

# CEE Joint-Fundraising Grant Proposal

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*Grant Application for the UC Berkeley Steel Bridge Competition team 2020-2021*

## **Executive Summary**

The UC Berkeley Steel Bridge Competition team is a Civil Engineering competition team associated with the American Institute of Steel Construction that competes at the AISC Student Steel Bridge Competition and the National Finals AISC Student Steel Bridge Competition. The team exists to introduce students to structural design and machine shop fabrication in a friendly and productive environment. We aim to teach students the basics of design principles, programs, and processes, augmenting what they learn in the classroom and providing a tangible application for this learning. In addition, we provide a hands-on experience that contrasts the highly technical and more theoretical work that our members experience in the classroom.

The team has seen success the past few years at competition. In 2021, Steel Bridge participated in both the new AISC Supplemental competition for those competing virtually, where we placed first overall in the Mid-Pacific Region and first for the additional compete-from-campus competition for those on campus and in-person. We placed eleventh in the National competition and received the Robert E. Shaw Jr. Spirit of the Competition Award for deep enthusiasm for the competition and the support displayed for the teammates. In 2020, unfortunately, the AISC competition was cancelled due to the outbreak of COVID-19. In 2019, the team won first place overall and in all sub-categories during the regional competition and 6th place overall at the national level. In addition to this, the team won first place in the regional Mid-Pacific Conference 2011-2014, 2017 and won the National Student Steel Bridge Competition in 2012 and 2013. Furthermore, we have received 4th place at the National level in 2017 and 2018. With the competition getting stronger each and every year, the team must continue to improve and keep pushing the limits in order to stay on top regardless of adversity. These limits were shown when we failed to qualify for Nationals during the 2014-2015 year; we have learned from our mistakes during the years following that failure and will continue to push forward in the future. Furthermore, as a team our dedication to the competition has been tested in the past year due to the 2020 cancellation of competition in light of COVID-19. Despite setbacks, we have a strong set of leaders and continuing members eager to hit the ground running in the fall. Our funding goals are to continue at our current budget. This past year, Boeing was unable to donate to us due to financial restraints. However, we hope to resume our \$5000 donation from Boeing each year by maintaining our relationship and continuing to succeed in competition.

## **Terms and Conditions Agreement**

The Steel Bridge team agrees to the Terms and Conditions of the Joint Fundraising Grant Program.

## **Maximum allocation request**

The maximum allocation request for the 2021-2022 budget will be the most accurate representation of the vital needs of the organization.

The project manager, assistant project manager and treasurer will have at least one in person meeting with the entire JFC committee during the summer 2020 or make other accommodations as deemed necessary.

### **Minimum Commitments to JFC**

At the very least the Project Manager and Assistant Project Manager, as well as any other available junior officers, will attend the JFC retreat, and attendance to prior JFC retreats will not replace attendance to the retreat scheduled for this academic year.

The Treasurer will be in attendance at the Treasurer Retreat organized by the Vice President of Treasury, and attendance of previous retreats may not replace the retreat for the term encompassed by 2021-2022 contract.

At least two representatives between the PM, APM and treasurer will attend monthly JFC meetings.

The Treasurer will be accountable to attend the fall treasury retreat, process reimbursements and deposits, apply to any eligible grant programs, establish a detailed fundraising plan for the academic year to meet projected additional needs of the team, be knowledgeable and regularly check JFC finance sheets, and maintain regular communications with JFC Treasurer for updates or concerns.

Sufficient representatives will attend infosessions based upon our budget, and an Infosession Liaison will coordinate with the Corporate Events Director for tasks, which will be completed in a timely manner. Infosessions will be every Tuesday and almost every Thursday 5:00pm-6:30pm in which attendees must stay for the entire duration to count for attendance.

The infosessions representative will coordinate with the Career Fair Director for tasks, which will be completed in a timely manner, and 5 unique volunteers will be supplied to each career fair.

Steel Bridge will submit CalLink/ESC Account statements to JFC by the Fall 2021 and Spring 2022 submission deadlines.

Submission of funding applications such as AOP, SOF, ESC, FiComm, etc. when requested by the committee.

Steel Bridge will be responsible and responsive in working with JFC officers and notify of any donations or income received.

### **Membership Perks**

As a part of JFC, Steel Bridge will have access to the benefits accrued to the members of JFC, such as access to department facilities, funds, administrative services, travel coordination, and referral benefits.

### **Donations**

Donations are defined as money obtained by solicitation only, and 80% of the value may be used by the team on either immediate, necessary needs or long-term investments, while 20% is given to JFC.

Taxable donations include corporate donations, donations made by a professional representing a company, donations exceed \$1000 from alumni or university faculty.

Non taxable donations include donations from students or parents, grants specifying the purpose, or donations of physical or tangible materials.

If the team is unsure if a donation is to be taxed, they will consult JFC.

