

Universal Floorplan Design for FEMA Disaster-Relief Housing

SME Panel Meeting #4

Chatham-Arch Room—Alexander Hotel
Indianapolis, IN

Tuesday, June 28, 2016
8:00 am – 10:00 am Eastern

SME Panel

Bert Kessler, Vice President, Engineering, Palm Harbor Homes
Charley Boyer, COO/VP-Manufacturing Division, Oak Creek Homes
Charles Fanaro, President, Hi-Tech Housing
Chet Murphree, General Manager, Deer Valley Homes
Delmo Payne, President, River Birch Homes
Tom Rehrig, Special Projects Manager, Clayton Homes
Mike Terrian, General Manager, Platinum Homes
Michael Wade, Director of Manufacturing Operations, Cavalier Homes, *Panel Chair*

Staff

Matthew Rabkin, MHU PMO Manager, FEMA
Emanuel Levy, Executive Director, Systems Building Research Alliance, *Panel Facilitator*
Pournamasi Rath, Senior Associate, Systems Building Research Alliance
Zoe Kaufman, Associate, Systems Building Research Alliance

Guests

Jayar Daily, Vice Chairman, American Homestar
Lois Starkey, VP-Regulatory Affairs, Manufactured Housing Institute
David Tompos, President, CEO, NTA, Inc.

Meeting Minutes

Emanuel began the meeting by restating project goals and outlining the agenda. First, the panel reviewed the designs, and then the group discussed space-conditioning systems.

I. Objectives

Matthew added that FEMA is concerned with maintaining a smaller inventory with more homogenous units, which is a goal currently driving this project and something that will be added to the list of objectives.

II. Design Review

Before discussing floor plans specifically, the panel discussed its concerns with the tank-and-pump system (TPS) being included within the MHUs. Among these concerns were:

1. Level of immediate availability of TPS's to manufacturers
2. How to strengthen the structural system to support the TPS
3. The TPS's location at the axel area (potential drainage issues, etc.)

The first concern will be addressed by FEMA's upcoming proposed work, where full-scale units will be manufactured and transported with TPS systems incorporated. This research will also involve the Lawrence Berkeley National Laboratory and others.

The second point may be addressed by the TPS sitting directly above the I-beams, although this may not be feasible if the axels are not removed, as is the current FEMA practice. This aspect should also be included in future testing.

The third concern prompted the suggestion that the units could be flipped to allow all plumbing to be located toward the front of the MHU; however, this would be unfavorable from a structural and transportation point of view. The drainage may be another aspect for future testing.

a. Express Unit

Since it had been most recently discussed, the Express Unit layout was critiqued first. The group went through the floor plan, sectional drawings, and elevations.

Dimensions

- Bert pointed out that the entries need to include a landing with a 5' x 5' platform.
- Some panel members recalled accessible showers being longer than the allotted 60" in outside length, which would significantly impact the bathroom designs, but after follow-up research, it appears that most standard accessible tub/showers are 60" in length.
- Bert noted that the panel-box wall should be of 2x4 framing to fit the panel box.

Accessibility

- Some panel members stated that the bedroom closets appear not to be accessible from a side approach, suggesting that the door and wall be left off the closet in the event that the current designs with a door were deemed inaccessible. Later discussions with Mark Mazz clarified that the closets are considered accessible exactly as they are designed, as per UFAS, ABA, and ETH guidelines.
- Because the kitchen countertop workspace has been provided by a standard countertop, the kitchen/dining table is not required to be on wheels. However, 40" must be maintained between permanent kitchen fixtures, which may necessitate a table on wheels.
- The panel asked where the accessible range/exhaust fan switches would be placed, given that the surfaces in the immediate proximity to the range are inaccessible, including behind the adjacent countertop because of the placement of the microwave. Tom Rehrig noted that a common location for these switches was on an adjacent wall beyond a countertop or on the side wall of an adjacent cabinetry panel. The following suggestions were made (both options will be explored):
 - Some suggested switching the two work areas to provide room for switches behind an empty countertop.
 - Others favored moving the partition wall 6" away from the range to add a small countertop space between the range and the wall, which would also provide wiggle room for kitchen-appliance installation and opening the oven door.
- The visual depiction of the kitchen-sink drain currently has the drain in the center of the sink, but this may not adhere to UFAS standards because of the required knee and toe spaces. The drawing needs modification, and a note should be made to specify drainage toward the back of sinks.
- "Removable cabinets," while noted in these plans, simply refers to the ability to place or remove cabinet faces depending on accessibility designation. However, this may not be acceptable under Emergency Transportable Housing guidelines. Additionally, any removable cabinet faces would have to also be removable on the side joining the 3' countertop because otherwise the under-sink area may not be accessible from a forward approach. All things considered, the design team will likely specify a protected clear space below the sink instead.

