

2017

## Sinatra Living: Facilities and Equipment

University of Nevada, Las Vegas. Solar Decathlon Team.

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### 3.4 Facilities and Equipment

There are several research facilities that will serve as excellent resources for Team Las Vegas:

The Center for Energy Research (CER, <http://www.cer.unlv.edu>) is a soft-money-funded operation that has performed a number of solar and renewable energy projects over the last 15 years. Included has been a project funded by the National Renewable Energy Laboratory (NREL) on the development of a zero energy house and its energy performance comparison to an adjacent code-built house. Both were monitored for five years. Currently the CER is the lead, in collaboration with Pulte Homes and NV Energy, on a large DOE-funded project on the development of a new housing tract (185 homes) that is designed to reduce the electrical energy peak demand by 65% compared to code built developments. CER also has a Solar Site that has two large high concentration (500X) PV systems, a number of solar and hybrid lighting systems, including a Sunlight Direct system, and a Façade Evaluation Facility. Lastly, CER has a wide variety of testing facilities related to PV and solar domestic water heating components and corresponding evaluation capabilities.

The Natural Energies Advanced Technologies (NEAT) Laboratory (<http://www.unlv.edu/labs/neatl>) was established in the summer of 2004 from a donation by the H.R. and E.J. Hay Charitable Trust with the intent to evaluate passive and low energy strategies for daylighting, heating, cooling as well as on-site water harvesting, treatment, and reuse. To that end, the NEAT Laboratory's mission is to pursue environmentally and culturally responsible design through the use of appropriate technologies. NEAT has an outdoor test area where prototypes permit investigation of the performance of green roofs, roof ponds, and thermal insulation materials. The outdoor test area also has a complete outdoor weather station. The lab's indoor facilities include the main laboratory space, a small office and graduate student work stations. It is equipped with a Heliodon (sun simulator) with digital video-recording capabilities.

There are several fabricating facilities in the College of Engineering and the School of Architecture that will be utilized by Team Las Vegas:

In the School of Architecture, the Craft Studio is a multimedia fabrication space equipped with a woodworking shop as well as cutting-edge digital fabrication equipment. The digital fabrication equipment includes one laser cutter, a Universal 25W. For three-dimensional sculpting and modeling, the lab has a CNC milling machine, and a 3D printer. The ShopBot PRS CNC milling machine is a three-axis milling machine, which can execute both two and three dimensional drawing file inputs. It also has a 4'x8' cutting bed and has been extensively utilized for architectural installation projects that are part of the curriculum. The 3D printer is the Dimension SST 1200es.

Also in the School of Architecture the David G. Howryla Design-Build Lab strengthens the school's ability in real scale building construction. Primarily to reinforce the ability to fabricate metal works, the Design-Build Lab is equipped with a PlasmaCam CNC Plasma Cutter, a Flux-core MIG welder and various metal-working tools. The students are able to perform two-dimensional computer-aided cutting on the 4'x8' bed of the plasma cutter on metal. The SimLab and the Design-Build Lab are adjacent to each other; they both share high bay space and 4 roll-up doors that open out into a gravel building yard large enough for on-site construction. Also sharing the building yard are the Structures Lab and the Natural Energies Advanced Technologies Laboratory (NEAT Lab). The Structure Lab has the same high bay space, which can serve as a clean space for material or components storage.

In the College of Engineering, there is a complex that consists of three rooms: a machine shop, a metals shop and a wood shop. The machine shop includes two milling machines, two lathes, a bench grinder, a wire wheel/deburring machine, and an assortment of small bench-top machines. The metals shop includes general use machines and equipment for supporting manufacturing and fabrication processes commonly found in manufacturing machine shops. The metals processing shop area includes a sixteen gauge finger brake, a twelve gauge power shear, a hand shear, two miller welding stations, a box corner notcher, a plasma cutter, two drill presses, two band saws, and a band saw blade welder. The wood preparation area has a ten inch radial arm saw, a twelve inch circular sander, and a six inch belt sander. The shops also house a five-axis HAAS CNC machine, a CNC turning center, and a rapid prototyping machine that have restricted-use access. There is also a large assortment of hand and power tools available for use in the shop or to be checked out to other labs.

- Contiguous to the College of Engineering shop is the Mendenhall Innovation Center, which couples entrepreneurship with design to enhance the student education experience. This fits in well with the Solar Decathlon for which innovation in design is needed and some of the new technologies have potential for commercialization. The Mendenhall Innovation Program is a resource available to Engineering Faculty and their Undergraduate Students for the purpose of enriching student experience in the commercialization of technology through exposure to independent "hands-on" activities. These activities are added to normal coursework to simulate the product conception, product design and product production processes required to successfully commercialize technical innovation. The laboratory space comprises 2,500 sq. ft. of space for general fabrication and project work, including an electronic testing and fabrication area, a computer-based design area, and space for undergraduate teams participating in national student competitions. Programs in the Center are underwritten through \$1 million gifts each from Dr. and Mrs. Robert Mendenhall and Mr. and Mrs. Fred Cox.

- The newest facility on the UNLV campus is the Science and Engineering Building. This is a state-of-the-art research and education facility that promotes an interdisciplinary environment with flexible laboratory space and integrated research areas. The machine shop is a 2,500 ft<sup>2</sup> facility staffed with a shop manager with 15 years of experience and can accommodate projects of significant size and diversity. Core equipment includes two four-ton cranes, a welding area, CNC milling machines, other standard mills, presses, cutters, and bending equipment, and rapid prototyping machining from 3-D CAD files.

- The last facility in the College of Engineering is the Perini Construction Engineering Laboratory that has 42 computers that are equipped with software related to construction engineering and management. The computers have scheduling software (Prima Vera, Sure Trak, and Microsoft Projects), estimating software (Heavy Bid, Quantity Take-off, Timber line), design software (AutoCad), and other Microsoft office software.