USGBC Natural Talent Design Competition

David Wollin, Brianna Luce, Patrick Garahan & Gregory Amon

A Lab
2:45
Neuenhofer

As a team, we are designing a LEED platinum building to be entered into the USGBC Natural Talent Design Competition. The goal of the competition is to develope plans for a sustainable and affordable building for elderly residents of the Broadmoor neighborhood in New Orleans, Louisiana.

2009-2010 AISC Steel Design Competition
RE-LIGARE INSTITUTE: Reconnecting Mind and Body

Walt Busch, Dago De La Rosa, Carl Fosholt, Jonas Houston, Jamie Jones, Vivian Lai, Melissa McKinney, Justin Schwaiger, Kalen Turner, Josue Urretia, William Wood & Charis Wu

D Lab
1:45
Dong

This competition challenges architecture students to design a public urban center dedicated to reconnecting people with their authentic selves, others, and nature. This new institution aims at stopping the enslaving cycles of unchecked production and consumption dominating our lives, by turning the attention and practice to "being" in its entirety and in all its rich dimensionalities. The project will encourage students to consider ethic, aesthetic, and critical issues facing contemporary civilization, vis-à-vis novel programmatic, technological, environmental, spatial, and phenomenological issues. Steel construction offers students great benefits in this endeavor, as it is ideal for multi-story buildings, quick delivery and assembly in congested urban environments, covering long spans without sacrificing flexibility and aesthetic lightness.

ARCE

ARCE

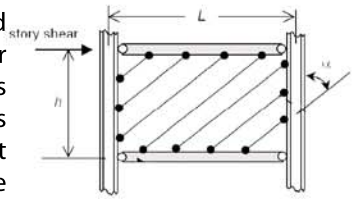
Senior Project Conference

June 4, 2010 12:00PM

Masters Project Proposal: Demand and Capacity Factor Design of Steel Plate Shear Walls

A Lab
12:45
Baltimore

Jonas Houston



A subset of Performance Based Design, Demand and Capacity Factor Design (DCFD) accounts for randomness in the design process. Current codes account for randomness such as a lateral systems configuration and behavior during a seismic event through the use of resistance factors. DCFD is more thorough method of predicting randomness in a structure because of the incorporation of confidence levels. The end result of DCFD is a quantitative and qualitative measure of how well a structure will meet a predetermined performance objective. The intentions of my study are to analytically assess the confidence levels arrived at through the DCFD of steel plate shear walls when paired against the collapse prevention performance objective.

Masters Project Proposal: Damping Capabilities of Shape Memory Alloy: The Transition from Small to Large Scale Usage

A Lab
1:00
Baltimore

Andy Alexander

This thesis will investigate the damping capabilities of shape memory alloys (SMA) for possible structural applications. A case study will be performed comparing the hysteretic behavior of a Nickel Titanium SMA wire to the hysteretic behavior of multiple Nickel Titanium wires bound together. The specimens will experience both linear-elastic and nonlinear-plastic static and dynamic cyclic loading. The case study will test the controlled sinusoidal response of the material. The intent of the case study is to determine the variance in energy dissipation between the set of specimens and issues that are involved with the increase in scale. To demonstrate whether the SMA wires could be applied to structures, a damping device will be constructed and tested against the normal building configuration. The case study and device testing results should provide engineers with material properties and parameters that could be used in the development of future damping devices for structures.

Masters Project Proposal: Recommendations on Retrofitting Masonry Infill Walls after the Haiti 2010 Earthquake

A Lab
1:15
Baltimore

Charis Wu

On January 12, 2010, an earthquake of magnitude 7.0 occurred in Haiti near the capital of Port-au-Prince, causing widespread damage. Because of the damage, there is now a need for reconstruction and retrofitting. Much of the residential construction in Haiti is done with poorly constructed masonry infill walls. This thesis will look at different options for retrofitting these masonry infill walls quickly, cost-effectively and with locally available materials and labor.

Interdisciplinary Capstone Project

E Lab
12:45
Mwangi

Rae Arizabal, April Cao, Carson Clay, Jenna Meath, Josh Plotner, & Elise Thelander

Our project was a part of the ARCE415 Interdisciplinary Capstone Project, where our group consisted of an ARCE, Architect, Construction Management, and 3 Landscape Architect majors in the USGBC Natural Talent Design Competition (2010). The intent of the competition focused on low-income residential housing for the Broadmoor neighborhood of New Orleans in which teams were challenged to design an approximate 800 SF home that achieved LEED Platinum status, ADA accessibility, structural resistance to hurricane winds of up to 150 MPH, and accommodation of the context of the Broadmoor Neighborhood, while remaining within a $100,000 budget. My team and I focused on retaining the cultural and historical precedents of New Orleans while establishing a current, post-Katrina identity.

