



Rapidly Deployed Post Disaster Housing: Advanced Component Construction

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In 2017 Hurricanes Irma and Maria created unprecedented demand for temporary housing solutions due to extensive damage, widespread utility outages and local construction and supply limitations. In 2018 Hurricane Michael destroyed public housing along with single family homes displacing thousands. Temporary housing options included rapid repairs to make homes habitable, direct housing assistance for hotels and apartments, and placement of Recreational Vehicles (RV's) and Manufactured Housing Units (MHU's) in survivors yards or group sites. All of these are preferable to living in cars, tents, partially gutted homes, or crowded with relatives sometimes at a distance from school and employment.

In a post disaster scenario where hundreds and even thousands of homes have been severely damaged or destroyed, can responders rapidly deploy temporary housing for survivors?

The Florida Housing Coalition posed this question to the Fannie Mae Disaster Response Network and the Rural Studio team at Auburn University's College of Architecture, Design, and Construction, two of the Coalition's partners and collaborators in housing resilience and disaster recovery.

First, what are the current options for rapid deployment of temporary housing in a post-disaster scenario?

FEMA's Individual and Households Program (IHP) provides financial and direct services to individuals and households impacted by a disaster. To be eligible, the survivor must have uninsured or under-insured necessary expenses. IHP can help with temporary housing costs such as rental assistance or reimbursement for hotel expenses, a temporary housing unit such as an RV or MHU, funds to support the repair or replacement of owner-occupied homes and other uninsured disaster caused expenses including repair or replacement of personal property, moving and storage expenses and more. Temporary housing assistance can be provided for up to 18 months while the home is being repaired.

Basic Repairs to Standing Structure Survivors may qualify for FEMA Individual Assistance or SHIP Disaster Recovery

Assistance which can cover the costs of debris removal, temporary roof repairs or tarps, secure home envelope with blue tarps, window coverings, and temporary power restoration.

Sheltering and Temporary Essential Power (STEP) STEP is worth mentioning even though it was discontinued in 2019 due to enormous implementation complexities. STEP was a pilot FEMA Public Assistance program for funding under Section 403 of the Stafford Act. In 2017-18, STEP was deployed to address sheltering needs post Hurricane Irma (and Maria in Puerto Rico) and was cancelled in 2019 after \$1.4 billion in repairs were completed. Properly administered, STEP was qualified as an emergency protective measure. Work under STEP was meant to provide the most basic, life sustaining needs for emergency sheltering and was NOT meant to restore homes to their pre-disaster condition. STEP was used to restore power to Florida Keys single family owner-occupied residences damaged by Hurricane Irma. STEP provided basic minimal work to survivors' homes to allow survivors to shelter in place for an extended period while enabling them to return to their homes as permanent repairs are completed.

FEMA Recreational Vehicles and Manufactured Housing Units Also known as "FEMA trailers," RV's and MHU's are intended to provide temporary emergency shelter and can be deployed in a shorter term and delivered to the survivor's homesite or to RV parks that have been prepared to receive them. RV's and MHU's are typically placed at the survivor's

homesite. This requires suitable terrain as well as restored utilities. While designed to be safe and secure temporary housing, they are subject to severe weather. RV's and MHU's can be made available for up to 18 months but extensions were required for Hurricane Michael survivors who were still unable to secure permanent housing. Some survivors eventually purchased their units, turning temporary housing into permanent housing.

Lessons learned from the past five years as Florida weathered Hurricanes Hermine, Matthew, Irma, Michael, and Sally reflect the overall housing challenges dealt with by the state's housing providers. The ongoing shortage of affordable housing is the backdrop to catastrophic losses and the prolonged duration of displacement and long-term recovery.

Preparation is Resilience The disaster management sequence of preparation, response, recovery, and mitigation begins with planning, risk assessment, and "pre-recovery" initiatives to create a resilient housing stock.

Homes that are strong enough to allow residents to shelter in place, or in the event of evacuation, that allow for a quick return post-disaster, are the ultimate goal in disaster housing mitigation strategic planning. Resilient housing can be properly insured and reduce the need for survivors and responders to undergo the procurement labyrinth for temporary repairs, homeowner displacement, and hotel expense reimbursement.

Housing is Local Florida is fortunate to have 121 local housing offices experienced in administering the State Housing Initiatives Partnership trust fund, federal HOME and CDBG, or USDA resources used for rehabilitation, new construction, and energy retrofits. Partnered with the local SHIP offices are multiple nonprofit housing organizations experienced with administering federal housing programs from HUD and USDA along with financial institutions and national community development organizations such as Enterprise Community Partners or LISC. SHIP programs collaborate with the state's Homeless Continuums of Care, Centers for Independent Living, and permanent supportive housing providers.

