

[THE]SIS
study of a portable modular dwelling.
by
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Architecture has to engage and elevate human life.

[CHANGE]

We live in a mobile and flexible society. Things are beginning to echo back to the time of nomads. Technology has given way to global interaction and communication through transportation and networking. The internet, laptops, and cellular phones have opened new doors. Now we are faced with two options; we can stay in the same place, or we can move.

How does our home reflect this mobility and flexibility?

Today's standard house is based on yesterday's notions. There should be ties to the past, but a change is needed. Families and households have evolved into different entities than what they were fifty years ago. For example, although the archetypal family of four^[2 parents + 2 children] remains, other sizes and configurations have become mainstream. Households now range from the individual to families with two working parents, single parent families, multigenerational households, and back to the individual sharing a house with another unrelated individual. There are even inherent instances for an almost autonomous house in a single household if teenagers or a grandparent are present; they may need their own separate space. These various household combinations and configurations however are not static. There is constant change within them. So it is not only question of what a household is made, but what that particular household needs.



In transport

[HOUSING OPTIONS]

What options are there for these different households?

The American Dream is to own a home. It is the principle on which the entire economy and culture are based on.² For many, the lack of affordable housing is one of the reasons it remains a dream. Current costs of a new home built from the ground up and designed for a specific household are usually well outside the price range of most new starting families and individuals. There are older homes that could be suited to a household, but they are usually in need of transformation, repair, or maintenance to bring the existing house up to date. They were designed for the needs of earlier generations, not for the needs of today. Apartment living and renting is an alternative for some, especially for those in the city, but sometimes it makes more financial sense to buy a home. Current low-cost housing options are a disappointment. They lack good quality of construction and good quality of life. Prefabrication is a response to poor on site construction because the controlled environment within the factory allows a higher quality work. Prefabricated homes, though, are not perfect. The typical stereotypes usually associated with the mass production housing industry, trailer parks and mobile homes on blocks in the front yard, have come to represent the downfalls of design.



[AFFORDING DESIGN]

Overall, each of these options has their selling points, but all are usually lacking in design or quality of life they provide. What is needed is an affording design that can combine or take advantage of the best features of each housing type to make The American Dream an affordable Reality.

In general there are four approaches to affordability. They are as follows:

- 1 make it cheap
- 2 make a bunch
- 3 make it smaller
- 4 make it fast

The generic equation for low cost housing is:

$$\frac{\text{fixed bottom-line costs (hard + soft costs)}}{\text{fixed ability to pay (mortgage or rent)}} = \text{SIZE/quality of unit}$$

The bottom-line of low cost housing is the cost of construction, but what is the cost of poorly designed housing? A well designed building is inherently sustainable. According to the architect William McDonough and the chemist Michael Braungart, sustainable design begins with a lifecycle analysis of the product as well as the materials that make it so that it can be easily reinserted into other various cycles of manufacturing of other products.³ [Cradle to Cradle: Remaking the way we Make Things](#) This waste equals food concept is a good paradigm, but it



The context mobile homes

is only one aspect of many factors that contribute to architecture. The play of light, surfaces, and space are some of the other contributing factors that combine to make architecture. A well designed home will sustain itself because it provides what Vitruvius calls “Utilitas, firmitas, venustas” or “Firmness, Commodity and Delight.”⁴

The Ten Books On Architecture Book I. Chap. II

[MOBILE HOMES]

“The house is a machine for living”⁵ This statement has taken more meaning in this age of technology. New tools are allowing people to roam again. Instead of settling in a static location for a static career, careers can now follow the individual wherever. It is fairly common to find someone working at home. Does it not make sense that our homes should be able to be both permanent and have the potential to travel with us if necessary? Mobile homes and manufactured housing offer a good starting point for an affordable housing system.

What is it about a mobile home that makes it instantly recognizable? Is it because of the way it meets the ground? The foundation systems are usually haphazard or makeshift, such as setting the home on blocks. If the system is not revealed, then it is usually hidden by a vinyl skirt that tends to warp. The most obvious best giveaway is if the foundation system consists of an axle. If the foundation does not



A mobile home with a foundation skirt and an attached front porch structure

reveal the building type, then perhaps the skin of the mobile home does. It is usually a vinyl siding made to look like wood or the other option is a dented aluminum skin. Perhaps it is the shape and massing of the mobile home. The long, narrow, single storied, flat roofed building form tends to be the archetype. More than likely it is a combination of two or more of these characteristics that help to instantly reveal the mobile home in any context.

