Design, Schedule, and Cost Estimate for New Cal Poly Football Office Building

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Around the nation, college football programs are building new football facilities to help their current players, coaches, and staff members succeed. These facilities can be additions to current buildings or completely new structures that have multiple functions. A common facility that is built is the football office building. New football office buildings are beneficial for programs because it gives players, coaches, and staff members a central location where coaches can hold meetings and players can interact with each other and support staff. These structures help bring everything that goes on in a football program come together. Because of the importance of these buildings, California Polytechnic State University in San Luis Obispo has a major need to construct a new football office building that will allow players, coaches, and staff members to interact. This senior project illustrates a hypothetical idea of what a new football office building on Cal Poly’s campus would look like. Using a 3D Revit model, general project schedule, and cost estimate, this senior project shows what it would take to add this football office building to Cal Poly’s campus.

Key Words: Cal Poly Football, Football Office Building, 3D Revit Model, Schedule, Cost Estimate

Introduction

When conceiving the idea for this project, I wanted to tie my Construction Management career with my Cal Poly Football career. After five years of competing in the classroom and on the field, I thought there would be no better way to display the skills learned than by designing a new Cal Poly Football Office Building. I believe this is an extremely interesting project because of the details tied into the building. Using my personal experiences from playing football, coaches interviews, and fellow teammates interviews, I was able to design a structure that had all the necessary aspects of a football office building and some unique features that would make the structure stand out from other football offices around the nation.

Methodology

When I first started developing the idea for a new Cal Poly Football Office building, I knew I was going to need information on what to include in the building. I had ideas of what I would have like to have had while playing based on experiences I had, but I needed more ideas on building characteristics. This sparked the idea of creating a questionnaire to send to the current football coaches and staff members. This questionnaire included questions that
specified what areas to include in the building, sizing of meeting rooms, sizing of coaches’ offices, and other ideas that the coaching staff would want included in the new building. Some examples of questions asked on questionnaire are display in Figure 3.

**Interview Results**

After receiving the questionnaires back, most of the answers were very similar to each other, but highlighted three major ideas. First, the coaching staff believed that having their own meeting rooms was extremely important. Having their own space would allow them to have informal meetings with the players and not have to worry about intruding on another position group. Second, they believed having large meeting rooms in one location would allow players to know exactly where meetings will take place. This would also allow larger position groups to hold meetings and not be crammed. Lastly, the coaching staff liked the idea of having a player’s lounge and academic center. They felt that having these areas would allow players to stay on top of the course work and interact with each other outside of school and practice.

**Figure 3 – First Page of Football Questionnaire**

**Design and Creation of Construction Documents**

Once I finished conducting the survey, I needed help created a formal floor and framing plan. To do this, I sought out the help from a current Architectural Engineering student, Spencer Bazer. Spencer completed an official
architectural floor plan and structural framing plan as shown in Figure 4 & 5 below. I felt it was important to get his help because having a close to professional layout of the building would resemble a floor and framing plan that

Figure 4 & 5 – Architectural Floor Plan and Structural Framing Plan of First Floor
would be used in a real design.

Once the plans were created, I needed to add finishing touches to the model. I took the floor plans created and added exterior siding, windows, doors, and other architectural features to resemble what the building will look like. In order to do this, I used three software programs to finish the deliverables. The three software programs I used were Revit, Microsoft Project, and Bluebeam. Revit was used by both Spencer Bazer and myself to create a 3D model of the Cal Poly Football Office Building. This model was used to create 3D images of the building, renderings to be used throughout the deliverables, and elevations.

Project Schedule

Microsoft Project was used as a tool to create the schedule and cost estimate. Using this software’s ability, I was able to generate a schedule using activities and proposed durations to create a timeline of the total project duration. Using a resource list consisting of key players, general labor crews, specialty crews, materials and equipment, Microsoft Project allowed me to link each activity with the respected resource and standard going rate to generate a total cost estimate of the project. This cost estimate consisted of both labor and material costs and a breakdown of how much each phase of construction were to cost.

Bluebeam was used to organize and label all sheets needed for deliverables. Bluebeam allowed me to compile all necessary files into one file for easy editing and saving. I used Bluebeam to create a title block template used on all the sheets in the project plan to make every page uniform. Also, I created the Owner’s Manual on Bluebeam to import the reports taken from Microsoft Project and include them into one document.

Project Deliverables

Project Plans and Revit Model

Creating the Cal Poly Football Office Building’s project plans and 3D model was the first step to creating a hypothetical project proposal. Generating a 3D model was very important in creating official floor and framing plans, elevations, and exterior and interior renderings of the structure to be used as documentation.

The project plans consist of 16 pages. Those pages include cover page, general notes, site plans, conceptual drawings, elevations, architectural floor plans, interior and exterior renderings of the 3D model, and structural plans.

Figure 6 – Site Plan Sheet from Project Plans
Figure 7 – Conceptual Drawings Sheet from Project Plans

Figure 8 – Exterior Rendering Sheet from Project Plans
The cover page and general note sheets help set the tone for what is to be expected when looking through the document by describing the project and attributes to the building. The two site plans display where the project will be located and job site trailer locations, traffic control, signage, and material drop locations. The conceptual drawings illustrate the development of the first ideas of design. The conceptual drawings also have preliminary floor plans to show the first layout of the building. The elevations and architectural floor plans show the dimensions of the building and the final layout of the structure. After the floor plans are the interior and exterior renderings. These photos show the building from the outside and inside, highlighting the major characteristics and zones of the building. Lastly, three sheets of structural framing plans are included showing the metal stud framing.

