**Sustainable Design Process**

Cal Poly has developed an approach to the design of new buildings to ensure that sustainability is a top priority.  This process starts during programming and carries all the way through startup and commissioning.

**Program Development**

The first step in design and construction of a new building is programming.  This process answers the basic questions necessary to define a building project:

* How many classrooms, labs, and offices are needed for the academic programs that will be housed?
* How much square footage is needed?
* How will spaces be used and how will instruction take place?
* How are spaces, areas, activities, groups, and traffic flows in the building related?
* What are the building's equipment and technology needs?
* What are the building's environmental requirements?
* What are the building's utility needs and where are campus utilities available?
* What are the project goals and performance requirements?
* What are the characteristics of the site?
* What is the project budget?

The program is developed by an Architect working in conjunction with Facilities Planning and the client – the academic and/or administrative department(s) that will occupy the building.  This process is very interactive and the end result is a set of documents that describe the building project in enough detail to ensure that the academic program needs will be met, the necessary spaces will be built with the required functionality, and the project requirements and budget will be clearly defined.  Once the program is completed, the project may advance to detailed design, starting with selection of the design team.

**Selection of Design Team**

**RFQ/RFP:**  Design consultants, frequently referred to as the A&E (Architecture and Engineering) Team, are solicited by RFP (Request for Proposal) or RFQ (Request for Qualifications).  The design team is usually led by an Architect, who puts together a team of subconsultants which include a Mechanical/Plumbing Engineer, Electrical/Telecomm Engineer, Structural Engineer, and Landscape Architect.  Depending on the unique needs of a project, additional design specialists may be brought in to address issues such as acoustics, interior design, lab design, theatrical or special lighting, and sound systems.  In Cal Poly's RFQ/RFP, respondents are asked to provide information regarding the design team's qualifications, education, experience, and portfolio of completed projects.

**Interview/Presentation:**  Upon review of A&E submittals to the RFQ/RFP, a short list of the most capable firms is invited to campus for interview by the selection committee, and is given the opportunity to give a presentation about their firm's capabilities and accomplishments.

**Selection Committee:**  The selection committee, comprised of staff from Facilities Planning, Facility Services, the Procurement Services Office, and the client then select the design team that best meets the project needs.  Selection Criteria:  Besides the usual knowledge, skills, and relevant project experience, selection criteria include sustainable design philosophy, design innovation, and demonstrated ability to achieve high levels of energy and water efficiency, and LEED certification.  Once the design team is selected, one of the first steps in the design process is the Sustainability Charrette.

**Sustainability Charrette**

The Sustainability Charrette is an intense brainstorming exercise that takes place at the beginning of the design process and involves all project stakeholders:

* The client including the Dean, Department Heads, faculty, staff, and students.
* The full design team of Architects, Engineers and any specialty consultants.
* Facilities Planning including the Project Administrator and Project Manager.
* Facility Services including the Executive Director, Sustainability Manager, Project Managers, skilled trades, custodians, and landscape services.
* Environmental Health and Safety.
* Information Technology Services and Media Distribution Services.
* The Program Management firm (if needed for large projects).
* The Construction Management firm (for CM at Risk projects).
* The Commissioning Agent.

**Process:**In the Sustainability Charrette, the various stakeholders exchange ideas and brainstorm issues related to the project requirements and programmatic needs, design process and methodology, structural systems, energy systems, materials, and construction methods.  The Charrette is an opportunity for outreach and education so that building users will understand the design, construction, and life cycle cost implications of their space and program needs.  Conversely, designers become more aware of the University's priorities, requirements, and campus standards.  Options for the building shell, structural system, heating, cooling and lighting systems, plumbing systems, materials and finishes, and other design details are considered and evaluated, and reduced to a short list (typically about 3 different designs or types for each major component or system).  These options are then more fully modeled, analyzed, and evaluated during the detailed design process.  Building components and systems are evaluated based on sustainability criteria such as energy efficiency, water efficiency, use of recycled, rapidly renewable, or local materials, life cycle cost, constructability, ease of use and maintenance, durability, toxicity and health impacts, indoor air quality, and emissions of environmental pollutants and greenhouse gases.