### **Income**

Income is defined as money obtained through a transaction, and the entire value is left to the team. Income includes any contributions and allocations provided by the following entities: University of California – Berkeley, UC Berkeley Engineering Student Council (ie. Initial Allocations, FiComm), Associated Students of California (ASUC) Allocations and Grants (AOF, SOF), UC Berkeley Department of Civil and Environmental Engineering, all donations and the National Organization for which Steel Bridge is registered as a chapter.

## **Program Budgets**

Program budgets may be used to fund necessary operations (not travel) such that they do not violate the limitations below.

Limitations:

JFC funds will not be used for:

- Unnecessary purchases
- Purchase of alcohol or drugs
- Illegal conduct of any kind
- Special luxury items
- Fines or penalties of any kind

The redistribution of funding from Program allocations to supplement Travel allocations must be explicitly communicated by the Project Manager to the JFC Chair via email.

## **Travel Budgets**

Travel budgets may be used to transport the team and necessary equipment to competitions. This includes lodging, the cheapest means of transportation (public transit, flights, vans, etc), and registration. The assigned travel budget is final, and any excess will need to be provided by the team. Students are required to pay 20% of their total travel costs as a co-pay.

Funds will be dispersed from JFC allocations first, then from donations.

Travel funds may not be used for program expenses.

## **Student Contribution**

Students traveling as part of their experience with the organization must pay 20% of their total travel. Co-pays will be paid before competitions.

All other competitions and events funded by the travel budget as outlined by the JFC Contract.

## **Unused Allocations and Donations**

Unused allocations will not roll over. In the event that a travel budget will not be needed due to COVID-19 related cancellation, an in-person meeting with the JFC committee can be set up to help make some of these funds available for use the following year.

Up to 50% of unused allocations under the operations budget may rollover to the following academic year in order to be used for long-term investments.

In order to request the rollover of leftover funds, the requirements outlined in the JFC contract must be met.

Unused donations must be used for long-term investments or other necessary expenses and will be considered income for the following year and will not be taxed again.

## **Funds Disbursal**

Reimbursements or purchase requests will be taken out of allocations first, then donations.

Food allocations are subject to change in light of COVID-19.

## Account Access

JFC will be granted stage 1 access to the Steel Bridge callink. Additionally, JFC will be notified when any donations are deposited into the Steel Bridge callink account.

## Breach of Contract

Monetary sanctions will be imposed for a failure to complete commitments to the Joint-Fundraising Committee.

- Failure to attend JFC retreat will result in freezing the team's JFC account until team leadership meets with JFC chair and obtains necessary information.
- Failure to attend a monthly ASCE-JFC meeting will result in a 3% reduction in total allocation
- Failure to provide necessary info sessions attendees will result in a maximum of 3 warnings per semester as outlined in the JFC contract. Furthermore, providing 60-99% of required attendees will result in 1 infringement and less than 60% will result in 2 infringements as outlined in the JFC contract.
- Failure to submit Callink statements or inform JFC of income or donations will result in freezing of JFC accounts until documents are provided.

As a part of JFC, Steel Bridge is also expected to contribute to the CEE Department and community, and failure to do this will result in a reevaluation of Steel Bridge's membership to JFC.

teams are pardoned from info sessions with their official competition dates spanning the durations of info sessions.

## Organization

### Description

The Steel Bridge team exists to introduce students to structural design and machine shop fabrication in a friendly and productive environment. We aim to teach students the basics of design principles, programs, and processes, augmenting what they learn in the classroom and providing a tangible application for this learning. In addition, we provide a hands-on experience that contrasts the highly technical and more theoretical work that our members experience in the classroom. The year-long process also imitates an industry-like project cycle from concept/design to construction and turnover.

The team is led by a Project Manager, who, with the help of an Assistant Project Manager, leads the four branches of the team. Each branch has a number of leaders who are responsible for the designated role of the Branch. While each Branch can perform its task on its own, the cooperation between the Branches is what has allowed the team to be so successful.

As a Civil Engineering Competition team at UC Berkeley, the Steel Bridge team falls under the CEE Joint-Fundraising Committee (JFC). As an organization that receives funding from JFC the team provides one member to sit on all JFC committees and participates in all JFC programs and fundraising activities.

### Project Manager

There will be a single Project Manager (PM) to lead the team with the authority to make all final decisions. The PM is chosen by the previous PM at the end of his/her term and will serve for a single year. Tradition has the previous Assistant Project Manager becoming the PM, as the position requires considerable experience. The PM will serve as the first of the team's two representatives on the JFC Board. The PM is responsible for managing all branches of the team through the determination of

team Leaders and the setting of goals, expectations and deadlines for each branch/division of the team. The PM will also work with the ASCE Executive team, the Joint-Fundraising Chair, the Undergraduate Advisor, and the team Faculty Advisor to ensure that all financial and resource needs of the team are satisfied. The PM will facilitate the Steel Bridge DeCal through which students will learn the basics of structural engineering design and analysis, the rules of the National Student Steel Bridge Competition, and the safe use of all shop tools.

