# CM Member of SLOCOE Peace Conference Center Feasibility Study

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This paper describes the parking design and estimate portion of a whole feasibility study conducted by an interdisciplinary team. The interdisciplinary team consisted of three senior undergraduate industrial engineering students, and one senior undergraduate construction management student. This feasibility study was conducted for the San Luis Obispo County Office of Education (SLOCOE) to determine if it is feasible to construct a new, 400-person conference center on a site in San Luis Obispo, CA. The complete study includes analyses of the following topics: economic, utilities, traffic/road, approval from Chumash Tribe, social/historical, climate, geological, vegetation and wildlife, noise and pollution, parking, mandatory findings of significance, permits and approvals, and compliance with California Environmental Quality Act (CEQA) For the feasibility study to move along, the team needed to complete a parking design according to San Luis Obispo building code. This design would give the client an accurate representation of how much additional land would be required if this conference center were to be constructed. In addition to the parking design, the team completed a labor and material cost estimate for the parking lot to input into the economic analysis for the whole project.

**Key Words:** Feasibility Study, Interdisciplinary Project, Parking Lot Design, Estimate, Parking Lot Construction

## Introduction

The San Luis Obispo County Office of Education (SLOCOE) currently uses an event center at Rancho El Chorro Outdoor School which is only able to hold 100 occupants. They have had to turn down events and possible revenue as the current center does not meet the capacity for the events they are looking to host. In turn, they are looking to expand and build a larger conference center that can host up to 400 people. The objective of this project is to determine if it is feasible to construct a new 400-person Peace Conference Center on the Rancho El Chorro property. The current conference center and a rendering of the proposed conference center are shown below in figures 1 and 2. The team for this feasibility study is comprised of three senior undergraduate industrial engineering students and one senior undergraduate construction management student, all with general experience

in project management. The engineering students' names are Roxie Peterson, Alden Glassey, and Timothy Scheuermann.

Figure 1: Current Conference Center

Figure 2: Rendering of Proposed Peace Center

## Background and Deliverables

The industrial engineering students conducted a literature review in the fall of 2020 to determine what would generate an accurate feasibility study. The following topics are what the engineering students determined for the feasibility study to be complete: economic analysis, utilities analysis, traffic/road analysis, approval from Chumash Tribe, social/historical analysis, climate analysis, geological analysis, vegetation and wildlife analysis, noise and pollution analysis, parking analysis, mandatory findings of significance, permits and approvals, and compliance with California Environmental Quality Act (CEQA). Due to the team's minimal experience with geological analysis, SLOCOE contracted this section out to a San Luis Obispo based civil engineering firm, the Wallace Group. During Winter quarter 2021 the team was able to fully complete the economic analysis, traffic/analysis, social/historical analysis, noise and pollution analysis, and parking analysis. The other deliverables were delayed due to Covid-19 restrictions. The following headings are what the construction management student assisted with and completed during Winter quarter 2021.

### *Site Selection*

At the beginning of the study, the SLOCOE sponsor proposed three potential sites for the Peace Center due to the proximity to the Rancho El Chorro Outdoor School, and capacity for a 7,600 square foot conference center. These three sites are represented in the two figures below.


Figure 3: Potential Sites A-A and A-B


Figure 4: Potential Site B

Site B was a viable option because it is relatively flat and minimal excavation and grading would be required to place the building foundation and parking lot. In addition, the site mostly contains grass and brush, meaning that no tree removal would be required. Unfortunately, this site "has no existing utility infrastructure, so the utilities would likely have to be brought in which would require a significant cost" (Peterson, Scheuermann, Glassey, 2021, p.19). It was also determined that there were numerous issues regarding stormwater runoff into the adjacent Pennington Creek, as well as the site being a potential archaeological epicenter for native Chumash artifacts.

After these considerations about site B, site A-A and A-B were selected for the parking lot and Peace Center, respectively. Although these sites are sloped and have numerous trees and shrubs that will need to be removed, there are minimal issues with utility connections, stormwater runoff, or archaeological findings of significance. There are two utility poles along Pennington Creek road that could easily be connected to a transformer outside of the Peace Center. As part of their DROPs program, SLOCOE recently constructed a bioswale that would handle the potential stormwater runoff from the sites. Due to the excavation done for the bioswale, the soil in that area has been previously examined and it will be unlikely that there are any archaeological findings of significance. Figure 5 below was created by the engineering students and is a comprehensive breakdown of the potential site options.