**Owner’s Manual**

The use of the Owner’s Manual was to give the owner a reference to what the new Cal Poly Football Office building is, what it will consist of, and the bottom-line numbers when it comes to cost and project duration.

The Owner’s Manual is a booklet that includes all important information about the project for quick reference. Included in this packet are general information about the project location and description, notable characteristics about the building, why the new Cal Poly Football Office Building is important, and a cost estimate and schedule.
**Figure 10 – Owner's Manual Cost and Duration Breakdown Sheet**

**PROJECT DETAILS**

**DURATION BREAKDOWN**

- **PreConstruction**
  - Start Date: June 2nd, 2022
  - Finish Date: January 9th, 2024
  - Duration: 419 Days
  - Details:
    - 6/22 - 10/17/22
    - 98 Days

- **Construction**
  - Start Date: 10/18/22
  - Finish Date: 12/6/23
  - Duration: 296 Days

**COST BREAKDOWN**

- **Estimated Material Cost**: $8,525,000.00
- **Estimated Labor Cost**: $2,173,000.00
- **Estimated Total Cost**: $10,618,320.00

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**RESOURCE COST OVERVIEW**

<table>
<thead>
<tr>
<th>Name</th>
<th>Standard Rate</th>
<th>Cost</th>
</tr>
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<tbody>
<tr>
<td>Project Manager</td>
<td>$75.00/hr</td>
<td>$487,800.00</td>
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<tr>
<td>Construction Manager</td>
<td>$55.00/hr</td>
<td>$357,720.00</td>
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<tr>
<td>Superintendent</td>
<td>$60.00/hr</td>
<td>$342,080.00</td>
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<tr>
<td>Supervisor</td>
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<td>$316,400.00</td>
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<tr>
<td>General Labor Crew</td>
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<td>Steel Crew</td>
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<td>Framing Crew</td>
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<td>Concrete Crew</td>
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<tr>
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<td>Mechanical</td>
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<td>Fire Sprinkler</td>
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<td>Dodge Team</td>
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<tr>
<td>Crane</td>
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</table>

**Figure 11 – Resource Cost Overview Diagram from Owners Manual**
The general information of the project and building description help the owner get an idea of what is to be included within the new structure. Each of the notable aspects of the building are explained with images to illustrate ideas of how the project will look. The most important piece of this document is the cost estimate and project schedule breakdown. The cost estimate and schedule are centralized on one page to help the owner understand the bottom-line numbers of total cost and total project duration. The pages following include cost reports, owner’s timeline with dates, and a list of resources to be used and their standard rates. Also included are breakdowns of the material and labor costs for the building and timeline breakdown to show when each phase is to be finished.

Project Schedule

The Cal Poly Football Office building’s schedule notes major aspects to the project. The schedule includes 81 line items summarized in different categories and subcategories. The schedule is split into three major categories: Milestones, Pre-Construction, and Construction. Within these categories, there are subcategories that help breakdown the activities to make the schedule easier to follow.

![Figure 12 – Cal Poly Football Office Building Schedule](image]

The Milestones help give a reference to important dates of different phases to the project. The schedule is started by a Notice to Proceed – Preconstruction and finished with Substantial Completion and Final Completion following the completion of Punch List items. Pre-Construction is a series of activities that help illustrate completion of designs and revisions, awarding bids, and receiving permits. The Construction phase is split into seven different sections. These sections include Site, Concrete, Framing, MEPFs, Interior, Interior Finishes, and Exterior.

Project Estimate

The project estimate displays how much the Cal Poly Football Office building will cost. The estimate was started by devising a resource list of Project Manager, Project Engineer, Supervisor, Superintendent, general labor crews, specialty labor crews, materials, and equipment necessary to complete each of the activities on the schedule. These resources were then given a standard rate per hour to add a cost factor to each. Average going rates for each type of laborer and equipment were found using the U.S Bureau of Labor Statistics. Using the resource list, the schedule was updated by adding each resource to specific activities throughout the project. Once the resources were added,
reports were generated showing the total project cost, labor cost, and material costs. Also, a cash flow report was created to illustrate how much money each phase of the project will cost and when payments will be sent out.

**Lessons Learned Conclusions**

Throughout the duration of this project, there were many issues that I had to work through. These issues caused the project to go longer than expected and forced me to get outside help from YouTube videos or individuals with skill in the accruing problem.

The main issues that arose were from the 3D model and scheduling software. The 3D Revit model had problems with showing and adding details from the second floor and above. This issue forced me to use outside resources and YouTube videos to find an answer. After countless hours, the answer finally came out and I was able to display the full model and finish renderings. Microsoft Project also created problems for my senior project. I first ran into complications with MS Project when I could not save or export properly from the Virtual Labs. This caused me to recreate the schedule and cost reports multiple times before finally downloading the program onto my laptop to complete the schedule professionally.

When these issues arose, I had to find answers to keep the project moving in the right direction. These problems, extremely frustrating in the moment, helped me learn more about the work I was completing and allowed me to become more comfortable with the software I was using. These problems were beneficial to my knowledge because they forced me to use the resources around me to find answers and learn more as I searched.