2017

**Sinatra Living: Team Las Vegas Proposal (Full Packet)**

University of Nevada, Las Vegas. Solar Decathlon Team.

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“An age-in-place home for today’s world.”
Team Las Vegas’ proposal offers a unique combination of technology and architecture, while maintaining a comfortable, diagnostic and safe environment. The central theme for this project is the design and construction of a house that can mediate the disparity between the realms of a comfortable age-in-place home and the harsh desert climate of Southern Nevada.

Innovative Design for the Mojave Desert
- Energy Efficient
- Water Conservation
- Passive Ventilation
- Optimized for both winter and summer

Independent Living Senior Living
- Orientation
- Security
- Independence
- Social Interaction
- Stimulation
- Integrated Bio-informatic systems
- Remote Monitoring

Team Las Vegas
University of Nevada Las Vegas
Solar Decathlon 2017
PI - David E. James, PhD, PE, NSPE
Objectives
For the DOE Solar Decathlon 2017 competition, Team Las Vegas proposes a housing prototype that seeks
to meet a rising regional and national demand for sustainable homes that offer safety, independence,
diagnostic capability and comfort to the elderly and disabled populations. The primary goals of this
project are to meet the physical and psychological needs of an aging-in-place market while
simultaneously creating a sustainable design for life in the Mojave Desert.

Description
To accomplish these objectives, Team Las Vegas is focusing on an interdisciplinary approach,
strengthening the empirical basis of design from the beginning of the project. The resulting design will
integrate smart-home and health monitoring technology with architecture and renewable energy to appeal
to both the target demographic as well as potential builders.

Methods
Team Las Vegas has identified several key principles for successful elderly and disabled design, each of
which were met with appropriate strategies:

- Careful attention to orientation and lines of sight
- Providing a safe and secure environment with the use of monitoring and diagnostic technologies,
screens and automated locks
- Offering a sense of autonomy through spatial design and deliberate furniture and fixture selection
- Spatial balance between public and private spaces
- Stimulation of both the senses and intellect with integration of social and activity spaces,
abundant landscaping, and daylighting

Developing an effective design for the harsh climate of the Mojave Desert presents its own unique set of
challenges which were addressed with their own relevant design approaches:

- Building orientation to maximize daylighting and minimize heating loads
- Use of bifacial photovoltaic panels for increased renewable energy production
- Separation of building skin and photovoltaic panels from core of house to prevent thermal
bridging, reduce heat loads, and allow for natural ventilation
- Overhangs, screens, and landscaping to create shade and prevent harsh direct light

Impact
It is the intention that the finished house will serve as a prototype for the integration of cutting-edge
monitoring technologies in conjunction with a modern understanding and approach to healthcare such that
it improves the quality of life of the resident. A permanent post competition location in the Las Vegas
Medical District or as part of the Downtown Project will expose the house to a multitude of visiting
medical professionals and entrepreneurs, showcasing the successful application of Team Las Vegas’
design goals to a national and international market.
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1. PROJECT OVERVIEW

Team Las Vegas is proposing a 21st century renewably-powered home that meets disabled and elder clients’ needs for safety, mobility, nutrition, monitoring and diagnosis. The home will feature strategies for active aging, and will be constructed on the UNLV campus and tested at the Solar Decathlon 2017 competition site.

Team Las Vegas’s design strategies are driven by quantitative evidence-based design in the scope of an aging-in-place demographic. In the United States, extended life expectancy and the aging of the large baby-boom generation, the 50 and older population will increase approximately 20% by 2030 to approximately 132 million. Though older adults are living longer and staying healthier, many eventually face the functional challenges of aging and disability as the incidence of chronic illness increases with age. The Medicare Current Beneficiary Survey (MCBS) data indicates 92% of older adults have at least one chronic condition and 77% have two or more. Similarly, by the year 2020, 19% of adults aged 65 and older will have limitations in activities of daily living (ADLs) and approximately 4% will be severely disabled (Administration on Aging, 2001).

Aging independently (aging in place) is significant to the older adult population as it affords better quality of life, saves resources, and results in better clinical outcomes than institutional long term care (Schwanen & Ziegler, 2011; Szanton et al. 2014; Marek et al 2005). However even with the potential to age in place, it is estimated that more than 15% of individuals residing in Nursing Homes (NHs) are placed there inappropriately (Spector et al 1996). Reasons for inappropriate placement include (a) public financing that favors NHs over alternatives, (b) state regulations that reduce viable options, and (c) lack of consensus on the best care setting (Marek et al, 2005). While functional challenges can compromise independence, the primary interaction between an older adult’s health and their surrounding environment present the greatest challenge to independence. The CDC (2012) suggests that aging in place is best accomplished with preparation that focuses on adaptation of physical space, modes of transportation and everyday facets of life prior to increased physical, cognitive, or functional need. While housing can be considered the linchpin of well-being for older adults, the current national housing inventory lacks basic functional and accessibility features, thus inhibiting older adults with disabilities from living safely and comfortably at home (Fernand, 2014). Given the current and predicted growth and complexities in the aging population, safeguarding that older adults have the appropriate home environment they need to ensure high-quality, independent, and financially secure lives has thus taken on new urgency on a national level. Thus, the quality of the designed environment has the potential to be innovative and integral to new technologies that may improve one’s health. The proposed UNLV home offers the ability to actively engage and monitor the user’s health, while still creating an ambiance of independent living. In today’s housing market, the design may resolve the need for actively aging populations to find spaces that support their lifestyles and allow them to continue living long, purposeful lives.

Team Las Vegas is is a multidisciplinary group of students and faculty from Architecture, Business, Communications, Engineering, Social Work, and Nursing & Allied Health Sciences.
This two-year effort will be integrated into several education programs, including the Solar and Renewable Energy Minor and Renewable Energy Graduate Certificates, the School of Architecture, and the Engineering Senior Design courses. In addition, industry support is provided through the Architecture and Engineering Advisory Boards, and through existing partnerships within industry and the past Decathlon endeavour. The final outcome of the project will be a home that is tested at the competition site, and brought back to Las Vegas for continued research by Nevada’s medical field.

2. TECHNICAL DESCRIPTION, INNOVATION, & IMPACT

2.1 DESIGN INSPIRATION

The conceptual design process has been inspired by the housing market demand for persons with disabilities and those aging-in-place. Specifically, meeting the physical and psychological needs of the steadily increasing retiree and elderly populations of Southern Nevada is the driving force of the design. It has become clear that as the population of this demographic increases, there will be a need for supportive, livable environments which integrate into society and offer occupants the ability to live safely and independently. With this in mind, the team has produced a conceptual design for a technologically advanced, comfortable, and adaptable home that enables its occupants to thrive in this challenging desert climate.

Inspiration was obtained from articles covering technological advances in home-based health care, as well as information about the unique climate of the region, the Mojave Desert. Merging these components offers an opportunity to address the design problem of consolidating the design response to hot summers and cool winters, with the need to accommodate the client population in a manner that addresses their needs for access, mobility, communications and safety.

Sustainable design renewable energy generation are integral in architectural design for the Mojave desert, where such practices can greatly improve function and comfort of the home. This is especially important for persons who might be house-bound in summer or winter seasons. In addition, smart home technology which allows the user to either have automated control or allow autonomous functionality will permit diagnosis and monitoring by medical professionals and family members. The integration of renewable and smart home technologies in such a manner that can improve the quality of life for the target demographic is a key aspect of the proposed design.

2.2 DESIGN APPROACH & DEVELOPMENT

Three primary factors came into play as the initial design proposal was developed; (1) the need for multidisciplinary resources, (2) meeting the needs of the target demographic, and (3) response to local climate. Team Las Vegas determined that an interdisciplinary approach which involves multiple academic disciplines, as well as local specialists, early in the design process would be essential to correctly address the design goals. Seamless integration of all the facets of the house including smart home technology, renewable energy resources, and demographic and climate-specific design strategies could only be accomplished by ensuring proper support and understanding in each category by the entire team. In this way, the design and functionality
of the home will greatly improved, bringing together passive design strategies and efficient active systems while also minimizing the energy loads required for the house to maintain a high level of thermal comfort.

In striving to create such a home, Team Las Vegas outlined several principles revolving around the needs of the target demographic to govern every decision. These serve as guidelines utilized to inform the design choices and ensure consistency of adhering to a vision of creating a functional, age-in-place home for current and future members of the elderly community of Southern Nevada.

The principles consist of:

- Attention to orientation and accessibility; effective and accessible circulation paths and lines of sight between spaces
- Promoting healthy living both physically and cognitively through responsive technology and a tangible connection to the outdoors
- Providing a safe and secure home in which residents feel protected yet independent.
- Establishing a home-like comfortable atmosphere with varying levels of privacy controlled by the occupant
- Encouraging social interaction through operable outdoor connections to the community and within the spaces of the home.

Incorporating these design principles while envisioning an innovative design for this target demographic in urban southern Nevada lends itself to a sustainable home that will be responsive, universal, and maintainable for residents of any physical ability. UNLV’s multidisciplinary approach will allow us to include modern technologies with digital fabrication and innovative construction that is original and effective with the desert climate.

Choosing design and construction elements that are well-suited for the harsh climate of the Mojave Desert will allow the finished house to be prepared for any potential condition therein, making the transition to any other location in the Southwest a seamless one. True to the nature of the competition, a key technique Team Las Vegas will employ will be generating energy through photovoltaic solar panels and solar thermal systems. This practice highlights building orientation as the foremost important design decision, as it must provide the most efficient solar angle for the greatest power generation to supply building operation requirements. Large overhangs and solar screens that offer cool shade, as well as an external shell that is elevated from the main living core, will decrease thermal bridging and decrease the overall heat gains on the building envelope. The glazing has been strategically arranged to control daylight entering the building, offering the benefit of natural lighting without the direct glare and heat of the desert sun. Indirect and diffused light entering through perforated screen walls on calculated areas of the facade in conjunction with clerestory glazing from the north will provide a sufficient amount of light for a favorable daylight factor within the living spaces.
2.3 TECHNICAL DESIGN APPROACH

The quintessential goal of a comfortable home is that it combines affordability with ease of maintenance and use. Tailored to optimize the well-being of elderly and disabled persons the house designed by Team Las Vegas will make this goal a reality though the use of integrated health monitoring technology. Collaborating with the UNLV School of Nursing and the Division of Allied Health Sciences and southern Nevada health care professionals, Team Las Vegas proposes to merge unobtrusive electronics with a comfortable lifestyle so that a user can independently live in a low-maintenance, energy-efficient home. In order to facilitate an ideal home life, the systems in house must be easy to setup and maintain. The bulk of the energy supplied to the power system of the home will not only be renewable, but readily accessible as well; supplied by an integrated photovoltaic system with grid backup. This efficient layout mapped in the architectural design would separate the house, creating a separation of public and private spaces by a module that houses mechanical equipment. Walls and flooring will need to be instrumented and provide access for maintenance and repairs. Furthermore, the modular, pre-fabricated structure will also consolidate other mechanical and plumbing elements involving the water storage & distribution, & solar thermal collection. In order to sustain and provide power for all healthcare systems integrated into the home, power generation and management and data management will be key. Screen technologies, motion sensors, and bioinformatics systems will require more power than an average home, and thus necessitate a larger than usual demand for renewably generated power.

2.4 MARKET VIABILITY CONCEPT

The investigation of market viability began with careful consideration of the current conditions of the city of Las Vegas and the surrounding valley. Contrary to its typical association as a resort town, in recent years Las Vegas has garnered much success as a leader in the field of healthcare. An advisory council of medical professionals was formed in 2013 to create a master plan with goals of expanding and revitalizing the Las Vegas Medical District. The scope of this initiative is broad, encompassing quality of healthcare, creation of jobs through both new facilities and educational collaboration with UNLV, and beautification of the district. In considering health care as a growing field in Southern Nevada, Team Las Vegas decided to design for the demographics which typically make the most use of these healthcare services, and examine how recent innovations can be integrated in housing to improve their lives. With this design target in mind, the choice was made to develop a house those looking to live out their later years in Las Vegas in health, comfort, and safety. The integrated health monitoring systems and overall adaptable health-promoting design are intended to appeal to a large but often overlooked demographic including retirees, and disabled persons of all ages with medical conditions that require assistance. It is the team’s belief that such a design could serve as a model by which elder and disabled persons can live higher level of dignity and quality of life, while assuring their safety and independence. The prototype is intended to be easily adaptable to suit both a range in needs as well as an individual’s changing needs through the years. In this way, it will serve a number of applications for both mobile persons and those with limited mobility in the southwest or similar climatic zones.
Adaptability of the house would be made possible by selection of the types of integrated smart home systems to suit each particular occupants’ needs, as well as a level of modularity in design allows for customizable spaces or additions to the structure. As the residents’ housing requirements change with age, additional modules could be added to accommodate them. Such additional modules could include an additional bedroom to house a caretaker, a module containing more advanced medical or health monitoring equipment, or even simply a spare room for additional workspace and storage. This feature also increases the marketability factor for builders, should the housing prototype go into production, as they would be able to offer multiple options and configurations to appeal to a wider range of clientele.

2.5 LEARNING FROM PAST COMPETITIONS

UNLV has preserved a significant portion of the critical knowledge and experience infrastructure that was instrumental to its Solar Decathlon 2013 successes. On this new project, engineering consultation has been present from the first iteration of the layout to better integrate with architectural concepts and simplify installation & servicing during construction. Lessons learned from the 2013 Solar Decathlon final report are being communicated to all team members. Principal lessons learned from the 2013 competition include a need to have better integration of engineered systems requirements with architectural design, a more cohesive management structure, an earlier start to fundraising, an improved accounting process to speed better environmental protection for materials during construction, a better integrated plan for selection and acquisition of interior furnishings, and both better shock isolation and improved trailer connections for transportation to the competition site.

2.6 DECATHLON HOUSE AFTER THE COMPETITION

There are several post-competition prospects for promoting the Solar Decathlon 2017 house as a model of renewable health sustaining design for seniors in Las Vegas.

- **The Las Vegas Medical District:** The Solar Decathlon 2017 house could be viewed by a wide range of medical professionals and potential clients in this designated center of innovative medical facilities and care. Las Vegas hosts numerous medical conventions and industry gatherings, through which the impact of the house could reach internationally as a model of the use of new and integrated healthcare technology in the home.

- **Downtown Las Vegas Redevelopment Area:** If located here, the Solar Decathlon 2017 house would be viewed by tourists as well as local innovators and entrepreneurs who call this area home. It could serve as a model to promote the more active lifestyle of modern seniors. Integration into a pop-up housing development is also a possibility with this project, which would encourage community and social engagement with different age ranges that other senior living opportunities can lack.

- **UNLV site:** Location at a UNLV site would allow Architecture and Engineering students to continue to monitor the performance of the structure and explore potential new technology and applications in ensuing years. Additionally, the house would be accessible as an educational opportunity for students in any relevant program (including Solar and Renewable Energy, Marketing, Computer Science, etc.), as well as local elementary and high schools.
2.7 CURRICULUM INTEGRATION

Due to the interdisciplinary approach Team Las Vegas has committed to applying to the design of the Solar Decathlon 2017 house, the opportunities for integration into UNLV’s curriculum and support from a range of local industries are plentiful. UNLV’s two-year effort will be integrated into several education programs, the most prominent being engineering senior design courses (supported by Fred and Harriet Cox), all degree programs offered by the School of Architecture (B.Arch., M.Arch., Interior Architecture, and Landscape Architecture), the Solar and Renewable Energy minor and Renewable Energy Graduate Certificate (both supported by NV Energy). Other disciplines upon which UNLV’s Solar Decathlon team will rely include Computer Science, Business (Finance, Marketing, Economics, Accounting), Construction Management, Graphic Design/Fine Arts, Hospitality, Nursing, Environmental Studies, Medicine, and Culinary Arts. In addition, industry support is provided through the Architecture and Engineering Advisory Boards, and through existing partnerships with regional industry leaders and professionals.

Integration into Existing Programs:
Team Las Vegas’ interdisciplinary approach for its upcoming Solar Decathlon 2017 entry provides many opportunities for integration into existing curricula across the university. Examples where there is a potential for relevant, high-impact learning include:

- The School of Architecture offers comprehensive undergraduate and graduate programs in architecture, as well as undergraduate programs in landscape architecture and interior architecture. The School is just starting to offer a new Master’s degree in Health Care Interior Design, which effective January 2016, will provide an educational experience that corresponds to the current state of professional healthcare interior design practice and the competencies needed to be recognized as a (AAHID) board certified healthcare interior designer. In the standard curriculum, a dedicated Solar Decathlon studio class will be offered in the Spring and Fall semesters of 2016 for the duration of the competition in which the majority of design and documentation will be managed and completed. This studio will enable interdisciplinary collaboration by combining multiple majors to enroll in the course.

- The College of Engineering’s senior design project serves as a capstone for students’ academic careers, requiring students to use their engineering education to create a practical, real world solution to an engineering challenge. The senior design experience is often multidisciplinary, making the Solar Decathlon effort an excellent option for student projects. As an example, civil engineering students evaluated the structural design for UNLV’s 2013 Solar Decathlon competition entry Senior Design Competition participants have recently focused on sustainability-related projects such as sustainable vertical farms, complete green communities for the United States and Iraq, electric car conversions and home metering systems. All these projects have helped the students develop a better understanding of sustainable issues and helped these young engineers understand the business side of their fields. The structural design team from UNLV’s Solar Decathlon 2013 entry DesertSol won first place in the 2012 Senior Design competition.
The Solar and Renewable Energy Minor and Renewable Energy Graduate Certificate Programs at UNLV provide students with the opportunity to learn about technical and social/policy aspects of renewable energy. The minor program and the Graduate Certificate in Renewable Energy offer two tracks, one in policy and one in science and engineering, specialized qualifications for career professionals in the energy industry, professionals from other fields seeking entry into the clean energy field, or currently enrolled graduate students seeking an added specialization. With their focus on improving the field of solar and renewable energy usage, both the Minor and Graduate Certificate programs inherently lend themselves to integration with the Solar Decathlon.

The College of Business programs in marketing, economics, finance, and accounting will contribute to the success of the team through curricular and co-activities. For instance, the Lied Institute for Real Estate Studies has advanced knowledge of the real estate industry and public policy of the region. This will be invaluable in determining the market viability of the house. In addition, the Center for Entrepreneurship is housed in the College of Business and interacts with units across campus to promote entrepreneurship in students.

The College of Urban Affairs offers programs in communications, journalism and media studies which will aid in successfully publicizing Team Las Vegas’s efforts to gain exposure and support. UNLV TV has relevant experience supporting student and faculty education and research efforts, while students and faculty of The Hank Greenspun School of Journalism and Media Studies are on the leading edge of appropriate use of media technologies for communication to the public.

The Nursing and School of Allied Health Sciences has several programs which can serve to strengthen Team Las Vegas’ entry in Solar Decathlon 2017. The Doctor of Philosophy in Interdisciplinary Health Sciences provides an innovative approach to healthcare research and responds to the growing demand to have an interdisciplinary focus to complex healthcare problems. The School of Nursing’s undergraduate nursing program has patient-centered care at the core of the curriculum. This project would fit well with upper division courses that focus on "Nursing Care of Older Adults" and "Population-Focused Nursing in the Community" and could be integrated as a capstone project.

Integration into Courses:
The Solar Decathlon will integrate into courses and curricula throughout all stages of the competition. A summary of some relevant courses which may contribute to the Solar Decathlon team is provided in Table 2.7. Participatory exercises and design projects can be integrated into existing required and elective courses in the standard curriculum, while special topics courses, experimental courses, seminars, independent study and research theses can be used for new topics and for research questions.

For example, many required courses in the School of Architecture’s curriculum already explore facets of the design and developmental processes necessary to completing a successful Solar Decathlon house. In several cases, the house design can be directly utilized as the course topic or as a case study. This is particularly true in the case of the School’s Integrated Building Systems, Construction Technologies, Building Structures, and Environmental Control Systems courses. In each of these courses, students are expected to develop design solutions that meet
the pedagogical objectives of the respective disciplines. With careful planning and communication between the design team and Building Technologies professors, these goals can be met by designing these critical systems for the Solar Decathlon House. A similar approach can be taken with engineering courses, where standard courses in electrical and mechanical engineering, such as solar thermal systems design and photovoltaic design can use the solar home as a case study. Additionally, senior design capstone courses can serve to provide projected based learning for engineering students seeking to solve design problems associated with innovative features of the home, such as powering the sensors with renewable energy, integration into a monitoring and control system, and design and construction of active floors and walls that meet structural requirements while providing for installation and maintenance of data systems. A case study approach can also be used in the Health Sciences, where nursing, kinesiology and nutrition courses can use aging in place as the paradigm for learning about how to deliver care to older and disabled persons.

Student members of Team Las Vegas will have a wide-range of internship opportunities both inside and outside the scope of engineering and architecture. For example, engineering students currently intern at Bombard Renewable Energy, NV Energy and Southwest Gas Corporation. Architecture students intern at TSK, KGA, Klai-Juba and LGA. Students from the communications portion of the team will be able to explore internship opportunities with UNLV Media Relations and the UNLV Foundation - a tradition to be carried on from the UNLV DesertSol team of 2013. Students will also be able to explore opportunities to integrate the Solar Decathlon through independent study projects in graphic design, health sciences, and business.

Works Cited:


Fernald, M. (2014). Housing America’s older adults: Meeting the needs of an aging population. Joint Center for housing studies of Harvard University, Cambridge, MA.


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<th>Courses</th>
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<td>AAE 770 Research Methods in Environmental Design</td>
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<td>AAE 780 The Design Build Process</td>
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<td>AAI 480 Furniture Design</td>
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<td>ABS 432/632 Solar Energy Applications in Architecture</td>
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<td>ABS 521/522 Construction Technologies I &amp; II</td>
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<td>ABS 531/532 Environmental Control Systems I &amp; II</td>
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<td>ABS 541/542 Structures for Architectures I &amp; II</td>
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<td>ABS 741 Integrated Building Systems</td>
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<td>BGES 440 Sustainability and Entrepreneurship</td>
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<td>CE/EE/ME 497/498 Senior Capstone Design</td>
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<td>CEE 250 Sustainability in Civil and Environmental Engineering</td>
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<td>CEM 250 Construction Materials and Methods</td>
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<td>CEM 450 Construction Field Inspection</td>
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<td>CEM 451/451L Construction Estimating</td>
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<td>CEM 480/680 Sustainable Construction</td>
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<td>CS 420 Human Computer Interaction</td>
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<td>CS 428 Introduction to Data Mining</td>
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<td>ECO 707 Environmental/Natural Resource Economics</td>
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<td>EE 340 Introduction to Electrical Power Engineering</td>
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<td>EE 370 Classical Feedback and Control Systems</td>
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<td>EE 446/646 Photovoltaic Devices and Systems</td>
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<td>EE 475/575 Autonomous Systems and Controls</td>
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<td>EE 480/680 Digital Signal Processing</td>
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<td>ENV 101 Introduction to Environmental Science</td>
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<td>ENV 350 Sustainable Urban Planning and Design</td>
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<td>LAND 333 Design with Climate</td>
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<td>LAND 399 Sustainable Design for the 21st Century City</td>
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<td>ME 412/612 Sizing Solar Thermal Systems</td>
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<td>ME 419/619 Advanced HVAC and Conservation Systems</td>
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<td>ME 421/621 Automatic Controls</td>
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<td>ME 477/677 Introduction to Solar Energy Utilization</td>
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<td>ME 707 Radiation Heat Transfer</td>
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<td>MKT 301 Marketing Management</td>
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<td>MKT 422 Integrated Marketing Communication</td>
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<td>NURS 401 Care of Older Adults</td>
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<td>NURS 420 Evidence-based practice and research in Nursing</td>
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<td>NURS 486 Gerontology</td>
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*Table 2.7 - Curriculum Integration*
3. WORKPLAN

3.1. BUDGET PLANNING

The gross area of the home is 970 square feet. The total estimated cost for design, planning, construction, transportation, deconstruction and hauling back to Las Vegas of the UNLV Solar Decathlon is estimated to cost $1,020,000. The cost is divided into three phases: design and planning phase, construction phase, and competition phase. The estimated cost of the design and planning phase is $180,000. After the design is completed the home will be constructed as separate modules in Las Vegas. The estimated cost of Phase II, Construction is $410,000. During the Competition Phase III, the modules will be transported and installed at the competition site with the help of paid student labor and professionals. The constructed home at the competition site will be broken down and transported back to Las Vegas. Estimated cost for the Competition Phase III is $430,000. Please refer to 1398-1513_UNLV_Budget_Justification for a detailed cost breakdown.