| | Site A-A | Site A-B | Site B |
|---|---|---|---|
| Preliminary Pros | -Accessible utilities from Rancho El Chorro<br>-Relatively flat<br>-Easily accessible DROPs program for stormwater mitigation<br>-Unlikely to contain Native American artifacts<br>-History of zoning approval | -Accessible utilities from Rancho El Chorro<br>-Minimal compacting required<br>-Can use DROPs program for stormwater mitigation<br>-Minimal tree removal<br>-Unlikely to contain Native American artifacts<br>-History of zoning approval | -Flat area<br>-Minimal grading or compacting<br>-No tree removal |
| Preliminary Cons | -Probable utilities upgrade needed<br>-Needs extensive compaction<br>-Needs some work to meet ADA accessibility standards | -Probable utilities upgrade needed<br>-Needs extensive grading<br>-Likely needs additional stormwater mitigation<br>-Needs moderate work to meet ADA accessibility standards | -No current utilities access<br>-Near a protected creek<br>-No existing stormwater mitigation measures<br>-Unknown if contains Native American artifacts<br>-Needs extensive work to meet ADA accessibility standards |

Figure 5: Site Breakdown
(Peterson, Scheuermann, Glassey, 2021, p.22).

## *Parking Lot Design and Estimate*

To get to the final parking lot design and estimate, the team had to go through a few design phases and site visits. To give the team an idea of what they wanted the site to look like, SLOCOE first provided an initial footprint shown in figure 6 below. After this footprint was provided, the team needed to visit the site to gather accurate measurements for the parking lot. The original parking lot plan created from these measurements is shown in figure 7.


Figure 6: Initial Site Footprint

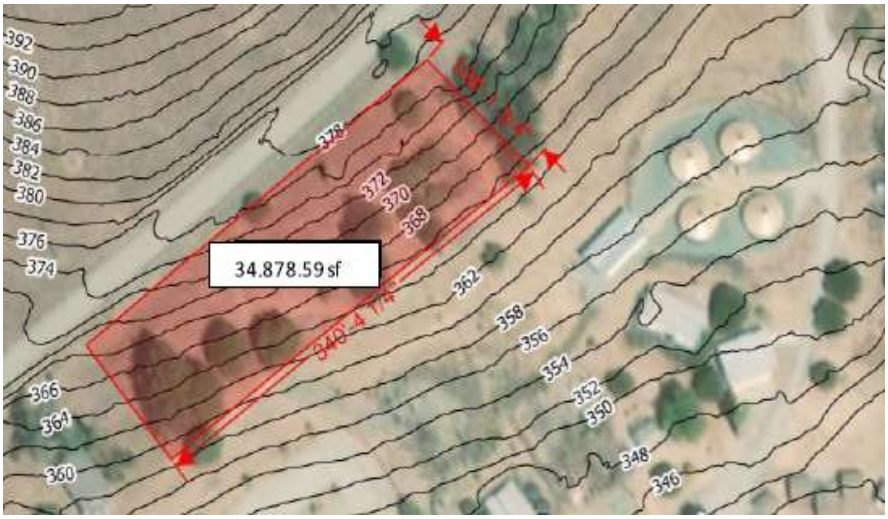


Figure 7: Initial parking plan

The team used an online parking lot calculator created by the US Army to determine how many parking stalls would be able to fit into this lot, about 100 stalls (US Army, 2020). Per SLO Municode code 22.18.050, SLO County requires one stall per 40 square feet of building area for a conference center. Since the building is going to be about 7,600 square feet, this means that 190 stalls are required, so the current 34,878 SF allotment does not fit this capacity.

With this information, the team was able to begin the second phase of design which expanded the parking lot past the Banning school, effectively creating enough space for 250 parking stalls. This intermediate design completed in Revit is shown below in figure 8 below.

