# *Bridge House Restoration*

*Written By:*
Samantha Solow, Adam Pruitt, Chris Levy, Severin Elste & Ben Sykes

## Introduction

Spanning across a ravine, high at the back of Cal Poly San Luis Obispo's Experimental Structures Laboratory, is a rectilinear, braced frame, Cor-ten steel building by the name of 'Bridge House'. Since its establishment in 1968, the Bridge House has seen both the best and worst of times, but overall, it gradually degraded from a habitable, educational space into a decrepit box, largely forgotten by everyone except the vandals who routinely defaced it. A few years ago, a group of students attempted to restore the structure in a way which would allow for an open air experience with views that could have only been seen from the building it its original state. This goal proved too lofty for the small team, as a number of factors allowed them to complete only a small portion of the work. Unfortunately, due to updated code stipulations, their work was deemed unsafe, and was once again boarded up, keeping inhabitants from experiencing Bridge House's full glory, and inspiring our team to take on the challenge.

Beginning in December 2018, our team of five set out to complete the restoration where the other team had left off. Our team is comprised of four Architectural Engineering students, three of whom received a Construction Management minor, and one Construction Management student. The phases of our project are as follows: design, procurement, prefabrication, installation, & demolition, each of which came with unique obstacles. The project was completed in June 2019 and the payoff was incredible.

## History

The Bridge House was a three-year long project that was completed from 1965-1968 by a group of eight students in the College of Architecture and Environmental Design with oversight from three faculty members. The project reflects serious influence from renowned modernist architect, Craig Ellwood. Upon completion of the structure, full-height windows that allowed for breathtaking views of the canyon below. One nationally recognized accomplishment the project received was for being one of the first structures in the nation to

*Bridge House. Image from the Paul and Verla Neil Resource Center, circa 1970.*

utilize Cor-ten steel in an architectural application. This choice in material not only impacted the global significance of the project, but it has allowed for bridge house to be appreciated by multiple additional generations than traditional steel would have.

Over the years, the Bridge House has served a multitude of uses. It began as a place to lodge visiting guest lecturers and critics and later had been used as an architecture studio, a canyon caretaker's home, and more recently a seismic testing facility for the Architectural Engineering department. As a team, we were excited to begin a new chapter for this storied structure.

*Bridge House 2018 - this is the condition the Bridge House was in when our project began*

# Project Goals

Bridge House was severely neglected for years since its creation. Our team's primary objective was to rejuvenate the structure and once again make it a priority destination for the public when visiting the Experimental Structures Laboratory. With this goal in mind, we replaced the plywood barricades with guard railings designed and fabricated by the team to complement those installed on the structure by the previous group. With the elimination of the plywood barricades, the Bridge House could once again be a sense of pride in the rich historical landscape of our Cal Poly community.

In addition, our team hoped to gain more knowledge and experience in working in an interdisciplinary group. An important goal for us was to have an experience that mimicked a true construction project. Throughout the experience, we expected collaboration between each discipline from the pre-construction phase through the final closeout of the structure. We aimed to embrace the Cal Poly spirit of learn by doing, by designing, welding and installing the guardrails around the structure by hand. At the end of this project, we hoped the team would gain experience in the collaboration of design, scheduling, budgeting, welding and manufacturing.

## Design

The railing design was originally created by the group of students which embarked on the initial effort to restore Bridge House. Their design proved harder to manufacture than would have meshed well with our construction schedule. The redesigned system reflects that original design by creating a rectangular frame from cold-rolled steel angle and a piece of flat bar, welded into a channel. This channel was infilled with diagonal square tubes placed at the same angle as the braces in the Bridge House, as seen below. All railings were designed or retrofitted to meet the current International Building Code specifications.

*Project South-East corner*

# Construction

Construction consisted of three phases: Prefabrication, Demolition, and Installation

***Prefabrication***

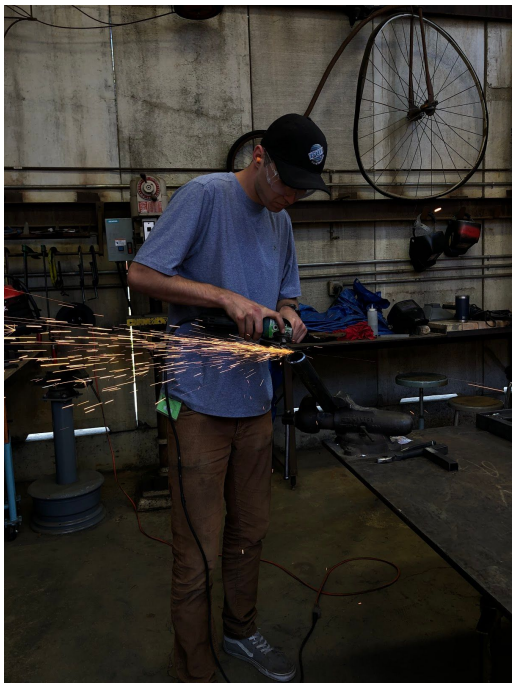
Prefabrication started with our material deliveries. Steel was ordered from B&B Steel in Santa Maria, CA. Initially, the goal was to order enough material for two railings, but this quickly changed, when we fell behind. Orders went from covering two railings to four or, in order to finish on time as well as comply with the company's delivery minimum.

Once our material was ordered, we spent most of our time in the CAED support shop where we utilized tools such as the metal cold-saw, various grinders and a mig welder. During certain times in the quarter, the CAED support shop becomes extremely busy and in some cases, too hectic to work with the efficiency we desired. On days when the shop was too busy, we utilized the High-Bay Lab to prep material to be welded while avoiding swaths of Design Village groups frantically preparing for their stay in the Canyon. The time spent in the CAED shop during peak hours was still highly valuable however, because it taught us what a busy jobsite can be like, and that cooperation and open communication between trades is invaluable.

*Ben Sykes welding the rectangular railing frame*

*A perfect bead*

*Severin Elste welding the infill*



*Adam Pruitt prepping the grab-bar*

*Preparing flat bar to be welded*

*Ben Sykes and the result of long days in shop*

***Demolition***

Demolition involved removing all doors, window frames, light gauge steel framing, insulation, exterior lap siding, and existing plywood barricades to allow for the structure to be prepared for guard rail installation. Because the building was of an age where lead-based paints were still widely used, we had to be careful when approaching the next step. In order to weld to the steel frame, we had to remove all lead paints in a manor which kept both us and the surrounding environment safe. After fulfilling the prescribed trainings and ensuring the protocols provided by Cal Poly's Environmental Health and Safety Department were met, we went ahead and stripped away all the paint in areas which we intended to weld.

*Temporary plywood barricades put in place after our first demo day*

*Samantha Solow with the sledgehammer*

***Installation***

Installation occurred over the course of one day. The railings were installed by welding part of the railing frame to the steel mullion columns that sit behind the Bridge House columns. These are the same mullions that once held the glass windows. Once the lead based paint was fully stripped, welding could be performed. As a group, we also made sure that before welding or grinding, we would water the surrounding vegetation to prevent any sparks from starting a fire. During the welding and grinding, there was at least one person with a working fire extinguisher on fire watch at all times. Installation also included the installation of a flat bar piece to the four existing railings to make them code compliant. In this case, the plywood barricades were left in front of the existing railings when welding the flat bar to them to protect the exterior area from sparks.

*Severin Elste welding a railing to the steel mullions while Chris Levy and Karl Wellens holds it in place*

*Adam Pruitt welding*

*Severin Elste welding*

## Project Considerations

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Upholding the nature of Cal Poly's 'Learn By Doing', our group set out to create a project that not only benefits the university as a whole, but more importantly the College of Architecture and Environmental Design. In an attempt to terminate the degradation of Poly Canyon, our restoration project is certainly a stride in the right direction. As one can imagine, many of the folks who were part of bringing Poly Canyon to life have been even more grieved to see such a beautiful site decay over time and that truly was upsetting for us to see. After meeting with and gratefully receiving funding from The Foundation For Interdisciplinary Studies (FIS) we established a commitment to not only ourselves and the university, but also to alumni who have the same motive of preserving the CAED college's history. Collectively, we set out to rehabilitate a once elegant space back to an accessible and inviting state in which the community can once again visit, enjoy and appreciate.