3.2. FUNDRAISING AND INSTITUTIONAL SUPPORT

UNLV successfully supported the 2013 Solar Decathlon team with a major fundraising effort, and the university leadership has committed to support the 2017 team.

In the event that UNLV’s proposal is accepted, the Provost will establish an internal account for the Solar Decathlon project to facilitate cash flow management and streamline the donation and purchasing processes. Deans from College of Engineering, College of Fine Arts, College of Urban Affairs, College of Business, the School of Nursing and the Division of Allied Health Sciences will contribute by allocating funds for graduate student assistantships, undergraduate research assistantships, and staff salary. In addition, the School of Nursing and Allied Health Sciences as well as a faculty member in the School of Social Work will also begin working with architecture students in the schematic design phase.
Operating units of the university, including Facilities and Maintenance, Planning and Construction, Purchasing, Web Communications, Media Relations, Alumni Relations and the Office of Information Technology will assign personnel to handle the day-to-day project specifics. Student workers and graduate assistants will be available to assist University staff with project tasks.

It is the intent of Team Las Vegas to offer the UNLV community and the communities of Southern Nevada several avenues to engage with and enrich the building of this home. Team Las Vegas will coordinate with student groups from the Colleges of Engineering, Fine Arts, Business, Urban Affairs, and Allied Health Sciences, to engage students at varying levels including team recruitment, event and social engagements, and community building.

Private external giving in support of Team Las Vegas will be coordinated by the UNLV Foundation an IRS 501(c)(3) nonprofit organization that is the designated organization for charitable giving to UNLV. The Foundation’s support was a key aspect in raising over $500,000 for the UNLV’s 2013 Solar Decathlon competition entry.

3.3. INDUSTRY SUPPORT

Many companies that helped with the 2013 team have expressed enthusiasm to again participate in UNLV’s effort towards the 2017 Solar Decathlon. The team leadership has identified four major areas of the project that will need assistance: (1) architecture, (2) engineering, (3) construction, and (4) patient care. Team Las Vegas has also identified key companies, including include Luchesi Galati Architects, NV Energy, and Bombard Renewable Energy that are well-suited to assist in the project by providing training to team officers and members to build, transport, and operate their home safely. In addition, UNLV’s Engineering and Architecture Advisory Boards and local engineering associations have shown their support for this effort (see Letters of Support).

Regarding patient care, the proposed development of a health-care centric home has already engaged new potential collaborators from the healthcare community, including University Medical Center the Lou Ruvo Center for Brain Health. The Lou Ruvo center will be working closely with UNLV to develop the design and integrate necessary accommodations for healthcare and senior living.)

3.4. SCOPE

3.4.1 PROJECT OBJECTIVE

To design and build an attractive, energy-efficient, renewably powered, functional and marketable home in the Mojave Desert that preserves the health, safety and dignity of elderly and disabled persons.

3.4.2 MILESTONES: Please refer to 1398-1513_UNLV_SOPO for detailed milestones.

3.4.3 TECHNICAL SCOPE SUMMARY

The project consists of the proposed residence located in southern Nevada. The project is approximately 964 square feet of enclosed space with an adjacent courtyard and patio space of
approximately 700 square feet. The proposed scope is to design and build the house, as well as ensure a final location for it after the competition. Please refer to the conceptual design package to identify the area of work. UNLV, in collaboration with local consultants, will provide architectural, interior design, landscape design, structural, mechanical, electrical, plumbing, and civil engineering services for this project.

3.5. WORK BREAKDOWN STRUCTURE

3.5.1 PROJECT SCHEDULE

The entire work plan consists of of three major phases spanning two one-year budget periods: The Design & Planning phases occurs in 2016 and and the Construction and Competition phases take place in 2017. Each performance period phase is split up into tasks and subtasks, detailing how to achieve the desired project goals. A summary of tasks and subtasks is shown below. Please refer to the 1398-1513_UNLV_SOPO for a detailed description of tasks to be performed.

BUDGET PERIOD 1 DESIGN & PLANNING PHASE

Task 1.0: SCHEMATIC DESIGN (Time Period: 2016, Q1 – Month 3 of Q1)
Subtask 1.1: Design Progression
Subtask 1.2: Schematic Design Summary
Subtask 1.3: Code Analysis

Task 2.0: DESIGN DEVELOPMENT (Time Period: 2016, Month 3 of Q1 – Month 1 of Q3)

Task 3.0: CONSTRUCTION DOCUMENTATION (Time Period: 2016, Month 1 of Q3 – Month 3 of Q4)

BUDGET PERIOD 2: CONSTRUCTION PHASE

Task 4.1: Health & Safety Plan
Task 4.2: Construction
Task 4.3: Final Deliverables

BUDGET PERIOD 3: COMPETITION PHASE

3.5.2 GO/NO-GO DECISION POINTS

UNLV’s two-year plan and commitment to the competition recognizes one annual Go/No-Go decision point per performance period. The Go/No-Go decision points will be evaluated by a committee that consists of members of advisory board, which includes the Principal Investigator, Project Manager, and UNLV Administration. Using a Go/No-Go decision checklist, the team will identify any serious gaps and deficiencies in the project and address them before moving further. The decision checklist will analyze the current metrics of the project relating to cost, constructability, and current performance to make an accurate decision. Please refer to 1398-1513_UNLV_SOPO for detailed description of Budget Period Go/No-Go Points.
### Table 3.5.1 Work Breakdown Structure (top) & Gantt Chart (above)

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Task Name</th>
<th>Deliverables</th>
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<tbody>
<tr>
<td>Q1 16</td>
<td>J</td>
<td>- Begin data &amp; requirements collection</td>
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<tr>
<td></td>
<td>M</td>
<td>- Begin Design calculations</td>
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<tr>
<td>Q2 16</td>
<td>M</td>
<td>- Target 50% Completion for Website</td>
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<td></td>
<td>J</td>
<td>- Design calculations completed</td>
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<td></td>
<td>A</td>
<td>- Schematic Design Model/Manual</td>
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<td>S</td>
<td>- Design Development Review</td>
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<td>Q4 16</td>
<td>O</td>
<td>- Target 100% Completion for Website</td>
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<td></td>
<td>N</td>
<td>- Design Development: BIM, Model &amp; Manual</td>
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<td>D</td>
<td>- Computer Animated Walk-through</td>
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<td>- Construction Documentation Review</td>
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<tr>
<td>Q1 17</td>
<td>L</td>
<td>- Scale Model, site preparations</td>
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<tr>
<td></td>
<td>M</td>
<td>- Health &amp; Safety Plan; safety training</td>
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<tr>
<td>Q2 17</td>
<td>M</td>
<td>- Project Summary</td>
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<td>J</td>
<td>- Public Exhibit Materials</td>
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<td></td>
<td>A</td>
<td>- Completion of Construction / Testing /Commissioning</td>
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<td>Q3 17</td>
<td>S</td>
<td>- Completion of Construction / Testing /Commissioning</td>
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<td></td>
<td>O</td>
<td>- Assembly / Open House / Testing Transport Systems</td>
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<tr>
<td></td>
<td>N</td>
<td>- Disassembly, packaging, transport to competition site</td>
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<tr>
<td></td>
<td>D</td>
<td>- Assemble, operate house at competition</td>
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<tr>
<td></td>
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<td>- Disassemble, haul back, redeploy in Las Vegas</td>
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<td></td>
<td></td>
<td>- Final Report</td>
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<td>WALKTHROUGH</td>
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<td>FINAL REPORT</td>
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3.6. PROJECT MANAGEMENT

ORGANIZATION

Project management will be a collaborative effort between student leaders, the Project Manager, and faculty and staff working at the direction of the Principal Investigator. All student team members will report to student leaders, who will report to the Project Manager. The Principal Investigator, with consultation from Co-Project Investigators and the Project Manager, will make all final executive decisions regarding the project.

In response to the university’s two-year effort towards the 2017 Solar Decathlon, UNLV will dedicate resources to hire one full-time staff member that will directly interface with the team and serve as as a Project Manager, and will assign an administrative assistant to support all purchasing and contracts for the UNLV’s entry in the competition.

Proper schedule management will be integrated into the project management process to establish an accurate timeline for delivering the project. In order to avoid missing deadlines and key project deliverables, a comprehensive project schedule will identify all project stages, phases, and activities assigned to each team member. The UNLV team includes:

Administrators - Advisory Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Title/Position</th>
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<tbody>
<tr>
<td>Tom Piechota</td>
<td>Associate VP Interdisciplinary Research Sustainability and Interdisciplinary Research Professor Civil and Environmental Engineering</td>
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<tr>
<td>Rama Venkat</td>
<td>Dean, UNLV School of Engineering</td>
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<tr>
<td>Nancy Strouse</td>
<td>Senior Associate VP for Development UNLV Foundation</td>
</tr>
<tr>
<td>Nancy Rapoport</td>
<td>Executive Vice President &amp; Provost</td>
</tr>
</tbody>
</table>

Principal Investigator

David James

Associate Professor, Fellow NSPE
Director, Solar and Renewable Energy Programs
Department of Civil and Environmental Engineering and Construction

Co-Project Investigators

Alfredo Fernandez-Gonzalez

Professor
Director

Catherine Dingley

Associate Professor

Participating Faculty

Bob Boehm

Distinguished Professor
Director

Attila Lawrence

Professor
COMMUNICATIONS AND CONFLICT RESOLUTION

Team Las Vegas recognizes that the need for a clear and concise communications process that anticipates issues and provides clear resolution when necessary. The project structure provides a delivery system where design and construction are contracted as a single entity that will design, engineer, procure and execute construction. Within this structure, Team Las Vegas will utilize decision matrices and the expertise of design-build professionals in the community to mediate issues and ensure issues are resolved in a timely and fair manner.

Team Las Vegas has identified three ways to combat any potential conflict that may energy over the next two years:

- Team Las Vegas will utilize the architectural design concept as a basis for directing decisions and driving resolutions. To reduce the number of conflicts, open dialogue and communication between all participants is crucial. Key to this is a successful and strong leadership team. The principal investigator, project manager and all team leaders have shown strong communication, leadership, and technical skills and will encourage discourse as a means to early and successful conflict resolution. The team will rely on coordinated leadership and frequent communications in all five teams to meet the demands of the integrated Design-Build schedule.
  - The advisory committee set up to consult for the project will act as an arbitration board when necessary, as would be done on traditional Design-Build projects. The UNLV Advisory Committee consists of representatives from UNLV School of Architecture, Howard R. Hughes College of Engineering, UNLV’S Center for Energy Research, and Las Vegas engineering and architecture firms.

4. TECHNICAL QUALIFICATIONS AND RESOURCES

4.1 FACULTY AND STUDENT TEAM + QUALIFICATIONS

Team Las Vegas will be composed of an extensive list of team members from a variety of disciplines with a range of experience. Architects, engineers, interior designers, graphic designers, social work, healthcare and nursing students will come together to meet the needs of
the target market. From the beginning, the range of expertise will help inform decisions that allow for a design to fit the desert climate as well as promote the design principles desired in an age-in-place home.

In the early stages of the design, students and faculty from the School of Nursing, School of Social Work and the Division of Allied Health Sciences will be instrumental in generating data and determining the technical specifications that will be incorporated into the projec. Their professional experiences and ongoing research will enrich the project and inspire the design. Dr. Catherine Dingley, Associate Professor, School of Nursing, will take the lead on coordinating Health Sciences contributions. Dr. Abbie Kirkendall will coordinate contributions from the School of Social Work.

The School of Architecture project investigator, Professor Fernandez-Gonzalez has conducted extensive research on thermal comfort, energy efficiency, green design, passive and low-energy heating/cooling systems, and water harvesting, treatment and reuse systems. His expertise will be invaluable as the design is refined, ensuring the house is particularly well-adapted to the Mojave Desert. Other faculty members from the School of Architecture will help guide the students through the process of construction documentation, construction administration, and other project delivery practices.

The engineering team, coordinated by Drs. Dave James and Dr. Bob Boehm, includes faculty and staff who have worked on a variety of interdisciplinary projects in renewable energy, solar energy applications, solar power generation from both thermal and photovoltaic approaches, as well as building applications of solar energy and zero energy building design. Other experts in structural, civil, materials, and construction engineering will contribute substantially to Team Las Vegas’ design process. The communications, marketing and outreach team includes experts that understand the regional real estate market and how best to communicate the complexities associated with the Solar Decathlon home that promotes renewable energy and energy efficiency.

Professor Boehm, Director of the Center for Energy Research, is a national expert in projects that involve solar power generation from both thermal and photovoltaic approaches, as well as building applications of solar energy and zero energy building design. Dr. Dave James is an associate professor in the Department of Civil and Environmental Engineering and Construction as well as the Director of Solar and Renewable Energy Programs at UNLV. Rick Hurt is a research engineer in the Mechanical Engineering Department with a focus on renewable energy research specifically power generation. He participated in design and evaluation of new net zero and peak-shaving homes in tract home settings. He played a large role in the success of the past UNLV Solar Decathlon team. Dr. Pramen Shrestha is an associate professor in the Department of Civil and Environmental Engineering and Construction who has contributed significantly to construction cost estimation for a number of projects including the 2013 Solar Decathlon. Attila Lawrence is the Coordinator of the Interior and Architecture Design program. He has published and lectured extensively addressing the
issues of strategic management of total project delivery systems and the social and psychological dimensions of human experiences in the built environment and housing.

The Principal Investigator, Dr. James will be committed ½ time to the project in 2016 through course release and relief from other administrative duties. His commitment will rise to ¾ time in Spring 2017 and full time in summer and fall 2017. The University has committed to providing course and administrative release time and summer pay to Dr. James for his service. Other faculty co-investigators will receive 1 to 2 course releases per year to cover their commitments and may receive summer salary as needed. Funds raised for the project will cover the salary costs of the Project Manager and Center for Energy Research engineer, Mr. Hurt.

4.2 FACILITIES AND EQUIPMENT

Several research facilities can provide excellent support 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. The CER has just concluded a 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 currently operating at several locations on the UNLV campus.

In the School of Architecture, 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 workstation. The School of Architecture’s 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. Students are able to perform two-dimensional computer-aided cutting on the 4’x8’ bed of the plasma cutter on metal. The Craft Studio 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 Structures Lab has the same high bay space, which can serve as a clean space for material or components storage.

The College of Engineering’s operates 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 milling 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 ft2 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.

College of Engineering also operates 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 (PrimaVera, SureTrak, and Microsoft Project), estimating software (Heavy Bid, Quantity Take-off, Timber line), design software (AutoCad), and other Microsoft office software.
Team Las Vegas
Solar Decathlon 2017
Project Statement

The vision of a house that can mediate the disparity between the realms of a comfortable age-in-place home and the harsh desert climate of Southern Nevada is a central theme that has been the driving force in every design decision for this project. Team Las Vegas’ conceptual proposal offers a unique combination of technology and architecture, while maintaining an environment of comfort and serenity. A spacious ADA compliant circulation path that is welcoming and easy to maneuver, provides railed and guided assistance with seating along the way. It offers clear lines of sight between destinations that adds to the openness of the space and assists in navigation. The surrounding colors and materials are purposely selected to promote a sense of warmth and a feeling of home. Sensible use of native vegetation and careful placement of screening affords a pleasing balance between privacy and outdoor connection, promoting a sense of well-being. These spatial characteristics, integrated with monitoring and diagnostic technology and sustainable design systems, serve to create a home that is not just livable and health-promoting, but a joy to experience.

“Buildings are deeply emotive structures which form our psyche. People think they’re just things they maneuver through, but the makeup of a person is influenced by the nature of spaces.” - David Adjaye
Integrated Systems

01 Automated drip irrigation
- maximizes water efficiency
- ease of plant care
02 Master security system
- centralized hub for smart lock control
03 Automated smart locks
- added security
- ease of nightly lock up
04 Learning thermostat
- central location
- adjusts to user patterns
05 Floor & roof sensors
- sense activity & heart rate
- Fall detection
06 Health monitoring systems
- additional devices as required
07 Smart TV
- displays collected data
08 Smart appliances
- increased level of efficiency
09 Biometric sample analysis
- health monitored by retrieval of samples
10 Sleep monitoring sensor
- track respiration & sleep cycle

Project Program

01 .................. entry 61 SF
02 .................. living 154 SF
03 .................. dining 176 SF
04 .................. kitchen 154 SF
05 .................. hall 141 SF
06 .................. bath 82 SF
07 .................. bed 167 SF
08 .................. mech 29 SF

= 964 SF
Principles of aging-in-place design

The design of the interior environment and architecture consists of several principles in which evidence-based design research comes to fruition. Environments which integrate proper orientation for the user, operate autonomously in daily activities, provide intellectual and sensory stimulation, security, and balance private and social spaces are ideal for the aging individual. These principles create interior environments for true independent living and successful aging.

2 autonomy The project allows for autonomy in spaces where mobility may be most difficult for an older person, such as the kitchen, bath, and living space.

3 intellectual + sensory-stimulation The design provides spaces for multipurpose activities and consequently a sense of novelty and variety throughout the day. It is a high priority to create variety in multipurpose spaces, as it is a form of intellectual and sensory stimulation.

4 providing a safe and secure environment The interior environment is divided within a sequence of transparent and opaque partitions to create a comfortable enclosure for privacy and security. The sequence of partitions allow for transparency and privacy in appropriate spaces.

5 between private and social spaces The home is divided into social and private modules. Both modules allow for generous outdoor exposure and semi-visibility to the adjacent spaces to retain way-finding abilities.

1 facilitating orientation Priming the user with appropriate visibility through penetrations of the building is a primary component to facilitate orientation.

Way finding and passive exercise The home provides simple circulation paths that encourage movement, improving the health of the resident by increasing their level of physical activity. The open floor plan allows for clear lines of sight and ease of orientation.
**Sustainable Design Strategies**

Team Las Vegas plans to use passive strategies combined with innovative mechanical systems. Passive strategies include attention to orientation and shading, separation of “shell” from “core” for natural ventilation, and operable overhangs which control direct solar exposure. Energy analysis will be used as an iterative modelling tool throughout the project to evaluate designs and identify cost-optimal efficiency packages at various stages of the development. Detailed simulation-based analyses will be developed using material characteristics, envelope design, electrical and mechanical systems and component selection, and target energy-savings levels. Structural design will satisfy a mobile and modular approach, as well as maximize energy efficiency. Plumbing and mechanical systems will be low-maintenance, cost-effective and durable. It is the hope of Team Las Vegas that the successful application of these principles in a residence will serve as a model of sustainable living in the Mojave Desert.

**Winter Setting** - Perforated metal screens fold open to allow for direct light to enter the patio and house as a way to heat the spaces.

**Summer Setting** - Perforated metal screens cover the back patio of the house, keeping out the direct light to keep the spaces cool.
A. PROJECT OBJECTIVES

To design and build an attractive, renewably-powered energy-efficient, intelligent and marketable home in the Mojave Desert that changes the way the elderly maintain their health.

B. TECHNICAL SCOPE SUMMARY

The project consists of the proposed residence located in southern Nevada. The project is approximately 964 square feet of enclosed space with an adjacent courtyard and patio space of approximately 700 square feet. The proposed scope is to design and build the house, as well as ensure a final location for it after the competition. Please refer to the conceptual design package to identify the area of work. UNLV, in collaboration with local consultants, will provide architectural, interior design, landscape design, structural, mechanical, electrical, plumbing, and civil engineering services for this project.

C. TASKS TO BE PERFORMED

BUDGET PERIOD 1 DESIGN & PLANNING PHASE – The Design & Planning Phase will last through all of 2016 and will consist of schematic design, design development, construction documentation, and funding reviews.

Task 1.0: SCHEMATIC DESIGN
Time Period: 2016, Q1 – Month 3 of Q1

Task Summary: Data collection and schematic design will start in January of 2016 and be completed through engineering senior design and architectural studio courses in the Spring 2016 semester. This task entails the involvement of all colleges at UNLV to create an innovative and unique project that successfully addresses the target market. Collaboration will be required from the schools of Architecture, Engineering, Allied Health Sciences, Business and Social Work. Integration of work between the schools will allow the team to identify what technologies will be integrated to monitor and diagnose the health of retirees, and how those technologies will be integrated with the home’s conceptual design and overall goal of the Solar Decathlon competition.

Subtask 1.1: DESIGN PROGRESS

Task Summary: The design will be 50% complete by the end of this task. The building program and the floor plan will be finalized, and major structural system and transportation design will also be determined. Preliminary finish materials, engineered systems, and other integrated technological features will be explored in the schematic phase.

Subtask 1.2: SCHEMATIC DESIGN SUMMARY
**Task Summary:** The Schematic Design Summary detailing non-standard design features, communications strategies, site-operations plans, and health & safety considerations will be submitted by the date required by DOE. A comprehensive contest scoring strategy will be created during this phase of the design, enabling the student team to evaluate every decision using the previously agreed-upon design criteria.

**Subtask 1.3: Code Analysis**

**Task Summary:** Students will conduct a code analysis on the home and perform a preliminary review with code officials. Code will be compliant with the Solar Decathlon Building Code, the 2012 International Residential Code (IRC) of the International Code Council with amendments and the 2014 National Electric Code (NEC) of the National Fire Protection Agency (NFPA), as well as local codes adopted by Clark County.

**Milestone 1.1:** Detailed Construction Cost Estimate  
**Milestone 1.2:** Completion of Design Calculations

---

**Task 2.0:** DESIGN DEVELOPMENT  
**Time Period:** 2016, Month 3 of Q1 – Month 1 of Q3

**Task Summary:** Design development will be continued from the previous Spring semester into summer, as an independent study course. This phase will conclude before the start of the Fall 2016 semester.

During this task, the Project Manual writing will be initiated.

The design will be 100% complete by the end of this task. The investigation and selection of finish materials, engineered systems, and integrated technological features will be finalized.