### **Assistant Project Manager**

There will be a single Assistant Project Manager (APM) who is responsible for aiding the PM in the management of the team. The APM is appointed by the PM at a time that he/she deems appropriate. The APM will serve as the second of the team's representatives on the JFC Board. If the APM is not available to attend JFC Board meetings due to a scheduling conflict the Treasurer or other team member appointed by the PM and APM will serve in the APM's place. The APM will assist the PM in determining the team Leaders and the setting of goals, expectations and deadlines for each branch/division of the team. The APM will also serve as the head of the Business Branch of the team ensuring that all requirements set by the Joint-Fundraising Committee (JFC) and this Grant are met by the team. The APM will be in charge of at least one of the four main groups of the team in order to gain more bridge-specific leadership experience.

### **Business Branch**

The Business Branch of the team is headed by the APM and is responsible for ensuring that all requirements set by the JFC and this Grant are met. The Business Branch will include the Treasurer, the Social Chair and team representatives for all the JFC Committees.

### **Treasurer**

The Treasurer will be responsible for managing the team's budget through the tracking of all spending and assisting team members in filing for reimbursements. The Treasurer is responsible for fulfilling any roles that are unable to be completed by any other member of the Business Branch.

### **Infosession Committee Representative**

The Infosession Committee Representative (ICR) will sit on the JFC Infosession Committee and represent the best interest of the team. The ICR will ensure that all tasks assigned by the JFC Infosession Chair are completed by the team through personal completion or delegation to other team members. The ICR will ensure that the team has its minimum number of members, at every Infosession; this will be done through advertising all Infosession to the team and reminding members to attend, if necessary the ICR will assign members to attend Infosessions.

The infosessions representative will also act as the The Career Fair Committee Representative (CFCR) will sit on the JFC Career Fair Committee and represent the best interests of the team. The CFCR will assist the JFC Career Fair Chair in the planning and management of the JFC Civil Career Fair. The CFCR will ensure that the team fulfills all volunteering requirements during the Career Fair.

### **Social Chair**

The Social Chair will be responsible for planning regular social events for the team. These events will be a chance for the team to get to know each other better outside of class and to bond so that we can work together better. The events will be inclusive and some will be funded by the team but not all.

### **Social Media Chair**

The social media chair will run all social media accounts for Steel Bridge, including Instagram, Facebook, and Tiktok. They will help share news about Steel Bridge and recruit new members on

social media. This newer method of communication will amplify Steel Bridge's voice and increase our presence in the community.

## **Pre-Fabrication Branch**

The Design Branch of the team is headed by the Pre-Fabrication Chair. The Design Branch is responsible for designing the optimal design for the National Student Steel Bridge Competition and producing shop drawings for the Fabrication Branch. The Design Branch will also teach team members how to use AutoCAD, SAP2000, SolidWorks, and any other software the team may choose to use.

## **Pre-Fabrication Chair**

The Pre-Fabrication chair will be responsible for serving as the communication channel between the design team and drafting team. They will lead the weekly Sunday design review meetings and provide technical support for all the new design/drafting leads. Furthermore, they will be responsible for being the final checkpoint for shop drawings to confirm they accurately reflect the design. This person must be skilled in both elements of the design and drafting sequence of the project cycle and demonstrate a comfortable level of proficiency in AutoCAD, SAP2000 and SolidWorks.

## **Design Leaders**

The Design Leaders will be broken down into multiple design teams, each with at least one Lead Designer. Each design team will be responsible for producing a design that satisfies all requirements put forth by the National Student Steel Bridge Competition Rules and the Design Branch Head. The Design Branch Head may choose to give each design team a type of design to produce (superdeck, over arch, under arch, etc.). The design teams will each host, at a minimum, two hours of design session(s) a week. Each design team can choose to hold a single two hour design session or two, one hour, design sessions depending on how they prefer to work. All design leaders will meet on a regular basis to share ideas and review the other designs making suggestions for improvements.

## **Drafting Leader(s)**

The Drafting Leader(s) will be responsible for managing their Drafting team in the production of all shop drawings after a final design has been chosen. The Drafting Leader(s) will work closely with the Design and Shop Leaders to ensure the chosen design satisfies all requirements and is able to be fabricated by the Fabrication Branch. The Drafting Leader(s) will hold weekly training sessions where they will teach their team how to use SolidWorks to ensure dimensions are satisfied and create shop drawings.

## **Fabrication Branch**

The Fabrication Branch of the team is headed by the Fabrication Chair. The Fabrication Branch of the team is responsible for producing the bridge during a project schedule as determined by the PM and APM.