Surrounded by ample vegetation, creeks and wildlife, the demolition and installation required a great amount of precaution and safety measures to ensure we did not impede nor destroy any of the adjacent project atmosphere. Throughout the demolition phase, we were meticulte about where all scrap screws, metal and plywood were disposed of. Additionally, we laid down barriers beneath the structure to ensure all debris was accounted for. Before installation began, we used chemical paint remover to strip the lead paint coated on the infilled frame that would be the surface of attachment. When it came time to grinding the attachment areas and welding the railings, we kept the immediate area watered down and devoted at least one person to keep an eye on the sparks with a fire extinguisher on hand in the event that a fire were to occur. Being our goal to restore a portion of the canyon, the last thing we hoped to do was hurt the canyon; however, we were prepared for any possible event.

A critical piece of historical preservation in most instances is restoring a structure in a way that most similarly resembles or compliments its original state. Due to previous efforts to restore the structure in which four guardrails had been completed, our goal was simply to make a seamless transition from the existing rails to our newly installed ones. Luckily, the existing work honored the structural braced members of the structure by matching the angle of each bay with the infilled tubing. Keeping this in mind, we continued the design around the entire perimeter of the structure and gave particular attention to matching the angle of the two adjacent rails on the front facing side of the structure.

It goes beyond the money to restore Poly Canyon and simply takes the right people with the right motivation to complete the work. This project is a perfect reflection of that. The only expenses of this project were the cost of materials, equipment for installation, and dump fees. All other components and work performed was done on a donation and volunteer basis. Fortunately, nearly all expenses were covered by a grant provided by FIS in which there was donated money by a group of individuals who share the same drive as our group.

Final Project Photos

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***Ben Sykes***

Visiting Cal Poly for the first time in high school, Poly Canyon was one of the most notable sites I got to experience. There was a tremendous amount of promotion regarding it to be one of the school's prized possessions and it fell nothing short of that when I got to see it for myself. In my freshman year design studio, I was lucky enough to design and build a temporary and much smaller scale, yet habitable structure as part of the annual Design Village Competition which is hosted in the canyon. As my educational career carried on, it was devastating to see the trash and vandalism left behind in these once glorious structures. Beyond that, I had thought the competition was going to be the only chance I'd have at leaving a mark in the canyon, as most of these structures were erected far before my time and not much activity had taken place since.

*Ben Sykes welding a frame*

The beginning of my fourth and final year at Cal Poly began to take stride and the opportunity to restore the Bridge House was presented. We gathered our team and hit the ground running knowing this was too good to pass up on. While getting my degree in Architectural Engineering, my fond interest in construction has also led me to minor in Construction Management. The lighter design requirements with a heavier construction emphasis this project was going to require was atypical for ARCE students, yet seemingly right up my alley.

As this project has come to a close, there was a tremendous learning process along the way; one that has taught me a lot about myself, real world operations, and ultimately an appreciation for historical preservation. Getting the experience of working with shop technicians, facilities services, project stakeholders, an adjacent construction team and my own team was largely the biggest learning curve. All aspects of a true building project were brought to the table and it was fascinating to see how each piece of the puzzle came together to create the success of this project. As expected, there were a lot of hiccups along the

way, but our team put our heads together to get through each one and the satisfaction of the final product is unmatched.

I am extremely excited to share my contribution to Poly Canyon with my friends and family while simultaneously paying respect to the original designers of the Bridge House and ultimately all who have put their own time and efforts into what the canyon is and will continue to be as time moves forward.

***Samantha Solow***


*Samantha Solow welding*

During my first visit to the structures in Poly Canyon, I never imagined that four years later I would build something of my own. Unfortunately, in our college, it is not common knowledge that there are still projects available for students to work on in Poly Canyon. Lucky for me, I reached out to our advisor, Kevin Dong, in hopes of finding a project that I would be proud to be a part of. That being said, I am extremely proud of my group and what we were able to accomplish.

In many ways, this project takes my experience here in the College of Architecture and Environmental Design full-circle. My favorite project freshman year of college was Design Village. The many things that I loved about my Design Village project mirrored the things I love about this project. It is the hands-on aspect of this project that I really hold near and dear to my heart. When I look at the before and after photos of the Bridge House and see how much we have accomplished, all the railings we have prefabricated, all the plywood we knocked down, the views that can be enjoyed from the interior of the house, I see that all the long days spent in the CAED shop and out in the canyon are absolutely worth it.

Within the project team, I found my role to be versatile. I worked in the shop and on the calculations package. I took the initiative in most of the administrative work and was the contact and main communicator to our main source of funding, the Foundation of Interdisciplinary Studies. However, most of the things I got done individually meant nothing without my team, but as enjoyable as this project was, we did have our mishaps. For example, we had some issues with our submittal package to facilities, but all together, we were able to work out what we needed to fix in order to make all the information as clear and concise as possible.

Overall, this project has taught me to greatly appreciate the design and construction process. I learned the importance of conveying information to other parties, such as facilities. I

also learned how to weld and most important, I learned how to work in a project team, on a project that mirrored a project I would encounter in my professional life. The skills I've learned in this experience are skills I will continue to use in my life after college. I know that the Experimental Structures Laboratory will continue to grow and I cannot wait to come back in a few years as an alum of the Cal Poly ARCE program to see how much it has changed.

***Adam Pruitt***

"Go visit architecture graveyard," they all said, alluding to the eerie remains of something come and past. So, naturally, during my first trip to campus, curiosity steered me onto the gravel road towards the canyon. But I didn't find a graveyard. Graveyards are usually clean and respected. If people speak so positively of this place, why doesn't it get treated that way?

During my years on campus, the canyon faded into the periphery. I rarely gave the canyon much thought because not much happened there. I, along with most CAED students, had come to understand that nothing new gets built out there anymore, and that senior projects are all about research or design. I later realized that my personal satisfaction comes through actually building things, rather than planning the things that other people get to build. This is why I chose to pick up a minor in Construction Management, and subsequently pursue it as a career.

When entering my senior year, this left me in a weird place: I was unenthused with research and design, but still had Senior Project looming ahead. I was wary of the irony that my senior project, designed by faculty to be an exclamation mark on one's education, could potentially be about something I didn't find exciting… but then everything seemingly fell into place.

The opportunity to work on Bridge House was one I knew I could not pass up. In speaking with the group, it sounded like none of them had much welding experience. Though my experience was limited, I saw this as my angle to play a primary role on the team and practice a skill I enjoyed. Knowing I was going into construction management made me even more inclined to join, as the scope of the project required more elbow grease than it did calculations. With the addition of our CM major team member, we had a well rounded and proactive team ready to create an impact.

I found my biggest motivator for the project during a meeting with representatives from the Foundation for Interdisciplinary Studies, or FIS. Those representatives were a part of the Cal Poly generation which built the original structures in the canyon, and they're determination to

erase the “graveyard” moniker was inspiring. The overarching goal of FIS is to breathe life back into Poly Canyon’s Experimental Structures Laboratory, as it is now called, to make it an active laboratory facility for the CAED and reintroduce to students the idea that they too can create a tangible, long lasting impact on their campus community. FIS granted our team the money to do this restoration project, and I am incredibly proud to have played a role in the sea change their foundation has in mind. I look forward to seeing the Canyon come back to life.

***Christopher Levy***

Upon the first visit to the large structures in Poly Canyon for WOW week, the initial thoughts that went through mind were somewhere along the lines of, “Wow, how can students achieve something of this scale?” From the modular house to the Geodesic Dome and everything else, it’s hard not to be amazed standing next to the structures out there. I really had no concept of what a senior project was or how to go about designing, funding, and constructing these projects; luckily an opportunity came about to contribute to what is an amazing part of Cal Poly’s campus and history.

