

A Case Study on The UCSF Transplant Center Renovation: Mitigating COVID-19 Risks and Tracking Cost Impact

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At the beginning of 2020, the world was turned upside down at the hands of the global coronavirus pandemic. Today, economies and business are counting the costs and wondering what recovery will look like – how to navigate and adapt to a new style of life after returning from government-mandated lockdowns. The question on everyone's minds is, "how do we continue to work while keeping people safe?" This question is extremely relevant in the construction industry where, for most people, working from home is not an option. This case study will delve into how Dome Construction, along with their client, The University of California Medical Center, adapted and developed a plan to safely return to work. Returning to work safely requires new protocols to be put in place, some of which affect the productivity of the construction process. There is no doubt that adjustments to the way an existing project is run will come with cost implications. Through interviews and on-site experience, this paper will examine how the Dome project team calculated and tracked cost implications in order to provide narrative for a COVID-19 change order.

Key Words: COVID-19, Construction, Safety, Change-Order, Documentation

Introduction/Literature Review

Corona Virus Pandemic

COVID-19 is an infectious disease caused by the coronavirus that is spread through droplets of saliva or discharge from the nose of infected individuals. (World Health Organization) The virus spreads rapidly due to its ease of transmission. Upon report of several cases in California, Governor Gavin Newsom declared a state of emergency on March 4, 2020. (www.gov.ca.gov) On March 11, 2020, roughly three months after the initial outbreak, the World Health Organization (WHO) declared COVID-19 to be a pandemic. (WHO Timeline – COVID-19) In light of the global pandemic, extreme measures were established to slow the spread of the virus. On March 16, 2020, Governor Newsom enacted a shelter in place order, instructing all individuals in six California counties to stay at home and business and work to halt operation unless deemed essential. (San Francisco Department of Public Health order No. C19-07)

This order had massive implications on the state economy and workforce, with almost all industries shutting down. Within the construction industry, many projects were shutdown except for some that were classified as public works projects. Even though the construction industry did not come completely to a halt, jobsites that remained active or were allowed to re-start were still greatly affected. A study was conducted in Los Angeles California that analyzed the data from over 730,000 COVID-19 test results. It concluded that the highest amount of positive test results came from people working in the construction industry. (Allan-Blitz, 2020) Within this study, they found that 42.3% of positive cases were asymptomatic. This could explain the high number of individuals contracting COVID-19 in the construction industry. Jobsites are high traffic areas in which many people are coming in and out, conversing, and sharing tools. If a person is asymptomatic, they might be attending work and unknowingly transmitting the virus to many other construction

workers. Having an employee test positive for COVID-19 is extremely detrimental to a project's progress. A positive test can result in a multitude of consequences such as a temporary project shutdown, extra cost and delays for sanitization of the site, and possible employee quarantines. Any repercussions from positive cases have tangible effects on productivity.

Even if a project is fortunate enough to avoid positive cases, it is still susceptible to a loss of productivity. A study conducted by members of the Department of Civil, Construction and Environmental Engineering at North Carolina State University examined some of these productivity impacts. Through interviews with construction professionals, they identified major impacts such as material procurement and availability delays, inspection and permitting delays and employees missing work. (Alsharef, 2020) Additionally, projects that were shutdown required new safety protocols to be put in place after returning to work in order to maintain and ensure the safety of all parties involved. Industry members that were a part of this study mentioned that workforce reductions, staggered shifts and additional cleaning and sanitization all had effects on the projects productivity. (Alsharef, 2020)

UCSF Medical Center

The University of California, San Francisco Medical Center is one of the nation's top hospitals. *U.S. News and World Report* ranked it as the second-best hospital in the state of California and the seventh best hospital in the nation. The hospital has three branches in San Francisco treating patients at the Parnassus, Mission Bay, and Mount Zion locations. UCSF offers a multitude of services, including treatment, medical tests, and clinical trials. To maintain such an esteemed ranking and continue providing top-notch service and treatment, UCSF Medical Center is constantly undergoing changes and construction to stay up to date with the latest technology and provide the most innovative, comfortable atmosphere for their patients and medical staff. While there are multiple projects taking place across all three hospital locations, The Transplant Center Renovation is the focus of this case study.