## **Fabrication Chair**

The Fabrication Chair will be responsible for serving as the communication channel between the Davis Steel Shop and the Etcheverry Machine Shop. They will work closely with the PM in order to create a project schedule for the fabrication of each part of the bridge and for each fabrication team.

## **Davis Shop Leader**

The Davis Shop Leader is responsible for the production of bridge members and the management of the Davis Shop. The Davis Shop Leader will work with the Shop Staff to determine training sessions, working hours, and all ensure all equipment and tools are safe. The Davis Shop Leader will produce

and maintain a fabrication schedule that meets the fabrication deadline. The Davis Shop Leader will manage the Davis Shop Supervisors in the training of team members, hosting of shop hours, and quality control of bridge member production. The Davis Shop Leader will also manage the Welders or work with the PM and APM to appoint a Head Welder to manage the Welders.

### **Davis Shop Supervisors**

The Davis Shop Supervisors will host shop hours where they will train team members, and produce bridge members. Davis Shop Supervisors will be experienced team members that can assist team members and perform quality control on all work performed.

### **Etcheverry Shop Leader**

The Etcheverry Shop Leader is responsible for the production of all bridge connections. The Etcheverry Shop Leader will work closely with the Design Branch during the Fall Semester to design and test new/improved connections. The Etcheverry Shop Leader will produce and maintain a fabrication schedule that meets the fabrication deadline. The Etcheverry Shop Leader will manage the Etcheverry Shop Supervisors in the training of team members, hosting of shop hours, and quality control of bridge connection production.

### **Etcheverry Shop Supervisors**

The Etcheverry Shop Supervisors will host shop hours where they will train team members, and produce bridge connections. Etcheverry Shop Supervisors will be experienced team members that can assist team members and perform quality control on all work performed.

### **Welders**

Welders will be dedicated team members responsible for welding the bridge. The Welders will be managed by the Davis Shop Leader or a Head Welder as appointed by the Davis Shop Leader, PM, and APM. They will be required to take welding lessons from the Shop Staff and spend, at a minimum, two hours a week practicing welding during the Fall Semester.

### **Competition Branch**

The Competition Branch is headed by the PM or a qualified PM appointed person. The Competition Branch is responsible for the performance at Regionals and Nationals.

### **Construction Manager**

The Construction Manager traditionally is a team member that was previously on the build team. The Construction Manager will be responsible for selecting the construction team that will build the bridge in competition. Furthermore, this person will be responsible for coaching and training the members of the “Build team”. They will set up the build practice schedule and serve in liaison with the project manager in creating an efficient and effective construction sequence. They will also brainstorm innovative tools and ideas to be implemented in our construction sequence. Finally, they will also determine the load team.

Any team member can hold a Leadership position, and may hold more than one position at a time. The PM and APM will serve for one year but other positions can be held for more than one year.

See attached Organizational Flow Chart and Contact List for 2021-2022 UC Berkeley Steel Bridge team for current team Leaders. An organizational flow chart will be produced each year as leaders change.

## Risk Management

In order to ensure every member of the team has a safe and comfortable social experience with one another as well as the leadership team, the branch leaders of the officer board will host office hours bi-weekly in order to give members a chance to express their questions or concerns in a more intimate setting.

Risk management processes will be instituted to keep the team safe and healthy. Prior to social events, the project manager will set boundaries about what is and is not appropriate at the event. These boundaries will be discussed at meetings prior to the event and will also be stated in the event invitation, whether that be via an email, Slack message, or Facebook event. This will create open communication and ensure members feel comfortable at all times.

Furthermore, the Social Chair will be responsible for addressing concerns in terms of the social experience whilst on the team and with other team members. The Social Chair will be responsible for reporting any acts of defiance of serious misconduct to the APM and PM. If any of the team members sees anything inappropriate or feels uncomfortable in any way, it will be communicated that they can inform the Social Chair, APM, or PM to address the issue. The Social Chair, APM, and PM will set guidelines on how to respond to various situations at the beginning of the semester. If there is a serious concern where someone is being harmful to themselves or others, the PM will contact the appropriate university agencies.

To ensure that all members are safe from physical injury in Davis Shop, we will have rules and protocols on shop rules, how tools are used, and what training is required in order to use them. Every member of the team who participates in Davis Shop activities will be trained by Matt Cataleta or Llyr Griffith, shop staff who assist the team on fabrication activities, on proper shop procedures and how to safely use tools and equipment. All team members working in the shop will also learn the safety protocols of the Davis lab, so as to lower risk of injury and ensure a proper response in the case of one. Whenever members work in the Davis lab on Steel Bridge activities, there will be a lead, who is a returning member and who is very knowledgeable about the various Davis lab safety procedures. These leads will also act to help teach members how to stay safe in the Davis lab.