The first time I heard about the chance to work on the Bridge House was halfway through the fall quarter of senior year. While on a trip to the canyon with Canyon Days, a club that revitalizes the structures in the canyon, Kevin Dong mentioned that there was an opportunity to work on the Bridge House by continuing a project that a group of students had started a couple of years ago. Upon seeing the confined and desolate looking structure, this chance to restore the structure to what it was originally intended to be could not be passed up and recruitment for a team began.

I have only welded a couple of times in my life, so being able to construct the thirteen railings gave me a lot of experience with a skill that will be helpful for later in my construction career. One of the biggest challenges of constructing these was figuring out an efficient system since we were on a time crunch. Having built only two railings in two weekends of work, the team knew that we had to cut down this time if we were to finish before graduation as was planned. Luckily we figured out better ways to cut material, set up frames for welds, and got better at welding as time went on. We also owe a lot of being from the different shops on campus a big thank you for all the help we were given; it’s truly amazing how the staff at Cal Poly wants to see students succeed. We also owe a lot to The Foundation for Interdisciplinary studies (FIS) for donating the funds for us to complete this project and for being huge proponents of building in Poly Canyon.

Contributing to something as long standing as the Poly Canyon Experimental Structures Laboratory is one of the highlights of my time here at Poly, and I’m glad that I got to experience it surrounded by a great group of motivated people.

# Thank You!

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We would like to extend our gratitude to all of the people who have helped towards the success of this project. This includes: Kevin Dong, Dave Kempken, Tim Diem, Vince Pauschek, Virgil Threlkel, & Karl Wellens; we couldn't have done it without you! We hope that we have helped in the beginning of a total restoration of the beautiful Poly Canyon and inspired younger students to get involved as well.

*From Left to Right: Ben Sykes, Chris Levy, Severin Elste, Adam Pruitt, Sam Solow*

# ADDENDUM

# Structural Calculations

Poly Canyon Bridge House Restoration

**Packaged For:**

Cal Poly Facilities
1 Grand Avenue
San Luis Obispo, CA 93407
805-756-2321

Revision I
May 16, 2019

Calculations By: Chris Levy, Adam Pruitt, Sam Solow, Ben Sykes
Checked By: Kevin Dong

# Table of Contents

**Description of Project**

An interdisciplinary group of students propose to complete the interior hand railing system for Bridge House, located in the Cal Poly Experimental Practices Laboratory. The group intends to renew The Bridge House to a newfound sense of purpose, making it a focal point of the canyon and restoring a sense of pride in the rich historical landscape of our Cal Poly community.

There are three phases of construction: fabrication, demolition, and installation. In chronological order, we will fabricate steel railings in the CAED Support Shop, remove the plywood sheets which currently enclose the Bridge House, then install the steel railings.

The group is composed of both ARCE and CM students enabling us to complete structural calculations and details along with an extensive schedule, budget and logistics plan.

The Bridge House's history is one which has inspired this group to take on this project. What was built in 1968 as a modernist, braced-frame structure with floor-to-ceiling windows, is presently little more than a decrepit plywood box subject to routine vandalism. With the removal of the flat plywood surfaces, vandals will be discouraged from tagging the structure, leaving only the breathtaking views of Poly-Canyon to captivate visitors.

*Bridge House. Image from the Paul and Verla Neil Resource Center, circa 1970.*

Installation Procedures

To ensure public safety, the demolition of plywood shall only occur one bay at a time and will be immediately followed with the installation of a railing. The installation involves field welding of certain members in which additional safety and environmental protection measures will be implemented as required with the approval of a hot work permit. All scrap materials and debris will thoroughly be cleaned up and disposed of throughout this process.

Expected Project Outcomes

A safe, functional viewing deck enclosed by code compliant handrail system that will allow for the fully functional use that was once the Bridge House.

Estimated schedule

Proposal and Permitting: Remaining weeks of Winter Quarter
Delivery 1: Beginning of Spring Quarter
Manufacture (3) railings
Delivery 2: Week 4 of Spring Quarter
Manufacture (4) railings
Delivery 3: Week 6 of Spring Quarter
Manufacture final (4) railings
5/23-5/24: Demo plywood
Install railings
Completed by Graduation

Figure 1: Bridge House in Current Condition, *2018*

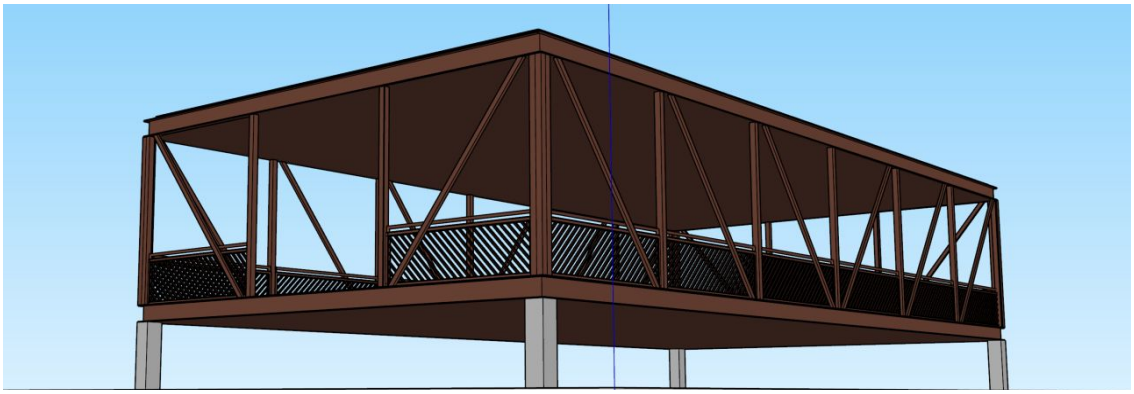


Figure 2: Proposed Bridge House: Perspective

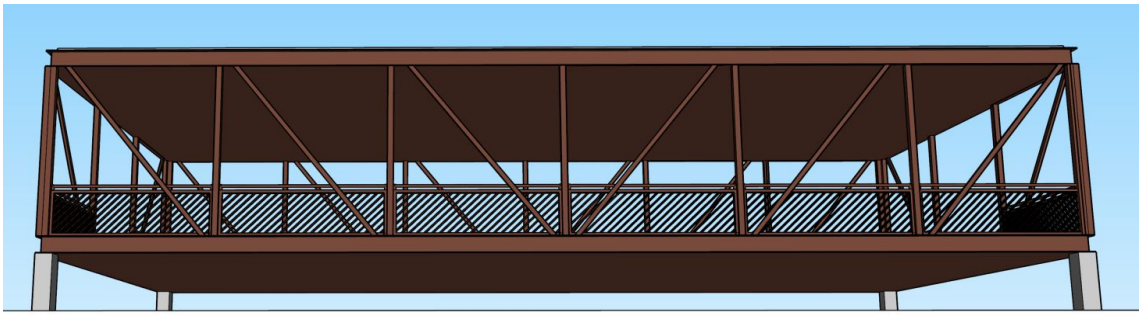


Figure 3: Proposed Final Bridge House: Elevation

Bridge House Location in Poly Canyon


Legend:

1. Bridge House
2. Stick Structure
3. Poly Pavilion
4. Hay Bale Arch
5. Greenhouse
6. Geodesic Dome
7. Cantilever Deck
8. Underground House

## CODE COMPLIANCE

IBC 1014.3.1
- HANDRAIL COMPOSED OF 1½ Std. Pipe WHERE OUTSIDE $\phi = 1.9"$
  ↳ PER IBC 1014.3.1 HANDRAIL $1¼" < \phi < 2"$