**Milestone 2.1:** Constructability Review  
**Milestone 2.2:** Identify final location of proposed project

---

**Task 3.0:** CONSTRUCTION DOCUMENTATION  
**Time Period:** 2016, Month 1 of Q3 – Month 3 of Q4

**Task Summary:** Design development will be continued from the previous spring semester into summer, as an independent study course. This phase will conclude before the start of the Fall 2016 semester. Construction documentation will be produced in Autodesk Revit in order to maximize the capacity for an integrated design approach. All BIM models and documentation will be upheld to the latest version of the National U.S. BIM Standard. Training for Autodesk Revit will be provided by Autodesk Certified Professionals to ensure proper use of the software.
During this task, communication will be enacted between students and professionals to uphold the integrated design approach, and ensure that the project gets executed with proper structural analysis, detailing, and construction plans. Quality assurance and quality control process will be performed to ensure careful coordination of the drawings.

By the end of this task, the drawings, Project Manual, and Computer Animated Walkthrough will be completed. The drawings and project manual will be a full-time commitment and collaboration between architecture and engineering students. The computer animated walkthrough will be a collaborative effort between architecture, graphic arts, film, and marketing students.

**Milestone 3.1: Quality Control Review**
**Milestone 3.2: 95% Construction Documents**

**Budget Period 1 Go/No-Go Decision Point:** Performance Period 1 recognizes a Go/No-Go decision point between the end of the Design Development Phase and start of Construction Documentation phase. At this point, UNLV and Team Las Vegas will analyze the current design, feasibility, and status of financial resources and fundraising. Through a careful decision analysis, UNLV will decide whether the project is on schedule and can be executed properly.

**BUDGET PERIOD 2: CONSTRUCTION PHASE** - The Construction Phase will start in January of 2017 and will last until just before the competition in October of 2017. It will consist of construction of the house, construction administration phase, assembly/testing/transport, reassembly and disassembly after the competition. The annual go/no-go decision point will be evaluated at the start of this performance period.

**Task 4.1: Health & Safety Plan**

**Task Summary:** The Health & Safety Plan will be completed by February of 2017 as part of the deliverables required by the DOE. OSHA certification will be received by all construction participants by January of 2017.

**Task 4.2: Construction**

**Task Summary:** Construction will begin in February of 2017 and will last until deconstruction and permanent installation after the competition. This task entails the fully executed construction of the final design through a balanced collaboration between student workers and construction professionals. A construction course will be offered through the School of Architecture to provide any extra help during this phase.

**Task 4.3: Final Deliverables**

**Task Summary:** The Jury Narratives, Audiovisual Presentation, and Project Summary will be completed during this phase by the date required by the DOE.
Milestone 4.1: Completion of Final Scale Model
Milestone 4.2: Completion and Final Review of 100% Construction Documents, Project Manual, BIM Model
Milestone 4.3: Health & Safety Plan
Milestone 4.4: Submittals / Bidding
Milestone 4.5: Inspection

Budget Period 2 Go/No-Go Decision Point: The project team recognizes a Go/No-Go decision point at the start of the 2nd budget period. At this point, the funding review must find that 100% of the fundraising goal is met before construction is started. Construction documents will have a final review by professionals and will be evaluated for technical and financial feasibility. Through a careful decision analysis, UNLV will determine if the project will be able to be completed within the proposed project schedule.

BUDGET PERIOD 3: COMPETITION PHASE – This phase will start after construction and testing is completed, and the house is ready to be transported to the competition site in October of 2017. The phase will consist of disassembly for transport, assembly, operation and testing at the competition site, and disassembly after the competition.

Milestone 5.1: Complete competition setup
Milestone 5.2: Place house on permanent site
Milestone 5.3: Final Report

D. PROJECT MANAGEMENT AND REPORTING

ORGANIZATION

Project management will be a collaborative effort between student leaders and faculty advisors working under the Principal Investigator. The Principal Investigator, with consultation from Co-Project Investigators, will make all final executive decisions regarding the project. All student team members will report to student leaders, who will report to the Project Manager.

In response to the university’s two-year effort towards the 2017 Solar Decathlon, UNLV will dedicate resources to hire one full-time staff member that will directly interface with the team and serve as a project manager for the UNLV’s entry in the competition, and will also reassign an administrative assistant to support the project manager with contract and purchasing documents.

Proper schedule management will be integrated into the project management process to establish an accurate timeline for delivering the project. In order to avoid missing deadlines and key project deliverables, a comprehensive project schedule will identify all project stages, phases, and activities assigned to each team member.
GO/NO-GO DECISION POINTS

UNLV’s two-year plan and commitment to the competition recognizes one annual Go/No-Go decision point per performance period. The Go/No-Go decision points will be evaluated and decided upon by a committee that consists of members of advisory board, which includes the Principal Investigator, Project Manager, and UNLV Administration. Using a Go/No-Go decision checklist, the team will identify any serious gaps and deficiencies in the project and address them before moving further. The decision checklist will analyze the current metrics of the project relating to cost, constructability, and current performance to make an accurate decision.

CONFLICT RESOLUTION

Team Las Vegas acknowledges that conflicts will arise during the design and construction of any project, and has a thorough understanding of the need for a clear and concise process that anticipates issues and provides clear resolution when necessary. The project structure provides a delivery system where design and construction are contracted as a single entity that will design, engineer, procure and execute construction. Within this structure, Team Las Vegas will utilize decision matrices and expertise of design-build professionals in the community to mediate issues and ensure issues are resolved in a timely and fair manner.

Team Las Vegas has identified three ways to combat any conflicts over the next two years:

- To reduce the number of conflicts, open dialogue and communication between all participants is crucial. Key to this is a successful and strong leadership team. The project manager and all team leaders have shown strong communication, leadership, and technical skills and will encourage discourse as a means to early and successful conflict resolution.

- While first relying on strong leadership in all five teams to meet the demands of Design-Build schedules and the rigorous requirements of the Solar Decathlon Competition, Team Las Vegas will utilize the architectural design concept as a basis for directing decisions and driving resolutions.

- Finally, the advisory committee set up to consult for the project will act as an arbitration board when necessary, as would be done on traditional Design-Build projects. The UNLV Advisory Committee consists of representatives from UNLV School of Architecture, Howard R. Hughes College of Engineering, and UNLV’S Center for Energy Research, and Las Vegas engineering and architecture firms.
# Milestone Summary Table

<table>
<thead>
<tr>
<th>Task Number</th>
<th>Task or Subtask (if applicable) Title</th>
<th>Milestone Type (Milestone or Go/No-Go Decision Point)</th>
<th>Milestone Number (Go/No-Go Decision Point Number)</th>
<th>Milestone Description (Go/No-Go Decision Criteria)</th>
<th>Milestone Verification Process (What, How, Who, Where)</th>
<th>Anticipated Date (Months from Start of the Project)</th>
<th>Anticipated Quarter (Quarters from Start of the Project)</th>
</tr>
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<tbody>
<tr>
<td>1.0</td>
<td>Schematic Design</td>
<td></td>
<td></td>
<td>Work with the Construction Management Department and develop quantity takeoffs, review budget, and estimate total construction cost</td>
<td>Work with the Construction Management Department and develop quantity takeoffs, review budget, and estimate total construction cost</td>
<td>4</td>
<td>2</td>
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<tr>
<td>1.1</td>
<td>Design Progress</td>
<td>Milestone</td>
<td>1.1</td>
<td>Detailed Construction Cost Estimate</td>
<td>Work with the Construction Management Department and develop quantity takeoffs, review budget, and estimate total construction cost</td>
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<td>2</td>
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<td>1.1</td>
<td>Design Progress</td>
<td>Milestone</td>
<td>1.2</td>
<td>Completion of all structural, mechanical, and energy calculations.</td>
<td>Work with civil, mechanical, and electrical engineers to derive all calculations necessary for the project</td>
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<td>2.0</td>
<td>Design Development</td>
<td></td>
<td></td>
<td>Review current design with project team and local professionals to identify major design flaws and assess project feasibility</td>
<td>Review current design with project team and local professionals to identify major design flaws and assess project feasibility</td>
<td>6</td>
<td>2</td>
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<tr>
<td>2.0</td>
<td>Design Progress</td>
<td>Milestone</td>
<td>2.1</td>
<td>Constructability Review</td>
<td>Review current design with project team and local professionals to identify major design flaws and assess project feasibility</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>2.0</td>
<td>Design Progress</td>
<td>Milestone</td>
<td>2.2</td>
<td>Identify the final location of the proposed project</td>
<td>Work with local medical professionals to identify best location for completed house to continue research</td>
<td>6</td>
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<td>3.0</td>
<td>Construction Documentation</td>
<td></td>
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<td>3.0</td>
<td>CD’s</td>
<td>Milestone</td>
<td>3.1</td>
<td>Quality Control Review</td>
<td>Conduct a thorough quality control inspection of construction documents and BIM model</td>
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<td>4</td>
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<tr>
<td>3.0</td>
<td>CD’s</td>
<td>Milestone</td>
<td>3.2</td>
<td>95% Construction Documentation</td>
<td>Conduct a thorough review of 95% construction document set</td>
<td>12</td>
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Go/No-Go Go/No-Go #1 Analyze current design, Through an advisory board, 6  2
<table>
<thead>
<tr>
<th>Task Number</th>
<th>Task or Subtask (if applicable) Title</th>
<th>Milestone Type (Milestone or Go/No-Go Decision Point)</th>
<th>Milestone Number* (Go/No-Go Decision Point Number)</th>
<th>Milestone Description (Go/No-Go Decision Criteria)</th>
<th>Milestone Verification Process (What, How, Who, Where)</th>
<th>Anticipated Date (Months from Start of the Project)</th>
<th>Anticipated Quarter (Quarters from Start of the Project)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Outdoor Testing</td>
<td>Milestone</td>
<td>4.1</td>
<td>Final Scale Model</td>
<td>UNLV and project team will assess current status of project and its continuation.</td>
<td>13</td>
<td>5</td>
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<td>5.2</td>
<td>Deliverables</td>
<td>Milestone</td>
<td>4.2</td>
<td>100% CDs, Project Manual, and BIM Model</td>
<td>Complete deliverables and submit through EERE-Exchange</td>
<td>13</td>
<td>5</td>
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<td>5.2</td>
<td>Pass lifetime Test</td>
<td>Milestone</td>
<td>4.3</td>
<td>Health &amp; Safety Plan</td>
<td>Complete plan and get construction participants OSHA certified before start of construction</td>
<td>13</td>
<td>5</td>
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<tr>
<td>5.3</td>
<td>Initial Abrasion Test</td>
<td>Milestone</td>
<td>4.4</td>
<td>Submittals / Bidding</td>
<td>Submit necessary documents for approval, complete shop drawings identify contractors</td>
<td>13</td>
<td>5</td>
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<tr>
<td>5.3</td>
<td>Pass Abrasion Test</td>
<td>Milestone</td>
<td>4.5</td>
<td>Inspection</td>
<td>Complete all inspections</td>
<td>20</td>
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### 5.0 Competition

<table>
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<tr>
<th>Task Number</th>
<th>Task or Subtask (if applicable) Title</th>
<th>Milestone Type (Milestone or Go/No-Go Decision Point)</th>
<th>Milestone Number* (Go/No-Go Decision Point Number)</th>
<th>Milestone Description (Go/No-Go Decision Criteria)</th>
<th>Milestone Verification Process (What, How, Who, Where)</th>
<th>Anticipated Date (Months from Start of the Project)</th>
<th>Anticipated Quarter (Quarters from Start of the Project)</th>
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</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Outdoor Testing</td>
<td>Milestone</td>
<td>5.1</td>
<td>Complete setup at competition site</td>
<td>Transport building, assemble at competition site and complete competition testing</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>5.2</td>
<td>Initial Lifetime Testing</td>
<td>Milestone</td>
<td>5.2</td>
<td>Place home at final location</td>
<td>Haul building back to Las Vegas, place at permanent site</td>
<td>23</td>
<td>8</td>
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<tr>
<td>5.2</td>
<td>Pass lifetime Test</td>
<td>Milestone</td>
<td>5.3</td>
<td>Final Report</td>
<td>Report will be uploaded to EERE-Exchange</td>
<td>23</td>
<td>8</td>
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</tbody>
</table>
## Milestone Summary Table

**Recipient Name:** Board of Regents on behalf of the Nevada System of Higher Education (NSHE), University of Nevada, Las Vegas  
**Project Title:** Team Las Vegas Solar Decathlon 2017  
**control number:** 1398-1513

<table>
<thead>
<tr>
<th>Task Number</th>
<th>Task or Subtask (if applicable)</th>
<th>Milestone Type (Milestone or Go/No-Go Decision Point)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Go/No-Go Decision Point</td>
<td>Go/No-Go #2</td>
<td>Analyze available funding and fundraising strategies to assess successful completion of project.</td>
<td>Through an advisory board, UNLV and project team will assess current status of project and its continuation.</td>
<td></td>
<td>12</td>
<td>4</td>
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</tbody>
</table>

*Go/No-Go Decision Point:*
- Go: Proceed with the project.
- No: Stop the project.

*Anticipated Date:*
- 12 months from the start of the project.

*Anticipated Quarter:*
- 4 quarters from the start of the project.
APPENDIX II

Team Resumes

Faculty Team:
- Dr. David James
- Alfredo Fernandez-Gonzalez
- Catherine Dingley
- Dr. Bob Boehm
- Rick Hurt
- Attila Lawrence
- Samir Moujaes
- Pramen Shreshta

Student Team:
- Nasko Balakchiev
- Evan Thomas
- Elias Benjelloun
- Andrew Doran
- Taryn Peake
- Brandon Wetzel
- Brenda Tena
- Matthew Segundo
- Katrina Castrillo
- Armon Latifi
- Matthew Pedraza
- Alan Bruno
- Darius Jackson
- Saul Mendoza
- Nir Herscovici
- Nicholas Huynh
David E. James, Ph.D., P.E. F.NSPE
Department of Civil & Environmental Engineering & Construction, University of Nevada, Las Vegas
4505 S. Maryland Parkway, UNLV Box 45-4015, Las Vegas, NV 89154-4015
Office Tel.: 702-895-5804; Email: dave.james@unlv.edu

Education
Ph.D. 1989 Environmental Engr. Science California Institute of Technology
M.S. 1983 Environmental Engr. Science California Institute of Technology
B.A. 1975 Chemistry University of California, Davis

Qualifications - Summary
- Currently, Director of Solar and Renewable Energy Programs, University of Nevada, Las Vegas
- Engineering faculty on 2015 UNLV Race to Zero Entry, winner of a Design award at the competition (one of three design award winners). Overall placement: 8th.
- PI or co-PI of 30 grants and sponsored research projects (total funding $3 million)
- Author or co-author of 21 peer-reviewed journal publications, 50 conference proceedings publications, and technical reports and 60 presentations at national, international and local conferences/meetings/workshops.

Registration
Registered Professional Engineer (Civil) – Nevada (#013388) – 1998 - present

Appointments and Work Experience
2014 – Present  Associate Professor Department of Civil and Environmental Engineering and Construction, University of Nevada, Las Vegas, and UNLV Director of Solar and Renewable Energy Programs,
2007 – 2013  Associate Professor & Associate Vice Provost for Academic Programs, Office of the Vice Provost for Academic Affairs, University of Nevada, Las Vegas
2002 – 2006  Associate Professor, Department of Civil and Environmental Engineering, University of Nevada, Las Vegas
1999 – 2002  Associate Professor and Department Chair, Department of Civil and Environmental Engineering, University of Nevada Las Vegas
1996 – 1999  Associate Professor, Department of Civil and Environmental Engineering, University of Nevada Las Vegas
1990 – 1996  Assistant Professor, Department of Civil and Environmental Engineering, University of Nevada, Las Vegas
1989 – 1990  Assistant Professor, Department of Civil and Mechanical Engineering, Southern Methodist University, Dallas, Texas
1982 – 1988  Graduate Assistant, California Institute of Technology, Pasadena, California
1975 – 1982  Research Technician, Product Development Associate Staff, and Product/Process Development Engineer, Raychem Corporation, Menlo Park, California

Relevant Synergistic Activities
- Advising Mechanical Engineering senior design team, Fall 2015 – Spring 2016, Automation and performance enhancements of solar stills
- Teach 2-3 sessions of Dr. Bob Boehm’s ME 477/677 class on Wind energy, Biomass Energy (and once on Solar Distillation)
- Advised and co-advised student theses and project reports on solar distillation, dust control, dust emissions measurement, engine start emissions, lithium-ion battery recycling, wastewater treatment, water quality analyses

Selected Relevant Funded Projects / Grants

Selected Relevant Peer-Reviewed Journal Publications
Alfredo Fernandez-Gonzalez, M. Arch.
School of Architecture, University of Nevada, Las Vegas
4505 S. Maryland Parkway, Box 454018, Las Vegas, NV 89154-4018
Phone: 702-895-1141; E-mail: alfredo.fernandez@unlv.edu

Education
M. Arch. 1999 Architecture University of Oregon (USA)
Specialist 1996 Helio-design (Architecture) National Autonomous University of Mexico (Mexico)
B. Arch. 1993 Architecture University La Salle (Mexico)

Qualifications - Summary
• Director of Natural Energies Advanced Technologies Laboratory, University of Nevada, Las Vegas.
• Architecture Faculty Advisor on 2015 and 2014 UNLV DOE Race-to-Zero Competition (2015 entry received “Design Excellence” Award).
• Investigator - 2013 UNLV Solar Decathlon (entry received overall 2nd place).
• PI or co-PI of 12 grants and sponsored research projects (total funding $372,000)
• Author or co-author of 2 book chapters, 4 peer-reviewed journal publications, 49 conference proceedings publications and technical reports, and 85 presentations at national, international and local conferences / meetings / workshops.

Registration

Academic Appointments and Experience
07/2013-present Professor of Architecture, University of Nevada, Las Vegas (USA).
07/2006-6/2013 Associate Professor of Architecture, University of Nevada, Las Vegas (USA).
01/2004-6/2006 Assistant Professor of Architecture and Director of the Natural Energies Advanced Technologies Laboratory, University of Nevada, Las Vegas (USA).
07/2000-2/2003 Assistant Professor of Architecture and Researcher at the Center for Energy Research, Education and Service, Ball State University (USA).

Summer of 2001 Visiting Professor, King Mongkut’s University of Technology, Thonburi (Thailand).
09/1999-6/2000 Full Time Lecturer, California Polytechnic State University, San Luis Obispo (USA).
09/1997-8/1999 Graduate Teaching Fellow, University of Oregon (USA).
09/1996-6/1997 Adjunct Professor of Architecture, National Autonomous University of Mexico (Mexico).

Relevant Synergistic Activities
• Coordinator of the Building Sciences & Sustainability Graduate Concentration in Architecture. The program graduates between two and five M. Arch. students per year with a focus in building sciences.
• Responsible for teaching the environmental control systems course sequence in the architecture program, as well as all the architecture courses listed in UNLV’s Solar and Renewable Energy Minor and Graduate Certificate.
• Current President of the Society of Building Science Educators (SBSE), an association of university educators and practitioners in architecture and related disciplines who support excellence in the teaching of environmental science and building technologies.
• Reviewer for the 2016 Passive and Low-Energy Architecture (PLEA) Conference.

Selected Relevant Funded Projects / Grants

Selected Relevant Peer-Reviewed Journal Publications
**Education**

<table>
<thead>
<tr>
<th>Degree</th>
<th>Year</th>
<th>Field</th>
<th>Institution</th>
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<tbody>
<tr>
<td>Ph.D.</td>
<td>2008</td>
<td>Nursing</td>
<td>University of Colorado</td>
</tr>
<tr>
<td>Post grad cert</td>
<td>2003</td>
<td>Nursing Education</td>
<td>University of Northern Colorado</td>
</tr>
<tr>
<td>MSN</td>
<td>1997</td>
<td>Family Nurse Practitioner</td>
<td>Midwestern State University, TX</td>
</tr>
<tr>
<td>BSN</td>
<td>1991</td>
<td>Nursing</td>
<td>University of West Florida</td>
</tr>
<tr>
<td>RN Diploma</td>
<td>1978</td>
<td>Nursing</td>
<td>USC/Los Angeles Co School of Nursing</td>
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</tbody>
</table>

**Qualifications - Summary**

- Currently, Associate Professor, tenure track, School of Nursing, University of Nevada, Las Vegas
- Completed a National Institutes of Health funded post-doctoral research fellowship with a focus on aging and end of life care.
- Significant clinical experience caring for older adults in community-based family practice setting and acute care setting
- Active membership in the Center for Aging, University of Utah
- Awarded - Graduate Fellowship, Grant Makers in Aging
- Research experience with older adults focused on choice / selection of long term care facilities
- Certified by ELNEC (End of life nursing education consortium)
- PI or co-investigator of 15 grants and sponsored research projects (total funding $1.7 million)
- Author or co-author of 13 peer-reviewed journal publications, 8 book chapters and technical reports, and 55 presentations at national, international and local conferences / meetings / workshops.

**Registration**

- Registered Nurse – Nevada (in process) – 2015 – present
- Registered Nurse – Colorado (# 117734) – 1998-present

**Appointments and Work Experience**

- 2015 – Present: Associate Professor, School of Nursing, University of Nevada, Las Vegas
- 2014 – 2013: Research Fellow, T32 Cancer, Aging, and End of Life Care, University of Utah, College of Nursing & Scholarship; University of Northern Colorado
- 2004 – 2010: Coordinator of the Dept. of Nursing Outcomes, Research, and Evidence-based Practice; Denver Health and Hospital Authority
- 2003 – 2007: Adjunct Clinical Faculty, School of Nursing, Regis University, Denver, CO
- 2001 – 2003: Research Assistant, AHRQ Nursing Home Choice study, College of Nursing, University of Colorado Health Sciences Center
- 2000 – 2001, 4: Teaching Assistant, College of Nursing, University of Colorado Health Sciences
- 1997 – 1998: Family Nurse Practitioner, Texas Dept. of Mental Health and Mental Retardation
- Wichita Falls, TX
- 1991 – 1993: Research Associate / Cardiac rehab nurse, St. Andrews University, Tayside Health Board, National Health Service, Dundee, Scotland
- 1987 – 1989: American Red Cross Nurse/ACLS Instructor, United States Naval Hospital, Camp Lester, Okinawa, Japan
- 1985 – 1986: Public health nurse, Home Health Dept., South Carolina Health Department, Sumter, SC
- 1983 – 1986: Staff nurse, Critical care, Tuomey Hospital, Sumter, SC
- 1978 – 1982: Staff nurse, Intensive care Women’s Hospital, USC-LA County Medical Center, California

**Relevant Synergistic Activities**

- Currently conducting research focused on home-based older caregivers’ well-being and self-care needs.
- Currently completing a study focused on family caregiving for American Indian/Alaskan Native Elders.
- Recently completed study focused on engaging older adults providing home-based care for family members with advanced cancer.
- Developing coursework in the Doctor of Philosophy in Interdisciplinary Health Sciences focused on Team Science which is consistent with the integrated team approach for this project.
- Advised and co-advised student theses and capstone projects focused on long term care for older adults, self-management of chronic illness in older adults.
Robert F. Boehm, Distinguished Professor of Mechanical Engineering, Dominic Marroccoo
Professor of Energy Research, Director of the Energy Research Center
Department of Mechanical Engineering
UNLV Box 45-4027, 4505 S Maryland Parkway Las Vegas, NV 89154-4027.
E-mail: bob.boehm@unlv.edu Phone 702/895-4160, Fax 702/895-3936.