## Goals

### Recruitment

Recruitment, especially of young students, is essential for the continuation of success for the Steel Bridge team. The team will work to recruit and retain ~10 freshman or sophomore students that stick with the team throughout the entire year and become dedicated team members. To meet this goal, the PM, APM, and other available members will visit lower division CE classes such as CE92, CE60, CE70, etc, in the Fall and Spring semesters and make announcements about joining Steel Bridge. In addition, the team Leadership will present at ASCE meetings throughout the semester, post fliers, and speak at orientation to spread the word about Steel Bridge. The team will also grow its presence on social media, which we think will improve our recruitment. We plan to create a TikTok and Instagram account this year! The retention of members from last year is also important since we did not get to see a full project cycle and competition season. To reach these goals, we plan to have summer virtual socials and meetings to keep the members engaged in the team.

## Design

Starting out in the summer, the new designers will be required to complete a summer design project and turn it into the PM, APM and lead designers by the beginning of school in order to demonstrate proficiency in AutoCAD as well as familiarity with the AISC rules and interpreting them. The design of the bridge will take place during the fall semester. The team will begin with a few design teams each working on a separate design. The designers and other team leadership will eliminate one design during the last week of September. The designers will continue to work on the two remaining designs until November when the leadership will pick the final design. The designers will continue to optimize the final design until the end of November. On this date the design will be finalized and sent out to all designers, PM, APM, and shop leaders to check for tolerances and other issues during Thanksgiving break.

## SolidWorks

The SolidWorks team will spend the last few weeks of the semester and the winter break developing shop drawings for the fabrication team. The SolidWorks team will send out finalized shop drawings to the PM, APM, designers and shop leaders during the first week of January.

## Fabrication

Fabrication of the bridge will take place during the beginning of the spring semester. The final times table for fabrication will be determined once the date for the Regional Conference is given. The bridge will be completely fabricated 2 weeks before the AISC regionals.

For the past few years, fabrication of connections and the welding jig has significantly held up the overall fabrication schedule, so the goal for this upcoming year is to complete more Etcheverry shop training in the fall and be able to have more members trained and able to start connection fabrication much earlier.

We plan to continue to allow new members to train on the welding process and give them the opportunity to weld on the bridge if they demonstrate proficiency.

Another goal would be the formation and publicity of our project schedule to the whole team. Previously this has been something only looked at by senior members. But, the hope is by being more transparent in our scheduling and regularly updating the schedule if set backs are to come up, everyone can stay up to date on what is next to be completed and what the push is. To accomplish this, the PM, APM and Fabrication Chair will have bi-weekly meetings to manage to the schedule and publish it the following day to the entire team.

## Donation

The Bridge team will continue to bring in donations from non-JFC Fundraising companies. The PM will work with the Boeing Representative to maintain a relationship to promote future donations which we have previously received since before the inception of JFC. The team will also start fundraising through alumni and peers to hopefully increase donations and seek out other corporate sponsors.

## Grants

The Bridge team will apply for ESC funding in fall and spring semesters. The team will apply for these funding sources to help cover the cost to attend the Regional Conference and the cost of steel.

## Long Term Investments

### This year

- Replacing broken tools and cutters for connections - \$1000
- Tools for construction to increase efficiency - \$1000
- PPE for construction team - \$450
- team outerwear - \$500
- team bonding events - \$500
- EZ-tent for regional competition- \$300
- Folding camping chairs - \$250
- Banner, other recruitment things - \$500
- Protective member bags (for the steel members) - \$500

### 2-3 years

- Welder - \$7000
- Shipping Crates - \$1000
- team bonding events - \$1500
- Cold saw - \$10000
- Sander - \$8000

### Miscellaneous

- Emergency repair - \$100-\$3000
- Nationals travel - \$2000-\$3000
- Community Engagement materials (i.e. STEM outreach) - \$200

These long term investments will be paid for with saved-up funds in our callink from donations and any other unused money from other fundraising efforts. This year, Steel Bridge hopes to seek out new corporate sponsorships and increase participation in campus fundraising efforts.

## Affiliations

### CEE-JFC

That's you!

### Boeing

Boeing has been our sponsor for several years now. Their donation allows us to routinely save money for long term investments or for attending nationals. In return, we host their representatives approximately twice per year to show them what we are working on, and provide them with newsletters and competition t-shirts each year. We also put their logo on our shirts, poster, and any

other promotional materials.

### **Computer and Structures Inc.**

CSI provides the team with SAP2000 licenses every year so that the designers can use the program to perform analysis on our bridge design. We also provide them with newsletter updates each year.

### **SolidWorks**

SolidWorks provides the team with SolidWorks licenses to be used to turn the AutoCAD design into fabrication drawings each winter, and to train our members in the fall. We also provide them with newsletter updates each year.