$1¼" < \phi = 1.9" < 2"$ ✓ adequate

IBC 1015.3 - HEIGHT
- HT. = 42in
  ↳ PER IBC 1015.3 GUARDS SHALL BE NOT LESS THAN 42in

H = 42in ✓ adequate

IBC 1015.4 - OPENING LIMITATION

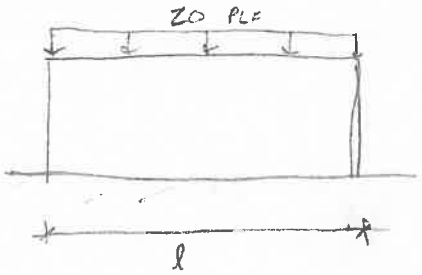
↳ PER IBC 1015.4 REQ GUARDS SHALL NOT HAVE OPENINGS THAT ALLOW PASSAGE OF A 4 INCH $\phi$ SPHERE

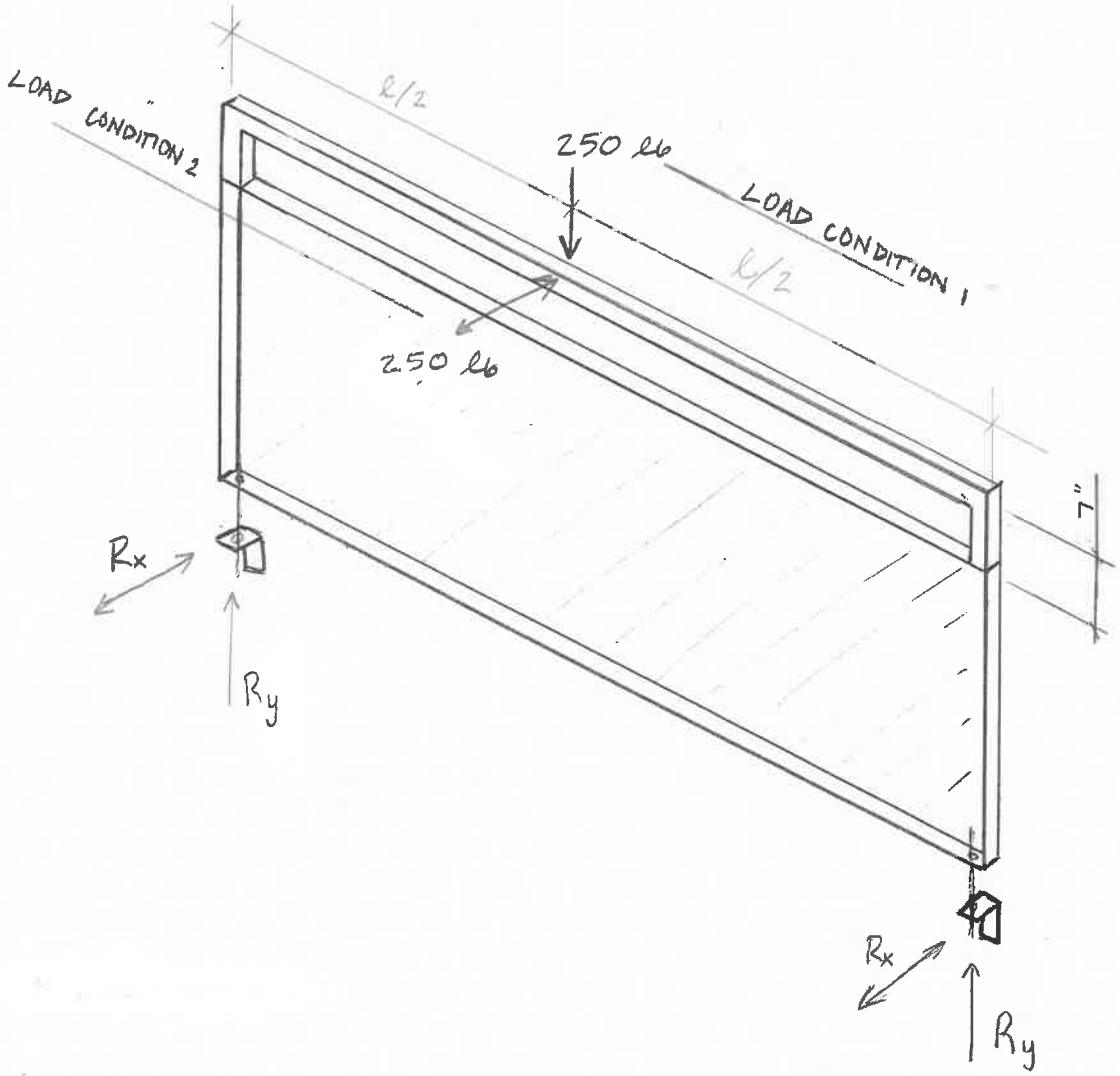
✓ adequate

REFERENCE
* SEE ELEVATION ON PG. 11

REFERENCES MADE TO IBC 2015.

