Preconstruction Plan for a Pedestrian Pathway Rehabilitation Project

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The Americans with Disabilities Act (ADA) was passed to enforce improvements of public commodities to fill the gaps in our nation's civil rights inequalities for people with disabilities. Public pedestrian pathways are required by federal and state law to comply with ADA guidelines to allow ease of access to individuals with disabilities. Many existing sidewalks and pedestrian pathways have been renovated and modernized to comply with these ADA guidelines. This paper outlines the preconstruction plan for a rehabilitation project of a problematic pedestrian pathway on the campus of California Polytechnic State University, San Luis Obispo, and highlights the need for an ADA compliant improvement though the affected area. The project provides a preconstruction plan of the proposed scope of work which includes, but is not limited to, a preliminary design, critical path schedule, equipment and material quantity take-off, and an initial cost estimate. The purpose of this paper and corresponding preconstruction plan is to bring awareness to this unsafe pedestrian pathway on campus in hopes this project can be continued into the final design phase and then eventually the construction phase.

Key Words: Americans with Disabilities Act (ADA), Pedestrian, Pathway, Improvements

Introduction

California Polytechnic State University, San Luis Obispo requires that all first-year, incoming students live on campus for the first three academic quarters. These incoming students are typically new to the college lifestyle and are not yet acclimated to living on their own. A frequent habit seen among these first-year students is how they often run behind schedule causing them to show up late to class. When this happens, students try to find the quickest way to class in hopes of rectifying their situation. Thus, they establish new walking pathways through unpaved terrain.

On the campus of California Polytechnic State University, San Luis Obispo, a make-shift pedestrian pathway was created through an unpaved landscape area; this is due to excessive pedestrian traffic from students. This pathway connects the North Mountain Dormitory complexes and the adjacent street, North Perimeter Avenue, to the center of campus where a large amount of student lecture halls are located. The pathway is also located next to a parking lot which adds to the foot-traffic of this area.

The current conditions of this pathway are unsatisfactory and dangerous for multiple reasons. The pathway was originally just dirt from students trampling the vegetation, but compacted decomposed granite was placed over it at one point to resurface the pathway. The lack of maintenance and the elevated traffic of this area has transformed the granite into an impermeable surface. This poses a severe issue when the area is exposed to inclement weather. The lack of absorptive soil and site drainage causes the pathway to flood, making it unsafe for students to utilize. Additionally, the sidewalk at North Perimeter Avenue is at a significantly higher elevation than the pathway so stairs were required for students to step down and access the pathway. Currently, temporary stairs are installed at this location to fix this problem, however, these stairs are inadequate. These improvised stairs are merely concrete tire stops recessed in the hillside. Not only are the stairs unsafe for students, but they are also not ADA compliant. Temporary repairs made on this pathway have been accepted as permanent solutions and need to be corrected.

The objective of this senior project is to bring attention to this problematic area on campus and to initiate the rehabilitation of this pathway by outlining a preconstruction plan of the construction phase. The goal after the completion of this senior project is for another student to take the project into the final design phase and eventually obtain permits and funding for the construction phase.

General Background

The inspiration for this idea came from my own personal experiences with this pedestrian pathway. I noticed the need for change four years ago while I was living on campus in a neighboring dormitory. This pathway was the fastest route to most classes and the University Union, where the food courts were located. It was routine for my peers and me to walk through this path at least once every day. The pathway was very convenient as it was a quick way to get to the interconnected parts of campus, however, the benefits of this pathway diminished quickly as the school year went on. At the first sight of rain, the path became a swamp, and the improvised stairs became dangerously slick. I decided to pick this topic for my senior project to set forward an initiative to improve this area for future students because nothing has been done to improve this area since before my first year.

