

A Reflection on Pre-Fabricating Exterior Partitions for a Single-Family Home

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In the wake of a fire in Weed, CA that destroyed nearly 150 homes, a non-profit organization called Great Northern Services (GNS) reached out to Cal-Poly San Luis Obispo about a service-learning opportunity that involved designing a single-family home and prefabricating the exterior partitions in San Luis Obispo. In Fall 2017, interdisciplinary teams of students delivered design proposals in the Integrated Project Delivery studio. The selected design was then finalized into a permitted set of drawings and planning for the prefabrication began. The extent of the prefabrication was limited to the framing and sheathing of the exterior walls. The length of each panel was changed from 6'-11" to a custom length for each to optimize panel weight, material usage, and maintain the studs at 16" on center. The prefabrication took place in the Simpson Strong Tie Demonstration lab at Cal-Poly, where space was allocated between other building labs and projects. An estimate was prepared, and material was sourced from a local lumber supplier. The panels were stacked in the construction management plaza as they were built. They were loaded vertically into a 40-foot shipping container, which was then shipped to the project location.

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Project Background

On September 15, 2014, a fire began in Siskiyou County near the city of Weed, CA. The fire, named the Boles Fire, burned 516 acres of land. 157 single residences and 8 commercial properties were destroyed. 4 single residences and 3 commercial properties were damaged. The fire was fully contained on September 20th, 2014. One of the structures that were destroyed was the Great Northern Services headquarters. Great Northern Services (GNS) is a non-profit organization that was founded in 1978. They work to foster housing, rehabilitation, and community infrastructure in the cities of Dunsmuir, Mt. Shasta, Weed, Dorris, Fort Jones, Etna, Yreka, Tulelake, Montague, and Siskiyou County. After their headquarters burned down, they decided to repurpose that plot of land to build a housing subdivision. GNS saw this project to be a suitable service-learning opportunity for students working in the built environment, so they decided to contact the College of Architecture at California Polytechnic State University, San Luis Obispo. An agreement was made that a senior-level design studio would be focused around delivering design proposals for a single-family residence, the first residence in the new subdivision. The design studio chosen for the project was Integrated Project Delivery, an interdisciplinary course that included students from the architecture, architectural engineering, and construction management departments. The studio took place in the Fall quarter of 2017, and in the end GNS selected one design they preferred the most. Once the design was chosen, a set of drawings to be issued for permitting was completed. This set of drawings was used in the next phase of the project: prefabrication.

The exterior walls of this project were designed to be framed in paneled sections that could be assembled separately in an off-site location. Once the panels were built, they were shipped to the project site, erected onto the building

should be concerned as well. The second is that I was afraid of my team members reacting negatively, and it would bring down the team chemistry. As I continue to grow in my career, I will make it an effort to be unafraid of the consequences of speaking up if it is for the best intentions of the project.

Weekly Meetings

The project team met once a week to review the deliverables that were in progress, receive feedback from the project supervisor, and collectively work towards a solution to any issues. The atmosphere at these meetings was always comfortable. The project team developed a chemistry that made communicating easy. Even when the project took an unexpected turn and the pressure was on, the team was able to keep a collective sense of poise and sensible positivity. A template for meeting minutes was created to keep track of the content in each meeting. Minutes were consistently taken during the early stages of the project, but as the project progressed, the consistency began to deteriorate. I believe that this was partly because the template that was created not could not be easily updated in an organized fashion from week to week. As each item developed a longer and longer history of updates, it became unclear what the current status of that item was. This progression eventually led to not taking any more meeting minutes at all. Instead, team members would take notes individually as they deemed appropriate. This experience made it clear how difficult it can be to capture the content of a meeting as it is happening. I found myself often unsure about how to concisely word a bullet point in order to communicate it accurately. Meanwhile, I would miss some details while I was writing and the subject was being discussed. The consequences were realized later when the subject would resurface, and the team was unsure about the final status of it. I come away from this with a deeper appreciation of those who have the responsibility of taking meeting minutes and a reinforced want to improve my written communication skills.

Communicating with Entities on Campus

There were aspects of this project that required coordination with other entities on campus such as getting approval for storing the container on campus, allocating space in the Simpson Strong Tie Demonstration Lab, or getting donations for equipment. This is where I saw the student team members were limited in their ability to contribute. These facets of the project required a higher level of experience and authority that fell solely on the project supervisor. I found that the project supervisor having this much responsibility was inappropriate for a senior project. In a typical senior project, the project supervisor would be just that: a supervisor. However, this project was not a typical senior project, so the amount of responsibility the project supervisor had was appropriate. This was something I had to come to terms with so that I can understand that my contributions were within my limits and responsibilities. The conclusion I have made from this is that it is important to remember these limits, because doing so will eliminate confusion and ill feelings about the contributions of each team member.

Logistics

The logistics of building, storing, and shipping the panels were especially difficult to coordinate. The team discussed many different approaches about each. The discussion I felt that we went back and forth on the most was about transporting the panels into the plaza after each one was built. There were many ideas thrown around. We once considered building a stage that could be lifted, so that the panels could easily slide off the stage and stacked adjacent to it. We also considered finding a location with an overhead bridge crane so that the panels can be lifted and stacked without lifting them manually. The idea of using skid rollers was a prominent one also. The only concern being that they would get caught on the control joints in the concrete. Yet when the time came to finally move the first panel into place, a solution that we decided against ended up being the easiest. We simply slid each

While building the panels was an enjoyable experience, it was certainly not an easy one. The work was physically demanding even when it was being done in the most favorable conditions. We were working inside a fabrication shop, protected from the sun, and the weather was fair each day. To think that carpenters perform this work in conditions very opposite to this has given me a deep and sincere appreciation for those working in the trades. I anticipate this appreciation will prove to be valuable, as my career will involve managing tradespeople who perform such demanding work. It will heavily influence the way I communicate and cooperate with these individuals, and the way I carry myself around them.



