

A Guide to Safe & Successful Event Construction

Welcome to the guide for student construction projects! Our shared goal is to help you bring your creative ideas to life while making sure everyone stays safe throughout the process. This guide walks you through guidelines, helpful best practices and key steps for a successful build. Think of this as your partner in planning a safe and amazing event.

Project Timeline



Important Contacts

Here are some key people and dates to keep in mind as you plan and work on your project.

For Tool & Safety Training	Erica Crawford	ecrawfor@caltech.edu
For Meetings & Approvals	Erica Crawford	ecrawfor@caltech.edu
For Flammables Storage and General Fire Safety	Kim Yu	kim.yu@caltech.edu

For Cleanup & Deconstruction Extensions	Juan Balcazar and Joe Bennethum	juan.balcazar@caltech.edu jbenneth@caltech.edu
For Questions About Guidelines and Process	Erica Crawford	ecrawfor@caltech.edu

Our Core Safety Principles

Every part of a successful project comes down to three simple, important ideas. Keeping these in mind makes everything else fall into place.

- **Protecting Our Builders:** The top priority is ensuring everyone working on the project goes home safe. This comes from good training, using the right gear, and looking out for one another.
- **Building a Sound Structure:** We want your creation to be stable and strong! Following proven building specs ensures your structure is safe for everyone to enjoy.
- **Caring for Our Community:** A great project is also a good neighbor. This means keeping our shared spaces, especially emergency paths, clear and safe for the entire community.

Guidelines for Platforms

For a sturdy and safe platform, please follow these guidelines:

These building guidelines are general in nature and not intended for permanent construction.

- All raised platforms will be no more than 4' in height from the lowest ground level and include guardrails around the perimeter (top rail at 42" and mid rail at 21"). Stairs should have handrails.
- DJ stands/booths must be at existing floor height.
- All steps are to be 7" maximum, minimum 4".
- All treads shall be closed to eliminate trip hazard.
- Platforms shall be supported by 2X4's and/or 4X4's no more than 4' on center.
- Platforms shall have a continuous 2X4 supports running along the entire perimeter of each section.
- Platforms shall have cross bracing of a "X" style on no less than 2 sides of each section.

- Decking shall be 3/4" plywood or OSB board.
- OSB board shall be replaced every 3 years or if it gets wet.
- Exterior Plywood shall be replaced every 5 years.
- All exposed surfaces shall be painted.
- All platforms shall be inspected before any sections are covered or hidden from view.
- Decorative Wall boards may be added along the perimeter as desired.
- Wall boards must have approved supports.
- All finished structures shall be inspected before use.

Responsibilities of the Construction Coordinator

The Construction Coordinator is the team's leader for safety and communication. Their role is to help the team succeed by:

- Attending the construction review and approval meeting before starting construction.
- Keeping the construction area clean and safe while the event is under construction and after construction has finished.
- Ensuring that exits, exit pathways and all means of egress are maintained clear at all times prior, during, and after construction.
- Ensuring that personal protective equipment is available and worn, e.g., safety glasses, hearing protection, and closed-toe shoes.
- Ensuring that all tools are put away/stored appropriately when work is not actively being done on the construction project.
- Ensuring that any extension cords are rated for the needed current and for outdoor use.
- Checking to make sure all electrical cords are unplugged when not in use and are in good condition (e.g., cords are not cut, ground prong is not missing).
- Confirming that nails, screws, sawdust, and other debris are swept/picked up daily during and after construction.
- Making sure all wood beams, planks, and scraps are stacked neatly and do not obstruct any walkways or egress pathways. Tarps should be available to cover the construction site in case of any inclement weather.
- Preventing issues with painting by taking the appropriate steps to avoid spills/damage to the house/courtyard. Paint and painting supplies should be sealed

and stored when work is not being done on the project. Any paint damage will be charged to the house.

- Any paint waste shall be disposed of as hazardous waste by creating a facilities work order for Environmental Health and Safety.
- Monitoring construction schedule and enforcing quiet hours. Construction should stop after quiet hours, and the quiet hour policy applies to noise due to construction. The quiet hour policy states: *Noise should always be kept at a reasonable level. The institute has quiet hours after 12AM Sunday through Thursday and 2AM Friday and Saturdays.*

Please note: Failure to maintain a safe and clean construction site will result in fees based on the labor required to clear the area. The House will face delays if the construction area is not clean and safe.

Key Steps for a Safe Project

Here are the most important steps to build a foundation of safety for your project.

Keeping Pathways Clear for Safety

In an emergency, every second counts. That's why keeping escape routes clear is one of our most critical commitments. An egress path is any route from a dorm room door all the way out to an open area.

- **Keep Exits Clear:** It's essential that all building and dormitory exits are completely free of tools, materials, or any other obstructions.
- **Maintain a Clear Walkway:** To ensure everyone, including emergency responders, can move freely, please maintain a clear path of at least **44 inches** from every building exit to the courtyard's main exits.
- **Prevent Trip Hazards:** Utilize cable trays or tape to keep cords down and minimize trip hazards.