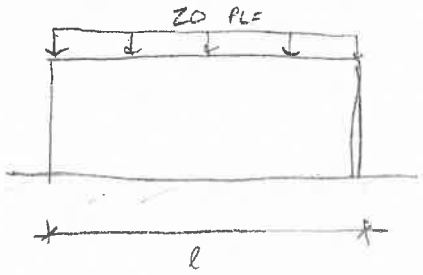
1014.2: HANDRAIL MIN HEIGHT

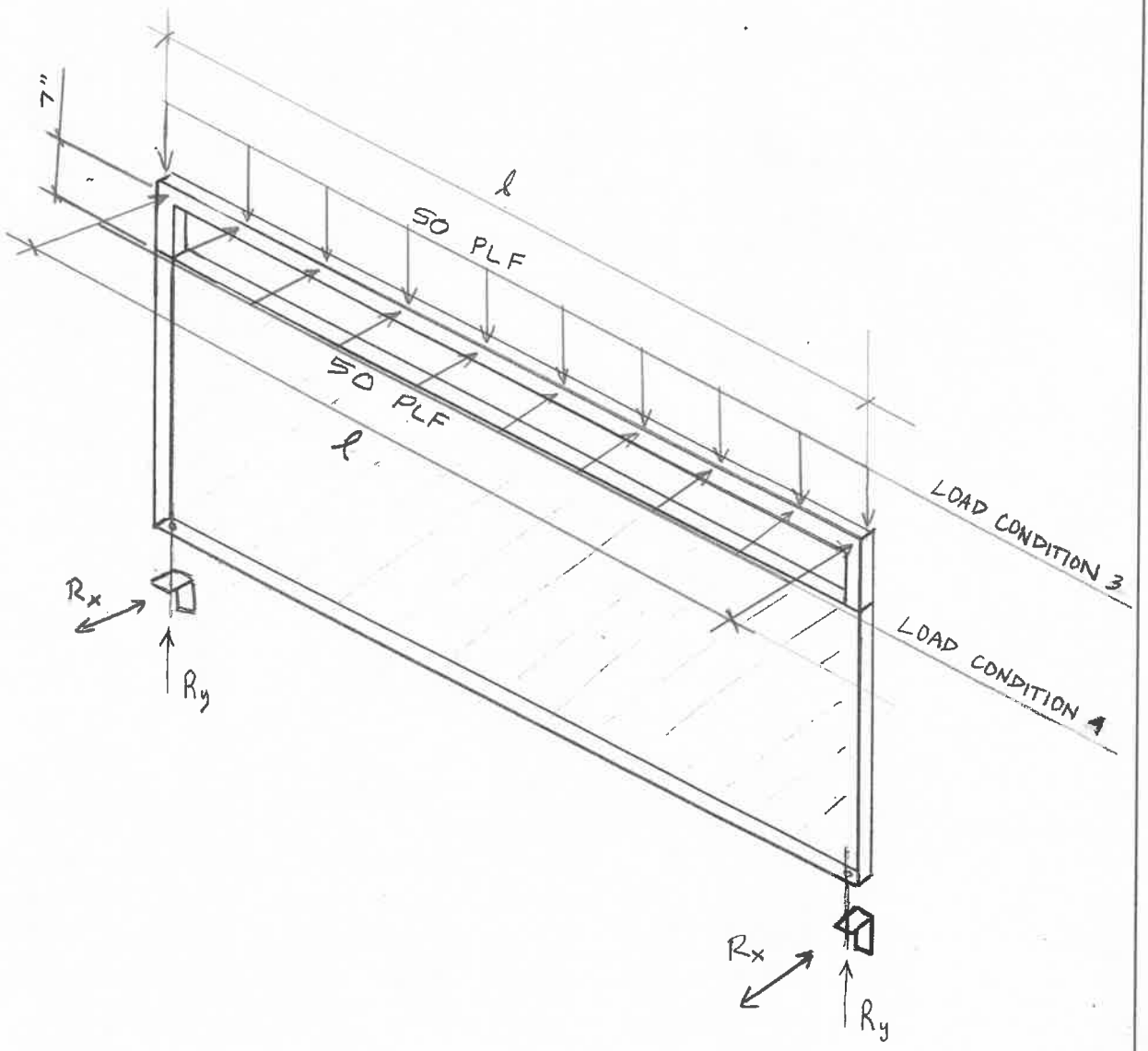


REFERENCES MADE TO IBC 2015.

1014.2: HANDRAIL MIN HEIGHT



REF

AISC 15th ed. I-106

$l = 125\text{ in}$ (LONGEST RAILING LENGTH)

CAPACITY

ASSUME 1½" STD. PIPE WHERE : $F_y = 36{,}000\text{ PSI}$, $Z_x = 0.421\text{ in}$

$M = F_y Z_x = 36{,}000\text{ PSI}\,(0.421\text{ in}) = 15{,}156\text{ lb·in}$

$\Phi M_n = 0.9\,(15.16\text{ K·in}) = \underline{13.64\text{ K·in}}$

FOR FULL FBD SEE PG. 8

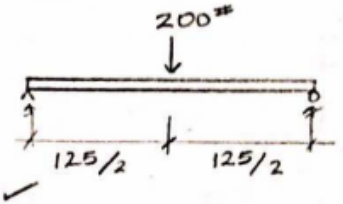
LOAD CONDITION 1

IBC 1607.8.1.1 : CONCENTRATED LOAD IN GRAVITY

$P_u = 200\#$s

$M_u = 200\#\,(125/2) = 12500\text{ lb·in}$

$M_u = 12.5\text{ K·in}$




$\Phi M_n = 13.64\text{ K·in} > 12.5\text{ K·in} = M_u \Rightarrow$ OK ✓

LOAD CONDITION 2

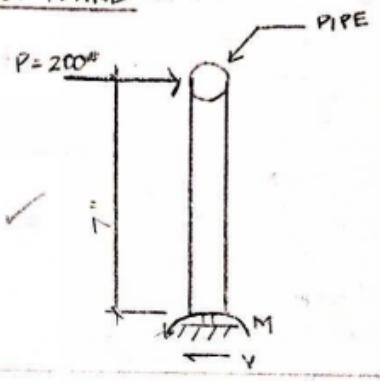
IBC 1607.8.1.1 : CONCENTRATED LOAD OUT OF PLANE

$V_u = 200\text{ lbs}$

$M_u = 200\#\,(7") = 1400\text{ lb·in}$

$M_u = 1.4\text{K·in}$

$\Phi M_n = 13.64\text{ K·in} > 1.4\text{K·in} = M_u \Rightarrow$ OK. ✓




FOR FULL FBD SEE PG. 9

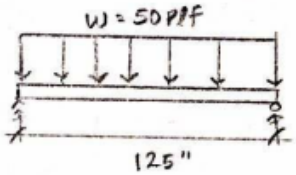
LOAD CONDITION 3

IBC 1607.8.1 : DISTRIBUTED LOAD IN GRAVITY

$w = 50\text{ plf}$

$M = \frac{wl^2}{8} = \frac{50\text{plf}/12\,(125")^2}{8} = 8138\text{ lb·in}$

$M_u = 8.14\text{ K·in}$




$\Phi M_n = 13.64\text{ K·in} > 8.14\text{ K·in} = M_u \Rightarrow$ OK ✓

LOAD CONDITION 4

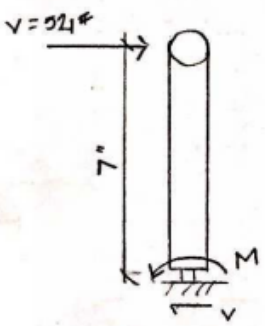
IBC 1607.8.1 : DISTRIBUTED LOAD OUT OF PLANE

$V = 50\text{plf} \times (125/2) = 521\#$

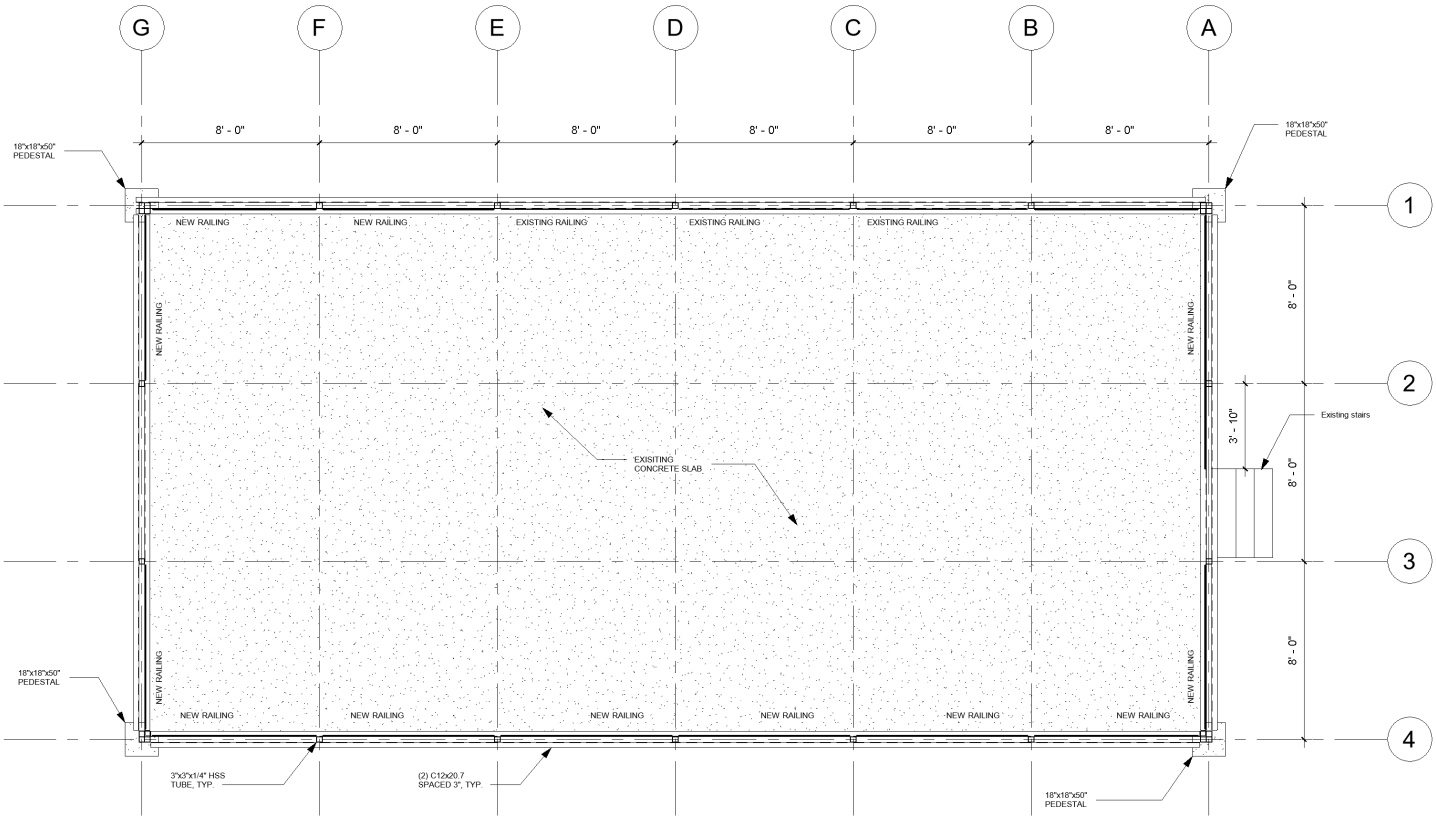
$M = 521\# \times 7' = 3647\text{ lb·in}$