Project Details

The Transplant Center Renovation project is referred to as ACC7 by the project team due to its location on the 7th floor of the Ambulatory Care Center Building. For the remainder of this paper, the project will be referred to as such. ACC7 is taking place at the Parnassus campus of UCSF Medical Center, located near the center of the city, a few streets away from Golden Gate Park. The project is a complete overhaul of the 11,000 square foot, 7th floor transplant center that began by gutting the space down to its structure. The \$10,000,000 project was general contracted to Dome Construction. Upon its completion, the space will provide medical staff with 12 exam rooms, 16 staff offices, various workstations, and common areas including a break room, conference room, waiting area, etc. ACC7 mobilized on October 4, 2019 and was well underway when the COVID-19 Pandemic was declared. After a 35-day shutdown, the project remobilized on May 4, 2020, with new safety protocols in place, as is shown in the following line items from the Microsoft Project schedule below.

COVID-19 Delay	35 d	3/16/20	5/1/20	Mar 16	COVID-19 Delay
COVID Set-Up	3 d	5/4/20	5/6/20	May 4	COVID Set-Up

Methodology

Implementing new safety protocols requires time and adjustment resulting in additional cost. This case study provides insight into the safety measures implemented and explains how Dome Construction tracks the additional cost to substantiate a COVID-19 change order. The research for this paper was conducted through on-site experience and qualitative interviews with the site superintendent and project manager. The superintendent's interview focused on the safety measures put in place and the collaboration with trade partners. The interview with the project manager focused on the need for tracking costs and projecting future COVID costs.

Case Study

UCSF Safety Measures

Upon arrival at UCSF Medical Center, all individuals must participate in a health screening conducted by hospital employees before getting cleared to enter the building. For those who are coming to the hospital on a regular basis, such as construction workers going to a jobsite, the hospital offers an online version that can be completed on a mobile phone. The questions are as follows:

The screenshots show the following steps of the health screening process:

- Initial Screen:** Welcome message, "Take pre-shift Health Screen" button, and a question: "In the past 30 days, have you or someone you live with been diagnosed with COVID-19?".
- Symptoms Screen:** "Do you live with someone who is waiting for COVID test results due to symptoms of a COVID-type illness?". If "No", it lists symptoms: 1. Fever (>37.8°C/100°F), chills or shivering/shakes; 2. Cough; 3. Sore throat; 4. Difficulty breathing; 5. Feeling unusually weak or fatigued; 6. Unexplained muscle aches; 7. Loss of senses of smell or taste; 8. Runny or congested nose; 9. Diarrhea (3 or more loose stools / 24 hours); 10. Eye redness +/- discharge (Pink eye, not allergy). It then asks: "In the past 14 days, have you had any of these symptoms, which is new or not explained by a pre-existing condition?".
- Travel Screen:** "In the past 14 days, have you returned from travel outside the U.S.". If "No", it asks: "In the past 14 days, have you been in unprotected close contact with someone diagnosed with COVID-19? (close contact = within 6 feet for 15 minutes or longer)". If "No", it asks: "For UCSF Health Employees only (all others answer No), in the past 14 days, have you worked at a non-UCSF health care facility and participated in direct care or had close contact with patients diagnosed with COVID-19? (At this time, SF VAMC and ZSFG are considered UCSF health facilities)".
- Final Screen:** "You are CLEARED to work". It includes a "TESTING UPDATE" section with instructions for scheduling a test and contact numbers: 415-514-7328 for UCSF Health Employees and 415-476-8736 for UCSF Students. A "I Understand" button is at the bottom.

Once, an individual is successfully cleared to work they are given hand sanitizer, provided with a new

mask, and a colored sticker corresponding with the day of the week. The sticker is placed on their badge and allows for re-entry that day without additional screening as they come and go.

Dome Construction Safety Measures

In addition to the UCSF daily health screening, Dome Construction has implemented additional safety measures of their own. When workers reach the ACC7 jobsite they complete another safety screening through Dome's in-house safety app eMOD. eMOD is an app created exclusively for and by Dome Construction that is used to track pre-task plans, toolbox talks, job hazard analysis reports, safety audits, etc. All trade partners are contractually bound to use eMOD features and comply with safety rules. When preparing for the remobilization of projects after the COVID-19 shutdown, Dome created its own daily screening through the app. The Dome screening is condensed and more focused on comfort and compliance. It reassures workers that they do not need to put themselves at risk if they do not feel comfortable and reiterates that face coverings are mandatory and must be worn at all times. Additionally, this screening helps with contact tracing, should a positive case be reported, by keeping a record of each individual on-site every day. Images from Dome's daily screening can be seen below:

4:01 5G

< Back COVID-19 Submit

To mitigate the spread of the COVID-19 virus, each company on a project must complete this survey that covers themselves and the selected crew. If you are working as part of a crew you must participate in this survey led by your crew leader.