### **Etcheverry Machine Shop – Jeff, Scott, Jacob, Dennis**

Each semester we are given 5 training slots to the mechanical engineering shop in Etcheverry Hall, which helps us make connections in the shop. This past year, since we were not granted access to Etcheverry Machine Shop, Jacob CNC'd all of our connections. The advice and help of the staff in Etch shop are also crucial to the successful bridge fabrication.

### **Davis Welding Shop – Matt Cataleta and Llyr Griffith**

Access to the Davis Welding shop is essential to our continued success as a team. We fabricate most of the bridge in the Davis shop, and all of our welding happens there. Matt Cataleta and Llyr Griffith, the two shop staff, are our main technical advisors, and we consult with them on all of our fabrication. Currently our expectation is that we have access to the shop for 10-15 hours per week, depending on the staff's schedules. It is expected that we always have a more experienced member who has been vetted by Matt and Llyr present during these hours to oversee the younger members. We also use a variety of the machines in the shop, and it is expected that we will use them safely and clean up after ourselves. In return, we allow the shop use of any of the team's tools and often our shop leads will also try to help them keep the shop in good order as much as possible. An interest for the 2021-2022 school year is to measure the feasibility of making all our connections in Cory Hall with the aid of Matt using the CNC machine. Since there is some uncertainty of this option, we will maintain our relationship with the Etcheverry Machine Shop.

### **Cruz Carlos**

Cruz helps us with connection testing every year, and he is a valuable technical advisor to the team. Helping us test our connections works towards our goal of increasing the knowledge transfer in Etcheverry shop, as well as the goal of having the best performing bridge, as our connections often give us a large advantage. Cruz is also a great supporter of the team and allows us to come speak to students in his classes, which helps us with recruitment.

### **Undergraduate Advisor**

Julia is crucial to the continued existence of the team. She helps us with all administrative aspects of the team, from the DeCal to travel arrangements and everything in between. She advises the PM, APM, and Treasurer for the most part due to their positions as the main administrators of the team. She is our main resource when we have any departmental or university issues, or for all things financial. In return, the leadership of the team often helps with admitted student tours, events, or other things as necessary.

### **Tracy Becker**

Professor Becker is our faculty advisor for the first time this year and is extremely excited about working with Steel Bridge. She helped us with our AISC Supplemental Competition submission this

year and when necessary we can also go to her for advice.

## **Contributions**

### **Representing the Department**

The team will represent itself and the Department at the PREP/T-PREP Presentations, Engineering Orientation at the start of the Fall semester, Homecoming in the Fall, Engineers Week in the Spring, and Cal Day in the Spring. In addition, team members will assist with welcoming admitted students as needed by the administration. Finally, every year (outside of this year due to COVID-19) the team volunteers at the Thousand Oaks Elementary Science Fair as a STEM outreach activity to foster a relationship with our community while representing our CEE department at Berkeley! This has been a tradition for many years and the students and teachers at Thousand Oaks love having us.

### **ASCE Membership**

Since Steel Bridge is no longer apart of an ASCE competition and many of our members are not civil engineers, we will not require them to become members of the Cal ASCE chapter and pay dues. However, the team leadership will advertise all ASCE events and encourage attendance and membership for our members, especially the CEE ones. The PM and APM will be Cal ASCE members.

## **Performance Review and Consequential Goals**

### **Fall Semester**

#### **Davis Shop**

Davis shop was led by 1 experienced senior as well as a few returning welders. Our leads ranged from returning juniors and seniors to first year leads, who were mainly sophomores. This was different from years past where the Davis team was almost entirely experienced seniors. The newer leads definitely stepped up to the plate and experienced leads helped them get there. We were unable to hold regular shop hours in the fall due to the pandemic. However, we would normally hold hours for where new members would come in and get trained, complete their fall project and even create new projects with the skills they learned in Davis Shop. There were a few informational sessions held virtually to help new members understand the work in Davis Shop. To help better prepare students to work in Davis shop in Fall 2021, we have been working with Matt and Llyr to set up outlined projects that students must complete prior to their use of certain materials and machinery. Through more rigorous training, students will be more knowledgeable and will be able to contribute more when fabrication starts in Spring 2022.

In the past, welding has been a very limited activity. Training on welding was reserved to more experienced members. Because of this, we lost many experienced welders after they graduated and it became too much work for just one or two welders. To combat this, we had welding training open to any member that wished to get trained after their preliminary Davis training. It was up to them to show up to shop hours and learn on their own time. Because of this, we had a few members excel very quickly and show a lot of dedication to welding. However, due to the strict hours set in Spring 2021, most students did not become proficient enough to weld on the bridge. We are excited for these

students and more interested students, especially 2nd year members on the team, to become welding experts in the Fall 2021 to be prepared to weld on the bridge in Spring 2022.