$M = 3.65\text{ K·in}$

$\Phi M_n = 13.64\text{ K·in} > 3.65\text{ K·in} = M_u \Rightarrow$ OK ✓

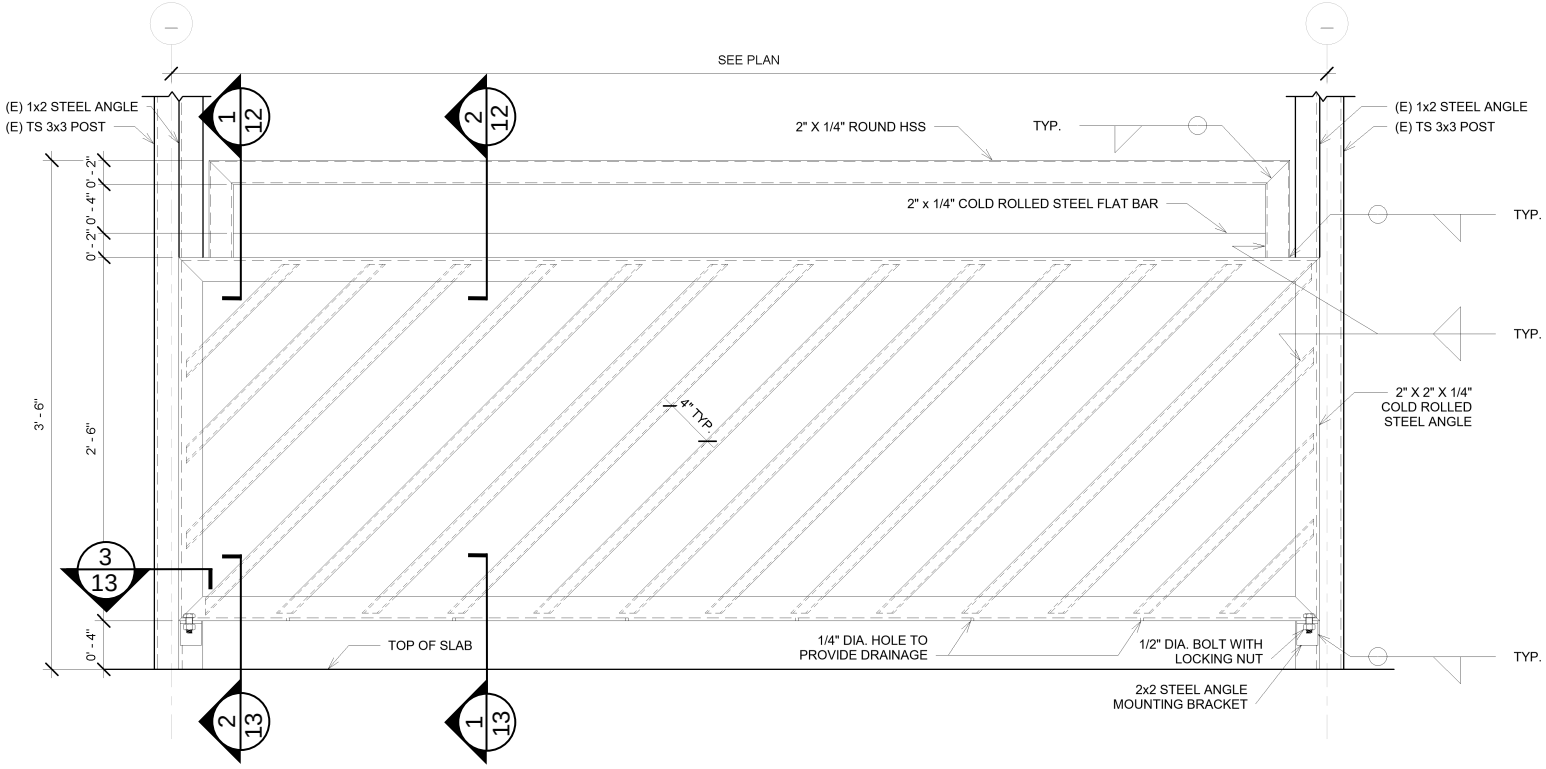



USE 1½" STD. PIPE



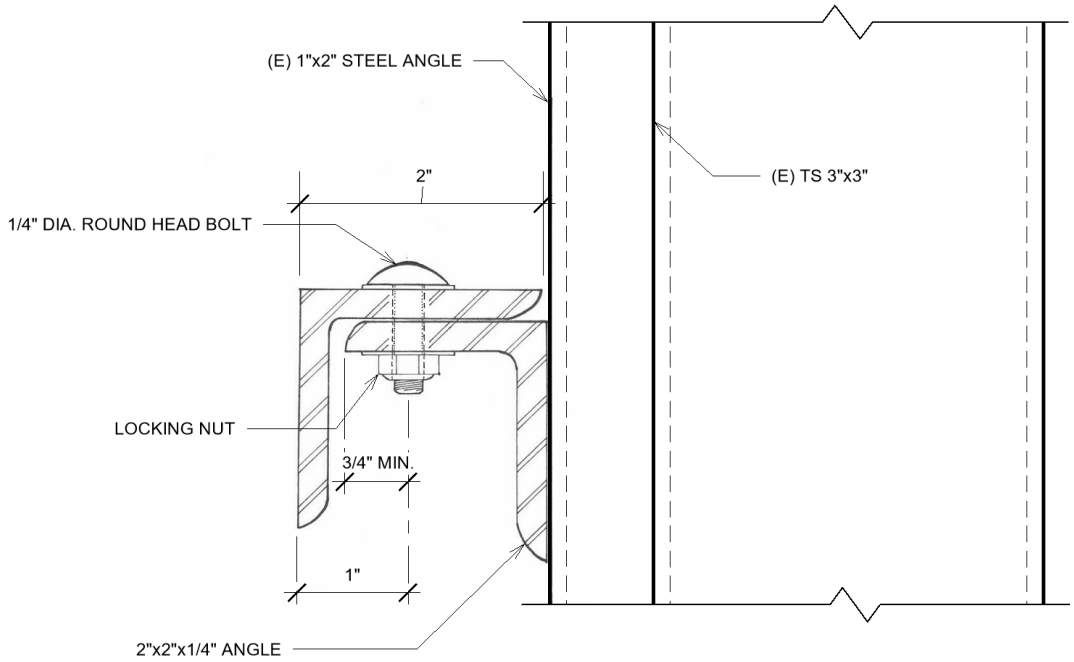

1 FLOOR PLAN

N.T.S.