A point worth noting about mobile homes is that although they are designed to be mobile and temporary, very few actually change sites. Once a suitable location is found, that site will typically remain the permanent location of the mobile home. The “temporary” home that was once the “mobile” home has in fact now become a permanent residence. It is no wonder that mobile homes that have been occupied for an extended amount of time tend to transform into a sort of hybrid structure, assimilating all sorts of additional components. Additional elements are added by the homeowner in an attempt to transform the original mobile unit into a better home both aesthetically and functionally. It is in this challenge to convention and static design that ingenuity occurs. Within these occurrences certain elements of architecture are brought to light and then heightened to elevate human life. We might better understand what is essential to making architecture by studying these conditions and other similar focused situations.



One of the first and most noticeable changes is the front door. Usually situated on the long side of a unit, there tends to be a lack of a transition from the outside to the inside of the house. The only threshold might be a step or two along with the door itself. As a remedy, there tends to be a particular interest in transforming the front door into a front porch with at least a modest overhang to protect from the weather. In America, the archetypal home almost always has a front porch. It is a nostalgic space where we can look out towards the world, and gaze at the happenings of the street. The contrary space to the front porch is the courtyard. In Europe, the courtyard is the dominate archetypal outdoor room. It is an interior-focused space, turning its back on the street while framing a view to the sky.

Creating one of these outdoor rooms is critical to transforming a mobile home into an enjoyable inhabitable space. That sounds like a paradoxical view, and it may be. The word inhabitable implies a space that one can live inside of. It comes from the Latin word '*hābīto*' which means *to have possession of* or *to dwell*. In French the verb is '*habiter*' which means '*to live in a particular location.*' To *habitually* occupy a space is to inhabit it, but to truly appreciate it and make it livable, it is necessary to get out and occupy the outside perimeter as well.



A separate roof structure and doubled living space

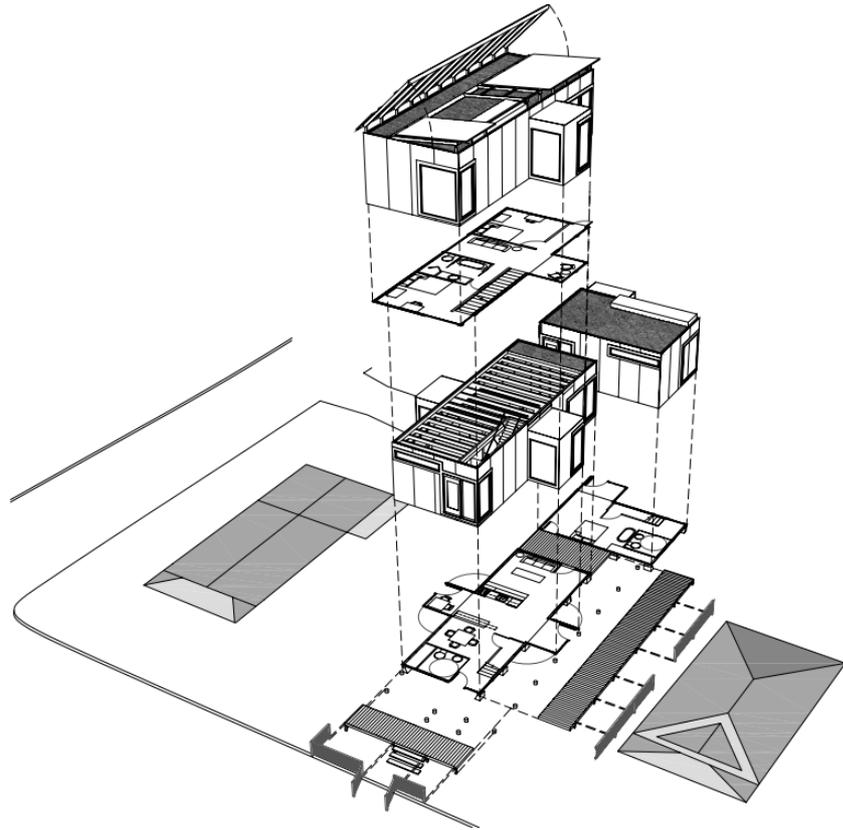
Another element typical of the mobile home is the roof. Although mobile home roofs are usually flat, they lack the roof gardens that Le Corbusier discusses when he mentions his idea of flat roofs. “Cafes and places for recreation would no longer be that fungus which eats up the pavements . . . they would be transferred to the flat roofs . . . (for is it not really illogical that one entire superficies of a town should be unused and reserved for a flirtation between the tiles and the stars?)”⁶ [Towards a New Architecture](#) (60) does make good sense for transportation, but it challenges the collective memory of what the roof of a house should look like and has looked like in the past. Interesting assemblages occur when a roof structure is built over a mobile home. In the form of a carport, the roof structure might be used to store the mobile home much like a car. However, the more intriguing collages occur when the mobile home has found a permanent location, and the roof structure is a device used to transform the mobile unit into a ‘house.’