Calcium Stabilized Adobe

B Lab
1:45
Baltimore

Anthony Palmas

Addressing the necessity for improved performance of adobe buildings in rural east Africa during floods, this investigation into the use of lime and cement additives seeks to enhance the engineering properties and overall durability of adobe blocks in effort to avoid the loss of countless hours of labor and the expense of having to repurchase material. Maintaining the affordability of the mixture was a primary focus and the project as a whole was designed to facilitate fabrication that could be easily replicated in this region.

ARCE

USGBC Natural Talent Design

Andrew Mayer, Lorenzo Leonard, & Serena Conti

E Lab
12:45
Mwangi

Our team of Architectural Engineers, Architects, Landscape Architects, and Construction Managers designed a hurricane proof building that is low cost, LEED platinum, and ADA accesible. It is compriosed of steel shipping containers elevated 10 feet on steel moment frames. The roof is half arched with corrugated steel and half sloped with a green roof. The building is located in New Orleans, LA. We will discuss the architecture of the building, the costs involved, and the structural considerations.

USGBC Natural Design Competition

Kevin Irwin, Caitlin Hickey, Shannon Minnis, Amy Chan, Simone Bundang & Kasey Trangsrud

E Lab
12:45
Mwangi

Our senior project is a competition entry to the US Green Building Council Natural Design Competition. The project goal is to design a small, single-family residence (approx. 880 SF) in the Broadmoor District of New Orleans, which was largely devastated by Hurricane Katrina. The house must be LEED Platinum Certified, have a budget of $100,000 or less, be seven feet above grade and be handicap-accessible (both ADA and Universal Design Considered). We designed all facets of the project as an integrated project team consisting of ARCE, CM, LARCH, and ARCH majors.

Integrated Project Delivery Studio: Dynamic Translucency

Princeton Cheng, Steve Davis, Nancy Lopez, Fernando Perez, Lorenzo Reynoso, & Jonathan Ondrejico

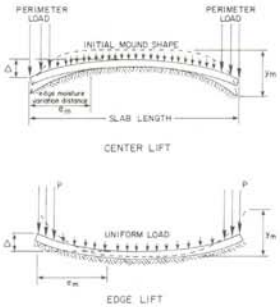
E Lab
12:45
Mwangi

Our senior project was part of this year's USGBC Design Competition. The competition involved designing LEED platinum affordable housing in the New Orleans Broadmoor district. Our team's concept was to create a house that not only completed all the competition requirements, but to stand out in terms of innovative design. Some of our innovations include translucent and movable partition walls, which lets the occupants feel like they're in a much larger space. With the team consisting of ARCH, ARCE, LA, and CM students, it allowed us to brainstorm creative ideas based on our different knowledge backgrounds.

Masters Project Proposal: Investigation of Post-Tensioned Slab-on-Grade Foundations

Nicholas Weeks

A Lab
1:30
Baltimore



Post tensioned slabs are used in areas with expansive soils to help resist the soil pressure on the foundation since post tensioned slabs have greater stiffness in comparison to conventional slabs and limitations occur during the design of more elaborate slabs. A significant simplification is the design procedure does not account for multiple soil-swell coefficients that occur due to differing depths of the foundations along its perimeter, which is especially critical in areas severely affected by frost heave. The outcome of this thesis will provide guidance to the engineering industry on the feasibility of using the PTI manual to successfully design foundations over expansive soils.

Portaledge

Andrew Oesterreicher & Jeff Thompson

A Lab
1:45
McDaniel

Our Senior Project was the design, construction, and testing of a portaledge used for rock climbing. Our goal was to create a new design based on previous designs that are currently commercially available. We wanted the portaledge to weigh less, and be more user friendly than ones currently available on the market. We tested many materials to come up with our final design. RISA was used as a computer model to help in our design and predict how the portaledge would act under loading. We tested a user load of 600 pounds on the portaledge in the high bay lab. Additional testing was done by actual use on a wall in Yosemite.