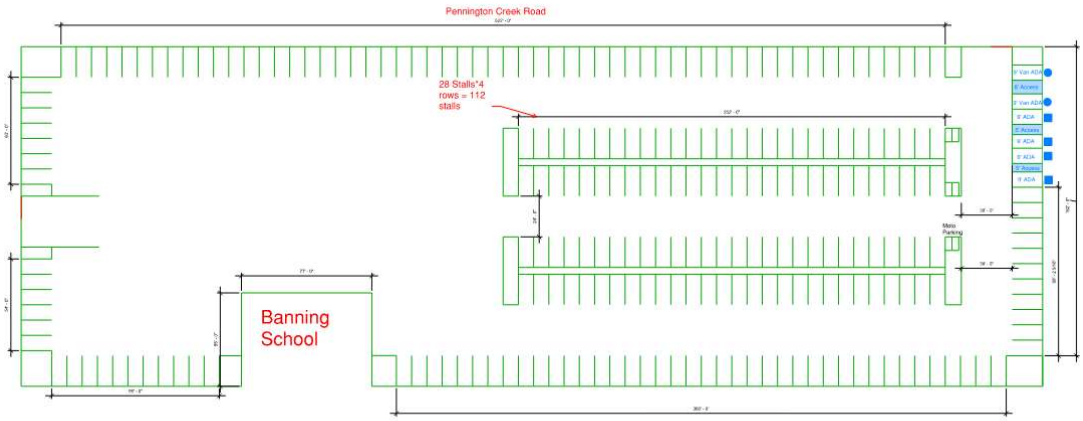


Figure 8: 250 Stall Parking Lot

This lot was designed with 90-degree parking stalls to allow for the highest parking capacity as well as the low turnover rate of the lot. According to SLO Municode 23.04.166, this lot is ADA compliant in terms of the required number of parking stalls for ADA users, consisting of two van ADA stalls and four standard ADA stalls. Other things that had to be taken into consideration were the number of parking stalls for motorcycles, electric vehicles, lane width in the case of a fire truck, and required landscaping on the lot, all of which this lot was compliant.

The sponsor was satisfied with this lot, but also mentioned that the bioswale needed to be effective for 20 years and would need to go untouched. This meant the team had to return to the drawing board for further design. The final design that the team created is shown in figure 9 below.

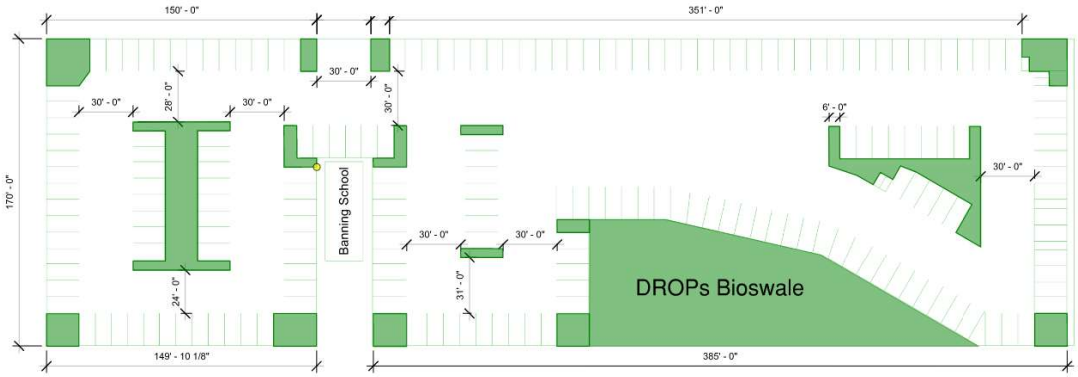


Figure 9: Final Parking Lot Design

This lot meets all the same requirements of the previous lot, in addition to space being created for the bioswale as well as increased landscaping surface area. The lot capacity was decreased to 190 stalls, with overflow parking placed in a two nearby gravel parking lots, bringing total parking capacity to the desired 250 stalls.

The next component of the team's scope was to create a conceptual estimate for the parking lot. This involved the help of Ed Boucher, a Cal Poly professor with knowledge of heavy civil construction. In addition, the team consulted Toste Construction, a local grading and paving contractor who provided the parking lot striping estimate sheet. Per SLO Municode 23.04.168, the parking lot final grade is not to exceed 5%. This means that cut and fill excavation is required to create a parking lot that is code compliant. A conceptual excavation plan is shown in figure 10 below.