In addition, we have spearheaded a summer competition amongst the team to design a chair. Leads for 2021-2022 have been placed into three groups, and they are required to design, draft, and fabricate a chair. Each group consists of returning leads and new leads. This project is designed to have returning leads prepare new leads for the Fall 2021 when new members will be turning to them. It is also to promote a synergy between all subsets of our team to create a more cohesive bridge. The welders and Davis shop leads will be incorporated into the design process to ensure the chair can be fabricated. There is a welder in each team, so they will be practicing their welding skills in Fall 2021 to weld the chair. The chair will be judged by Matt and Llyr to promote friendly competition and have students inspire each other to continue growing into their potential.

### **Etch Shop**

One of our setbacks in the Etchevery machine shop this year was that we had very few experienced returning members and the shop was not open to students. Since we had only a handful of experienced returning members on the Etchevery machines, it was challenging to hand make connections on those older, more tedious machines in Davis Shop. Jacob from Etchevery Machine Shop was a great asset to our team this past year, as he made all of our connections on the automated machine in the shop. After going through this process and since this machine has been installed into Cory Hall, we are looking into having Matt from Davis Shop assisting and teaching us how to automate our connection fabrication. Because we are uncertain about the trajectory of these efforts, we intend on having 5 more students trained in the Etchevery Machine Shop for Fall 2021.

### **Design**

This year we had five returning designers who worked on iterations of an “arch-bridge” after deciding that the faster construction speed was not worth increased deflections. Each design time presented their progress to the team every week until we chose our final design. Because of this collaboration, we were able to frankenstein together a bridge with elements from the design of different mini-teams and send it to the drafting stage in November. Furthermore, by focusing on one type of bridge earlier on we were able to optimize more than usual.

We held AutoCAD and SAP2000 workshops for our new members where they had to complete assignments that demonstrated their proficiency. These workshops have successfully been continuing for multiple years. Although design hours were readily available, we still struggled to get new members to show up to these hours, especially since it was all virtual. Part of this reason is probably because since design is so complex a lot of newer members are intimidated by the technical process. Our hope is to open it up more and make some sessions mandatory in the future like other workshops and assignments in order to facilitate a space where our members can easily learn and contribute to the design process. Drafting and fabrication leads will also be a part of design to promote communication and to determine constructability.

In addition, for the summer competition returning designers will walk through new design leads in their groups the ins and outs of AutoCAD when designing their chair.

## **Drafting**

This past year we learned from a lot of drafting mistakes from past years, so we were prepared and had a smooth semester besides a few slight hiccups. Drafting was not as challenging as previous years, since less pieces needed to be fabricated, using a modified bridge for the regimented schedule.

Our rising drafting leads are passionate about creating a more applicable training program that makes it easier for new drafters to work on the bridge. They have already started working on it this summer. One aspect of the summer competition is centered around helping first-year drafting leads gain more experience with SolidWorks, so each drafter is required to submit a drawing of the chair to prepare them for Fall 2021.

## **Spring Semester**

### **Fabrication**

During fabrication the Davis shop leaders will continue to assign teams of students specific bridge members so they will be involved in every aspect of the fabrication process. This will help free up the shop leaders to focus more on quality control, ensuring that each piece is perfect. This model has been used with relative success the last two years and we hope to continue improving on it. Through the set projects in the Fall, students will also be better prepared to contribute to the fabrication of the bridge. In addition, this upcoming year we are adding a separate lead to manage the welding, rather than one person managing the welding and the cutting of steel. A list of weekly goals will also be created at the beginning of the semester to create deadlines. Extra materials will be ordered to cut down on the number of delivery costs. The extra material will be used in the event of a mistake.

Fabrication this year was different due to the last minute modification of the rules from AISC. Since the deflection was not going to be measured, we modified our bridge from the previous year to fit the specifications. Because our schedule was more strict than normal, we created a regimented schedule for shop groups to follow. Working with our old bridge proved to be more challenging than expected because the designers who designed it graduated, so our design leads had to think through each piece when modifying the bridge and when helping Davis shop leads fabricate the bridge.

In the past there was only one Davis Shop lead, and we learned that having an additional fabrication lead proved to be extremely beneficial. Two people were able to properly balance the workload and the pressure for the final steps in making the bridge.

For fabrication in Spring 2022, we are taking preemptive measures to better prepare students in the Fall to step up to the responsibilities when contributing to the bridge. We are also considering having a team doing weekly checks to double check each group's progress to ensure the maintaining quality and keeping up with the schedule.

Since Etcheverry Machine Shop was closed, Jacob from Etch was able to make all of our connections on the CNC, automated machine. For 2021-2022, beyond looking into making all our connections in

Cory Hall with the aid of Matt from Davis, another goal would be to get at least 2 people CNC trained in order to automate the connection making process more. By CNC-ing connections, it reduces the variation and tolerances and makes it so we have much smoother connections.