Bliss Dance

Selinda Martinez

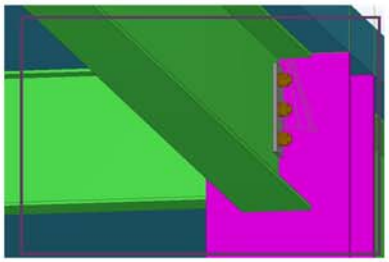
B Lab
12:45
Lynn

Bliss Dance is a 40ft tall, exposed steel sculpture of a naked woman dancing on one foot. She is composed of steel tubing and solid steel bars oriented in a truss-like fashion throughout. Bliss Dance is being constructed to début at this years Burning Man festival in Black Rock Desert, Nevada. After the festival, she will be transported back to San Francisco where she will be displayed indefinitely. The artist is an Italian born but California raised sculptor with over 20 years experience, Marco Cochrane. This is Marco's first attempt to build a sculpture of the scale and material that comprise Bliss Dance. My role was to design truss that she is made of as well as both a temporary base for the Burning Man festival and a permanent base for her display in San Francisco.

Tekla Structures: An Overview of its Usage and Capabilities

A Lab
2:15
Neuenhofer

Erika Peterson



While AutoCAD Revit has been established as the standard in 3D modeling and BIM applications in the structural engineering industry, it is not the only BIM solution available. This presentation will take a brief look at TEKLA Structures, a competing modeling program, examining the process of use and its utility in numerous fields of interest for structural engineers. Included areas will be modeling and detailing of steel and concrete, analyzing modeled structures, and interfacing with other BIM applications, as well as the industry's use of each.

Structural Engineering: Learning to Teach

B Lab
2:15
Brady

Sina Shakerian & Lindsey Finger

Whether you are accepted into the Architectural Engineering program as a freshman or a transfer student, knowing precisely what you are getting into is rare. Our daily lives are often governed by the buildings we occupy and the misplaced belief that we are always safe inside of them. Considering the average high school student has little to no knowledge concerning structural engineering, the value of producing a brief introduction to the Cal Poly curriculum seemed invaluable to incoming students. While we were mainly focused on what we wanted to teach others about structural engineering, the most insightful part of this experience was what we learned ourselves.

ASCE Charles Pankow Foundation First Annual Architectural Engineering Student Competition

B Lab
1:15
Brady

Andy Alexander

This project was submitted as part of the Structural Systems category of the AEI/ASCE Charles Pankow Annual Architectural Engineering Student Competition. The project was to renovate an existing historical warehouse to meet the requirements of a new medical clinic. The structure was required to serve as a tornado shelter during a storm. Additional goals of the project were to improve the "value, quality, efficiency, and performance" of the building. In the course of this project I researched methods of improving the tornado resistance of buildings. I will discuss my research, choices, and the changes that would be made if I were to redesign this same structure.

Zipline Design and Construction

D Lab
2:15
McDaniel

Trevor Oppezzo

This senior project consists of the design, construction, and analysis of a 1000ft zipline in the mountains of Northern California. Some challenges of the project included creating a clear path in a heavily forested area, mechanically prestressing a ½ inch cable to 3100 lbs, and the construction of two timber framed towers. My analysis is based on a static approach which assumes an inelastic cable and ignores the dynamic inertial effects of an accelerating point load. Given an assumed cable size, cable span, and elevation change as parameters, I produced a model that predicts the cable tension and length. I was able to conclude that for high initial cable strain, the effects of the accelerating passenger on the cable can be ignored. From a design perspective, this allows for a simple but accurate approach to zipline design.

Inventory of Non-Ductile Concrete Buildings in San Luis Obispo

D Lab
1:15
Lynn

Emmett Seymour

The construction of non-ductile concrete buildings in seismic risk areas of California was very common prior to the enforcement of modern seismic codes for ductile concrete in the mid-1970's. These buildings have proven to have poor seismic performance through the catastrophic failures seen in earthquakes over the last 15 years. The purpose of this project is to identify and gather information about these buildings in San Luis Obispo. This inventory will then be used to augment an EERI database of non-ductile concrete buildings in California cities.

ASCE Charles Pankow Foundation First Annual Architectural Engineering Student Competition

E Lab
1:45
Guthrie

Emily Carlip & Grace Rose

A multidisciplinary team of ARCE, ARCH, and ME students addressed the design considerations for a new medical clinic located in Tulsa, OK to support an underserved community within an existing cast-in-place concrete warehouse with masonry infill. Challenges included the design of a community tornado shelter and triage center, and use of sustainable materials and practices. At the AEI Student Conference in Kansas City, the Cal Poly team won second and third place in the Structural Systems and Building Integration categories, respectively.