Getting Trained & Staying Protected

- **Training First:** To make sure everyone knows how to use the tools safely, each student builder should complete the one-hour tool and safety training before starting.
- **Gear Up for Safety:** Using Personal Protective Equipment (PPE) is a straightforward way to prevent injuries. Please make sure everyone on site wears safety glasses and closed-toe shoes.

Building a Stable & Sound Structure

Here are the technical specs to help you build a structure that's both impressive and safe.

Thoughtful Structure Placement

- To ensure everyone's safety, the final structure should be placed where it doesn't narrow any required egress paths. This will be part of the initial design review.

Hardware and Connections

To ensure all structural connections are strong and safe, please follow these hardware guidelines.

- **Drill Pilot Holes:** Always drill pilot holes before inserting screws or bolts. For screws, a pilot hole prevents the wood from splitting; for bolts, it ensures a snug fit without damaging the wood. A **1/8-inch** drill bit is a good, general-purpose size for most common wood screws. For bolts, the pilot hole should match the diameter of the bolt (e.g., a 3/8-inch hole for a 3/8-inch bolt).
- **Use Bolts for Legs:** When attaching support posts (legs) to the platform frame, always use through-bolts with washers and nuts. We recommend using bolts that are at least a **3/8-inch in diameter** for a secure connection.
- **Avoid Screws for Structure:** Do not use screws for attaching structural components like legs or cross-bracing. Utilize bolts to connect platforms together at the edges. While screws are excellent for attaching decking boards, they are not designed to handle the sideways forces (shear forces) that support posts endure.

Using Fabrics, Tarps, and Decorations Safely

To ensure a fire-safe event, it's essential that decorative materials do not contribute to fire risk.

- **Check the Tag:** All fabrics, tarps, and plastic sheeting used as part of the event's decoration or structure must be certified as flame-retardant. Before you buy or use a material, check for a tag or label stating it passes the NFPA 701 test, a common standard for fire resistance.
- **What to Avoid:** Do not use standard, untreated plastic sheeting (like painter's tarps) or fabrics that do not have a flame-retardant certification as part of the final event setup. These can ignite easily and spread fire very rapidly.
- **A Note on Construction Tarps:** Standard, non-flame-retardant tarps (like a typical blue tarp) are perfectly fine to use for covering your materials or the construction

site from rain **before** the event. However, these tarps must be put away and cannot be part of the final decoration or be left out **during** the event itself.

Best Practices for Site Management

A happy project is a clean and organized one. These practices help things run smoothly and show respect for our shared spaces.

Critical Fire Prevention

- **Grills and Ignition Sources:** We know that weekly house grill nights are a great tradition. To keep this tradition safe during construction, the grill must be kept at least **15 feet away** from the construction site and the finished wooden structure. This distance also applies to other heat sources like space heaters or smokers.
- **The Dangers of Daisy-Chaining:** Plugging one extension cord into another (daisy-chaining) can cause them to overheat, creating a serious fire hazard. Please use a single, heavy-duty extension cord that is long enough for the job. If you need more outlets, plug a power strip with a built-in circuit breaker directly into the main extension cord or utilize a spider box. All temporary sources of power, including power strips, must be unplugged at the end of the day.
- **The Flammability of Sawdust:** Daily cleanup of sawdust is more than just being tidy—it's a critical fire prevention step. Fine sawdust is highly combustible. When suspended in the air, a cloud of sawdust can be ignited by a single spark (from a tool, a faulty cord, or a nearby grill) and flash over in an instant, similar to grain dust in a silo. Piles of sawdust on the ground can also act like tinder, allowing a fire to spread quickly.
- **Fire Extinguishers:** Locate the nearest institute-supplied fire extinguisher before you begin work. It's important to make sure the extinguisher remains visible and accessible throughout your project. The Construction Coordinator should confirm its location with a staff member and ensure everyone on the team knows where to find it and how to use it in an emergency.

Keeping a Clean & Organized Site

- **Tidy Up Daily:** A quick cleanup of all wood scraps, nails, screws, and especially sawdust at the end of each day keeps the site safe and ready for the next day's work.
- **Use a Shop Vac:** For the most effective cleanup, especially for fine sawdust, using a **shop vac** is highly recommended. It captures the small sawdust particles that a

broom leaves behind, which significantly reduces the fire risk and keeps the air cleaner. It is also the best tool for picking up small hardware.