(a) Professional Preparation
BSME, MSME, Washington State University, 1962, 1964
Ph.D. ME, University of California at Berkeley, 1968

(b) Appointments
Department of Mechanical Engineering, University of Nevada-Las Vegas Professor (1990-2004), Distinguished Professor (2004-present), Chairman (1990-1996), Howard R. Hughes, College of Engineering, University of Nevada-Las Vegas, Director of Research (1999-2001), Director of Energy Research Center (1995-present), University of Nevada (3 campuses)
Senior Liaison to DOE (1994-1995)
The following positions in the Department of Mechanical Engineering, University of Utah, Salt Lake City, Utah: Assistant Professor (1968-1972); Associate Professor (1972-1976); Acting Chairman, (1975-1976); Professor (1976-1990); Department Chairman (1981-1984).

(c) Recent Publications (Random Selection from Over 600 total titles).

(d) Synergistic Activities
Solar Program and Course Development: Was one of the main members of a committee to establish the UNLV Solar and Renewable Energy minor and graduate certificate program for students of any major. Have developed and taught a number of solar related courses, including “Introduction to Solar and Renewable Energy,” general education course (EGG 450/650) that brings together experts from a number of fields to lecture and lead field trips about a broad base of renewable energy topics.
Center for Energy Research: a research collaboration and outreach organization involving faculty from a variety of fields in renewable energy topics. The externally funded research budget is currently nearly $30M with R. Boehm PI or Co-PI.
PROFESSIONAL PREPARATION
BS Geology, University of Nevada-Las Vegas, 1983
BSME, University of Nevada-Las Vegas, 2002,
On Hiatus from MSME, University of Nevada-Las Vegas, 2003-Present

EMPLOYMENT
University of Nevada-Las Vegas, Department of Mechanical Engineering, Center for Energy
Superior Air Conditioning, Inc., Henderson, NV, Mechanical Contracting, General Foreman,
R & L Refrigeration, Inc., Aitkenvale, Queensland, Australia, Refrigeration and Mechanical
Contracting, Service and Installation Technician, (1985-1987)
National Air Conditioning / Dille Mechanical, Las Vegas, NV, Refrigeration and Mechanical
Polar Air Conditioning, Las Vegas, NV, Refrigeration and Mechanical Contracting, Fabrication,
and Installation Technician, (1974-1977)

SELECTED PUBLICATIONS
Z. Zeng, A. Chen, R. Hurt, R. Boehm, The passive and engineered systems in University of Nevada Las
A. Cross, K. Hammer, R. Hurt, R. Boehm, An autonomous controller for ductless minisplit
heat pumps, residential solar thermal collection, and hydronic floor heating, Proceedings of the 8th
Z. Zeng, R. Hurt, R. Boehm, The 2013 University of Nevada Las Vegas Solar Decathlon house—strategy,
design, simulation and results, Proceedings of the 8th International Conference on Energy
Sustainability, 2014.
T. France, R. Hurt, R. Boehm, and S. B. Sadineni, Home Energy Conservation in the Las Vegas Valley,
ENERGY ENGINEERING, 130, 021006, 2008
L. Zhu, R. Hurt, D. Correa and R. Boehm, Validated Evaluation on Building Energy Conservation Features
in a Zero Energy House, Proceedings of the 37th ASES Annual Conference, May 3-8, San Diego, CA,
2008.
D. Correia, R. Hurt, L. Zhu and R. Boehm, Comprehensive Modeling on the Integral Collection Storage
Unit Demonstrated in a Zero Energy House, Proceedings of the 37th ASES Annual Conference, May 3-
8, San Diego, CA, 2008.
L. Zhu, R. Hurt, D. Correa and R. Boehm, Real Energy Saving Performance of Thermal Mass Walls
Demonstrated in a Zero Energy House, Proceedings of the 37th ASES Annual Conference, May 3-8,
San Diego, CA, 2008.

WORK ACTIVITIES
Construction, Documentation, and Analysis of Energy Efficient Homes: Assisted in the
construction of several solar powered home projects including a "Near Zero Energy Home",
two New American Homes for the NAHB, and others. Designed and installed data logging
and sensors to monitor homes and buildings. Worked as an engineering advisor on the
award winning DOE UNLV 2013 Solar Decathlon Home. Assisted in installation of solar
thermal and photovoltaic systems for homes and buildings. Tested energy efficient systems
and components for researchers and manufacturers.
Attila Lawrence
Professor and Program Coordinator ~ School of Architecture, University of Nevada, Las Vegas, NV  89154
Telephone: (702) 895 0936 ~ E-mail: attila@unlv.nevada.edu ~ http://architecture.unlv.edu/interiors.html

Education
Pennsylvania State University, MA
Philadelphia College of Art (The University of the Arts), BFA

Professional Licenses
National Council for Interior Design Qualification
General Building Construction, California

Academic and Teaching experience
University of Nevada, Las Vegas, Nevada, 1988-Present
School of Architecture, Interior Architecture and Design
Program Coordinator and Professor

University of Nevada, Las Vegas, Nevada,
School of Architecture,
Interim Director of the School of Architecture,

Professional Experience
Design Four (Design/Build Entity), La Jolla, California, 1983-1992
President

SCAN, Washington, D.C., 1972-1975
Director of Design Operations

Publications - Book Chapters
"Metro Stations of Paris", Encyclopedia of Twentieth Century Architecture, ed. Sennott, R. S.,

"Central Railway Station of Helsinki", Encyclopedia of Twentieth Century Architecture, ed. Sennott, R. S.,

Publications - Scholarly Journals
The International Journal of Technologies in Learning
www.CnormgroundPublishing.com


"Expositions, Resorts, and Housing Design" International Journal for Housing Science


Publications - Conference Proceedings
"Direct and Indirect Mental Health Correlates of Interior Environmental Spatial Qualities", International Neuroscience and Biological Psychiatry Conference, 2015
Samir Moujaes, PhD, PE  
Professor of Mechanical Engineering; Department of Mechanical Engineering  
University of Nevada, Las Vegas  
Mail stop: 45-4005  4505 S Maryland Pkwy, Las Vegas NV 89154-4015  
Tel: 702-895-3265  Fax: 702-895-5013  e-mail: samir.moujaes@unlv.edu

Education
Ph.D. in ME Dec. 1980, University of Pittsburgh (Thesis: Two-Phase Upflow in Vertical Channels)
BSME in ME July 1972, American University in Beirut, Beirut-Lebanon

Employment History
1. 1984-present UNLV, currently Full Professor in the ME Dept.@ UNLV
2. 1981-84 Senior Research Engineer, Air Product & Chemicals, Allentown, PA
3. 1976-80 Research Assistant in ME@ University of Pittsburgh
4. 1977-80 Teaching Assistant in ME @ University of Pittsburgh
5. 1972-75 HVAC engineer worked in consulting, contracting and technical sales Beirut-Lebanon

Research Publications

Synergistic Activities
Dr Moujaes teaches and performs research in the general area of Thermal Sciences. His areas of interest are: energy conservation, HVAC systems simulation, high level nuclear waste canister thermal issues, transmutation energy research, high temperature hydrogen production using nuclear/solar energy, residential air duct leakage methods focusing on their measurement and characterization.

He has graduated over 25 MS students and currently advises 1 Ph.D. and 1 MS student. He has also managed 4 post-doctoral researchers over the last 5 yrs. Recent courses taught include: undergraduate thermodynamics and heat transfer, graduate heat conduction and convection courses and two undergraduate/graduate courses in HVAC system design.
Pramen P. Shrestha -Biographical Sketch
Department of Civil and Environmental Engineering and Construction
Howard R. Hughes College of Engineering, University of Nevada Las Vegas
4505 Maryland Parkway, Las Vegas, NV- 89154-4015
Telephone: 1-702-895-3841, Email: pramen.shrestha@unlv.edu

A. Professional Preparation:

<table>
<thead>
<tr>
<th>Institution</th>
<th>Major</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Institute of Technology (NIT)</td>
<td>Civil Eng.</td>
<td>B.Sc.</td>
</tr>
<tr>
<td>Jamshedpur, India</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oklahoma State University</td>
<td>Civil Eng.</td>
<td>M.Sc.</td>
</tr>
<tr>
<td>Stillwater, Oklahoma</td>
<td>Const. Eng. &amp; Manage.</td>
<td></td>
</tr>
<tr>
<td>University of Texas at Austin</td>
<td>Civil Eng.</td>
<td>Ph.D.</td>
</tr>
<tr>
<td>Austin, Texas</td>
<td>Const. Eng. &amp; Manage.</td>
<td></td>
</tr>
</tbody>
</table>

B. Appointments:

- 2013 – Present: Associate Professor: Civil and Environmental Eng. & Const. University of Nevada Las Vegas
- 2007 – 2013: Assistant Professor: Civil and Environmental Eng. & Const. University of Nevada Las Vegas
- 2001 – 2007: Research Assistant: University of Texas at Austin
- 1999 – 2001: Traffic Engineer: Department of Transportation, Nepal
- 1998 – 1999: Highway Internship: Department of Transportation, Germany

C. Publications:

Some recent publications:

Nasko Balakchiev
Mobile: 702-426-9598
naskobalakchiev@gmail.com

EDUCATION:
Expected: 2012 – 2016
University of Nevada, Las Vegas
B.S. Architecture

2008 – 2012
Advanced Technologies Academy
Advanced Honors Diploma with Emphasis in Architectural Design

WORK EXPERIENCE:
JAN 2014 - Present
[N] Site Studios
Position: Intern III
Responsibilities:
• Project Management for several small projects in the Las Vegas area.
• BIM Modeling and Management of an extensive Revit model for a large residential expansion.

JAN 2012 – DEC 2013
Holman’s of Nevada Inc,
Position: CAD/BIM Instructor and Support Technician
Responsibilities:
• Creating facilities management 3D models using Revit and Infrastructure Modeler for Las Vegas Convention Center & UNLV.
• Training individual students and groups in AutoCAD and Revit, intermediate and advanced levels.
• Technical and sales knowledge of Autodesk AEC products.

CERTIFICATIONS:
• Autodesk AEC Building Technical Representative
• Autodesk Revit 2014 Certified Professional

SKILLS
• BIM Modeling (Revit, ~5+yrs. Experience)
• Construction Documentation
• Network Administration/License Management (Autodesk Products / Revit Server)
Evan J Thomas
261 Windmill Croft Dr
Las Vegas, NV 89148
(702) 724-3468 (C)
thomae3@unlv.nevada.edu

Education:
UNLV Honors College Class of 2018
  Major: Computer Science
  Minor: Mathematics
  GPA: 3.975
  Credits: 55
Valley High School- International Baccalaureate Diploma; June 2014
  GPA: 4.8 Weighted
  4.0 Un-weighted

Honors and Award
  • NSTEC National Security Scholarship Recipient; August 2015
  • Michael Gail Andress Memorial Scholarship; August 2015
  • College of Engineering Dean’s Honor List; Fall 2014, Spring 2015
  • DOE Race to Zero 2015 Design Excellence Award; April 2015
  • Valedictorian; Ranked #1 out of 651 students attending Valley High School in Las Vegas, NV; June 2014
  • Nomination from Senator Harry Reid to the United States Air Force Academy; January 2013
  • Accepted to United States Air Force Academy; December 2013
  • Recipient of American Legion Scholastic Medal; May 2011

Relevant Experience
  • Real Time Intelligent Systems Lab; UNLV
    o Position: Undergraduate Research Assistant September 2015 – present
    o Duties: Work under the supervision of a Ph.D. student on a computer vision project based on using traffic cameras to predict car trajectories for use by driverless cars. Write test scripts, collect and classify data, and provide my problem solving skills for the project.
  • Skyworks Aerial Systems; Henderson, Nevada
    o Position: Electrical and Software Engineering Intern October 2014 – present
    o Projects: Design schematics for circuits, prototype them, and implement them in a printed circuit board design for manufacturing. Work with software engineers to implement different drivers into firmware for unmanned aerial vehicles. Work on web applications to implement data collection and automated control for unmanned aerial vehicles. Worked on floating-point math emulator for a microcontroller with no integer division support. Worked on gas sensor attachment for remote gas detection in mines through the use of drones. Developed proficiency in data structures and algorithm usage and learned software engineering techniques.
  • Electromagnetics Lab; UNLV
    o Position: Research Assistant Shadow September 2014 – December 2014
    o Duties: Helped research assistant set up and conduct experiments with electromagnetic systems. Learned to use MATLAB and gained experience in a research environment for future endeavors.

Other Experience
  • DOE Race to Zero 2015 Electrical Engineer January 2015 – April 2015
  • Math Tutor through Mathnasium of Las Vegas December 2013 – October 2014

Professional Associations
  • Institute for Electrical and Electronics Engineers Member September 2014 – present
    o UNLV Student Chapter General Officer January 2015 – present
  • Association of Computing Machinery Member August 2015 – present
    o UNLV Student Chapter Vice Chair September 2015 – present

Relevant Community Involvement
  • Build Website for Diabetes Nonprofit Event September 2015 – present
  • Lighting Engineer at Hope Church November 2013 – present
Elias Benjelloun
Entrepreneur & Scientist
benjello@unlv.nevada.edu
(702) 741 - 4332

EXPERIENCE

Troph
Co-founder, CEO
May, 2015 - today
A Las Vegas based startup developing products and services in an effort to increase access to educational resources.

UNLV
Student Body President
May, 2014 - Apr 2015
Represented 23,000 students on a platform to reinvest student funds into enriching academic programs, advocating on behalf of students, and platforms for professional development.

Better Education Today
Executive Assistant
Apr 2015 - Aug 2015
Organized parents, teachers, and students to advocate on behalf of public education reform at the Nevada 2015 legislative session.

Bilbray for Congress
Assistant Political Director
Aug, 2014 - Nov. 2015
Developed and managed the campaign website, graphics, and social media strategy. Assisted in field organizing, event planning, and general operations.

EDUCATION

UNLV
Kinesiology, M.S
2015 - Today
Expected graduation Spring 2017

Solar Decathlon
Team Las Vegas
2015 - Today
Serving as the communications lead for the development of a net-zero home designed for personalized senior medicine.

Allied Health Sciences
Research Assistant, Dr. Brach Poston
2015 - Today
Investigating the neural efficiency hypothesis and potential correlations between heart rate variability and baseline alpha.

UNLV
Biology, B.S
2010 - 2015
Engaged in research and student advocacy since freshmen year.

Biochemistry
Research Assistant, Dr. Ernesto Abel - Santos
2011 - 2013
Investigated germination inhibition in Clostridium perfringens.

COMMUNITY

UNLV OURS
Alumni Ambassador
2015 - Today
Supporting research enrichment programs through the Office of Undergraduate Research and Creative Scholarship

PI Labs
Board of Directors
2015 - Today
PI Labs brings scientists and professionals of Southern Nevada together to grow the economic presence of research and technology.
Andrew M. Doran

Objective: A position that develops essential skills and abilities that can be applied to a future career in architecture related to commercial and/or residential design.

Education:
Expected: Current-2016
University of Nevada, Las Vegas
B.S. Architecture

January 11’- May 12’
Santa Barbara City College
Certificate C.A. Drafting/CAD/Architecture

August 08’- December 10’
University of California, Santa Barbara (not complete)
B.S. Mechanical Engineering

June 11, 2008
Granite Hills High School, Apple Valley, CA
High School Diploma & Academic Honors

Skills:
- AutoCAD (~2yrs. exp.)/ Revit Architecture (~1yr. exp.)
- Rhinoceros 3D and Maxwell Rendering
- Machine Shop (Mill, Lathe, Drill Press, etc.)
- Modelmaking
- Adobe Photoshop, Illustrator, InDesign
- Microsoft Office

May 15’ – Current
Architecture Intern, assemblageSTUDIO, Las Vegas, Nevada
- Help design and model projects throughout their design development. From early conceptual and massing models to final models used for award submission. (modeling, developing construction documents)

March 14’ – Current
Fabrication Lab Technician, School of Architecture, University of Nevada, Las Vegas
- Clean and prepare the lab and studios for the following year. Overseer and aid the students from the School of Architecture as they use the woodshop equipment, CNC mill, laser cutter, and 3D printer. Maintain the machines and tools as students check-in/out and use the equipment and the lab. Other small projects to help the lab including designing material racks, organizing equipment and supplies, furniture arrangement and assembly.

February 13’ – August 15’
UNLV Educational Outreach – Client & Division Services, University of Nevada, Las Vegas
Student Assistant
- Carry out daily administration duties including registering students for classes and processing payments. Maintain and prepare classrooms and technology for instructors. Develop campus relationships and provide other clerical work.
- Campus Floor Plan Project - Developed campus floor plan(s) to scale for thirteen classrooms ranging in size. Provided dimensions along with different arrangements using Microsoft Vizio.

June 12’ - Current
Edward Jones Investments, Apple Valley, CA / Las Vegas, NV
On Call – Branch Office Administrator
- Provide daily office administration duties including overseeing appointment setting and schedules and processing deposits and transactions. Managing the office while maintaining relationships with clients, involving updating prospect and client data records, executing direct mail programs, assisting with planning seminars, and making follow-up appointments and phone calls to set or confirm appointments.

References: Available upon request.
competencies
problem solving
interpersonal relations & teamwork
design
computer: Autocad, Sketchup, Rhino/vray, Illustrator, Photoshop, InDesign, Microsoft office

education
2012 - present University of Nevada Las Vegas, Las Vegas, NV
   Degrees sought:
   Bachelor of Science in Architecture
   Minor in Solar and Renewable Energy

2010 - 2012 College of Southern Nevada, Las Vegas, NV
   Major: Architecture

2008-2010 Simon Fraser University, Burnaby, BC, Canada
   Major: Liberal and Fine Arts

work experience
2013 - present Apple Inc, Family Room Specialist, Las Vegas, NV
   utilize technical specialities to resolve customer issues
time management, customer focus, teamwork

2010 - 2013 Sambalatte, Senior Barista, Branding, Las Vegas, NV
   supervisory and barista duties, customer service, facilitating training
   assisting in brand development and design

2009 - 2010 Java Cat Cafe, Barista, Vancouver, BC, Canada
   barista cafe management duties, customer service

2008 - 2009 Canadian Cancer Society, Vancouver, BC, Canada
   assisting event coordination and volunteer opportunities

2005 - 2009 Agape Center
   volunteer, coordinating volunteer team-members, food prep and distribution
Brandon Wetzel
2248 Almart Circle, Henderson, NV 89014
bleewetzl@gmail.com (702)-338-7180

Work Experience:

assemblageSTUDIO 2014-Current
Intern
working on any and all tasks related to custom home, penthouse, and restaurant design

Wetzel Architecture 2010-2013
Draftsman
assisted in auto cad for various small commercial projects

Caesars Palace Hotel and Casino 2009-2010
front desk agent
selected as employee of the month for the entire Caesars Palace property (4,000+ employees)

Education:

UNLV - senior
School of Architecture
2017 Solar Decathlon Design Team
Ben Barton Memorial Scholarship Recipient

Green Valley High School
Senior Class President
Honors diploma (2009)

Architectural Tools:
Rhinoceros, Grasshopper, Auto CAD, Adobe InDesign, Adobe Illustrator,
Adobe Photoshop, Sketch-Up, digital renderings, model making
OBJECTIVE
To obtain a position at your design firm that will foster my design skills and allow me to grow as a design professional.

EDUCATION
Bachelor of Science, Interior Architecture and Design
University of Nevada, Las Vegas
Anticipated graduation, May 2016

COURSEWORK
Exhibition Design: Space Planning, Material and Finish Selection, Hand Drawn Perspective
Restaurant Design: Space Planning, Material and Finish Selection, Computer Rendering
Hotel Room Design: Space Planning, Material and Finish Selection, Hand Rendering
Product Design: Logo Design, Concept Development, Computer Rendering
Stage Set Design: Logo Design, Concept Development, Lighting Configuration, Character Development, Costume Design, Computer Rendering
Retail Design: Research, Concept Development, Lighting Design, Space Plan Development, Merchandising Design, Computer Rendering,

TECHNICAL PROFICIENCY
Platforms: Mac OS X and Windows XP/Vista/7/8
Applications: Adobe Photoshop, Adobe Illustrator, Adobe InDesign, Microsoft Word, Microsoft PowerPoint, Microsoft Excel, AutoCad, SketchUp, Rhino

ACTIVITIES
Office of Civic Engagement and Diversity (OCED), UNLV
- Alternative Spring Break Volunteer Spring 2012
- Alternative Spring Break Volunteer Spring 2013
American Society of Interior Designers, UNLV Student Chapter
- Member 2012–Present
- President-Elect 2014–present
Freedom By Design Committee, UNLV AIAS Student Chapter

EMPLOYMENT
The Sherwin–Williams Company
- Design Product Specialist August 2013–September 2014
Henriksen Butler Design Group, Las Vegas
- Intern/Librarian Summer 2014
BUNNYFISH studio
- Design Intern September 2014–November 2014
assemblageSTUDIO
- Interior Architecture Intern November 2014–present
Matthew Segundo

Education
University of Las Vegas (UNLV) – Las Vegas, NV 2012 – Present
Bachelor of Arts: Graphic Design, Minor in Art History, anticipated 2015
GPA: 3.6
Courses: Design Studio IV, Adv. Typography, Digital & Commercial Photography

College of Southern Nevada (CSN) - Las Vegas, NV 2004, 2008 - 2009
Courses: Liberal Arts Curriculum

Extra Curricular Activities
UNLV AIGA (American Institute of Graphic Artists) - 2015
Board Member & Treasurer
SAGA (Student Association of Graphic Artists) - 2014- Present

Skills & Proficiencies
Adobe Suites: Photoshop, Illustrator, Bridge, InDesign, and After Effects
MS Word, Excel, and Outlook
Traditional and Digital illustrations
Branding, advertising and campaign development, layout and publication design

Experience
Studio Design Intern
R&R Partners: Las Vegas, NV June 2015 - Present
Plan, analyze, and create visual solutions to marketing and communication challenges, finding the most effective way to get messages using color, type, illustration, photography, while adhering to strict brand guidelines.
Develop overall layout and production design of advertising, sales collateral, e-newsletters, banners, emails, signage and promotional items.
Execute and manage production of communications deliverables.