Changes to Rugged Specifications

- Manufacturers asked Matthew whether the two-seater kitchen/dining table was acceptable, given that the Rugged Specifications have always required four seats. Matthew answered that a smaller table is acceptable, and FEMA is approving cases with minor modifications to the included furniture (e.g., two standard chairs in place of a love seat).
- A general question about Rugged Specifications emerged, probing what details exactly should be included in this project. The answer, coming from both Matthew and from the manufacturers, was that as much detail, instruction, and specification as possible is desired. The MEMA units were examples of highly specified units that were consequentially easy to manufacture and get approved. These will be used as models for level of specification detail. David Tompos has provided MEMA's documents as examples.

b. 1-, 2-, and 3-Bedroom Units

General Differences and Design Evolution

- Staff reviewed the differences between the current designs and the first version of the 1-, 2-, and 3-bedroom units. It was noted that the current designs accommodate any manufacturer's nominal 14' width, both in floor plan and in window area, so that very little must be changed in the documents to adapt the designs for any manufacturer.
- Also notable is the fact that all designs presented are UFAS-compliant. FEMA favors having an all-accessible inventory, allowing for just four SKUs rather than eight (and eight rather than sixteen via CONUS design).

Bathroom

- The panel agreed that a bath tub with integral seat is favorable to a transfer shower, supporting the current design's choice to include an accessible tub.
- Concern was raised regarding tub/shower controls being located on exterior walls for all designs.
- In order to adhere to ETH guidelines, the sink's clear space may need to be centered on the fixture rather than to the side. Repositioning the sink will affect how the water-heater closet is accessed. However, subsequent research clarified that accessible space for the sink does not need to be centered as per the ETH and UFAS guidelines.
- The panel box cannot be located in the bathroom as shown, per code. If placing on the interior wall outside the bathroom, note that the top of the panel box may be no higher than 79" from the ground. This should be checked for conflicting grab-bar reinforcement above the toilet.

Orientation

- FEMA's standard for locating the service entrance junction box is 10' from the rear of the house. To meet this requirement, the home should be mirrored then flipped (preserving the front-door location and placing the TPS over the axels).
- The mini-split is best placed at the rear of the home for these units to prevent damage during transportation; however, it should remain at the front of the Express Unit, with transportation protection, given size constraints.

Kitchen

- The panel approves of the design continuity between the units, including the consistent pantry location. It was stated that this allows for standardization in production, which is a core goal of this effort.

- FEMA and the panel agree that the pantry is helpful in reducing upper cabinet space that needs to be at accessible height—something that has caused clashes with microwaves and other appliances.

Living Room

- The SME panel advised SBRA to check with fire code to determine how the TPS must be accessed and whether the access door can be located in the living room as the designs currently dictate. Subsequent research by FEMA clarified that the current location of the access door is acceptable and an exterior door is not required.
- The SME raised a question about whether the single window in the living/dining area would suffice for natural ventilation in accordance with HUD code. David Tompos will check on this requirement.

III. Space Conditioning

The next item on the agenda was discussion of space-conditioning options. A table with capabilities and drawbacks of four potential space-conditioning systems was presented. The mechanical systems included were:

1. Electric furnace with central AC
2. Unitary heat pump
3. Standard, split-system heat pump
4. Ductless mini-split heat pump

Several members of the SME panel stated that it appears that the only option with “CONUS” as a design constraint is the mini-split heat pump. The following reasons were provided:

- To meet the demands of CONUS climates with regard to effectiveness and comfort, variable-speed/capacity equipment is necessary.
- Mini-splits are significantly more energy-efficient than are other equipment types, so if HUD code were conducive to the technology it would be favorable for all parties.

Concerns brought up included:

- Mini-splits are currently not approved by HUD, and an AC letter is required for a plant to use a mini-split. (It was pointed out, however, that a blanket A.C. letter can be procured for all of company’s plants. Additionally, BARD units face this same problem and are used anyway for FEMA units.) Getting mini-splits listed under HUD would be favorable and less time-consuming.
 - Lois Starkey will initiate the movement to push toward HUD listing of mini-splits, getting MHI on board. Lois will solicit any required information from the panel participants to get started on this process.
- The panel requests that sound-dampening capabilities are tested during upcoming phases of the project so that occupants are not disturbed by the mechanical system.

Additionally, Jayar will provide mini-split performance data from the NEMA project in Mississippi to understand how mini-splits have performed in these disaster-relief MHUs. The panel agreed that this step to pursue mini-split technology in factory-built housing would be a step toward improving the manufactured housing industry as a whole, but it will also require diligent research.

IV. Primary Action Items

1. **SBRA** – Propose a research plan that incorporates the items listed in these meeting minutes, in response to FEMA’s upcoming RFP. Amend the designs to reflect comments from this meeting. Become familiar with the Emergency Transportable Housing guidelines in order to ensure accessibility criteria for these homes are met in the future.
2. **MHI/Lois Starkey** – Initiate the process for HUD to list mini-splits. Panel-meeting participants and hosts will first provide her with information needed to move forward on this, upon request.
3. **David Tompos** – Check with HUD to determine whether window area in the kitchen/living spaces is sufficient as designed for light and ventilation.
4. **Jayar Daily** - Provide mini-split performance data from the NEMA project in Mississippi to understand how mini-splits have performed in these disaster-relief MHUs.

V. Wrap Up

Next meeting date: TBD

Location: TBD

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