Voluntarily Working

Each individual confirms that they are working voluntarily, and is aware that their participation in working at the project site/ worksite is completely voluntary & that working under the following conditions is not mandatory.

Yes No

Each individual is aware that any employee who has any concerns about his/her health while working under these conditions and chooses not to work should notify their supervisor immediately without the fear of reprisal

Yes No

Face Coverings are Mandatory

Each individual confirms that they are aware that face coverings are required to be worn while at work.

Yes No

Each individual confirms that they will comply with this requirement while at the project site or work site.

Yes No

Health Check

In the past 14 days, have you experienced any

4:01 5G

< Back COVID-19 Submit

Yes No

Face Coverings are Mandatory

Each individual confirms that they are aware that face coverings are required to be worn while at work.

Yes No

Each individual confirms that they will comply with this requirement while at the project site or work site.

Yes No

Health Check

In the past 14 days, have you experienced any COVID-19 related symptoms, such as: fever, chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headaches, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, or diarrhea?

Yes No

Within the last 14 days, have you, or anyone that you have been in close contact with (within 6 feet for 15 minutes or longer), been diagnosed with COVID-19?

Yes No

At any point during the last 14 days, have you been issued a public health order to enforce isolation, quarantine or conditional release related to COVID-19?

Yes No

Should a guest who is not a regular worker arrive on-site, such as a client or inspector, they are met by Dome's COVID-19 attendant. The COVID-19 attendant is a laborer who is tasked with reviewing and approving each subcontractor's daily screening, administering the screening to guests, and offering the proper PPE for those in need.

In speaking with the superintendent, he explained how Dome has implemented staggered construction shifts to reduce the amount of traffic at the jobsite. These staggered shifts are crucial for project safety and make it easier for workers to practice social distancing. The Center for Disease Control and Prevention (CDC) defines social distancing as "at least 6 feet (about 2 arms' length) from other people who are not from your household in both indoor and outdoor spaces." (Corona Virus disease cdc.gov) The site superintendent explained that having everyone at ACC7 working simultaneously made social distancing very difficult. In order to combat this, staggered shifts were implemented by trade to create less traffic on-site. The first shift begins with the superintendent and a handful of subcontractors who arrive early and begin work. Later in the day a field engineer from the Dome team arrives as well as the rest of the subcontractors. After a collaborative, socially distanced foreman's meeting, the early shift leaves for the afternoon shift to begin work, supervised by the field engineer. These shifts provide the construction team with the opportunity to properly social distance and maintain safety protocol.

Although health screenings and staggered shifts are effective ways to mitigate the risk of contracting COVID-19, unknowing carriers can spread the virus asymptotically. According to a study by Chinese researchers, asymptomatic carriers can transmit the disease and healthy individuals that are under 45 years of age are more likely to be asymptomatic. (Chao Yu) With many people on the jobsite that fit this description, sanitization is key. The Dome Construction team hired a janitorial service as a full-time subcontractor at ACC7. The janitorial company adds to the team one individual who patrols the jobsite and continually sanitizes all common surfaces such as desks, door handles, and bathrooms. This individual is a critical part of the ACC7 safety measures.

Tracking Cost

Understandably, there was some pushback from the subcontractors when the new safety measures were put in place. Their concerns were that completing daily screenings was tedious and took additional time which impacted productivity. The site superintendent explained that the trade partners felt overall that the new safety measures made them less productive and were taking away from the value of their contract. After high-level conversations with the Dome team, it was agreed that the subcontractors were owed compensation for the extra time that they were spending to adhere to the new safety protocols.

During his interview, the project manager explained that, although the team agreed the subcontractors were owed compensation, this left Dome in a predicament of figuring out where this money would come from. After many conversations and ideas, it was decided that Dome, in collaboration with trade partners, would thoroughly track the time spent daily by each subcontractor in regard to COVID-19 and present the UCSF Design and Construction Team with a change order. UCSF was involved in this decision-making process and stressed that documentation was essential in justifying the final dollar amount of the change order.