Optical Laboratory Technician
Lens Crafters: Las Vegas, NV February 2011 - 2015
Utilized product knowledge to determine the best manufacturing process.
Operate optical machinery & processed per work instructions.
Layout and edge lenses & mounting in frames

Referrals/Authorizations Specialist
John B. Siegler, Ltd: Henderson, NV January 2013 – August 2014
Obtaining authorization from insurances, workers compensation, and etc.
Scheduled patients for office visits appointments and surgeries
Carry out new prescriptions and refill requests

Interests
Guitar & Drums, Pop Culture, Street Art, TV infomercials, Pub Trivia!
Katrina Janine Castrillo

9078 Mackanos Ave.
Las Vegas, Nevada 89148
(702) 576-4920
castril2@unlv.nevada.edu

Education

University of Nevada, Las Vegas
Bachelor of Arts in Art; Concentration in Graphic Design
Minor in Art History
2010-Present

Skills


Software

Adobe Suite CC: InDesign, Illustrator, Photoshop, Premiere & AfterEffects
Autodesk: Maya & Mudbox

Work Experience

ArtHouse Design Studio – 2015
Las Vegas, Nevada
Graphic Designer

Purple Cow Digital Print – August 2015 - Present
Las Vegas, Nevada
Graphic Designer
Armon Latifi
1571 Cordero Bay Avenue
Las Vegas, NV 89123
(702) 480-8876
latifa1@unlv.nevada.edu

EDUCATION
Electrical & Computer Engineering Major, Math Minor
University of Nevada, Las Vegas
Cumulative GPA: 3.94
Expected Graduation: May 2018

Related Coursework:
MATH 181, 182, 283, 431, EE 220, CS135

SKILLS
Languages & Platforms: MATLAB, C++, Windows, Linux, Android

PROJECT/WORK EXPERIENCE
Rocket Propulsion Lab, Team Member
Spring 2015
• Assisted in the design and construction of several carbon fiber-based rockets, in order to reach low-space altitudes
• Exposed to the creation of the avionics placed in the nose of rockets, assisted in the construction of the “sled” to house PCB’s and the Raven Altimeter
• Sanded casting tubes for case construction and cut carbon fiber to mold fins

Entertainment Research Center, Research Member
Fall 2015
• Expedited the construction and testing of Arduinos and Unmanned Aerial Systems (UAS)
• Promoted STEM learning and development for K-12 students through structural origami
• Developed the skills necessary to create a consumer-friendly aesthetic product of engineering

LEADERSHIP/ORGANIZATIONS
Joint Education Project (JEP) Local instructor, mathematics tutor,
Spring 2015
• Prepare weekly lesson plans and worksheets tailored to each individual elementary school student
• Carefully listened to the needs of students, and ensured that they learn the essentials of mathematics
• Wrote biweekly essays analyzing the University Park Community, aided in the creation of a Wikipedia Page for University Park

Engineers Without Borders (EWB), Team Member
Fall 2014 & Spring 2015
• Develop blueprints for Lomas Del Sol, Costa Rica trip, in order to create an improved sanitation structure
• Create an educational program for the Lomas Del Sol community, in order to raise environmental consciousness
• Understand the problems facing individuals in developing nations, and work with other engineers to ameliorate their situation

IEEE, Engineering Member
Spring & Fall 2015
• Developed strong soldering skills through locally held workshops
• Formed strong intrapersonal communication between professional electrical engineers in the field
Matthew J. Pedraza
650 Whitney Ranch Dr. Apt. 2424
Henderson, NV 89014
Matthew@EngineeringDesign.ME
+1 (702) 569-3176

Relevant Work Experience

Performance Engineer Intern – NRG Energy Services (May 2015–present) – Nipton, CA
• Duties: (a) analysis of generating units via plant-wide data acquisition database (OSIsoft PI) & control room DCS software (Siemens SPPA-T3000); (b) design & implementation of software for data processing, analysis, & reporting via VBA programs in Excel.
• Special projects: (a) analysis of auxiliary boiler performance in IP-turbine only mode & boosting mode; (b) participation in plant improvement projects, lost energy analyses, & plant performance modeling.
• Accomplishments: (a) successfully removed over 80% of redundant control room alarms through Pareto analysis of I&C systems; (b) increased daily plant production by 8 to 11 MWh through successful demonstration of IP only mode analysis; (c) improved accuracy & speed of metric report generation through automation of repetitive tasks.

• Duties: (a) jig design for assembly to optimize safety, process control, & throughput; (b) fixture design/wiring to perform thermal/vibration experimentation; (c) generation of part/assembly drawings per ASME Y14.5-2009 standard.
• Special projects: (a) root-cause problem solving sessions during new product development; (b) identification, quantification, & resolution of potential failure modes through process and design FMEA; (c) firmware testing & documentation on Bugzilla.
• Accomplishments: (a) designed final acceptance test circuit for electronics-free configured NX3 pump; (b) designed process & tools to eliminate syringe crashing during assembly of same pump.

Graphics/Manufacturing Intern – Bigelow Aerospace (Oct 2013–Aug 2014) – North Las Vegas, NV
• Duties: (a) accurate, organized, & timely information logistics of a large volume of technical documentation as required by client contracts (e.g. NASA, Boeing, etc.); (b) calculation of KPI metrics; (c) creation of project calendars & kit lists for flight article assembly tree.
• Special projects: (a) interior design of BA 330 simulator; (b) developing an action plan for implementation of a property-wide MSDS database.
• Accomplishments: (a) developing action plan for continuous improvement of SDS database; (b) facilitating ITAR compliance & AS9100C audit preparation across multiple departments.

Other Work Experience

Engineering Tutor – UNLV Academic Success Center (Feb 2013–Oct 2013) – Paradise, NV
Automation/Rigging Technical Intern – Cirque du Soleil (Summer 2012) – Paradise, NV

Education: University of Nevada, Las Vegas
• Expected graduation in Fall 2015 with Bachelor of Science in Mechanical Engineering (GPA > 3.0)
• 5-time scholarship recipient from UNLV, the state of Nevada, & private industry
• Research includes: (a) Performance/Financial comparison of PV/CPV modules and tracking systems; (b) High temperature fuel cells replacing natural gas turbines in combined cycle power plants.
• Senior Design Project: IP 1000 Pump Value Improvement – (IMI Precision Engineering collaboration)

Professional Certification/Training
• NABCEP certification credits through SOMO Conference training, 2015
• Excel Advanced Training (including Pivot Tables & Databases) through CSN Workforce, 2014
• Valve Ed 2-day Training Seminar through Valve Manufacturers Association, 2014
• Permit-Required Confined Space Entry (OSHA 29 CFR 1910.146) through Bigelow Aerospace, 2013
PERSONAL STATEMENT
As a current UNLV student with a major in mechanical engineering and a current internship position for Bombard Renewable Energy, I’m looking to develop and apply my skills in solar and renewable energy as well as learn new concepts of the solar field. I’m an individual that can stay calm under pressure and able to prioritize workloads. Seeking to use my past experience and knowledge into a more challenging role.

TECHNICAL SKILLS
- AutoCAD
- SolidWorks
- MS Excel

EDUCATION
- University of Nevada, Las Vegas January 2014-Present
  Mechanical Engineering Major
  Solar & Renewable Energy Minor
- East Career and Technical Academy August 2009-June 2013
  Mechanical Technology Program

EMPLOYMENT
Mechanical Engineering Intern
Achievements
- Offered contributions to residential/commercial layout plans made through Autocad. Also, collaborating in submitting multiple project estimating cost proposals and engineering calculations. The concepts were accepted and integrated into the final rollout.

REFERENCES
- Bo Balzar - Bombard Renewable Energy’s Operations Manager
  bbalzar@bombardelec.com 702-492-0957
- Vu Tran - Bombard Renewable Energy’s Design Engineer
  vu.tran@bombardelec.com 702-492-0957
- Jared Peterson - Bombard Renewable Energy’s Design Engineer/Estimator
  jared.peterson@bombardelec.com 702-492-0957
DARIUS JACKSON

11617 Grotta Azzurra Avenue, Las Vegas, NV, 89138  
(702) 401-4138 / dariusjackson22@gmail.com

OBJECTIVE

While developing a stable foundation in the studies of kinematics, computer programming, and renewable energy, I would like to apply my knowledge towards any of the following fields:

- Robotics/ Artificial Intelligence (AI)
- Autonomy (Autonomous Vehicles)
- Computer Software/ Mobile Application Development
- Renewable Energy (Solar/Wind energy)

EDUCATION

2013- Current  University of Nevada Las Vegas  Las Vegas, NV

- **Majors:** Mechanical Engineering; Computer Science
- **Minors:** Renewable Energy; Technology Commercialization
- Current GPA: 3.4
- Awarded multiple scholarships & recognition on the Dean’s List

RELATED SKILLS

- Developing CAD skills with SolidWorks/ Creo
- Developing programming skills in C++
- Proficient skills with Word, Powerpoint, & Excel
- Typing: 42 WPM average

OUTREACH

- Created multiple presentations for UNLV to get MS/HS students involved in STEM fields
- Involved with multiple student organizations on campus such as SWE (Society of Women Engineers) & NSBE (National Society of Black Engineers)
- UNLV tutor that specializes in helping students understand conceptual mathematics and ensure their progression in their respective program
- Volunteered with ThreeSquare, Opportunity Village, and other companies to motivate students to join STEM fields or donating time & efforts to the less fortunate
Saul Mendoza  
(702) 409-9403  
saul.mendoza16@hotmail.com

Experience:

- Security Services for St. Moritz from 15 February 2015 - 5 June 2015
- Cashier at Del Taco from 28 August 2013- 15 February 2015.
- Tae Kwon Do instructor from November 2009-August 2013
- Nationwide level D-1 referee under USAT

Education:

- Currently attending University of Nevada : Las Vegas (2.50 < GPA)
- Graduated from Western High School with an advanced honors diploma and a weighted GPA of a 4.01 on June 13, 2013

Skills:

- Great customer service
- Bilingual
- Social
- Technology knowledge
- Multi-task
- Patience
- Phone/fax knowledge

Awards and Recognitions:

- Second degree black belt certificate worldwide
- Advanced honors diploma
- Perfect attendance

Activities:

- Participated in thirty-three tournaments and won thirty-three medals in during the years of 2009-2013
Nir Moshe Herscovici
herscn1@unlv.nevada.edu

EDUCATION
B.S Mechanical Engineering & B.A Computer Science Major, Mathematics Minor
University of Nevada, Las Vegas (Expected Graduation: December 2018)
Core Engineering GPA: 3.62 / Cumulative GPA: 3.22

University Education:
John Cabot University (Rome, Italy) & University of Nevada, Las Vegas (current)

BACKGROUND/LIFE EXPERIENCES
Fluency in 3 Languages: Hebrew, Romanian, and English.
Resided in 5 countries: (Israel, Nigeria, Romania, Italy, United States)

PROJECT/WORK EXPERIENCE
Internship: Gilmore Engineering Corporation (Abuja, Nigeria)
Location: Mainly Abuja, Nigeria (2010 – 2013)
• Assistant of the General Manager (CEO) of a civil engineering company residing in Abuja, Nigeria.
• Exposure to serious engineering projects throughout the duration of my unique high school experience of living in Africa.

Volunteer at Médecins Sans Frontières (Doctors Without Borders)
Location: Abuja, Nigeria & Accra, Ghana (2011)
Cofounder: “Party-Information (PINFO)”
Location: Rome, Italy (2013)
• Co-Founder and partner of an Android and IOS platform application that caters to the tourist industry.

Location: Las Vegas (Spring 2014/2015/2016.)

President of Hillel (student-run Int’l organization)
Location: Las Vegas (Fall 2014 – 2015)

Student Activist for AIPAC (American Israel Public Affairs Committee)
Location: Las Vegas & Washington D.C (Fall 2014 – 2015)
• Lobbied senator Dean Heller in Washington D.C as a representative.

Potential Mensa International Member (Spring 2016)

Private Tutor: Low-Level Mathematics, Hebrew, and English (Fall 2014 -2015)

ACADEMIC ACHIEVEMENTS
Awarded Dean’s list Honors (several enumerated dates)
• For high academic prowess and understanding of rigorous engineering courses.
Nicholas Huynh

Phone: (702) 265-8108 | Email: huynhnt2@unlv.nevada.edu | LinkedIn

Objective:
To learn about the operations of a business including marketing with an emphasis on computer science.

Education:

University of Nevada, Las Vegas 08/2012 - Present
- Honors College
- Major: Computer Science
- Minor: Global Entrepreneurship
- GPA: 3.49
- Global Entrepreneurship Experience Program 01/2014 - Present
- OCA Las Vegas Mentorship Program 02/2014 - 05/2014

East Career and Technical Academy 08/2008 - 06/2012
- GPA (Non-Weighted): 4.0 out of 4.0
- GPA (Weighted): 4.8 out of 4.8
- Class Rank: 1 of 401
- Project Based Learning
- Business/Marketing Student

Work Experience:

- Lucky Girl Design Marketing Internship 06/2014 - 08/2014
- Skyworks Aerial System Marketing Internship 11/2014 - Present
- Asian Community Development Council Web Design Internship 01/2015 - Present
- Miss Asian Las Vegas Graphic Design & Web Designer 07/2013 - Present
- UNLV Entertainment Engineering Research Center Marketing & Web designer 06/2015 - Present
- UNLV College of Engineering Student Ambassador 11/2015 - Present

Achievements:

- International Deans List Society Member 06/2013
- College of Engineering Dean’s List 06/2013
- Finalist in Undergraduate Governor’s Cup Business Plan Competition 03/2014
- Gold Level Collegiate DECA Passport Program 04/2014 & 04/2015
- Preliminary and Top 5 Finalist for Emerging Technology Marketing Strategies 04/2014

Extracurricular Activities

UNLV American Marketing Association, Vice President 08/2013 - 05/2014
- Collaborate with President duties
- Work with other officers to meet deadlines

UNLV Collegiate DECA, President 08/2012 - Present
- Create advertisements for events
- Create MailChimp emails and maintain email database
- Liaison with the high school division
- Collaborate and motivate officer team

OCA Las Vegas, Secretary 01/2014 - Present
- Record notes of Board Meetings and manage website

Tau Beta Pi, Member 11/2014 - Present

UNLV Collegiate DECA, Vice President of Technology 05/2015 - Present

Additional Information

- Proficient in Adobe Photoshop
- Proficient in C++, Assembly, and C
- Self-taught in HTML
APPENDIX III

Letters of Support

Community Support:
- NV Energy
- Senator Harry Reid
- Congressman Joe Heck
- PKMM Inc.
- Cleveland Clinic
- AIA Las Vegas
- Mendenthal Smith Structural Engineers
- Zappos
- Tesla
- Luchessi, Galati Architects
- Bombard Renewable Energy
- Las Vegas Railway Express
- Nevada Medical Center
- UMC
- McCarthy Construction
- Southern Nevada Homebuilder’s Association
- City of Las Vegas Public Works
- Clark County Water Reclamation District
- Venture Catalysts
- Home Energy Connection
- Michael J. Plinski
- NAIOP Southern Nevada
- Las Vegas Railway Express
- MedLion
- NantMobile
- O’Reilly Law Group, LLC
- Burns & McDonnell

University Support:
- President
- Executive Vice President and Provost
- Vice President for Research and Economic Development
- Center for Energy Research
- Dean, Engineering
- Dean, Nursing & Allied Health Sciences
- UNLV Planning & Construction
- Alfredo Fernandez-Gonzalez
- Attila Lawrence
October 26, 2015

David E. James, PhD. PE F.NSPE
Director, Solar and Renewable Energy Programs
Associate Professor
Department of Civil and Environmental Engineering and Construction
UNLV 45-4015
4505 S Maryland Parkway
Las Vegas NV 89154-4015 USA


Dear Mr. James:

We commend you and your department’s efforts to enrichen the educational experience of your students and to contribute to a more sustainable environment. And, we feel your aspiration to blend the needs of a health-care centric home with renewable energy and energy efficiency is also commendable.

We were pleased to support your efforts in 2013 and excited to do so again. Please consider this letter as evidence of our willingness to support your application for the U.S. Department of Energy Solar Decathlon 2017 competition.

As you have specific energy efficiency, rooftop solar and smart-home needs or questions, our team of engineers, energy efficiency experts and renewable energy professionals stand ready to assist and collaborate with your students and faculty.

Warm regards,

Tony F. Sanchez III
United States Senate  
WASHINGTON, DC 20510-7020  
October 26, 2015  

The Honorable David Danielson  
Assistant Secretary  
Office of Energy Efficiency & Renewable Energy  
Forrestal Building  
1000 Independence Avenue, SW  
Washington, DC 20585  

Dear Secretary Danielson:

I am writing today in support of the University of Nevada, Las Vegas (UNLV) and its application to participate in the Department of Energy’s 2017 Solar Decathlon competition.

As you know, the Solar Decathlon challenges collegiate teams to design, build, and operate homes that are cost-effective, energy-efficient, and attractive. This event serves an important role by allowing our next generation of innovators to confront the challenges presented by climate change. UNLV is uniquely positioned to benefit from participating in the Solar Decathlon, as Nevada is one of the leaders in investment in sustainable housing and clean energy.

I am confident that UNLV, which has a variety of on-campus research centers that support its application, would be a strong addition to the 2017 Solar Decathlon. As you are aware, during the 2013 Solar Decathlon, UNLV took 2nd place in the world and 1st place in the United States. UNLV will build upon this success by focusing on improving the effectiveness of sustainability that can meet the needs of disabled persons and the nation’s aging population.

We have the ability to adapt and confront the challenges posed by climate change and I am proud that Nevada is doing its part to reduce our reliance on fossil fuels. UNLV’s participation in the 2017 Solar Decathlon would help to reinforce this model while simultaneously allowing the disabled and elderly to maintain their independence at home with quality health care.

I support UNLV in this application and hope that you will keep my recommendation in mind when making your decision. Thank you for your consideration.

Sincerely,

HARRY REID  
United States Senator  

CC: Dr. Dan Arvizu  
Director and Alliance President  
National Renewable Energy Laboratory
October 22, 2015

Team UNLV,

It is with great pleasure that I congratulate you on your decision to enter the Solar Decathlon 2017. I am pleased that University of Nevada Las Vegas students, faculty, and community leaders have partnered to participate in this unique opportunity.

In 2013, UNLV won 2nd place in the International Solar Decathlon, and I am proud to represent southern Nevadans like yourselves who embody key characteristics critical to success such as leadership, community awareness, and commitment to excellence.

As a physician, I look forward to your development of a modular, personalized, and intelligent home that will improve the quality of aging and retirement living. It is my hope that you will continue to pursue your interests in medicine and leadership, fields that are very important to the future of both Nevada and our nation.

Again, I appreciate you sharing your partnership to develop a medically intelligent home with me. I wish Team UNLV the best of luck.

Sincerely,

DR. JOE HECK
Member of Congress
October 19, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

As Senior Vice President for PKMM Inc., we are pleased to offer our support to the students and faculty of University of Nevada Las Vegas' Colleges of Engineering and Fine Arts, regarding their application to the US Department of Energy's 2017 Solar Decathlon competition.

The UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. Personally, I am very excited that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a home that is a net zero user of energy. This excitement is rooted in the fact that I am a father of a son with special needs, and a Daughter who has begun her studies at the University of Nevada Las Vegas. Nevada as the rest of the United States has a growing demographic need for such a home for both disabled persons and a generally aging United States population. This solar home, when completed, could lead the way towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with all departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, of the proposed home and also evaluation of the home's potential effectiveness.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV's 2013 Solar Decathlon entry was a fantastic project that reflected well on the UNLV students' abilities to develop an appealing design that was internationally competitive. As a 2013 UNLV Solar Decathlon Sponsor, we look forward to supporting another successful competitive entry in 2017.

If UNLV's application is accepted for the competition, PKMM Inc., would be pleased to provide guidance or other material or in-kind support for UNLV's entry.

Please accept our letter offer of support to UNLV for its 2017 application.

Sincerely,
Mark P Pallotta
Sr. VP / Chief Operations Officer
October 22, 2015

David E. James, PhD. PE F NSPE
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

Dear Dr. James:

As Director of Education for Cleveland Clinic Lou Ruvo Center for Brain Health, I am pleased to offer our support to the students and faculty of UNLV’s Colleges of Engineering and Fine Arts who are applying to the US Department of Energy’s 2017 Solar Decathlon competition.

The UNLV team has proposed a connected, healthcare-centric, energy-neutral home for the 2017 competition. Our Center, which treats and supports patients and caregivers facing Alzheimer’s, Parkinson’s, and other neurodegenerative disorders, is excited that UNLV is expanding its commitment to improving the effectiveness of sustainably delivering home-based health care for the disabled and elderly. Over the past few years, we have collaborated with UNLV on initiatives to train students in designing homes that directly confront the challenges of normal aging and of diseases that disproportionately affect seniors. Nevada, as a retirement destination, is particularly sensitive to the aging of the US population. Therefore, developing environments and services that benefit our seniors is an area in which our community is particularly motivated and experienced. UNLV’s proposed solar home, when completed, will provide a practical example of how elders can remain in their homes while receiving appropriate monitoring and care.

It is especially appealing that the University is developing a collaborative effort with departments, schools and colleges across the campus; this is also quite typical of UNLV’s approach to education and problem-solving. Students from many academic disciplines will have an opportunity to participate in the home’s design and construction, as well as its operation, testing, and marketing. We expect strong support from the Las Vegas community, including our Center, which is the norm for UNLV projects.

With a first place among US entries (2nd place overall), UNLV’s 2013 Solar Decathlon entry reflected well on UNLV students’ abilities to develop an appealing, world-class design. We look forward to supporting another successful entry in 2017.

If UNLV’s application for the competition is accepted, our Center will provide expert consultation during planning, construction, and post-project evaluation and testing. We are also prepared to liaise between UNLV and the community organizations that serve our patients.

Please accept my offer of support to UNLV for its 2017 Solar Decathlon application.

Sincerely,

Dylan Wint, MD
Director, Education Programs
NV Energy Foundation Chair for Brain Health Education
Cleveland Clinic Lou Ruvo Center for Brain Health
October 22, 2015

David E. James, PhD. PE. NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
UNLV 45-4515
4505 S. Maryland Parkway
Las Vegas, NV 89154-4515

Subject: UNLV application – US DOE Solar Decathlon 2017 competition

Dear Mr. James,

It is with pride and enthusiasm that I provide this letter of support for Team Las Vegas Solar Decathlon 2017. The interdisciplinary team composed of UNLV students, faculty and community leaders possess the intellectual, technical and innovative talents necessary to envision and create an exemplary solar home that is energy efficient, cost-effective and a beautiful and comfortable place to live.

The UNLV team received international recognition in 2013 by being the highest placing U.S. Team and taking 2nd place in that year’s solar decathlon competition. This year the team combines the intellectual collective of the UNLV Colleges of Engineering, Architecture, Applied Health Sciences and Liberal Arts as well as the experience of local leaders from the medical and business communities. Building on the momentum of 2013, and with an expanded focus on improving the quality of healthful living, the team continues to evolve and incorporate advancements in solar technologies and applied health sciences.

Aligned with the amazing resources of the University of Nevada Las Vegas, and an informed and committed community of architects and design professionals through the Las Vegas Chapter of the American Institute of Architects, I have no doubt that Team Las Vegas will exceed all expectations and will demonstrate the most exceptional achievements in the Solar Decathlon 2017.

On behalf of the members of AIA Las Vegas I enthusiastically support the selection of Team Las Vegas as a Solar Decathlon 2017 team.

Sincerely,

Randy Lavigne, Hon. AIA
Executive Director
AIA Nevada / AIA Las Vegas
October 26, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

As a principal at Mendenhall Smith Structural Engineers I am pleased to offer support for the students and faculty of University of Nevada Las Vegas’ Colleges of Engineering and Fine Arts, regarding their application to the US Department of Energy’s Solar Decathlon 2017 competition.

The UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. Personally, I am pleased that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a home that is a net zero user of energy. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This solar home, when completed, could lead the way towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with all departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, of the proposed home and also evaluation of the home’s potential effectiveness.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s Solar Decathlon entry 2013 was a fantastic project that reflected well on UNLV students’ abilities develop an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, I would be pleased to consider providing guidance or in-kind support for UNLV’s entry.