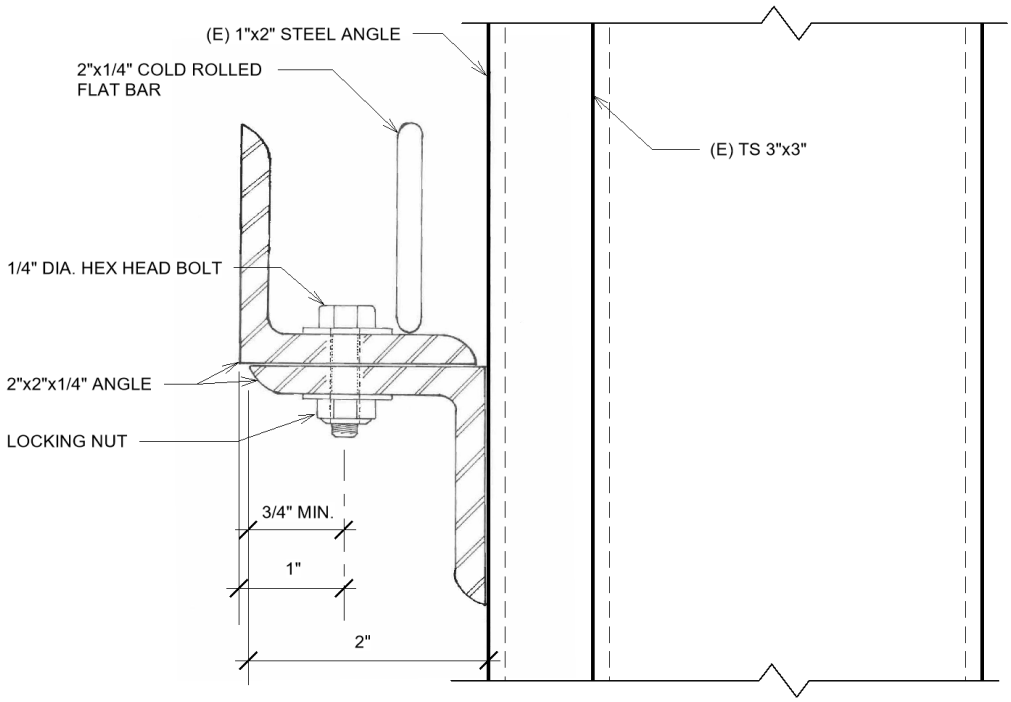

2 TYPICAL PANEL INTERIOR ELEVATION

N.T.S.



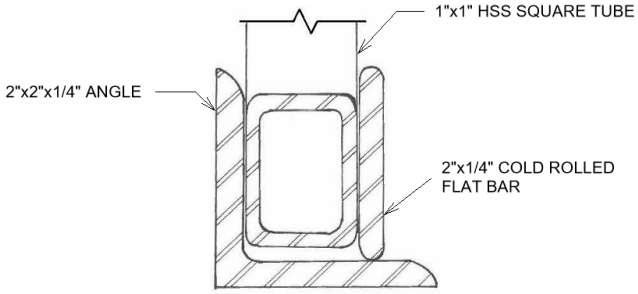

1 TYPICAL TOP CONNECTION TO STRUCTURE

N.T.S.



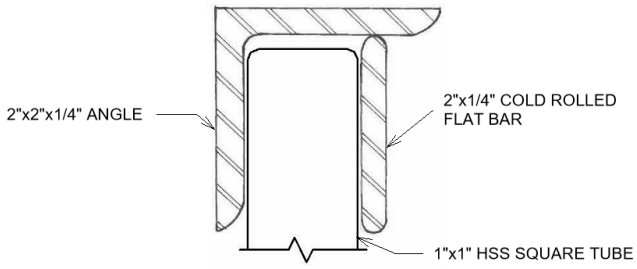

2 TYPICAL BOTTOM CONNECTION TO STRUCTURE

N.T.S.



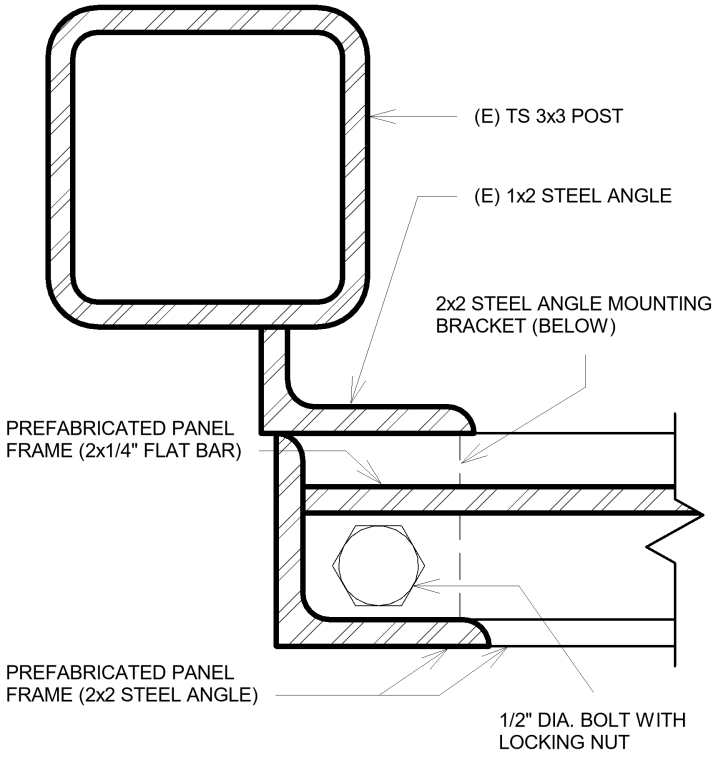

1 TYPICAL MIDSPAN PANEL SECTION (BOTTOM)

N.T.S.




2 TYPICAL MIDSPAN PANEL SECTION (TOP)

N.T.S.




3 TYPICAL CONNECTION TO STRUCTURE

N.T.S.

# Bridge House Restoration Senior Project

Adam Pruitt, Ben Sykes, Chris Levy, Samantha Solow, Severin Elste

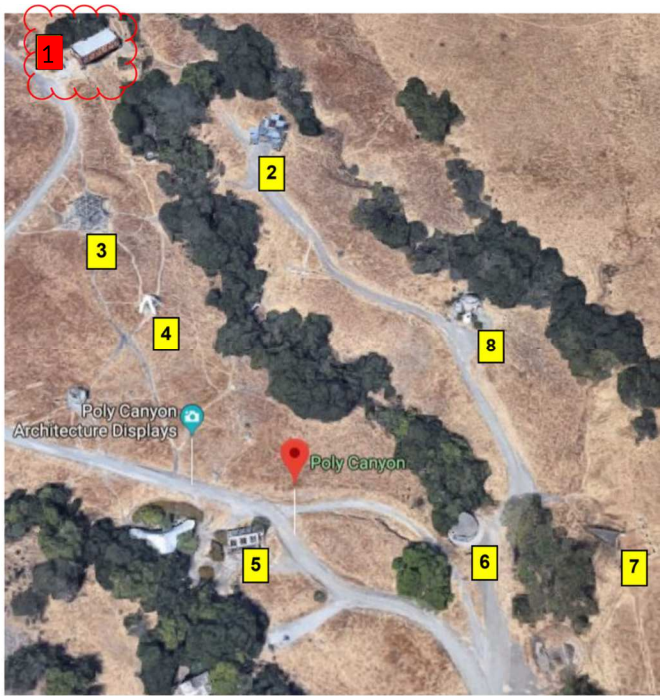
## Presentation Overview

1. Site Location
2. Bridge House History
3. Project Goals
4. Code Compliance
5. Funding
6. Permitting
7. Prefabrication Process
8. Cleanup and Staging
9. Final Takeaways

## Site Location

Legend:

1. Bridge House
2. Stick Structure
3. Poly Pavilion
4. Hay Bale Arch
5. Greenhouse
6. Geodesic Dome
7. Cantilever Deck
8. Underground House




## Bridge House History

- Steel Braced-Frame Dwelling
- Corten Steel
- Various Programs
- 1965-1968
- 8 CAED Students, 3 Faculty

https://polycanyon.calpoly.edu/history/bridge-house

## Bridge House, original project team

https://arce.calpoly.edu/content/prospective/program-history

## Bridge House, 2011

https://www.hikespeak.com/trails/cal-poly-canyon-design-village-hike-san-luis-obispo/