Figure 1. Satellite image of pathway location

Important Project Considerations

2035 Master Plan

The California Polytechnic State University, San Luis Obispo 2035 Campus Master Plan, first proposed in 2015, is a conceptual look at how the campus is preparing to grow over the next 20 years. Looking into the proposed expansion of the University was paramount in understanding how the campus views this problematic pathway and in predicting future improvements of this area. The 2035 Master Plan outlines various landscape areas and pedestrian pathways that are to be reconstructed in future expansions but fails to even identify the pedestrian pathway on the campus map of existing landscapes and pedestrian routes. It appears that no future improvements nor rehabilitation plans have been made for this pathway.

The University plans to build new dormitories to accommodate an increase in first-year student admissions. The 2035 Master Plan outlines that the university intends to increase its student enrollment population by 4,056 before the year 2035. To house these new students, 14 new dormitory buildings are proposed to be built on the east side of campus, 9 of which are adjacent to the existing North Mountain Dormitory (Campus Master Plan, 2019). The occupants of these 9 new dormitories will most likely take the same route as the students living in the North Mountain Dormitory. This will exponentially increase the pedestrian traffic of this area and further increase the need for improvement of the pathway.

Americans with Disabilities Act

The Americans with Disability Act is a civil rights law that prohibits discrimination towards those who have disabilities in all areas of life. Local, state, and federal building codes have been revised to include ADA specific guidelines. New commercial and public pathways must adhere to ADA compliance guidelines and follow strict specifications so that disabled individuals can easily access these pathways, if need be.

The existing pedestrian pathway is not ADA compliant for multiple reasons. The closest ADA accessible detour route from this pedestrian pathway crosses the exit driveway of the parking lot adjacent to the pathway. Drivers exiting this parking lot have a blind corner while pulling onto North Perimeter Avenue and cannot see pedestrians walking on the sidewalk. This poses a dangerous risk to an individual in a wheelchair that is lower in height and harder to see for drivers which increases the need for improvements to the pathway.

Project Reflection

The deliverables of this project are as follows:

- Preliminary Design
- Critical Path Schedule
- Equipment and Material Quantity Take-Off
- Initial Cost Estimate
- Site Logistics Plan
- Traffic Control Plan
- Risk Hazard Analysis

Looking into the project from the start, it seemed manageable. When I outlined these seven deliverables mentioned above in my senior project proposal, I felt comfortable with the amount of work I assigned to myself and never believed it was going to be too much. Once I started on the preliminary design, I started experiencing difficulties. I do not have any prior experience in design, so this part was challenging for me. Although I had no knowledge of design coming into the project, I learned a lot from procuring the design myself. In doing so, I experienced the opposite side of construction that I am not familiar with. I had not realized there were so many factors to consider when designing projects such as this one. One part that I struggled with that surprised me was figuring out the run lengths of the ADA wheelchair ramp and confirming the correct total rise height before installing another landing. Another part of the project that I did not consider to be hard but took me by surprise was the initial cost estimate. This part was hard because the preliminary design still had so many unknowns about the project which made it difficult to get an accurate cost for the project.

Connection to the Construction Management Curriculum

The construction management curriculum provided me with technical skills and construction industry knowledge that abled me to successfully complete this project. Throughout the extensive course work, the construction management professors and instructors cover a broad range of topics with very detailed and intricate teaching methods to ensure students are well-rounded and knowledgeable in all areas and aspects of the construction industry. Following the University's motto of "Learn by Doing," the construction management department furthers student education in more unique ways than other polytechnic universities. The construction management curriculum not only teaches students how to plan and delegate construction work from the office and be successful construction managers but furthers education into the field and pushes students to learn how to build, presenting a different insight on how strenuous and demanding the construction industry can be. This perspective of learning equips students with a greater understanding of construction methods, scope durations, and field-to-office cohesion. These teaching strategies provided me with hands-on experience that aided me in providing a functioning and valuable preconstruction plan.

Relevant courses that directly assisted me in this project are CM 239 Construction Surveying, CM 280 Building Information Modeling, CM 314 Heavy Civil Construction Management, and CM 314 Jobsite Construction Management. During the planning phase of this project, I allocated the skills I acquired in these courses to effectively complete this project and produce an elaborate, detailed preconstruction plan.