Please accept my letter offer of support to UNLV for its 2017 application.

Sincerely,

Kirsten E. Nalley, PE, SE

Mendenhall Smith Structural Engineers, LLC
October 21, 2015

Maggie Hsu
Executive Advisor
Zappos.com
400 East Stewart Avenue
Las Vegas, NV 89101

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

I am pleased to offer my words of support to the students and faculty of University of Nevada Las Vegas’ Colleges of Engineering, Fine Arts, Health Sciences, and Business regarding their application to the US Department of Energy’s 2017 Solar Decathlon competition.

The UNLV team has identified a connected, healthcare-centric net zero energy sustainable home as its theme for its proposal to join the 2017 competition. Personally, I am very excited that UNLV has focused on improving the effectiveness of sustainably delivering health care to the disabled and elderly in a home that is a net zero user of energy. Nevada, similar to the rest of the US, has a growing demographic need for such a home for both disabled persons as well as a generally aging US population. This solar home, when completed, could lead the way towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with multiple departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, and marketing, of the proposed home and also evaluation of the home’s potential effectiveness.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on UNLV students’ abilities to develop an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, I would be pleased to provide guidance, other material or in-kind support for UNLV’s entry.

Please accept my letter offer of support to UNLV for its 2017 application.

Sincerely,

Maggie Hsu
mhsu@zappos.com
(617) 894-4764
October 23, 2015

David E. James, PhD. PE. F.NSPE  
Principal Investigator, UNLV Solar Decathlon 2017  
Associate Professor and Director, Solar and Renewable Energy Programs  
4505 S Maryland Parkway UNLV 45-4015  
Las Vegas NV 89154-4015

Subject: UNLV Application – U.S. DOE Solar Decathlon 2017 Competition

Tesla Motors is pleased to write this letter in support of the proposal being submitted by the University of Nevada – Las Vegas (UNLV) to participate in the 2017 U.S. Department of Energy (DOE) Solar Decathlon competition. The UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. We are particularly excited about the opportunity to integrate energy storage into the design and operation of the home.

Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, of the proposed home and also evaluation of the home’s potential effectiveness. With an overall 2nd place finish – first place for U.S. entries – UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on UNLV students’ abilities develop an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

In conclusion, we fully support UNLV’s application for the 2017 Solar Decathlon. Please feel free to contact me if you have any further questions. If UNLV’s application is accepted for the competition, Tesla would be pleased to provide guidance or other support for UNLV’s entry.

Best regards,

[Signature]

JB Straubel  
Co-founder and Chief Technical Officer  
Tesla Motors
October 21, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

LGA is pleased to offer our support to the students and faculty of University of Nevada Las Vegas’ Colleges of Engineering and Fine Arts, regarding their application to the U.S. Department of Energy’s Solar Decathlon 2017 competition.

We are excited to see that the UNLV team has identified a connected, health-care centric, net-zero energy home as the theme as their conceptual design approach. Nevada, as the rest of the U.S., has a growing need for such homes for a generally aging population with various health challenges. This solar home, when completed, could lead the way towards providing a living example of how people could remain in their homes longer and be diagnosed, treated, and potentially monitored for their wellness status without being institutionalized. As designers of many health and wellness projects specifically catering to the Medicare population, LGA will be glad to provide technical assistance for the student team during the design process.

It is especially exciting that the University is approaching this as a collaborative effort with all departments, schools and colleges across the campus. Through this interdisciplinary team effort, the students will be able to grow to be well-rounded designers and engineers, who will be valuable additions to the State’s future workforce. We also anticipate new research and innovative technological integration in the design for a “wellness home” to result from the creative endeavor of this project.

With an overall 2nd place finish (first place for U.S. entries), UNLV’s Solar Decathlon 2013 entry was a fantastic project that reflected well on UNLV students’ abilities to develop a high quality design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

Sincerely,

Craig Galati, President
October 26, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

Dear Solar Decathlon committee,

Bombard Renewable Energy is honored to be asked to support University of Nevada, Las Vegas (UNLV) and the U.S. Department of Energy’s 2017 Solar Decathlon competition. We find that UNLV and their renewable energy education programs have played an important part in the advancement of the industry. Several interns from the UNLV engineering department have turned into great employees for Bombard Renewable Energy. The UNLV team’s 2017 competition proposal to have a connected, health-care centric net-zero energy sustainable home as a theme works well bringing in all academic areas to participate in the research, design, construction, documentation, operation and marketing of the proposed home.

Bombard and its employees found our experience very rewarding as a supporter in the 2013 Solar Decathlon. We were so proud of their 1st place finish nationally and overall 2nd place finish for UNLV’s 2013 Solar Decathlon entry. That entry is still drawing large crowds and educating the public as this home is on display at the Las Vegas Springs Preserve. Bombard has participated in many projects and events with the students and faculty of University of Nevada Las Vegas’ Colleges of Engineering and other departments in the past several years and look forward to many more.

This is an exciting opportunity for UNLV to show continued leadership in the area of energy efficient buildings. We also see this as a long term value in the efforts of economic diversification and workforce development for Nevada. We look forward to supporting another successful competitive entry in 2017.

Sincerely,

[Signature]
Bo Balzar
Operations Manager
October 26, 2015

David E. James, PhD, PE, FNSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

Dear Dr. James,

As Chairman of the boards of the Nevada Medical Center and University Medical Center of Las Vegas, as well as serving on the board of the UCLA Health System, I write to strongly state my support for the students and faculty of the University of Nevada Las Vegas’ Colleges of Engineering and Fine Arts, regarding their application to the US Department of Energy’s 2017 Solar Decathlon competition. I am an alumnus of UNLV, a supporter of UNLV in many capacities, and an advocate for improved health care in our community. As such I perceive great value for UNLV, Southern Nevada, and the American public for allowing a UNLV team to compete in this prestigious competition.

As I understand it, the UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. Personally, I am delighted that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a renewably-powered home that is a net zero user of energy and provides a high level of thermal comfort and accessibility. Nevada and the US more broadly have a growing demographic need for such a home for both disabled persons and a generally aging US population. This type of home, when completed, could pave the way towards providing a living example of how persons can age in place, including diagnosis and, as needed, monitoring without being institutionalized.

The Nevada Medical Center is designed to foster partnership and collaboration between the many health care and medical entities in Nevada, including and beyond UNLV. Therefore it is especially appealing that the University is approaching this as a collaborative effort with all departments, schools and colleges across the campus. Students from numerous disciplines will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, of the proposed home and also evaluation of the home’s potential effectiveness.

If UNLV’s application is accepted for the competition, the Nevada Medical Center would be pleased to include UNLV’s team in our work and provide guidance and support as it is helpful. Together we build a better, stronger, and more sustainable community.
October 26, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

As the Chief Executive Officer at University Medical Center of Southern Nevada (UMC), I am pleased to offer support to the students and faculty of University of Nevada Las Vegas’ Colleges of Engineering and Fine Arts, regarding their application to the US Department of Energy’s 2017 Solar Decathlon competition.

UMC is Nevada’s premier academic medical center and has partnered with UNLV for over 35 years to train our future healthcare workforce. Currently, UNLV students in the fields of nursing, physical therapy, radiography, social work and dietary receive clinical education at UMC. UMC is home to 100 medical students and more than 260 physicians in 16 accredited residencies and fellowships. Our hospital has participated in graduate medical education since 1978 and is proud to partner with the new UNLV School of Medicine to educate and train Nevada’s next generation of physicians. A lasting partnership between UMC and the new medical school at UNLV will allow our community to flourish for decades to come.

The UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. Personally, I am enthused that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a renewable-powered home that is a net zero user of energy and provides a high level of thermal comfort and accessibility. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This type of home, when completed, could lead the way towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

If UNLV’s application is accepted for the competition, UMC would be pleased to provide guidance or in-kind support for UNLV’s entry. Please accept my letter, offering support to UNLV for its 2017 application.

Respectfully,

[Signature]

Mason VanHouweling
Chief Executive Officer

Page | 65
October 21, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

Please accept this letter as an offer of support to UNLV for its 2017 application. As a Project Director of McCarthy Building Companies I am pleased to offer my words of support to the University of Nevada Las Vegas Colleges of Engineering and Fine Arts, for the UNLV’s application in 2017 US Department of Energy’s Solar Decathlon.

The UNLV team has identified a connected health-care centric net-zero sustainable home as its theme for the 2017 competition. Personally, I am very excited that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly. Nevada, as the rest of the US, has a growing demographic need for such a home, for both disabled and generally aging US population. This solar home, when completed, could lead the way to providing a living example of how persons could remain in their homes much longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, and evaluation of the home’s potential effectiveness.

Should UNLV’s application be accepted for the competition, myself and other members of McCarthy Building Companies would be pleased to provide guidance or other material or in-kind support for UNLV’s entry.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on UNLV students’ abilities to develop an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

Sincerely,

[Signature]

Ryan Cogley
Project Director
October 22, 2015

David E. James, PhD, PE, NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

Dear Dr. James;

As Executive Officer of the Southern Nevada Home Builders Association, I am pleased to offer the support of my members to the students and faculty of the University of Nevada Las Vegas' Colleges of Engineering and Fine Arts, in their application to the US Department of Energy's Solar Decathlon 2017 competition.

The UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. Our Board supports their focus on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a home that is a net zero user of energy. This home, when completed, could lead the way towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized. Drawing attention to the feasibility of efficient new home construction as part of meeting our county's growing need for safe, accessible and affordable housing for our aging population.

It is especially appealing that the University is approaching this as a collaborative effort with all departments, schools and colleges across the campus, as building healthier communities draws on, and impacts, so many different disciplines. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, of the proposed home and also evaluation of the home's potential effectiveness.

We look forward to supporting another successful competitive entry in 2017. If UNLV's application is accepted for the competition, SNHBA's members will be pleased to provide guidance and financial support for UNLV's entry. Please accept my/our letter offer of support to UNLV for its 2017 application.

Respectfully Submitted,

Nathaniel W. Hodgson III
Chief Executive Officer,
Southern Nevada Home Builders Association
October 22, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

As a Construction Project Representative currently under the employ of the City of Las Vegas’ Public Works dept., City Engineer division, I am pleased to offer my support to the students and faculty of University of Nevada Las Vegas’ Colleges of Engineering and Fine Arts, regarding their application to the US Department of Energy’s Solar Decathlon 2017 competition.

The UNLV team has identified a connected, health-care-centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. Personally, I am very intrigued that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a home that is a net zero user of energy. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This solar home, when completed, could lead the way towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with all departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, of the proposed home and also evaluation of the home’s potential effectiveness.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s Solar Decathlon entry 2013 was a fantastic project that reflected well on UNLV students’ abilities develop an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, I would be pleased to provide guidance or other material or in-kind support for UNLV’s entry.

Please accept my letter offer of support to UNLV for its 2017 application.

Sincerely,

[Signature]

Page | 68
October 23, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

Dear Dr. James:

As an employee of the Clark County Water Reclamation District and a member of the Civil & Environmental Engineering and Construction College Advisory Board, I fully support the University of Nevada Las Vegas (UNLV) Colleges of Engineering and Fine Arts application for the 2017 US Department of Energy’s Solar Decathlon.

UNLV has identified a connected, health-care centric net-zero sustainable home as its theme for the competition. Personally, I am very pleased that the team has chosen to focus on improving the effectiveness of sustainably delivering health care for the disabled and elderly. Nevada, in particular, has a growing demographic need for such a home, and this could lead the way to providing a realistic option for persons to remain in their homes much longer before being institutionalized. It is especially appealing that UNLV is approaching this as a collaborative effort with departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, and evaluation of the home’s potential effectiveness.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on the students’ abilities to develop an appealing design that was internationally competitive. I look forward to supporting another successful entry in 2017. If UNLV’s application is accepted for the competition, I, on behalf of the Advisory Board, would be honored to provide guidance and mentoring to the team.

Please accept my letter of support to UNLV for its 2017 application.

Sincerely,

ADAM M. WERNER
Manager, Design & Construction

AMW/mo

BOARD OF TRUSTEES
Lawrence L. Brown III, Chair. Steve Sisolak, Vice Chair.
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Thomas A. Minwegen, General Manager

5857 East Flamingo Road, Las Vegas, Nevada 89122 (702) 668-8888, (800) 762-4324
cleanwaterteam.com
October 22, 2015

David E. James, PhD, PE, NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Dear Dr. James,

As a member of the UNLV College of Engineering Advisory Board, I have been a long-time supporter of collaborative efforts between the College and the College of Fine Arts. The 2017 entry into the US Department of Energy’s Solar Decathlon Competition will build on 2013’s award winning effort, adding health care technologies for the aging and their families to a net-zero sustainable home, and I am delighted to add my voice in support of the project.

Most developed countries have a large and aging populations, but more than many other nationalities families in this country live in diverse locales, often states or even a continent away from one another. With aging parents in one city and their children scattered across the country in others, managing the parents' transition from an active to somewhat dependent lifestyle is a continuing challenge for all involved. Those challenges are often exacerbated when a non-family caregiver is involved, either full or part-time.

The safety and security of aging parents is of concern to all who are facing that challenge. Incorporating new technologies into the net-zero sustainable home will enable them to continue to live independently longer in their communities. And developing this health-care smart home, with state-of-the-communications and non-intrusive monitoring, will enable all families to continue their lives with minimum interruption and perhaps most importantly, peace of mind.

Sincerely,

Judi Dohn
Managing Member
October 22, 2015

David E. James, PhD. PE F. NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

As the owner of Home Energy Connection, LLC, I am thrilled to express my continued support to the students and faculty of the University of Nevada Las Vegas’ Colleges of Engineering and Fine Arts regarding their application to the US Department of Energy’s 2017 Solar Decathlon competition. Based on the incredibly positive experience I had supporting UNLV’s 2015 entry in the Race to Zero Competition and the 2013 UNLV Solar Decathlon team in their second place finish with energy modeling services, training on building science best practices along with fundraising and emotional support, I find their proposed entry for the 2017 competition to have world-wide applicability.

The UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. With my involvement in the EPA’s indoor airPLUS program and connection with Lawrence Berkeley Labs’ work on indoor air quality and mechanical ventilation, I am very conscious of the importance of creating indoor environments that promote the occupant’s health. UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a zero energy home. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This high performing home, when completed, would lead the way towards providing a living example of how persons can remain in their homes longer through the remote diagnostic and monitoring of their health care status without being institutionalized.

I love UNLV’s collaborative approach by including all departments, schools and colleges across the campus. This design also ties in with the opening of their Medical School in 2017. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing and the evaluation of the home’s potential and actual effectiveness.

We look forward to supporting another successful competitor in 2017. Home Energy Connection looks forward to providing Team UNLV guidance, material donations and financial support. Please accept this letter of support to UNLV for its 2017 application.

Sincerely,

Les Lazareck, CEM
Owner
Home Energy Connection, LLC
• Licensed Nevada Energy Auditor and Trainer
• Certified BPI Building Analyst, Envelope and AC & Heat Pump Professional
• BPI and RESNET HERS Rater, Instructor, Proctor and QA Designee
• ENERGY STAR and DOE Zero Energy Home Rater and Verifier
• Level I Infrared Thermographer
October 23, 2015

David E. James, PhD. PE F.NSPE  
Principal Investigator, UNLV Solar Decathlon 2017  
Associate Professor and Director, Solar and Renewable Energy Programs  
4505 S Maryland Parkway UNLV 45-4015  
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

As an alumni of University of Nevada Las Vegas College of Engineering, I am pleased to offer my words of to the University of Nevada Las Vegas Colleges of Engineering and Fine Arts, regarding UNLV’s application in 2017 US Department of Energy’s Solar Decathlon.

The UNLV team has identified a connected, health-care centric net-zero sustainable home as its theme for the 2017 competition. Personally, I am very excited that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This solar home, when completed, could lead the way to providing a living example of how persons could remain in their homes much longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, and evaluation of the home’s potential effectiveness.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on UNLV students’ abilities develop an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, I would be pleased to provide guidance or other material or in-kind support for UNLV’s entry.

Please accept my letter offer of support to UNLV for its 2017 application.

Sincerely,

Michael J. Plinski  
BS and MS in Mechanical Engineering from UNLV
Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

On behalf of NAIOP Southern Nevada, I am pleased to offer our words of support to the students and faculty of University of Nevada Las Vegas’ Colleges of Engineering, Fine Arts, Health Sciences, and Business regarding their application to the US Department of Energy’s 2017 Solar Decathlon competition. We have personally witnessed the impact the 2013 Desert Sol team has had on Las Vegas and are excited to witness the growth and impact the 2017 Vegas team will have on Southern Nevada.

The UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. We are very excited that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a home that is a net zero user of energy. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This solar home, when completed, could lead the way towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with all departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, of the proposed home and also evaluation of the home’s potential effectiveness.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on UNLV students’ abilities develop an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, I would be pleased to provide guidance or other material or in-kind support for UNLV’s entry.

Please accept our letter offer of support to UNLV for its 2017 application.

Sincerely,

[Signature]

Charles Van Geel, President
NAIOP Southern Nevada
October 19, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

As The CEO of Las Vegas Railway Express, Inc. and a past real estate residential housing lender and developer, I am pleased to offer my words of support to this project for the University of Nevada Las Vegas Colleges of Engineering and Fine Arts, regarding UNLV’s application in 2017 US Department of Energy’s Solar Decathlon.

The UNLV team has identified a connected, health-care centric net-zero sustainable home as its theme for the 2017 competition. Personally, I am very pleased that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This solar home, when completed, could lead the way to providing a living example of how persons could remain in their homes much longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, and evaluation of the home’s potential effectiveness.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on UNLV students’ abilities develop an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, our organization would be pleased to provide guidance or other material or in-kind support for UNLV’s entry.

Please accept my letter of support to UNLV for its 2017 application.

Sincerely,

[Signature]

Michael Barron
CEO/President
Las Vegas Railway Express, Inc.
Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

I am a medical doctor, technology entrepreneur, and new resident of Las Vegas. The UNLV solar decathlon team reflects the best of our community: enthusiasm, diligence, intelligence, and a desire for Las Vegas to be more than it is.

Those qualities attracted me to Southern Nevada, and it is inspiring to see them reflected in the effort of the UNLV solar decathletes. These young people grew up in a Las Vegas of job losses, foreclosures, and severe economic woe. Instead of despair, they responded with the dedication to learning and the embrace of technology that are slowly transforming Southern Nevada. They deserve a chance to show what they can do — and, by extension, what Las Vegas can do — and I encourage you to give the strongest possible consideration to allowing the UNLV team to compete in the U.S. Department of Energy Solar Decathlon 2015.

Please feel free to contact me with any questions.

Sincerely,

Dr. Q.
Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

As a proud UNLV alumnus, current employee of Nantmobile Health, and former employee of Intel Corporation, I am would like to offer my words of support to the University of Nevada Las Vegas Colleges of Engineering and Fine Arts, regarding UNLV’s application in 2017 US Department of Energy’s Solar Decathlon.

The UNLV team has identified a connected, health-care centric net-zero sustainable home as its theme for the 2017 competition. Personally and now professionally, I am very pleased that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This solar home, when completed, could lead the way to providing a living example of how persons could remain in their homes much longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is of particular interest that the University is approaching this as a collaborative effort with departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, and evaluation of the home’s potential effectiveness. Engaging these studies today in a collaborative manner will reap dividends later in their professional careers.

With the overall 2nd place finish in 2013 (first place for US entries), UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on UNLV students’ abilities develop an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, our organization would be pleased to provide guidance or other material or in-kind support for UNLV’s entry. Please accept my letter of support to UNLV for its 2017 application.

Sincerely,

Alex Marquez
Executive Vice President
Nantmobile Health
UNLV ’94, Electrical Engineering
October 26, 2015

David E. James, PhD. PE.F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway, UNLV 45-4015
Las Vegas NV 89154-4015

Re: UNLV Application - US DOE Solar Decathlon 2017 Competition

Dear Dr. James:

As an alumnus, lawyer, licensed contractor and a supporter of University of Nevada Las Vegas (UNLV) who has focused on health care and community issues for many years, I am pleased to offer our support to the students and faculty of UNLV’s Colleges of Engineering and Fine Arts regarding their application to the U.S. Department of Energy’s 2017 Solar Decathlon competition.

The UNLV team has identified a connected, health care centric, net zero energy, sustainable home as its theme for its proposal to join the 2017 competition. Personally, I am thrilled that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a renewably-powered home that is a net zero user of energy and provides a high level of thermal comfort and accessibility. I have believed for many years that the home of the future (which is now today given our aging population) for Nevada, as well as for the rest of the U.S., is a home that can not only be comfortable and functional for both disabled persons and a generally aging U.S. population, but also one that is designed to help promote health and fitness for those who are not disabled. This type of home, when completed, could lead the way towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with all departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation and marketing of the proposed home as well as evaluation of the home’s potential effectiveness.

With an overall 2nd place finish in 2013 (first place for U.S. entries), UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on its students’ abilities to develop an
appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, we would be pleased to provide guidance, other material or in-kind support for UNLV’s entry.

Please accept our letter of support to UNLV for its 2017 application.

Sincerely,

O’REILLY LAW GROUP, LLC

[Signature]

John F. O’Reilly, Esq.
Chairman and CEO

JOR/sp
October 19, 2015

David E. James, PhD. PE NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

As an alumni of UNLV I am honored to offer my words of support to the University of Nevada Las Vegas Colleges of Engineering and Fine Arts, regarding UNLV’s application in 2017 US Department of Energy’s Solar Decathlon.

The UNLV team has identified a connected, health-care centric net-zero sustainable home as its theme for the 2017 competition. Personally, I am very excited that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This solar home, when completed, could lead the way to providing a living example of how persons could remain in their homes much longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, and evaluation of the home’s potential effectiveness.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on UNLV students’ abilities develop an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, Burns & McDonnell would be pleased to provide guidance or other material or in-kind support for UNLV’s entry.

Please accept my/our letter offer of support to UNLV for its 2017 application.

Sincerely,

Jonathan Grantham, SE
Business Development Manager
Burns & McDonnell
October 22, 2015

Dear Solar Decathlon Committee:

It is my distinct pleasure to support UNLV’s proposal to compete in the 2017 Solar Decathlon. As we learned in 2013, competitions like the Solar Decathlon offer an opportunity to combine research, teaching, and community engagement in unique and meaningful ways. They are also critical for UNLV as it continues to emerge as a top tier national research university.

The 2013 Solar Decathlon gave dozens of UNLV students the chance to prove they can compete on a global stage. With a home that stood out for its consumer appeal and design excellence, UNLV didn’t just compete — we succeeded. UNLV’s entry, Desert Sol, topped every U.S. competitor and finished second in the world. The home, a beacon of excellence in sustainable design, now sits as a point of pride for the entire community at Las Vegas’ Springs Preserve.

But success stretches far beyond the competition itself. A team of more than 60 students, with help from dedicated faculty and industry mentors, translated classroom learning into something truly amazing.

Teams of motivated students from architecture and engineering, business and communications, worked together to energize the UNLV campus and capture the attention of one of the nation’s most vibrant communities. They learned principles of design and construction, but also public relations, marketing, fundraising and business. In true UNLV Rebel spirit, they learned how to work together and turn adversity into opportunity, proving that energy neutral homes have the potential to thrive in the harsh Mojave Desert climate. I am proud to say that nearly 100 percent of the 2013 participants are now employed in their chosen career fields.