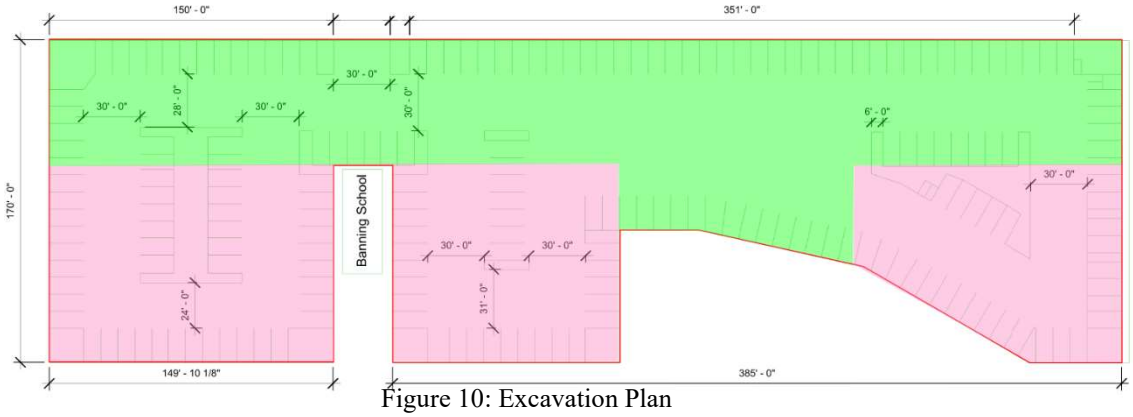

Figure 10: Excavation Plan

The area in green is where 12 inches, or 1,760 cubic yards of dirt will need to be cut to account for 6 inches of class II base and 6 inches of paving. This area does not exceed a 5% slope, so minimal earthwork is required. The top left corner of the Banning School is at an elevation of 360 feet and is the planned base elevation of the parking lot. The areas in red currently exceed the 5% slope, sloping downward, and an estimated 2,685 cubic yards of soil will need to be imported to fulfill the requirement. The pricing for excavation, importing the soil, rough and fine grading, is expected to be around $173,000. As mentioned before, 6 inches of class II base and 6 inches of asphalt will need to be imported and installed over the 83,793 SF lot, bringing the paving price to a total of $556,386. These costs were determined using National Construction Estimator, an online estimating program. Figure 11 shown below is the cost estimate sheet for grading and paving.

| EXCAVATION | NOTES | QTY | UNIT | UNIT COST | TOTAL |
|---|---|---|---|---|---|
| EXCAVATION | | 1,760 | CY | | $ - |
| IMPORTED SOIL | 108 TRIPS W/ 25 CY TRUCK PLUS $55 PER CY SOIL COST, $2000 MIN JOB CHARGE | 2,685 | CY | $ 57.46 | $ 154,280 |
| 335 HP D-8 W/ U BLADE (EXCAVATION) | $1350 MIN JOB CHARGE | 1,760 | CY | $ 1.79 | $ 4,500 |
| 100 HP D-4 TRACTOR (ROUGH GRADING) | $3000 MIN JOB CHARGE | 2 | ACRE | $ 342.29 | $ 3,685 |
| 335 HP D-8 TRACTOR (ROUGH GRADING) | $3000 MIN JOB CHARGE | 2 | ACRE | $ 287.85 | $ 3,576 |
| GRADING) | $3000 MIN JOB CHARGE | 2 | ACRE | $ 251.46 | $ 3,503 |
| 100 HP MOTOR GRADER (FINE GRADING) | $3000 MIN JOB CHARGE | 2 | ACRE | $ 390.75 | $ 3,782 |
| **PAVING** | | | | | **$ 173,325** |
| 6" PAVING OVER 6" CLASS 2 BASE | INCLUDES LABOR AND MATERIAL COST | 83,793 | SF | $ 6.64 | $ 556,386 |

Figure 11: Excavation and Paving Estimate

Being that this is a parking lot, lot striping and signage are an integral part of the project. Using the Toste Construction estimate sheet, parking lot striping and signage are expected to cost around $6,400. Figures 12 and 13 shown below are the required lot striping elements and quantities.