**Goals and Metrics:** Design goals are established with metrics for energy efficiency, water efficiency, use of recycled materials, diversion of construction waste, and other criteria based on the USGBC LEED Rating System, California Title 24 Energy Efficiency Standards, ASHRAE 90.1, and Labs21.  An initial run through of the LEED checklist is performed to ensure the project can achieve LEED Silver certification or equivalency, or higher.

**Outcomes:** At the completion of the Sustainability Charrette, the various stakeholders have all gotten a "big picture" view of the project, established contacts will all members of the team, and has an understanding of roles, responsibilities, and dependencies.  The design team will have narrowed their focus to a few design options and will have a clear understanding of the desired building performance criteria, along with a set of metrics to track progress toward sustainability goals, such as those for the [Rec Center Expansion Project.](https://afd-test.calpoly.edu/sustainability/docs/LEED/Rec_Center_Sustainability_Charrette.pdf)

**Campus Standards**

Based on lessons learned from many years of operation and maintenance of campus buildings and infrastructure systems, Cal Poly has developed [Campus Standards](https://afd-test.calpoly.edu/facilities/campusprojects/Cal%20Poly%20Campus%20Standards.pdf) for a wide variety of building materials, components, equipment, and systems.  In some cases, these standards set performance requirements that can be met by competitive bid.  In other cases, standards require a particular product, system, or vendor be used to maintain consistency with existing campus systems.  These standards seek to avoid problems like having a new building with paper towel dispensers that don't fit the paper towels used by Custodial Services, or having to stock a large number of unusual size light bulbs or lamps.  Standards exist for door locks, building automation control systems, electrical switchgear and service panels, plumbing fixtures, irrigation controls, and many others.

**Project Review Procedure**

Cal Poly seeks to make the design process very collaborative and interactive, using an integrated design process that strives to produce a satisfied client, a project that is delivered on time and under budget, and a high performance building that is functional, flexible, efficient, attractive, and sustainable.  To accomplish this, a [Project Review Procedure](https://afd-test.calpoly.edu/sustainability/docs/Capital_Project_Review_Procedure.docx) and a [Project Review Matrix](https://afd-test.calpoly.edu/sustainability/docs/Capital_Project_Review_Matrix.xlsx) have been developed to ensure that all stakeholders have the opportunity to be involved, review plans and specifications, and provide input to the design team.  Furthermore, the design team is required to track all comments received from the project stakeholders, and [report on the status of every comment at each stage of design](https://afd-test.calpoly.edu/sustainability/docs/Project_Review_Comment_Log.xlsx) – whether it was able to be incorporated in the design, or why not.  While this process is time consuming on the part of both reviewers and designers, it has proven to produce a more focused design, identifies problems earlier when they are easier and cheaper to resolve, before beginning [Cal Poly's Offical Project Inspection Procedure](https://afd-test.calpoly.edu/sustainability/docs/Inspection_of_Maj_Cap_Proj.docx), which results in better budget control and reduced change orders during construction.

**Commissioning**

Commissioning is a highly detailed process of inspection, testing and documentation that is intended to ensure that buildings and systems are functioning properly and meet or exceed the designer's performance requirements.  A [Certified Commissioning Agent](http://www.calstate.edu/cpdc/ae/gsf/documents/commissioning_guidelines.pdf) is a key member of the design and construction management team, and is involved beginning with the Sustainability Charrette, throughout design and construction, during startup and testing of the building, and for the first year of operation.  The Commissioning Agent is hired directly by the University rather than the design team or contractor to avoid any possible conflict of interest.  The Commissioning Agent develops the OPR – Owner's Project Requirements, as well as a comprehensive set of commissioning specifications which the contractor and subs are required to follow.  These specifications include prefunctional and functional testing of building systems such as HVAC, lighting, fire/life safety, and building automation controls.  The specs require that systems are tested to prove their operation, with careful measurements taken of temperatures, pressures, flow rates, and status of equipment.  Sequences of operation are proven, and systems are tested in multiple seasons to ensure they perform properly in all weather conditions.