UNLV is fully committed to supporting the 2017 entry with the necessary financial support, by actively seeking co-curricular and research opportunities, and through committed infrastructure to advise and mentor students along the way.

Team UNLV is poised to build on its success in previous competitions by incorporating emerging technology in health and into solar and energy efficient building design. This unique proposal has implications for research and home design, but as important is its potential to address issues of health and housing facing the southwest region’s fast-growing and aging population. A “smart” home that would afford residents the opportunity to age in place is a remarkable concept, and the team has engaged mentors campus wide, including from our nationally recognized Division of Health Sciences. The team will also include mentors from UNLV’s new School of Medicine, which is scheduled to open its doors to students concurrent with the Solar Decathlon in fall 2017.

I am often asked about the Solar Decathlon in meetings with community partners, both about the 2013 success and when we’ll have the opportunity to participate again. We would look forward to the chance of once again showcasing the ingenuity of our students, university and community in 2017, while helping the Department of Energy highlight the future of sustainable housing design.

Cordially,

Len Jessup, Ph.D.
UNLV President

Box 451001 • 4505 S. Maryland Parkway • Las Vegas, NV 89154-1001 • Tel: 702-895-3201 • Fax: 702-895-1088
October 26, 2015

To the Solar Decathlon Committee:

The Office of the Executive Vice President and Provost at the University of Nevada, Las Vegas (UNLV), enthusiastically offers its support for UNLV's 2017 Solar Decathlon competition team entry. The UNLV team's developing proposal for a diagnostic home that can sustainably monitor and support aging and disabled persons who wish to live in security and dignity for their entire lives, addresses a major demographic need for the early to mid 21st century in the United States and in much of the world.

This proposed project has significant potential to engage the entire UNLV academic and professional community in an interdisciplinary project that also provides a focus for all components of UNLV's drive to attain Top Tier status. There are opportunities for interdisciplinary research and publication in areas integrating architecture, construction, engineering health sciences, sustainability, renewable resources, social sciences and communications. Work on this home will put UNLV at the forefront of this emerging field, integrating renewable energy, sustainable construction, and health care diagnosis and monitoring all within one building. There are substantial research opportunities in fields such as building design and fittings that will sustainably and humanely address the needs of disabled and elderly persons, integrating inputs from the health and social sciences with the technical and design capabilities of architecture, construction and engineering to meet mobility and access requirements, as well as provide renewable energy resources to illuminate and power the home. UNLV's Dean of Allied Health Sciences, Dr. Carolyn Yuchia, has enthusiastically offered her support and has already dedicated a portion of one faculty member's time to the project.

The potential for this proposed Solar Decathlon 2017 project to enhance quality of life provides substantial opportunities for community engagement, including the community of professionals who deliver social and health care services to disabled and elder persons. They could provide substantial input and expertise to the design team on requirements for access, comfort, food preparation and mobility. Research stimulated by this project could lead to grants and publications that will substantially and beneficially effect UNLV's standing in the academic community. Intellectual property developed during the project could be patented or copyrighted and then licensed for manufacture and distribution.

Because the potential benefits to the university are both numerous and long-lasting, the Office of the Provost is pleased to enthusiastically support this project. If UNLV is admitted to the competition, the Provost's office can support the project through allocation of staff time to support coordination of university facilities operations management of budgets, allocation of support personnel for internal and community communications, direction to the UNLV Foundation for fundraising, and guidance and direction for instructional and research impacts.

Sincerely,

Nancy B. Rapoport, J.D.
Acting Executive Vice President and Provost
October 25, 2015

Dr. David James
Civil, Environmental and Construction Engineering
University of Nevada, Las Vegas
4505 Maryland Parkway
Las Vegas, NV 89154

REF: Solar Decathlon 2017

The Office of the Vice President for Research and Economic Development is very pleased to support the US Department of Energy 2017 Solar Decathlon application. This proposed project has numerous benefits and aligns greatly with the mission of the office.

In the area of research, the proposed health-care centric, sustainable home powered by renewable energy provides opportunities for interdisciplinary research collaboration across the university and community. Professionals, students and faculty, in health and social sciences can provide information and insights about client needs that can be applied by UNLV’s architecture, business, construction, engineering, marketing, and hospitality colleges/schools. Applying these objectives will improve the design and delivery of sustainable, affordable, humane and livable homes to allow the disabled and elderly to live well and securely, without isolation, throughout their lives. Collaborations in these areas could attract students to the project, be fruitful for research publications and grant funding in health care and social sciences, as well as in the more traditional design, engineering and construction fields. It is possible that patentable or copyrighted intellectual property could be developed, and could be licensed to interested companies for large-scale manufacturing and distribution, and the Office of Economic Development maintains a full-time staff that supports protection and licensing of the university’s intellectual property.

Once designed, constructed and deployed to scale, this type of state-of-the-art renewably powered health-care diagnostic and monitoring home could provide significant benefits for the region, and the potential to integrate the operation of these homes with curricula in health sciences programs, including nursing, nutrition, physical therapy and medicine is great.

The VPRED office will work collaboratively with other research units on campus to identify and support student opportunities to be involved in the Solar Decathlon project. This includes working with the Graduate College, the Office of Undergraduate Research and the Office of Economic Development. All of these units have direct opportunities to support undergraduates and graduate students on the project. In addition, the VPRED office will assist in the using the network of businesses that we work with to support the project.
This letter serves as documentation of my strong support for this program.

Sincerely,

[Signature]

Thomas Piechota, PhD, PE  
Vice President for Research and Economic Development
October 21, 2015

David E. James, PhD, PE, F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

As a faculty member and Director of the Center for Energy Research of the University of Nevada Las Vegas’ College of Engineering, I have the following comments regarding the UNLV application to the US Department of Energy’s 2017 Solar Decathlon competition.

The UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. Personally, I am impressed to see that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a home that is a net zero user of energy. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This solar home, when completed, could lead the way towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with all departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, and marketing of the proposed home and also evaluation of the home’s potential effectiveness.

I was the engineering advisor for the 2013 Solar Decathlon effort of UNLV. With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s Solar Decathlon effort developed an appealing design that was internationally competitive. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, I and other members of the Center for Energy Research will be pleased to provide guidance or other material or in-kind support for UNLV’s entry.

Please accept this letter offer of support to UNLV for its 2017 application. Best wishes with your effort.

Sincerely,

[Signature]

Box 454027 • 4505 S. Maryland Parkway • Las Vegas, NV 89154-4027
Main: 702-895-1331 • Fax: 702-895-3936 • web: http://me.unlv.edu
20, October 2015

David E. James, PhD. PE F.NSPE
Director, Solar and Renewable Energy Programs
Associate Professor
Department of Civil and Environmental Engineering and Construction
UNLV 45-4015
4505 S Maryland Parkway
Las Vegas NV 89154-4015 USA

The Howard R Hughes College of Engineering enthusiastically supports UNLV’s 2017 Solar Decathlon competition team entry. The developing proposal for a renewable energy powered health-care centric diagnostic home for disabled and aging persons provides opportunities to engage our students and faculty from all disciplines in development of the finished home, ranging from software development and integration for computer science students, to energy conservation and application of renewable and energy efficient technologies by our electrical and mechanical engineering students, to efficient and sustainable construction and infrastructure technologies and approaches for our civil engineering and construction management students.

Students in the University-wide 21-23 credit Solar and Renewable Energy minor, hosted by the College, will have background to work on both the technical and policy sides of the proposed home. Regularly offered coursework, including Sizing Solar Energy Systems, Solar and Renewable Energy Utilization, Sustainable Construction and Photovoltaic Devices and Systems can provide students with technical background to work on the home. In addition, all disciplines in the college have capstone project requirements within which students could participate in developing innovative approaches using currently available technologies for the proposed home.

UNLV faculty and staff in several departments, are willing to contribute their time and energy to support and guide students in the effort, and staff at the College’s Center for Energy Research have indicated their willingness to provide guidance and direction for students engaging in the project. The College has infrastructure needed to test home components, including instrumented rooftop and ground level research facilities, and machine and carpentry shops that can be sources of training, and as needed, provide support for fabrication.
If UNLV's application is selected, the College's Development Director, Jack Aylor, will be tasked to seek development support for the project. The College will also provide release time for the Principal Investigator, Dr. David James, to support and advise the students on the project. College administrative staff could provide support for procurement and contracts to keep the project on schedule.

The 2017 Solar Decathlon competition is a fantastic opportunity for UNLV's students to learn-by-doing on a state-of-the-art project that could have tangible benefits for a large segment of the population that will need sustainable, humane housing that lets them live sustainably, safely, and independently throughout their entire lives. The College stands ready to provide substantial material support for students and faculty in all aspects of the project.

Sincerely,

Rama Venkat, PhD
Professor and Dean,
Howard R. Hughes College of Engineering
October 19, 2015

David E. James, PhD, PE F, NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
UNLV 45-4015
4505 S Maryland Parkway
Las Vegas NV 89154-4015

Subject: UNLV application - US DOE Solar Decathlon 2017 competition

The Schools of Nursing and Allied Health Sciences are honored to assist the Colleges of Engineering and Fine Arts with the 2017 Solar Decathlon. We believe that we can add a great deal to the design to build a home that will meet the future needs of our expanding elderly population. I have provided some examples below as to how we can assist.

As you know, many nurses work with patients in their homes and are well aware of the safety issues in some homes. We are also looking to the future as more healthcare will be provided in the home and individual health will be diagnosed and monitored by healthcare professionals in portable electronic devices. These issues are critical to allow the elderly to “age in place” successfully and safely. As examples, our Physical Therapy faculty can help design spaces for elderly with limited mobility and our Nutrition faculty may help design spaces that make it easy to prepare healthy foods.

Personally, I am very excited that you are taking on this project focused on the disabled and elderly. There is a great need for safe, low-cost housing for the elderly, especially in Nevada where many move to retire. The escalating cost of nursing home care has made it critical that we design and provide homes where persons who are disabled or elderly can live safely and securely.

Sincerely,

Carolyn Yucha, RN, PhD, FAAN
Dean, Schools of Nursing and Allied Health Sciences
October 23, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: Letter of Support - UNLV Application - US DOE Solar Decathlon 2017 Competition

As the Executive Director of UNLV Planning and Construction, I am pleased to offer my support to the students and faculty of University of Nevada Las Vegas’ Colleges of Engineering and Fine Arts, regarding their application to the US Department of Energy’s 2017 Solar Decathlon competition.

The UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. Personally, I am very gratified that UNLV has focused on improving the effectiveness of sustainably delivering health care for the disabled and elderly in a home that is a net zero user of energy. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This solar home, when completed, could lead the way towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

It is especially appealing that the University is approaching this as a collaborative effort with all departments, schools and colleges across the campus. Students from all academic areas will have an opportunity to participate in the research, design, construction, documentation, operation, marketing, of the proposed home and also evaluation of the home’s potential effectiveness.

With an overall 2nd place finish in 2013 (first place for US entries), UNLV’s 2013 Solar Decathlon entry was a fantastic project that reflected well on UNLV students’ abilities develop an appealing design that was internationally competitive. UNLV Planning and Construction was very proud to support the 2013 Solar Decathlon effort, through logistical, coordination for plan review and inspection, technical, and other support activities. Some UNLV Planning and Construction staff also personally supported the 2013 entry through personal financial contributions and other personal means of support – as our department is a team of planning, design, construction and administrative professionals – the Solar Decathlon effort is very important to many of us personally. We look forward to supporting another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, UNLV Planning and Construction commits to provide guidance and support for UNLV’s entry for 2017. We would provide support through logistical, technical, project site and other support activities.

Please accept my letter offer of support to UNLV for its 2017 application.

Sincerely,

[Signature]
David Frommer
Executive Director
UNLV Planning and Construction
October 22, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

RE: UNLV Application to the US DOE Solar Decathlon 2017 Competition

I am delighted to write in support of the University of Nevada, Las Vegas application to the US Department of Energy's Solar Decathlon 2017 Competition. As Professor of Architecture, Director of the Natural Energies Advanced Technologies Laboratory, but most importantly, as a participant in UNLV’s successful 2013 Solar Decathlon Competition, I am excited to collaborate once again with UNLV students in the preparation of their entry.

I am really encouraged by UNLV’s focus on a health-care centric net-zero energy sustainable home for its 2017 proposal. I believe this is a very important niche within housing that deserves the kind of multi- and inter-disciplinary research proposed by UNLV’s team. Furthermore, given that Nevada has a growing demographic need for such a home, I look forward to the exciting research results that would be generated by this important collaboration.

If UNLV’s application is accepted for the competition, I would be pleased to provide guidance and share the Natural Energies Advanced Technologies resources to support UNLV’s entry. Please accept my letter of support to UNLV for its 2017 application.

Sincerely,

Alfredo Fernández-González
Professor of Architecture
Director, Natural Energies Advanced Technologies Laboratory
University of Nevada, Las Vegas
4505 Maryland Parkway, Box 454018
Las Vegas, NV 89154-4018
Phone: (702) 895-1141
October 22, 2015

David E. James, PhD. PE F.NSPE
Principal Investigator, UNLV Solar Decathlon 2017
Associate Professor and Director, Solar and Renewable Energy Programs
4505 S Maryland Parkway UNLV 45-4015
Las Vegas NV 89154-4015

Subject: UNLV Application - US DOE Solar Decathlon 2017 Competition

Dear Dr. James,

This is to offer my strongest possible support to the University of Nevada, Las Vegas, Colleges of Engineering and Fine Arts for the application in 2017 US Department of Energy’s Solar Decathlon.

The UNLV team has identified a connected, health-care centric net-zero energy sustainable home as its theme for its proposal to join the 2017 competition. Personally, I am very pleased that UNLV has focused on improving the effectiveness of sustainably delivering health care for the elderly in a home environment that is a net zero user of energy. Nevada, as the rest of the US, has a growing demographic need for such a home for both disabled persons and a generally aging US population. This solar home, when completed, may well be on the cutting edge of a paradigm shift towards providing a living example of how persons could remain in their homes longer and be diagnosed and, as needed, monitored for their health care status without being institutionalized.

Bearing in mind UNLV’s 2013 Solar Decathlon winning entry and the current stellar UNLV Team, I enthusiastically support what promises to be another successful competitive entry in 2017.

If UNLV’s application is accepted for the competition, the award winning students recognized for their work in neuroscience-informed environmental design responses to neurodegenerative disorders in UNLV’s internationally recognized Interior Architecture and Design Program will be wholly committed to participating in the competition.

Please consider this letter as unconditional support to UNLV for another successful competitive entry in 2017.

Sincerely,

Attila Lawrence
Professor
Interior Architecture + Design
University of Nevada
Application for Federal Assistance SF-424

1. Type of Submission:
   - [ ] Preapplication
   - [X] Application
   - [ ] Changed/Corrected Application

2. Type of Application:
   - [X] New
   - [ ] Continuation
   - [ ] Revision
   - [ ] Other (Specify):

3. Date Received:

4. Applicant Identifier:

5a. Federal Entity Identifier: 
5b. Federal Award Identifier:

6. Date Received by State: 
7. State Application Identifier:

8. APPLICANT INFORMATION:

   *a. Legal Name: Board of Regents, NSHE, obo University of Nevada Las Vegas

   *b. Employer/Taxpayer Identification Number (EIN/TIN):

   88-6000024A3

   *c. Organizational DUNS:

   0983771360000

   d. Address:

   * Street1:
     4505 S. Maryland Parkway
   * Street2:
   * City:
     Las Vegas
   * County/Parish:
   * State:
     NV, Nevada
   * Province:
   * Country:
     USA: UNITED STATES
   * Zip / Postal Code:
     89154-1055

   e. Organizational Unit:

   Department Name: 
   Division Name: 
   Civil Engineering College of Engineering

   f. Name and contact information of person to be contacted on matters involving this application:

   Prefix: 
   * First Name: Dave
   Middle Name: 
   * Last Name: James
   Suffix: 
   Title: Associate Professor

   Organizational Affiliation:

   * Telephone Number: 702-895-5804
   Fax Number: 
   * Email: dave.james@unlv.edu
Application for Federal Assistance SF-424

<table>
<thead>
<tr>
<th>* 9. Type of Applicant 1: Select Applicant Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>H: Public/State Controlled Institution of Higher Education</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Applicant 2: Select Applicant Type:</th>
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<tbody>
<tr>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Applicant 3: Select Applicant Type:</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>* Other (specify):</th>
</tr>
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<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>* 10. Name of Federal Agency:</th>
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</thead>
<tbody>
<tr>
<td>Department of Energy</td>
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<table>
<thead>
<tr>
<th>11. Catalog of Federal Domestic Assistance Number:</th>
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<table>
<thead>
<tr>
<th>CFDA Title:</th>
</tr>
</thead>
<tbody>
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<table>
<thead>
<tr>
<th>* 12. Funding Opportunity Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>DE-FDA-0001398</td>
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</table>

<table>
<thead>
<tr>
<th>* Title:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017 Solar Decathlon Team Competition</td>
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</table>

<table>
<thead>
<tr>
<th>13. Competition Identification Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Title:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14. Areas Affected by Project (Cities, Counties, States, etc.):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Add Attachment</th>
<th>Delete Attachment</th>
<th>View Attachment</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>* 15. Descriptive Title of Applicant's Project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Las Vegas</td>
</tr>
</tbody>
</table>

Attach supporting documents as specified in agency instructions.
16. Congressional Districts Of:
   * a. Applicant  NV-001  * b. Program/Project  NV-001

Attach an additional list of Program/Project Congressional Districts if needed.

17. Proposed Project:
   * a. Start Date:  01/01/2016  * b. End Date:  12/31/2017

18. Estimated Funding ($):
   * a. Federal
   * b. Applicant  1,019,999.00
   * c. State
   * d. Local
   * e. Other
   * f. Program Income
   * g. TOTAL  1,019,999.00

19. Is Application Subject to Review By State Under Executive Order 12372 Process?
   □ a. This application was made available to the State under the Executive Order 12372 Process for review on
   □ b. Program is subject to E.O. 12372 but has not been selected by the State for review.
   ◊ c. Program is not covered by E.O. 12372.

20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)
   ◊ Yes    □ No
   If "Yes", provide explanation and attach

21. "By signing this application, I certify (1) to the statements contained in the list of certifications** and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 215, Section 1001)
   ◊ " I AGREE

   ** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix:  Mr.  * First Name:  R. David
Middle Name:  
Last Name:  Paul
Suff:  

* Title:  Executive Director, Sponsored Programs

* Telephone Number:  702-895-1357  Fax Number:  702-895-4379

* Email:  bagaunlv.edu

* Signature of Authorized Representative:  

   * Date Signed:  10/27/2015
**Board of Regents, obo NSHE, UNLV**

**Award Number**: 1398-1513

**Budget Information - Non Construction Programs**

### Section A - Budget Summary

<table>
<thead>
<tr>
<th>Grant Program Function or Activity</th>
<th>Catalog of Federal Domestic Assistance Number</th>
<th>Estimated Unobligated Funds</th>
<th>New or Revised Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a)</td>
<td>(b) (c) (d) (e) (f) (g)</td>
<td></td>
</tr>
<tr>
<td>1. Budget Period 1</td>
<td></td>
<td>$0</td>
<td>$134,826</td>
</tr>
<tr>
<td>2. Budget Period 2</td>
<td></td>
<td>$0</td>
<td>$885,173</td>
</tr>
<tr>
<td>3. Budget Period 3</td>
<td></td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Totals</td>
<td></td>
<td>$0</td>
<td>$1,019,999</td>
</tr>
</tbody>
</table>

### Section B - Budget Categories

#### 6. Object Class Categories

<table>
<thead>
<tr>
<th>Grant Program, Function or Activity</th>
<th>Budget Period 1</th>
<th>Budget Period 2</th>
<th>Budget Period 3</th>
<th>Total (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Personnel</td>
<td>$66,550</td>
<td>$34,405</td>
<td>$0</td>
<td>$100,955</td>
</tr>
<tr>
<td>b. Fringe Benefits</td>
<td>$16,296</td>
<td>$3,788</td>
<td>$0</td>
<td>$20,084</td>
</tr>
<tr>
<td>c. Travel</td>
<td>$0</td>
<td>$100,000</td>
<td>$0</td>
<td>$100,000</td>
</tr>
<tr>
<td>d. Equipment</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>e. Supplies</td>
<td>$0</td>
<td>$106,000</td>
<td>$0</td>
<td>$106,000</td>
</tr>
<tr>
<td>f. Contractual</td>
<td>$0</td>
<td>$277,700</td>
<td>$0</td>
<td>$277,700</td>
</tr>
<tr>
<td>g. Construction</td>
<td>$0</td>
<td>$311,300</td>
<td>$0</td>
<td>$311,300</td>
</tr>
<tr>
<td>h. Other</td>
<td>$51,980</td>
<td>$51,980</td>
<td>$0</td>
<td>$103,960</td>
</tr>
<tr>
<td>i. Total Direct Charges (sum of 6a-6h)</td>
<td>$134,826</td>
<td>$885,173</td>
<td>$0</td>
<td>$1,019,999</td>
</tr>
<tr>
<td>j. Indirect Charges</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>k. Totals (sum of 6i-6j)</td>
<td>$134,826</td>
<td>$885,173</td>
<td>$0</td>
<td>$1,019,999</td>
</tr>
</tbody>
</table>

7. Program Income: $0
### Summary of Budget Category Costs Proposed

#### Section A - Budget Summary

<table>
<thead>
<tr>
<th>Budget Period</th>
<th>Cost Share</th>
<th>Total Costs</th>
<th>Cost Share %</th>
<th>Proposed Budget Period Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1</td>
<td>$0</td>
<td>$134,826</td>
<td>100.00%</td>
<td>01/01/2016 - 12/31/2016</td>
</tr>
<tr>
<td>Period 2</td>
<td>$0</td>
<td>$885,173</td>
<td>100.00%</td>
<td>01/01/2017 - 12/31/2017</td>
</tr>
<tr>
<td>Period 3</td>
<td>$0</td>
<td>$0</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$0</td>
<td>$1,019,999</td>
<td>100.00%</td>
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</table>

#### Section B - Budget Categories

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>Budget Period 1</th>
<th>Budget Period 2</th>
<th>Budget Period 3</th>
<th>Total Costs</th>
<th>% of Project</th>
<th>Comments (as needed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Personnel</td>
<td>$66,550</td>
<td>$34,405</td>
<td>$0</td>
<td>$100,955</td>
<td>9.90%</td>
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<tr>
<td>b. Fringe Benefits</td>
<td>$16,296</td>
<td>$3,788</td>
<td>$0</td>
<td>$20,084</td>
<td>1.97%</td>
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<tr>
<td>c. Travel</td>
<td>$0</td>
<td>$100,000</td>
<td>$0</td>
<td>$100,000</td>
<td>9.80%</td>
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<tr>
<td>d. Equipment</td>
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<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>e. Supplies</td>
<td>$0</td>
<td>$106,000</td>
<td>$0</td>
<td>$106,000</td>
<td>10.39%</td>
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<tr>
<td>f. Contractual</td>
<td>$0</td>
<td>$277,700</td>
<td>$0</td>
<td>$277,700</td>
<td>27.23%</td>
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</tr>
<tr>
<td>g. Sub-recipient Vendor</td>
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<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>h. FFRDC</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Total Contractual</td>
<td>$0</td>
<td>$277,700</td>
<td>$0</td>
<td>$277,700</td>
<td>27.23%</td>
<td></td>
</tr>
<tr>
<td>g. Construction</td>
<td>$0</td>
<td>$311,300</td>
<td>$0</td>
<td>$311,300</td>
<td>30.52%</td>
<td></td>
</tr>
<tr>
<td>h. Other Direct Costs</td>
<td>$51,980</td>
<td>$51,980</td>
<td>$0</td>
<td>$103,960</td>
<td>10.19%</td>
<td></td>
</tr>
<tr>
<td>Total Direct Costs</td>
<td>$134,826</td>
<td>$885,173</td>
<td>$0</td>
<td>$1,019,999</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>i. Indirect Charges</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>0.00%</td>
<td>Indirects charged as 0 MTDC because cost share funds received from donations</td>
</tr>
<tr>
<td>Total Costs</td>
<td>$134,826</td>
<td>$885,173</td>
<td>$0</td>
<td>$1,019,999</td>
<td>100.00%</td>
<td></td>
</tr>
</tbody>
</table>
**Detailed Budget Justification**

**a. Personnel**

**INSTRUCTIONS - PLEASE READ!!!**

1. List project costs solely for employees of the entity completing this form. All personnel costs for subrecipients and vendors must be included under f. Contractual.
2. All personnel should be identified by position title and not employee name. Enter the amount of time (e.g., hours or % of time) and the base pay rate and the total direct personnel compensation will automatically calculate. Rate basis (e.g., actual salary, labor distribution report, state civil service rates, etc.) must also be identified.
3. If loaded labor rates are utilized, a description of the costs the loaded rate is comprised of must be included in the Additional Explanation section below. DOE must review all components of the loaded labor rate for reasonableness and allowable costs (e.g. fee or profit).
4. If a position and hours are attributed to multiple employees (e.g. Technician working 4000 hours) the number of employees for that position title must be identified.