The construction surveying class was structured around hands-on, outdoor assessments of terrain surveying and construction layout. Using Trimble geospatial surveying equipment, instructors taught students distance measurement, leveling, angular measurement, basic roadwork, and as-built surveys. To improve the preliminary design of this project, I was going to elicit the assistance of my construction surveying professor and request to use the Trimble equipment to shoot point elevations for a cut and fill the map of the site.

The building information modeling (BIM) class taught students how to navigate and utilize 3D, 4D, and 5D modeling programs such as Navisworks, Revit, Synchro, Tekla, etc. The construction management department has a computer lab for their students to use that have desktops equipped with all these modeling programs. Using what I learned in this class, I planned to use these programs to aid in the completion of the preliminary design as well.

Unforeseen Limitations

Just like a construction project, life is full of unforeseen challenges each day. The uncertainty nature of life and unpredictability of future events makes life challenging. Just like in construction when posed with a difficult situation, the first step is to accept the situation and then react.

In December 2019, a man in China was hospitalized for severe respiratory symptoms. Later, he tested positive for a virus called coronavirus (COVID-19). This was the first time this strain of the virus had been found in humans. While this virus is easy to recover from in most individuals, it is deadly to individuals with underlying health conditions. The most dangerous part of this virus is that symptoms may not appear for up to 14 days which makes spreading the virus unknowingly a concern. After the COVID-19 virus had spread to several countries, disease control officials declared a pandemic. Unfortunately, the Unites States finally confirmed its first positive test in late February 2020. A little over a month after that, San Luis Obispo County reported its first positive case as well. In response to this, California Polytechnic State University, San Luis Obispo shut down their campus, requiring a completely virtual learning platform for the rest of the year until summer. With the entire campus being shut down, I was faced with an immense challenge. It was too last minute to change my senior project idea, so I continued with the original plan and submitted my project proposal during the first week of Spring Quarter.

My first challenge was to figure out how I was going to map the existing grade of the pathway now that faculty supported activity with students had been suspended and I was not able to use the Trimble survey equipment. After talking with my subject matter expert, we came to the idea to use Google Earth for point elevations. While this is not the most accurate reference for survey point elevations, it was the closest I could have gotten to actual elevations. Moving forward, I exported the view into a PDF and created 15’ x 15’ grids in Bluebeam to divide up individual areas of the site. Next, using Google Earth, I hovered the cursor over the location of each grid intersection and recorded the elevation that was displayed in the status bar. After compiling these data points, I created a sheet that displayed the existing site elevations and overlaid it on the Google Earth exported PDF.