The dome team devised a system in which subcontractors would submit weekly COVID-19 tags listing the employees on-site and the time spent following safety protocol. Each foreman would then submit the tags to the superintendent for review and approval at the end of each week. Although this idea seemed feasible initially, it soon became apparent that the process needed to be revised. Many of

the weekly tags were rejected by the superintendent with the feedback “Excessive time,” and tags from every subcontractor varied on the time spent by each employee. After many emails between the client, general contractor, and subcontractors, as well as discussions in the weekly Owner/Architect/Contractor and subcontractor meetings, it was agreed upon that trade partners would be compensated for a time of fifteen minutes, per employee, per day. These fifteen minutes are made up of five minutes for the UCSF daily health screening, five minutes for the Dome eMOD check in and 5 minutes for miscellaneous cleaning and sanitizing of employee’s tools after use. At first, fifteen minutes per day does not seem to be a substantial amount of time but Dome’s project manager explained that a comprehensive assessment of how many people will be on-site and the remaining duration of the project would lead to a significant monetary impact.

During his interview, the project manager explained that his idea of a successful pending change order (PCO) is one that “tells a story to the client.” What he means by this, is that a PCO must be constructed with detail and evidence that the money being requested is in fact necessary for the success of the project. In his experience, PCOs that have little narrative often yield negative results. If a client sees a document asking for a large sum of money at the bottom with little justification to support the dollar amount, they will be inclined to reject it. Providing this justification for a COVID-19 change order is slightly more difficult due to the fact that the money is not going to a tangible change in the project scope. The ACC7 project intern was tasked with creating a document that would offer this justification and essentially “tell the story.”

After a few drafts and feedback from the project manager, the project intern was able to produce a final excel spreadsheet outlining the monetary impact of the COVID-19 safety measures. The basic idea of the spreadsheet was to utilize the hourly labor rate of the subcontractors and the daily crew sizes based on the COVID-19 tags. With these tools the team was able to determine how much money was lost to COVID-19 procedures. This was calculated weekly for each individual subcontractor and summed up for a total cost of all trade partners. The specific formula for the individual total is as follows:

$$(crew\ size) * (labor\ rate / 4) * (active\ days\ of\ the\ week)$$

The hourly labor rate is divided by four to reflect the agreed upon fifteen minutes, per employee, per day. The subcontractors are organized on the left-hand side of the document by the CSI division corresponding to their scope of work. This document was an extremely accurate representation of the COVID costs that the team needed for justification of the change order. However, the job was not done yet and the most complicated part of the intern’s task was still left. The project managers goal was to create one change order that encompassed the entire duration of the ACC7 project. Since the spreadsheet was created in September but the project’s completion date was in February, this took some estimating. The intern used the remainder of the project schedule to estimate the remaining time subcontractors would be required on-site. This is where the knowledge and experience of the superintendent played a huge role. He explained that he used his prior construction experience, along with the pace of the project and his knowledge of the remaining scope, to provide insight as what daily crew sizes would be necessary and the duration subcontractors would remain on-site. These estimated figures were then logged in the change order spreadsheet template to project the COVID-19 costs for the remainder of the project. At the end of this process, the Dome Construction team was confident they had created an accurate depiction of costs in order to back up their change order. A section of the spreadsheet can be seen on the following page. Examining this document makes it evident that even though 15 minutes, per employee, per day seems minimal, it quickly adds up to thousands of dollars.

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Conclusion

This case study was based on three of the most important aspects of the construction industry: safety, schedule, and cost. Every project's number one priority should be to keep all parties involved safe. Doing so, while working amidst a global pandemic, can be extremely challenging. Dome Construction, along with its trade partners and the UCSF Design and Construction team, devised an effective system to quantify the cost of implementing safety protocols that can hopefully serve as an example for other contractors in the future. Dome's dedication to keeping their subcontractors safe and getting them paid, coupled with UCSF's flexibility and commitment to providing the healthiest workspace possible, made for a highly collaborative process that offers a productive and safe jobsite for all parties involved. Even though UCSF wants to help, they were completely justified in requesting proper documentation to back up the COVID-19 change order. The action could not have taken place without the Dome team's expertise, in-depth knowledge of the schedule and pace of the project, as well as the participation from all trade partners.

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