



Housing Innovations Program – 3D Printed Affordable Home Project



Santa Barbara County is a region where it is difficult and expensive to develop affordable housing. Local impact fees, environmental review, construction costs and time delays make development extremely expensive, and it is not unusual for one to two-bedroom units in an affordable housing project to cost over \$500,000 per unit. These costs are simply too high to be affordable to local residents without extensive layering of limited financial subsidies. HTF has decided to embark on a new **Housing Innovations Program** to research and demonstrate

innovative technologies that reduce the cost of constructing affordable housing and encourage sustainability through the use of sustainable and fire-resistant building materials.

Project Description: Our first project is to sponsor the construction of a prototype 3D printed affordable home in collaboration with Apis Cor, an engineering firm that was a NASA finalist to develop housing on Mars. Apis Cor developed a state-of-the-art 3D printing robot that can print entirely on-site an earthquake reinforced concrete 407 square foot home in 24-hours for a cost of \$10,000. The technology is scalable to any sized home. Apis Cor and HTF have entered into an MOU to collaborate to construct the first 3D printed affordable home in Santa Barbara County, perhaps California. The first model will be a small one-story home to demonstrate the application of 3D printing technology in creating affordable housing. The home will include energy efficiency systems and sustainability features. We will evaluate the 3D printing technology's ability to reduce the time and costs involved in constructing an affordable home and publish the results of the demonstration project.

Activities/Outcomes: The project will be completed in three phases, including: 1) Planning and Predevelopment; 2) Construction; and, 3) Documentation and dissemination of the project findings. In Phase I we will complete a detailed plan to construct the 3D printed affordable home that will include: identifying a site, development team and target client group; engaging the community in the design of the project; resolving engineering and technical issues necessary for obtaining a local building permit; developing project evaluation criteria; and, creating a detailed project development budget with capital needs. HTF will solicit grant funding for the planning phase and can commit capital for predevelopment financing of the 3D printed home project.

Sustainability Features: The first model will be a small one-story home to demonstrate 3D printing technology. We plan to incorporate energy efficient systems and sustainability features into the design of the 3D printed affordable home, including a solar photovoltaic system and drought tolerant and/or edible landscaping, among others. We are coordinating with the UCSB Bren School of Environmental Science to study the environmental impacts and the life cycle of the 3D printed structure.

Targeted Clientele: The prototype home will be targeted to serve a low-income household, such as a low-income working family, farm workers, persons with disabilities or homeless persons.

Community Engagement and Education: We will engage the community in the planning and design of the project through sponsoring a Design Charette in collaboration with the Santa Barbara AIA, hosting community workshops and outreaching to local schools, business and civic groups. The community will be

invited to view the 3D printing of the home. We will document the process using multi-media techniques and disseminate the key findings of the prototype 3D printed affordable home project. Depending upon the site that is selected, the completed prototype 3D printed home may also serve as a local and regional community education center for new housing technology and use of sustainable building materials.

For more information: See <https://www.apis-cor.com/affordable-housing> and watch <https://www.youtube.com/watch?v=xktwDfasPGQ>

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