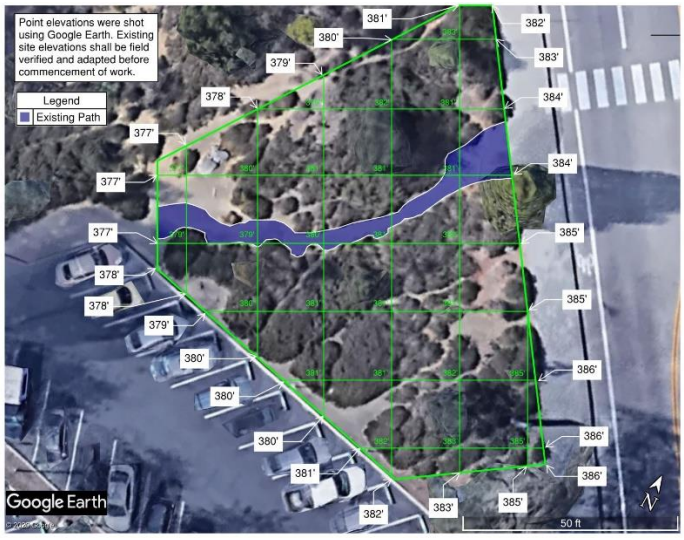

Figure 2. Existing site point elevations

My next challenge was to figure out how to design this project. My access to the construction management computer lab and all the modeling programs was revoked due to the campus closure. I had originally relied on using Civil 3D for the preliminary design but that was not an option anymore. Fortunately, I was able to acquire a student instructional license for Revit in one of the other classes that I was taking concurrently. This was the only program I had been able to get access to excluding Bluebeam that was already downloaded on my laptop. I decided to put together a topography model in Revit with the point elevations I pulled from Google Earth. This allowed for a better visual understanding of the grades throughout the existing site. Once this was completed, I decided the easiest way to complete the preliminary design, given the restricted circumstances, was to outline the proposed stairs and ADA wheelchair ramp in Bluebeam. Surprisingly, this worked fantastic.

When virtual instruction was announced, I had concerns about finishing this project in the same way that I had originally envisioned. There were speed bumps and challenges I had to overcome and resolve that I did not expect when drafting this project but the process went a lot smoother than I had thought it would have when the COVID-19 pandemic began.

Existing Conditions

Figure 3. Temporary stairs (Top view)

Figure 4. Temporary stairs (Bottom view)