<table>
<thead>
<tr>
<th>SOPO Task #</th>
<th>Position Title</th>
<th>Budget Period 1</th>
<th>Project Total Hours</th>
<th>Project Total Dollars</th>
<th>Rate Basis</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Time (Hrs)</td>
<td>Pay Rate ($/Hr)</td>
<td>Total Budget Period 1</td>
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<td>1</td>
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<td>$85.00</td>
<td>$170,000</td>
<td>$190,000 Actual Salary</td>
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<tr>
<td>2</td>
<td>Technicians (2)</td>
<td>4000</td>
<td>$20.00</td>
<td>$80,000</td>
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<td>2</td>
<td>Faculty summer salary</td>
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<tr>
<td>2</td>
<td>Student Assistant wages</td>
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<td>$15.00</td>
<td>$24,405</td>
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<tr>
<td>1</td>
<td>Project Engineer - design calc</td>
<td>120</td>
<td>$55.00</td>
<td>$6,600</td>
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<tr>
<td>2</td>
<td>Project Engineer, systems Integration</td>
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<td>$50.00</td>
<td>$10,000</td>
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<tr>
<td>1</td>
<td>Data collection</td>
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<td>$30.00</td>
<td>$12,000</td>
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<td>1</td>
<td>CAD - construction drawings</td>
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<td>$30.00</td>
<td>$3,600</td>
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</tr>
<tr>
<td>1</td>
<td>Project Engineer - BIM/phys model</td>
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<td>$55.00</td>
<td>$7,315</td>
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<tr>
<td>1</td>
<td>Web designer</td>
<td>67</td>
<td>$55.00</td>
<td>$3,685</td>
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<td>1</td>
<td>Marketing/communications</td>
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<td>$50.00</td>
<td>$18,500</td>
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<tr>
<td>1</td>
<td>Student assistant wages</td>
<td>750</td>
<td>$15.00</td>
<td>$11,250</td>
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</tr>
</tbody>
</table>

**Total Personnel Costs**: 2020 $66,550 $1827 $34,405 $0 0 $100,955

Additional Explanation (as needed):
**b. Fringe Benefits**

**INSTRUCTIONS - PLEASE READ!!!**
1. Fill out the table below by position title. If all employees receive the same fringe benefits, you can show "Total Personnel" in the Labor Type column instead of listing out all position titles.
2. The rates and how they are applied should not be averaged to get one fringe cost percentage. Complex calculations should be described/provided in the Additional Explanation section below.
3. The fringe benefit rates should be applied to all positions, regardless of whether those funds will be supported by Federal Share or Recipient Cost Share.

<table>
<thead>
<tr>
<th>Labor Type</th>
<th>Budget Period 1</th>
<th>Budget Period 2</th>
<th>Total Project</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Personnel Costs</td>
<td>Rate</td>
<td>Personnel Costs</td>
</tr>
<tr>
<td>EXAMPLE!! Sr. Engineer</td>
<td>$170,000</td>
<td>20%</td>
<td>$34,000</td>
</tr>
<tr>
<td>Faculty summer salary</td>
<td>$3,600</td>
<td>33.00%</td>
<td>$1,188</td>
</tr>
<tr>
<td>Student Assistant wages</td>
<td>$0</td>
<td></td>
<td>$24,405</td>
</tr>
<tr>
<td>Project Engineer - design calcs</td>
<td>$6,600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Engineer, systems integration</td>
<td>$0</td>
<td></td>
<td>$10,000</td>
</tr>
<tr>
<td>Data collection</td>
<td>$12,000</td>
<td>33.00%</td>
<td>$3,960</td>
</tr>
<tr>
<td>CAD - construction drawings</td>
<td>$3,600</td>
<td>33.00%</td>
<td>$1,188</td>
</tr>
<tr>
<td>Project Engineer - BIM/phys model</td>
<td>$7,315</td>
<td>33.00%</td>
<td>$2,414</td>
</tr>
<tr>
<td>Web designer</td>
<td>$3,685</td>
<td>33.00%</td>
<td>$1,216</td>
</tr>
<tr>
<td>Marketing/communications</td>
<td>$18,500</td>
<td>33.00%</td>
<td>$6,105</td>
</tr>
<tr>
<td>Student assistant wages</td>
<td>$11,250</td>
<td>2.00%</td>
<td>$225</td>
</tr>
<tr>
<td></td>
<td>$0</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>$0</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>$66,550</td>
<td></td>
<td>$16,296</td>
</tr>
</tbody>
</table>

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required at the time of award negotiation if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information if not previously submitted.

- [ ] A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is/was included with the project application.
- [ ] There is not a current federally approved rate agreement negotiated and available.*

*When this option is checked, the entity preparing this form shall submit an indirect rate proposal in the format provided in the Sample Rate Proposal at [http://www1.eere.energy.gov/financing/resources.html](http://www1.eere.energy.gov/financing/resources.html), or a format that provides the same level of information and which will support the rates being proposed for use in the performance of the proposed project.

**Additional Explanation (as necessary):** Please use this box (or an attachment) to list the elements that comprise your fringe benefits and how they are applied to your base (e.g. Personnel) to arrive at your fringe benefit rate.
### c. Travel

**INSTRUCTIONS - PLEASE READ!!!**

1. Identify Foreign and Domestic Travel as separate items. Examples of Purpose of Travel are subrecipient site visits, DOE meetings, project mgmt. meetings, etc. Examples of Basis for Estimating Costs are past trips, travel quotes, GSA rates, etc.

2. All listed travel must be necessary for performance of the Statement of Project Objectives.

3. Federal travel regulations are contained within the applicable cost principles for all entity types. Travel costs should remain consistent with travel costs incurred by an organization during normal business operations as a result of the organizations written travel policy. In absence of a written travel policy, organizations must follow the regulations prescribed by the General Services Administration.

#### Additional Explanation (as needed):

**PROJECT TOTAL**

$100,000

<table>
<thead>
<tr>
<th>SOPO Task #</th>
<th>Purpose of Travel</th>
<th>Depart From</th>
<th>Destination</th>
<th>No. of Days</th>
<th>No. of Travelers</th>
<th>Lodging per Traveler</th>
<th>Flight per Traveler</th>
<th>Vehicle per Traveler</th>
<th>Per Diem per Traveler</th>
<th>Cost per Trip</th>
<th>Basis for Estimating Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EXAMPLE!!! Visit to PV manufacturer</td>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
<td>$250</td>
<td>$500</td>
<td>$100</td>
<td>$100</td>
<td>$2,020</td>
<td>Current GSA rates</td>
</tr>
<tr>
<td>2</td>
<td>Transport/housing/per diem</td>
<td>Las Vegas</td>
<td>SD 2017</td>
<td>10</td>
<td>30</td>
<td>$150</td>
<td>$600</td>
<td>$203</td>
<td>$103</td>
<td>$100,000</td>
<td>Estimated GSA rates</td>
</tr>
<tr>
<td>3</td>
<td>International Travel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Domestic Travel</td>
<td>Budget Period 1 Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>International Travel</td>
<td>Budget Period 2 Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Domestic Travel</td>
<td>Budget Period 3 Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>International Travel</td>
<td>PROJECT TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Domestic Travel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>International Travel</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>
## e. Supplies

**INSTRUCTIONS - PLEASE READ!!!**

1. Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Please refer to the applicable Federal regulations in 2 CFR 200 for specific supplies definitions and treatment. A computing device is a supply if the acquisition cost is less than the lesser of the capitalization level established by the non-Federal entity for financial statement purposes or $5,000, regardless of the length of its useful life.

2. List all proposed supplies below, providing a basis of costs (e.g. vendor quotes, catalog prices, prior invoices, etc.). Briefly justify the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

3. Multiple supply items valued at $5,000 or less used to assemble an equipment item with a value greater than $5,000 with a useful life of more than one year should be included on the equipment tab. If supply items and costs are ambiguous in nature, contact your DOE representative for proper categorization.

4. Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

### Detailed Budget Justification

<table>
<thead>
<tr>
<th>SOPO Task #</th>
<th>General Category of Supplies</th>
<th>Qty</th>
<th>Unit Cost</th>
<th>Total Cost</th>
<th>Basis of Cost</th>
<th>Justification of need</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6</td>
<td>EXAMPLE!!! Wireless DAS components</td>
<td>10</td>
<td>$360.00</td>
<td>$3,600</td>
<td>Catalog price</td>
<td>For Alpha prototype → Task 2.4</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**Budget Period 1 Total**

<table>
<thead>
<tr>
<th>SOPO Task Period</th>
<th>General Category of Supplies</th>
<th>Qty</th>
<th>Unit Cost</th>
<th>Total Cost</th>
<th>Basis of Cost</th>
<th>Justification of need</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Flooring</td>
<td>1</td>
<td>$12,500.00</td>
<td>$12,500</td>
<td>estimate</td>
<td>to complete house</td>
</tr>
<tr>
<td>2</td>
<td>Furnishing, finishes and equipment</td>
<td>1</td>
<td>$18,500.00</td>
<td>$18,500</td>
<td>estimate</td>
<td>to complete house</td>
</tr>
<tr>
<td>2</td>
<td>Doors and Windows</td>
<td>1</td>
<td>$25,000.00</td>
<td>$25,000</td>
<td>estimate</td>
<td>to complete house</td>
</tr>
<tr>
<td>2</td>
<td>Sensors hardware, software controllers, networking</td>
<td>1</td>
<td>$50,000.00</td>
<td>$50,000</td>
<td>estimate</td>
<td>to complete house</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget Period 1</td>
<td>Total</td>
<td></td>
<td></td>
<td>$36,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Budget Period 2 Total**

<table>
<thead>
<tr>
<th>SOPO Task Period</th>
<th>General Category of Supplies</th>
<th>Qty</th>
<th>Unit Cost</th>
<th>Total Cost</th>
<th>Basis of Cost</th>
<th>Justification of need</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget Period 2</td>
<td>Total</td>
<td></td>
<td></td>
<td>$106,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Budget Period 3**

<table>
<thead>
<tr>
<th>SOPO Task Period</th>
<th>General Category of Supplies</th>
<th>Qty</th>
<th>Unit Cost</th>
<th>Total Cost</th>
<th>Basis of Cost</th>
<th>Justification of need</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget Period 3</td>
<td>Total</td>
<td></td>
<td></td>
<td>$0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PROJECT TOTAL**

$106,000

**Additional Explanation (as needed):**
### f. Contractual

#### INSTRUCTIONS - PLEASE READ!!

1. The entity completing this form must provide all costs related to sub-recipients, vendors, and FFRDC partners in the applicable boxes below.
2. Sub-recipients (partners, sub-awardees): Subrecipients shall submit a Budget Justification describing all project costs and calculations when their total proposed budget exceeds either (1) $250,000 or (2) 25% of total award costs. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient forms must match the sub-recipient entries below. A sub-recipient is a legal entity to which a subaward is made, who has performance measured against whether the objectives of the Federal program are met, is responsible for programmatic decision making, must adhere to applicable Federal program compliance requirements, and uses the Federal funds to carry out a program of the organization. All characteristics may not be present and judgment must be used to determine sub-recipient vs. vendor status.
3. Vendors (including contractors): List all vendors and contractors supplying commercial supplies or services used to support the project. For each Vendor cost with total project costs of $250,000 or more, a Vendor quote must be provided. A vendor is a legal entity contracted to provide goods and services within normal business operations, provides similar goods or services to many different purchasers, operates in a competitive environment, provides goods or services that are ancillary to the operation of the Federal program, and is not subject to compliance requirements of the Federal program. All characteristics may not be present and judgment must be used to determine sub-recipient vs. vendor status.
4. Federal Funded Research and Development Centers (FFRDCs): FFRDCs must submit a signed Field Work Proposal during award application. The award recipient may allow the FFRDC to provide this information directly to DOE, however, project costs must also be provided below.

<table>
<thead>
<tr>
<th>SOPO Task #</th>
<th>Sub-Recipient Name/Organization</th>
<th>Purpose and Basis of Cost</th>
<th>Budget Period 1</th>
<th>Budget Period 2</th>
<th>Budget Period 3</th>
<th>Project Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4</td>
<td>EXAMPLE!!! XYZ Corp.</td>
<td>Partner to develop optimal lens for Gen 2 product. Cost estimate based on personal hours.</td>
<td>$48,000</td>
<td>$32,000</td>
<td>$16,000</td>
<td>$96,000</td>
</tr>
<tr>
<td>6</td>
<td>EXAMPLE!!! ABC Corp.</td>
<td>Vendor for developing robotics to perform lens inspection. Estimate provided by vendor.</td>
<td>$32,900</td>
<td>$66,500</td>
<td></td>
<td>$119,400</td>
</tr>
<tr>
<td>2</td>
<td>TBD</td>
<td>Metal works</td>
<td></td>
<td>$6,700</td>
<td></td>
<td>$6,700</td>
</tr>
<tr>
<td>2</td>
<td>TBD</td>
<td>Millwork and casework</td>
<td></td>
<td>$11,000</td>
<td></td>
<td>$11,000</td>
</tr>
<tr>
<td>2</td>
<td>TBD - Mobilize/transport home</td>
<td>Mobilization and module transport to competition site</td>
<td></td>
<td>$100,000</td>
<td></td>
<td>$100,000</td>
</tr>
<tr>
<td>2</td>
<td>TBD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>TBD</td>
<td>Deconstruct home at competition site</td>
<td></td>
<td>$70,000</td>
<td></td>
<td>$70,000</td>
</tr>
<tr>
<td>3</td>
<td>TBD</td>
<td>haul home back to Las Vegas and reinstall</td>
<td></td>
<td>$90,000</td>
<td></td>
<td>$90,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sub-total</td>
<td></td>
<td>$0</td>
<td>$277,700</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Contractual</td>
<td></td>
<td>$0</td>
<td>$277,700</td>
<td>$0</td>
</tr>
</tbody>
</table>

**Additional Explanation (as needed):**
### Detailed Budget Justification

#### g. Construction

**PLEASE READ!!!**

1. Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient should be entered under f. Contractual.

2. List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

#### Overall description of construction activities: **Example Only!!!** - Build wind turbine platform

<table>
<thead>
<tr>
<th>SOPO Task #</th>
<th>General Description</th>
<th>Cost</th>
<th>Basis of Cost</th>
<th>Justification of need</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td><strong>EXAMPLE ONLY!!!</strong> Three days of excavation for platform site</td>
<td>$28,000</td>
<td>Engineering estimate</td>
<td>Site must be prepared for construction of platform.</td>
</tr>
</tbody>
</table>

| Budget Period 1 Total | $0 |

| Budget Period 2 Total | $311,300 |

| Budget Period 3 Total | $0 |

**PROJECT TOTAL** $311,300

---

**Additional Explanation (as needed):**
## h. Other Direct Costs

INSTRUCTIONS - PLEASE READ!!

1. Other direct costs are direct cost items required for the project which do not fit clearly into other categories. These direct costs must not be included in the indirect costs (for which the indirect rate is being applied for this project). Examples are: tuition, printing costs, etc. which can be directly charged to the project and are not duplicated in indirect costs (overhead costs).

2. Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

<table>
<thead>
<tr>
<th>SOPO Task #</th>
<th>General Description and SOPO Task #</th>
<th>Cost</th>
<th>Basis of Cost</th>
<th>Justification of need</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>EXAMPLE!!! Grad student tuition - tasks 1-3</td>
<td>$16,000</td>
<td>Established UCD costs</td>
<td>Support of graduate students working on project</td>
</tr>
<tr>
<td>1</td>
<td>Graduate student stipend, fringes, fees, Task 1</td>
<td>$51,980</td>
<td>Established UNLV costs</td>
<td></td>
</tr>
</tbody>
</table>

**Budget Period 1 Total** $51,980

**Budget Period 2**

| 2           | Graduate student stipend, fringes and fees, Task 2 | $51,980 | Established UNLV costs |                                                                                     |

**Budget Period 2 Total** $51,980

**Budget Period 3**

| Budget Period 3 Total | $0 |
| Project Total        | $103,960 |

Additional Explanation (as needed):
### i. Indirect Costs

**INSTRUCTIONS - PLEASE READ!!!**

1. Fill out the table below to indicate how your indirect costs are calculated. Use the box below to provide additional explanation regarding your indirect rate calculation.
2. The rates and how they are applied should not be averaged to get one indirect cost percentage. Complex calculations or rates that do not correspond to the below categories should be described/provided in the Additional Explanation section below. If questions exist, consult with your DOE contact before filling out this section.
3. The indirect rate should be applied to both the Federal Share and Recipient Cost Share.

<table>
<thead>
<tr>
<th>Provide ONLY Applicable Rates:</th>
<th>Budget Period 1</th>
<th>Budget Period 2</th>
<th>Budget Period 3</th>
<th>Total</th>
<th>Explanation of BASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead Rate</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>Indirect rate on donations is 0%</td>
</tr>
<tr>
<td>General &amp; Administrative (G&amp;A)</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>FCCM Rate, if applicable</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>OTHER Indirect Rate</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td><strong>Indirect Costs (As Applicable):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overhead Costs</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>G&amp;A Costs</td>
<td></td>
<td>$0</td>
<td></td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>FCCM Costs, if applicable</td>
<td></td>
<td></td>
<td>$0</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>OTHER Indirect Costs</td>
<td></td>
<td></td>
<td></td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td><strong>Total indirect costs requested:</strong></td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td></td>
</tr>
</tbody>
</table>

A federally approved indirect rate agreement, or rate proposed (supported and agreed upon by DOE for estimating purposes) is required if reimbursement of indirect costs is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed.

- [X] An indirect rate has been approved or negotiated with a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.
- [ ] There is not a current, federally approved rate agreement negotiated and available*.

*When this option is checked, the entity preparing this form shall submit an indirect rate proposal in the format provided by your DOE contact, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Additionally, any non-Federal entity that has never received a negotiated indirect cost rate, except for those non-Federal entities described in Appendix VII to Part 200—States and Local Government and Indian Tribe Indirect Cost Proposals, paragraph D.1.b, may elect to charge a de minimis rate of 10% of modified total direct costs (MTDC) which may be used indefinitely. As described in §200.403 Factors affecting allowability of costs, costs must be consistently charged as either indirect or direct costs, but may not be double charged or inconsistently charged as both. If chosen, this methodology once elected must be used consistently for all Federal awards until such time as a non-Federal entity chooses to negotiate for a rate, which the non-Federal entity may apply to do at any time.

You must provide an explanation (below or in a separate attachment) and show how your indirect cost rate was applied to this budget in order to come up with the indirect costs shown.

**Additional Explanation (as needed):** Computed as approved indirect rate multiplied onto Modified Total Direct costs as shown in Cell E30, in the tab Instructions and Summary.
### Cost Share

**PLEASE READ!!!**

1. A detailed presentation of the cash or cash value of all cost share proposed must be provided in the table below. Identify the source organization & amount of each cost share item proposed in the award. All items in the chart below should also be identified within the applicable cost category tabs a. through i. in the Cost Share Item section.

2. **Cash Cost Share** - encompasses all contributions to the project made by the recipient, subrecipient, or vendor for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, equipment, etc. for their own company with organizational resources. If the item or service is reimbursed for, it is cash cost share. All cost share items must be necessary to the performance of the project.

3. **In Kind Cost Share** - encompasses all contributions to the project made by the recipient, subrecipient, or vendor that do not involve a payment or reimbursement and represent donated items or services. In Kind cost share items include volunteer personnel hours, donated existing equipment, donated existing supplies, etc. The cost value and calculations thereof for all In Kind cost share items must be justified and explained in the Cost Share Item section below. All cost share items must be necessary to the performance of the project. If questions exist, consult your DOE contact before filling out In Kind cost share in this section.

4. Funds from other Federal sources **MAY NOT** be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include any source not originally derived from Federal funds. Cost sharing commitment letters from subrecipients and vendors must be provided with the original application.

5. Fee or profit, including forgone fee or profit, are not allowable as project costs (including cost share) under any resulting award. The project may only incur those costs that are allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

<table>
<thead>
<tr>
<th>Organization/Source</th>
<th>Type (Cash or In Kind)</th>
<th>Cost Share Item</th>
<th>Budget Period 1</th>
<th>Budget Period 2</th>
<th>Budget Period 3</th>
<th>Total Project Cost Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC Company</td>
<td>Cash</td>
<td>Project partner ABC Company will provide 20 PV modules for product development at the price of $680 per module</td>
<td>$13,600</td>
<td></td>
<td></td>
<td>$13,600</td>
</tr>
<tr>
<td>EXAMPLE!!!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>private fundraising</td>
<td>cash and in-kind</td>
<td>all labor, supply, equipment, travel contractor, construction costs</td>
<td>$134,826</td>
<td></td>
<td></td>
<td>$134,826</td>
</tr>
<tr>
<td>private fundraising</td>
<td>cash and in-kind</td>
<td>all labor, supply, equipment, travel contractor, construction costs</td>
<td></td>
<td>$885,173</td>
<td></td>
<td>$885,173</td>
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<td></td>
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<tr>
<td><strong>Totals</strong></td>
<td></td>
<td></td>
<td>$134,826</td>
<td>$885,173</td>
<td>$0</td>
<td>$1,019,999</td>
</tr>
</tbody>
</table>

**Total Project Cost:** $1,019,999  
**Cost Share Percent of Award:** 100.0%

**Additional Explanation (as needed):**