## Competition

Due to COVID-19, AISC hosted both a Supplemental competition for schools to compete in virtually and a From-Campus competition for those able to attend school in person this past year. The Supplemental competition consisted of a formal report for a proposed bridge design which fit the AISC SSBC guidelines. Additionally, we had to create a video to supplement this proposal. This virtual competition allowed all members to contribute to the report, and to work with faculty and other mentors as we sold our bridge design. To compete from campus, we had to submit a video of our timed construction run and testing to AISC.

For the regional competition, Steel Bridge at UC Berkeley won first place overall for the in-person competition, and first place for the Supplemental competition and video as well. This brought us to the National AISC Finals, where we won the Robert E. Shaw, Jr. Spirit of the Competition Award for deep enthusiasm for the competition and the support displayed for teammates.

This year, we plan to compete in-person again, but we are still waiting on confirmation from AISC. If there is another supplemental competition we will participate in that opportunity as well. We will be sure to follow all CDC and university guidelines if competition is once again in person. This could include but is not limited to only sending a few people from each class level so as to ensure knowledge transfer. If attendance is very limited, the bare minimum of people we require at competition is our build team, load team and the project manager.

## Other

Finally, the goal of more team bonding was incredibly successful last year and we aim to follow a similar approach this year. While interactive events are normally in person, and consist of general team meetings and socials such as karaoke, barbeques, and game nights. The switch to online interactions helped create a strong team bond between both old and new members. Typical events such as "Bridge Jeopardy" and game socials moved to Zoom and allowed members of all years to interact. The older members of the team tend to be a very tight knit group of friends that enjoy spending time together in and outside of bridge and class. This can be very uncomfortable for a new member who does not know everyone as well and ends up on the outside of the group. Because almost every meeting was online this year, there were equal interactions between members of all years and allowed for strong relationships and knowledge flow to occur. Additionally, now that most meetings will be back to in-person, the team has more planned activities that do not involve bridge where all team members are invited and encouraged to attend. Such activities will include going to eat together, play sports (Frisbee, soccer, football, basketball etc.), or attend Cal Athletic events. This will require dedication from older team members to remember to invite the younger members and make them feel included in the group. We need to make sure newer members don't have to wait until we go to competition to feel included in the team.

Additionally, this past year the leadership of the team had weekly meetings to touch base on goals, attendance, and any other issues. This worked out well so we hope to continue it. This should help integration between different facets of the team and ensuring the team as a whole knows the bigger picture of the year.

## Contingency Plan

In the event that the team is unable to fulfill its role in the CEE community entirely or is unable to fulfill our goals, we will accept the consequences of failing these commitments.

The team assesses its performance largely based on member retention and performance at competition.

Member retention indicates that we are considered relevant by the student population, and that current members are happy as part of the team, which is very important to us. If we start to have fewer and fewer members, this should indicate to the team leadership that some changes are necessary for the continuation of the team.

If member retention becomes an issue for the team, the leadership should consult first with their advisors and other mentors to devise a plan to make the team more visible and attractive to students. Suspension is not particularly an option for a competition team, as the knowledge loss would be crippling, and the team would essentially be dissolved. Obviously, if too many team members leave, this will be grounds for dismissal of the team.

Performance at competition is also an important factor in the health of the team. While it is not reasonable to expect that we will always win at the competition, any structural failures should be immediate indicators that the team needs to restructure and regroup to address the issues that lead to such failures. Following the example of 2015-2016, this would require the team to be more cautious in the following years to prevent repeated failure, which would surely damage the member retention, knowledge transfer, and overall health of the team. If the team does not qualify for Nationals more than one year in a row, a small group should also be sent to the national competition just to observe the work of other schools and ensure that the knowledge of Nationals level bridges are not lost to the team. As stated above, suspension is not particularly an option for a competition team, as the knowledge loss would be crippling, and the team would essentially be dissolved.

Despite COVID-19 related cancellations and changes to regular competition, our team can continue to have a strong presence in the department and recruit/retain members. While not all new members last year got to see a full in-person project cycle, they were fully immersed in the virtual supplemental competition, and those on campus helped with physical aspects of the compete-from-campus competition. These are also the same students that will be in charge of the team in a few years. Knowledge transfer is very important aspect of making sure these students are prepared for the years to come and feel comfortable with the logistics and processes of this team.

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# Steel Bridge 2021 - 2022 Leadership

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<b>Construction Manager</b>
Kevin McEntee

<b>Fabrication Chairs</b>
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Zane Schemmer

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<b>Design Leads 1</b>
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Zane Schemmer
Jeffrey Cheng
Thomas Le
Sam Kim
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Titus Yuen
Bishal Nayak
Srishti Hazra
Rachel Lee
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Oswaldo Castillo
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Max Braunstein
Ankit Rastogi
John Strickely
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Max Braunstein
<b>Social Media Manager</b>
Srishti Hazra
Andrea Lopez

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