Figure 5. Existing pathway

Deliverables

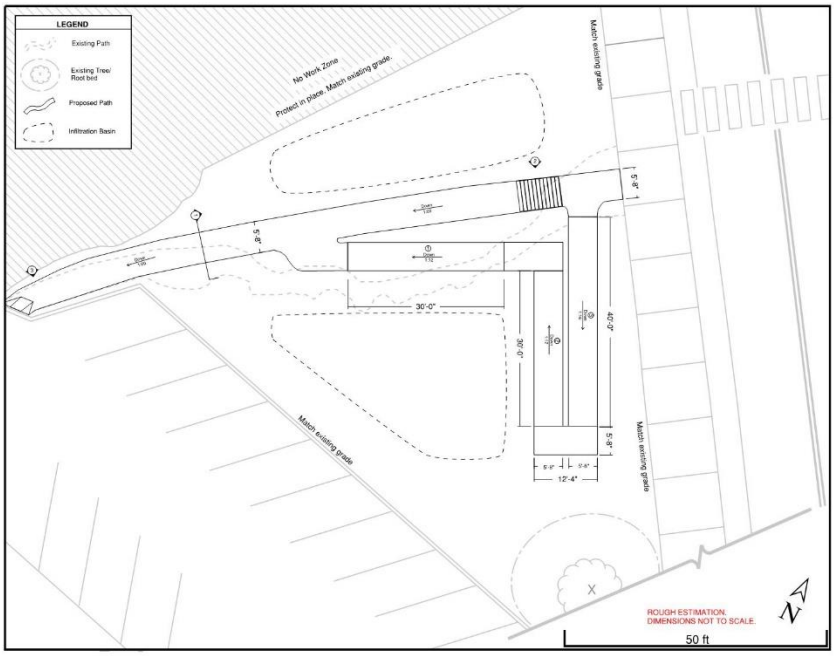

Figure 6. Proposed site plan

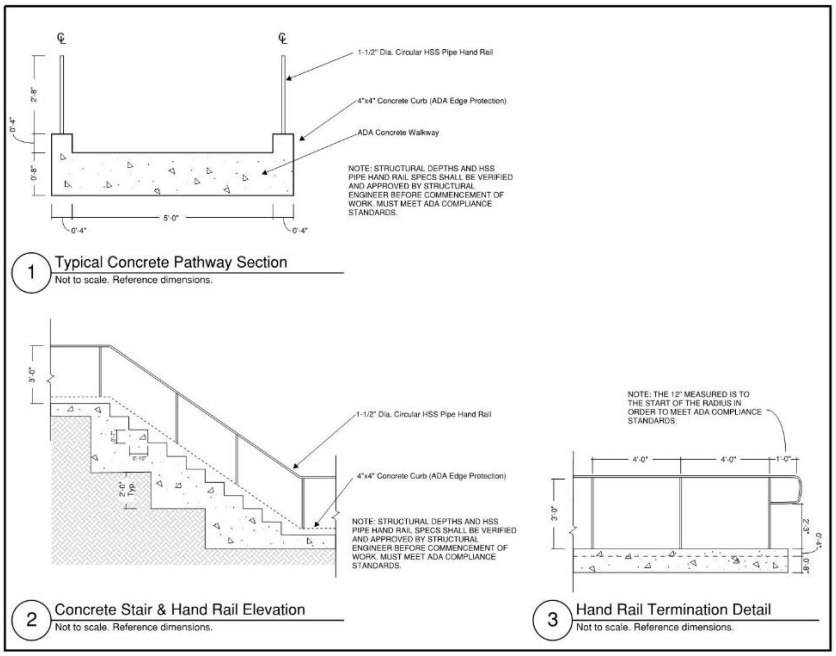

Figure 7. Sections and details

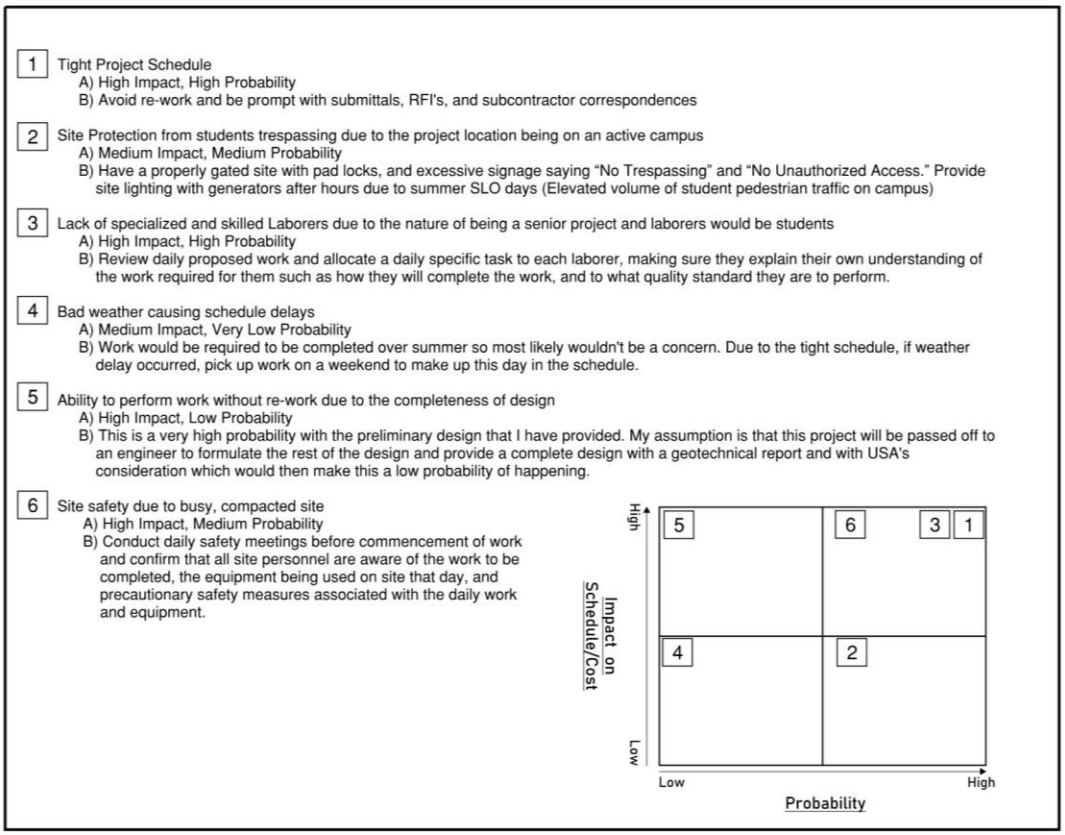

Figure 8. Risk hazard analysis

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