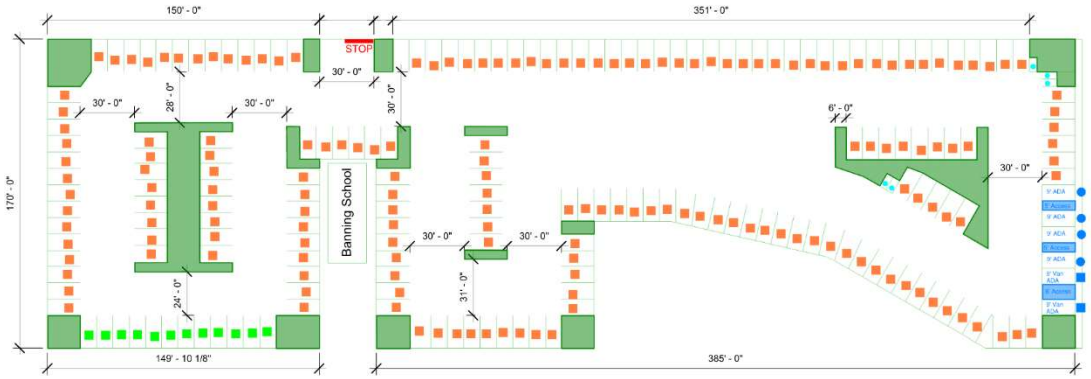


Figure 12: Lot Striping Plan

| STRIPING | | | | |
|---|---|---|---|---|
| STANDARD STALL | 175 | EA | $ 5.00 | $ 875 |
| STANDARD ADA | 4 | EA | $ 75.00 | $ 300 |
| VAN ADA | 2 | EA | $ 100.00 | $ 200 |
| HASHED AREA | 330 | SF | $ 0.30 | $ 99 |
| MOTORCYCLE | 5 | EA | $ 10.00 | $ 50 |
| STOP & BAR | 1 | EA | $ 75.00 | $ 75 |
| STANDARD ADA SIGNAGE | 4 | EA | $ 250.00 | $ 1,000 |
| VAN ADA SIGNAGE | 2 | EA | $ 250.00 | $ 500 |
| STOP SIGNS | 1 | EA | $ 300.00 | $ 300 |
| FUEL EFFICIENCY | 12 | EA | $ 250.00 | $ 3,000 |
| | | | | $ 6,399.00 |

Figure 13: Lot Striping Estimate

Parking Elements

| Description | Quantity | Unit |
|---|---|---|
| ADA Signage | 4 | Count |
| EV Stalls | 12 | Count |
| Hashed Area | 329.37 | sf |
| Landscaping | 7,254.17 | sf |
| Moto Parking | 5 | Count |
| Standard Parking Stall | 175 | Count |
| Van ADA Signage | 2 | Count |

Figure 14: Striping Plan Key

The final element of the parking lot is a 6”x12” curb running around the perimeter of the lot and surrounding all landscaped areas. The linear footage of the curb is estimated to be 2,966 LF and will cost $12.11 per linear foot, in total costing $35,918. With all these parking elements in place, the final price of the parking lot is estimated to be $772,028.

## Reflection

### *Project Conception*

This project came about through the IME department, as they work closely with SLO County and have had industrial engineering students work on numerous senior projects for the county. I became part of this project when the IME department reached out to the CM department for a potential senior project opportunity. They needed a student with construction knowledge for this project to help with specific aspects of building construction. At the time, I was unsure of what I was going to do for my senior project and this opportunity came at the perfect time.

### *Group Dynamics and Responsibilities*

Working with a group of industrial engineers was a valuable and enjoyable experience. We all worked very cohesively and were able to help each other on different aspects of the project. At the beginning of the project, we established roles and expectations for the team. Roxie was main point of contact between the team and Hugo, our SLOCOE advisor. Alden was responsible for taking notes and

completing the traffic and road simulation for the project. Timothy oversaw completing the economic analysis for the project. My main responsibility was completing the parking lot design and cost estimate. In addition to the parking lot, I worked with Timothy to begin the conceptual design and cost estimate for building construction.

For team meetings, we met early in the week on Zoom to discuss deliverables for the week. On Wednesday evenings, I would join their senior project class on Zoom, and we would discuss the project in a breakout room with their senior project professor, Tali Freed. At the end of the week on Friday mornings, we would go to the SLOCOE office and discuss further project details with our SLOCOE advisor, Hugo Bastidos. Meeting with our sponsor often consisted of visiting the site and the surrounding areas, as well as presenting our weekly deliverables to him.

### *Difficult Aspects of the Project*

At the beginning of the project, we determined that my scope of work would be doing the utilities analysis for the building. This sounded like an exciting endeavor. However, as time went on, I slowly began to realize that I did not possess the necessary skills to determine what utilities would be feasible in this conference center. I knew that this work should be reserved for mechanical and electrical engineers. Fortunately, on a site walk with our sponsor, he mentioned that a parking lot design would be helpful for this feasibility study. I had recently taken a heavy civil construction class and learned about parking lot and road design, so I was eager to head this part of the project. At times, meetings with the client needed to be conducted over zoom due to covid-19. This was difficult, as important information needed to be conveyed and having an in-person meeting would have been more efficient, especially when a site walk was necessary.

### *Lessons Learned*

After working with the team to complete this feasibility study, I learned how important it is to frequently communicate with the client. They have a specific idea in mind for how they want the project to look, and it is important to work closely with them to make these ideas become a reality. In addition, I found that client meetings went smoothly when there was a meeting agenda to adhere to. The meetings always went well when we had a list of topics and questions that we wanted to cover. This allowed us to efficiently accomplish project milestones the following week.

I also learned that I am an analyst and need a methodical approach when completing a milestone. I found that my section of the project began moving more smoothly when I was able to define steps for myself on how to get to the finished design and estimate. I was very grateful for the team that I worked with, as we all were able to rely on each other for help for the different sections of this study. This showed me that a cohesive team makes a project enjoyable, even if the work you are doing is not the most exciting thing to be done.

## References & Appendix

Peterson, R., Scheuermann, T., & Glassey, A. (2021). *San Luis Obispo County Office of Education Peace Center Feasibility Study (*dissertation)

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