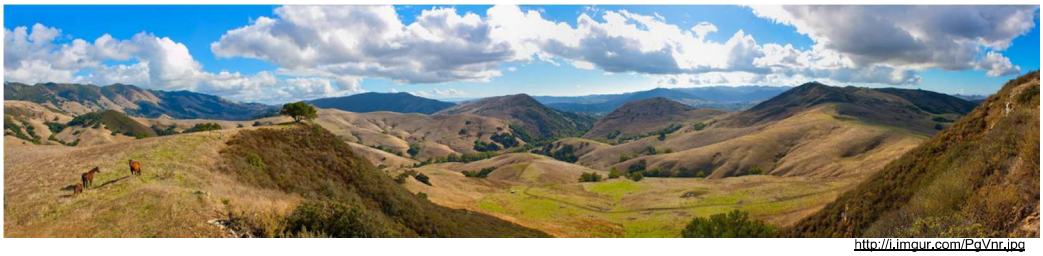
## Bridge House, 2015

https://strayngerranger.com/poly-canyon-design-village/

## Bridge House, 2018

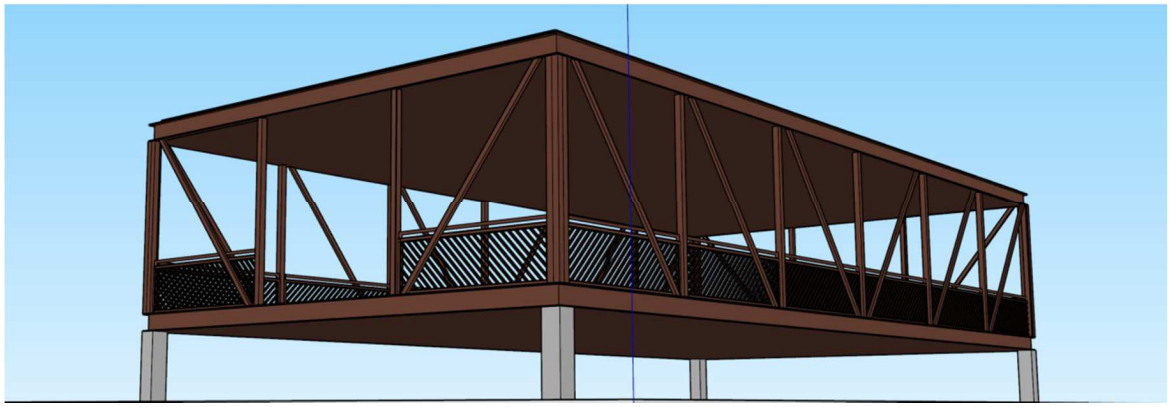
## Project Goals

- Complete the restoration of structure to allow for public access
- Interdisciplinary team experience
- Construction practices with applied engineering knowledge
- Have a positive and lasting impact on Poly Canyon



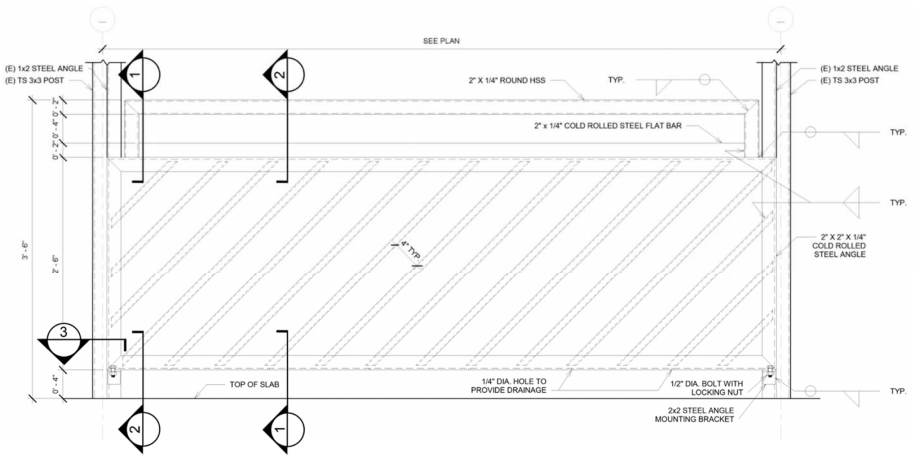
http://i.imgur.com/PgVnr.jpg

## Proposed Final Structure



# Code Compliance Checks

- IBC 1014.3.1 (*Grab-bar Size*)
  - Handrail diameter must be greater than 1 ¼” and less than 2”
- IBC 1015.3 (*Height)*
  - Guards shall not be less than 42”
- IBC 1015.4 (*Opening Limitation)*
  - Guards shall not have openings that allow passage of a 4” diameter sphere
- These checks governed the design of the handrail system; lead to redesign of the originally installed railings




2 TYPICAL PANEL INTERIOR ELEVATION

N.T.S.

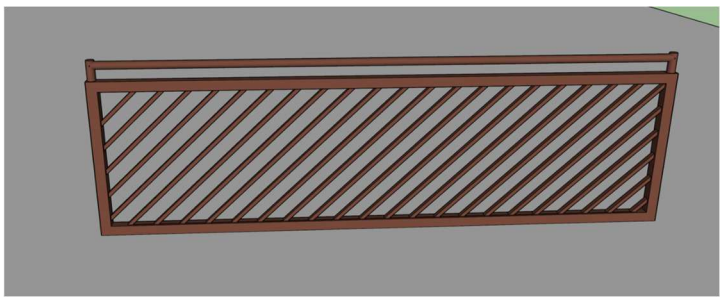
## Funding

- Several available opportunities
- Received funding from Foundation for Interdisciplinary Studies (FIS Grant)
- Multiple Senior Projects Scholarships through ARCE Department and the College of Architecture & Environmental Design

FIS Foundation
SLO, CA For Interdisciplinary Studies

## Permitting Process

- Thorough calculation and drawing package submitted to Facilities
- Hot work permit granted from Environmental Health & Safety Department



## Prefabrication Process

- The learning curve
- Quickly realized we needed extra outside help
    - Much thanks to the people who volunteered their time
- CAED Support Shop could get extremely busy

## Volunteers and Key Supporters

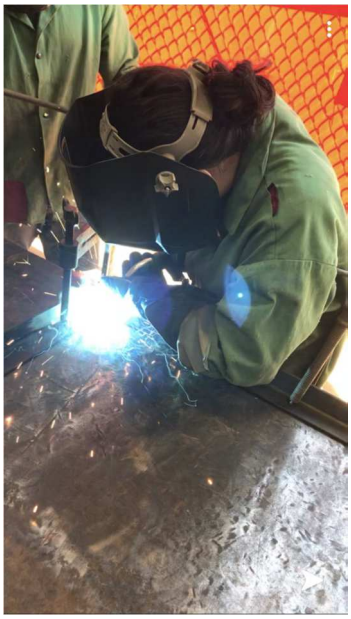
Karl Wellens

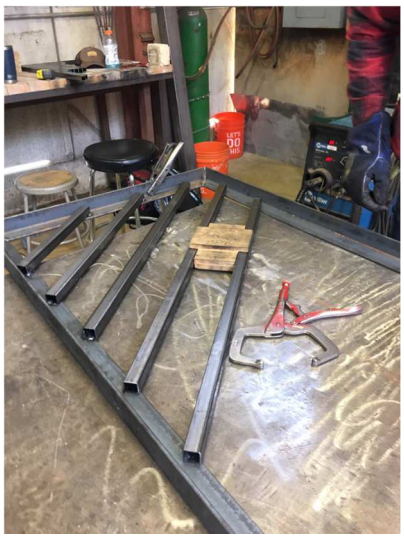
Virgil Threlkel

Dave Kempken

Vince Pauschek

Tim Dieu





## Cleanup and Staging

- Moved forward with starting clean up on the site.
- Removed as much material that we could without making it a safety hazard
- Began stripping paint to prepare for welding
- Staged all materials on site

## The Next Step

- Secure EHS permit
- Gather welder and generators for remaining cleanup and installation
- Estimated 8 hours of group effort to complete
- With a predicted completion date of 6/14/2019

# Questions?