Temporary vs. Permanent Housing Solutions Immediately following a disaster, temporary but reliable shelter is imperative. In a compressed timeframe, assistance that leads continuously to permanent housing repair or replacement can shrink the

recovery period saving money as well as abbreviating the period of displacement and trauma survivors face. The idea is simple: If FEMA assistance can result in a temporary core, a permanent home can seamlessly result as other funds are available such as CDBG-DR and SHIP.

Pre-recovery means actions taken prior to a disaster that can shorten the emergency response and long-term recovery period. Pre-recovery includes the identification of vacant building sites for staging temporary housing. Materials can be pre-bid and pre-ordered pending a disaster, such as structurally insulated panels. Local communities can stockpile other housing components including concrete supplies, bath and kitchen core kits, posts, beams, and roofing materials. Labor can be identified through community outreach to form teams of skilled workers willing to be deployed post-disaster.

RURAL STUDIO TEAM

Rural Studio is Auburn University's internationally recognized design-build architecture program. Established in 1993 Rural Studio gives architecture students a hands-on educational experience while assisting the underserved communities of Alabama's rural Black Belt region. The students work in partnership with their neighbors in the local community to define solutions, fundraise, design, and ultimately build remarkable projects. Over the past decade Rural Studio has expanded the scope and complexity of its projects to include the design and construction of community-oriented infrastructure, the development of more broadly attainable small home affordability solutions, and a comprehensive approach to addressing insecurity issues relative to income, energy, food, health, and education resources. Altogether, the Studio continually questions what should be built, rather than simply what can be built.

As part of their ongoing housing access and affordability research and development, and to provide temporary housing that can also become part of the permanent housing solution, Rural Studio is currently developing a prototype system that uses basic construction materials and methods to create a habitable space that can be rapidly deployed and then expanded to a full-scale permanent house during the recovery period.

Advanced Component Construction Auburn's Rural Studio team has been researching and testing the concept of rapid housing recovery that flows from temporary housing solutions to a permanent structure without discarding the investment made in the temporary unit. A post and frame structure with a poured concrete foundation can be rapidly erected to shelter a premanufactured core unit, referred to as a "thermal envelope." By installing premanufactured "wet cores" of bath and kitchen

facilities, a habitable space can be quickly ready for occupancy. The "thermal envelope" can be built with structurally insulated panels that are flat packed for ease of storage and bulk shipment. Later the temporary core can be expanded and renovated via more conventional onsite construction technologies and to the homeowner's needs for a complete house with kitchen, living room, bedrooms, and bathrooms.



Advanced component construction can be mobilized post disaster as mass shelter care is ending and evacuees begin returning home. Homesites must be cleared of debris including the remains of the former home. Disaster assistance should cover the costs of pouring the concrete foundation, erecting the post and frame structure, the free-standing thermal envelope under the roof structure, and the wet core kit.



Long term recovery and completion of the home can begin as resources become available. This can include insurance payments, CDBG-DR, SHIP, the Governor's Disaster Housing Trust Fund created in 2022 with \$500 million in appropriations, and other financing including banks, the Solar Energy Loan Fund, as well as the many services provided by charitable organizations in disaster recovery.



Gladys Cook is the Resilience and Recovery Director for the Florida Housing Coalition. As a planner, Gladys provides research and analysis skills in the formation of disaster recovery strategies for the equitable redevelopment of housing. She produces a weekly disaster recovery webinar for housing professionals and provides training and technical assistance to communities and organizations in the financing of housing development and rehabilitation.



Rusty Smith Rusty Smith is the Associate Director of Rural Studio, Auburn University's internationally recognized design-build program. Rusty is a nationally recognized teacher and scholar. His honors include the AIA National Teaching Honor Award and Auburn University's Creative Research and Scholarship Award. Collectively, Rural Studio has received numerous recognitions for both teaching and design, including The AIA's Presidential Citation, The Whitney M. Young Jr. Award for Social Responsibility, and the UNESCO Global Award for Sustainable Architecture.

Advantages of Advanced Component Construction Method

- ◆ Start ASAP!
- ◆ Requires simple, basic materials locally available
- ◆ Can be assembled by semi-skilled local labor
- ◆ Practical opportunity for *pre-recovery* planning
 - ◆ Avoid materials and equipment shortages
 - ◆ Presumably lower costs
- ◆ High-performance components-durable, resilient, energy efficient
- ◆ Flat-packing SIPs for efficient shipping
- ◆ Reduce displacement by rapid occupancy