- **Tool Care:** Putting tools away and unplugging cords when you are done protects the equipment and prevents accidents. Be sure to avoid leaving tools out in the rain or other inclement weather.
- **Painting Pointers:**
 - **Timing:** It's often much easier and faster to paint individual pieces of your project *before* final assembly.
- **Safety:** A smooth coat of paint on railings, steps, and platform surfaces is the best way to prevent splinters.
- **Storage:** All spray paints and solvents must be checked into the institute's flammables storage program when not in active use. For details on this process, please contact Kim Yu at kim.yu@caltech.edu.
- **Cleanup:** To avoid accidental spills, it's helpful to seal paint cans when not in use. For disposal, simply request a hazardous waste pickup through a facilities work order

Wrapping Up: The Cleanup Process

- **Deadline:** There's a one-week grace period after your event to clear the site.
- **Need More Time?:** If you need an extension, just reach out to Juan Balcazar and Joe Bennethum *before* the deadline.
- **Completing the Job:** Ensuring the cleanup is done on time avoids having outside contractors handle it at the expense of the house.

Pro-Tips from Students & Staff

Building Tips

- **Use the Student Shop:** Don't forget about the Caltech student shop! It's a valuable resource with access to better and more specialized equipment than what might be available in the houses. Using tools like a table saw or drill press from the shop can significantly improve the quality, accuracy, and efficiency of your build. Additionally, the shop has a flat, level floor, which is a major advantage when assembling your platform frames. It helps you build everything square and level, especially if you're working with slightly warped lumber.
- **Plan for Even Stairs:** Planning your platform height to be a multiple of your step height (e.g., 28 inches high for four 7-inch steps) can save you a lot of

trouble. It helps ensure your top step will be perfectly level with the platform floor.

Hardware Tips

- **Why Bolts and Nails Are Better Than Screws for Shear:** When a platform has weight on it, it creates a sideways force, called **shear force**, on the hardware connecting the legs and frame. Screws are brittle and can snap under this force, while softer nails and bolts will bend, making them safer. For heavy connections like legs, **always use through-bolts and utilize washers with bolts for easier removal**. For sheathing, **use nails**.
- **Avoid Stripped Screws:** To avoid the frustration of stripped screw heads, consider using **Torx or Star drive screws** (a common size is T25). The star shape allows the driver bit to get a much better grip than a Phillips head, making them easier to drive. Also be sure to use outdoor rated screws to avoid rust.

Cleanup & Safety Tips

- Folks sometimes walk barefoot in the courtyards, so it's super helpful to be extra careful with sharp objects. A **magnetic broom** works wonders for finding stray nails. To request use of a magnetic broom, please submit a Facilities Services Request to Student Housing, and Housing will schedule delivery and pick up with you.

Resources

- **Suggested construction design software:** Solidworks, Fusion360, Onshape
- **Purchasing tarp/black plastic:** Stores like Home Depot and Amazon would be good to check for tarp and/or black plastic.
- **Where to get pre-cut stairs:** Home Depot sells precut stair stringers and stair treads.
- **Student Shop:** The student shop at Caltech has a variety of tools available for student use. Those interested in the student shop should follow the below link for the sign-up form: <https://caltech.sharepoint.com/sites/CaltechStudentShop>

Daily Construction Site Cleanup & Organization Checklist

General Site Safety

- ☐ Exits and exit pathways are completely clear (at least 44" wide).
- ☐ No tools, wood, or materials block walkways or emergency routes.
- ☐ Fire extinguisher location confirmed and remains visible/accessible.
- ☐ PPE (safety glasses, closed-toe shoes, hearing protection if needed) is available and worn.

Debris & Waste Removal

- ☐ All nails, screws, sharp objects, and hardware picked up.
- ☐ Sawdust swept or vacuumed (shop vac preferred for fine particles).
- ☐ Wood scraps stacked neatly away from walkways.
- ☐ Magnetic broom used to catch stray nails/screws (if available).
- ☐ Trash and recyclables disposed of in proper bins.

Tools & Equipment

- ☐ All tools unplugged and stored properly when not in use.
- ☐ Extension cords checked for damage and unplugged at end of day.
- ☐ No "daisy-chained" extension cords in use.
- ☐ Power strips unplugged when work is done/end of the day – No temporary power shall be left plugged in overnight.

Painting & Hazardous Materials

- ☐ Paint cans and solvents sealed tightly when not in use.
- ☐ Flammable materials stored in designated flammables storage.
- ☐ Paint waste disposal requested via Facilities work order if needed.
- ☐ No spills, drips, or paint left exposed on walkways or surfaces.

Fire Prevention

- ☐ Grill, heaters, or other ignition sources are at least 15 ft away from construction area.
- ☐ Sawdust and wood dust cleared to prevent fire hazard.
- ☐ Tarps used only for weather protection (not left as part of final structure).

End of Day Wrap-Up

- ☐ Site free of hazards (sharp debris, spills, loose cords).
- ☐ Tools and hardware neatly stored.
- ☐ Tarps secured over materials if bad weather is expected.
- ☐ All exits and egress pathways are cleared.
- ☐ Quiet hours observed (stop work after midnight Sun–Thu, after 2AM Fri–Sat).

Construction Coordinator Sign-Off: _____ Date: _____