[STACKING]

Another interesting assemblage occurs when mobile homes are grouped to gain additional living space. But what if mobile homes were not only grouped, but stacked to create larger homes? In such a scenario, the space around the home would become highly activated and would become just as important as the form of the assemblage. Stacking preassembled components into a house is not a



Abacus Architects & Planners affordable house in Cleveland, Ohio is a stacked two-storied manufactured house.



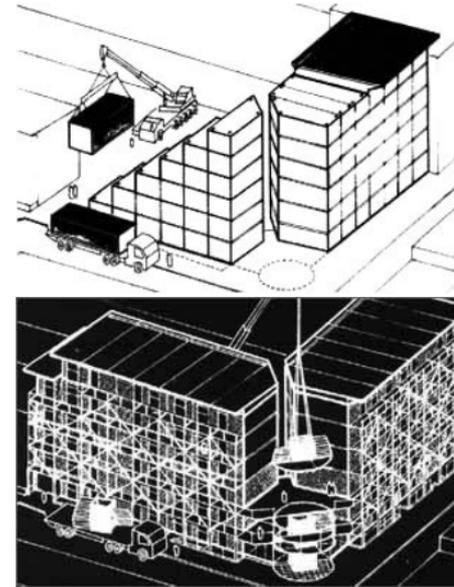
The massing of a home under construction in Roanoke, Virginia built with traditional on site framing techniques begins to suggest the possibility of stacking of modular elements prepared off site and then assembled on site to create a dwelling.

new idea. Just looking at the massing of a home under construction begins to imply such possibilities.

Abacus Architects & Planners won an affordable housing competition in Cleveland by proposing such a maneuver.⁷ Abacus Architects & Planners The [Progressive Architecture](#) Affordable House Cleveland, Ohio. The house was two stacked units shipped by truck to the site and lifted into position by crane. After the roof was folded into place, the home was finished with a surrounding deck and vinyl siding. It is almost impossible to distinguish it from a site built home.

Is it possible to stack a modular unit into more than just houses? In London, England the Peabody Trust, one of the oldest housing authorities in Britain, elected to use a prefabricated system designed by Cartwright Pickard Architects to build an apartment complex called Murray Grove.⁸ [Prefab \(68-75\)](#) The system used two light steel gauged modules based on hotel room dimensions to create a single flat to which additional balconies, hallways, and stair systems could be attached. In theory a stackable modular building could be used to create any number of affordable building types, from apartments to classrooms and office buildings.

There is a current trend of reusing shipping containers to create housing of various sizes. Firms like LoTek and Jones and Partners use shipping containers as building blocks to make modular dwellings. It is a good idea. They are stackable and very durable, so the difference between a small dwelling and



Assembly of the Murray Grove Apartments, Hackney, London took less than ten days start to finish and in theory could be disassembled just as quickly.

a large complex is just the number of containers. The paint poses a problem. It is highly toxic and is very difficult to dispose of. As a result, to retrofit the containers, the inside is usually refinished in plywood while the exterior is for the most part, left as is. Another problem has to do with aesthetics and is similar to the inquiries of the mobile home. Does the end result of the dwelling fit into a given context or is it still essentially shipping containers out of context?

So the question arises, what makes a house a house? Are there elements necessary to the massing and assemblage both inside and out to imply a home? Alberti stated that, “A private House is manifestly designed for the Use of a Family, to which it ought to be a useful and convenient Abode. It will not be so convenient as it ought, if it has not every Thing within itself that the Family has Occasion for.”⁹ ^{Ten.} The Books of Architecture: The 1755 Leoni Edition. Book V. Chap. XIV this project attempts to address these elements.

[pMod]

There is a need for a new housing type that can accommodate the issues of today. Not only have environmental concerns changed, but so have our families, our living arrangements, and lifestyles. A new paradigm is needed to address these concerns. The attempt is to design a dwelling that can respond to this diversity with a built-in flexibility. If successful, then the prototype has the potential to



Sean Godsell's future shack is an attempt to transform a shipping container into a temporary relief housing unit. the pitched roof structure is an attempt to express the feeling of a traditional home. the structure also stores inside the container during transport.

become a Home for a given family or household.

The computer industry offers a good analogy. When a computer needs more memory or perhaps an upgrade for a particular drive, then it becomes a matter of contacting, purchasing, and installing the upgrade. An example is Apple's iPod. The basic concept of the device is a well designed portable core unit that comes in different sizes and styles with various optional peripherals that can seamlessly integrate with it. Why can't our houses be the same way?

These concerns are the main concepts of the pMod. It is system of portable modular dwellings that can stand ALONE, or fit into an existing context. It is adaptable to different foundation systems and can plug into the existing electrical and plumbing grid or be modified to be removed from it. By grouping and stacking the unit to create different configurations and housing types appropriate to a particular site, the materiality of the complex could be chosen to challenge the contextual restraints. The lifespan of a pMod is dependant on the owner, but the controlled environment during manufacturing ensures quality construction, while the component design allows for upgrade and recyclability. By utilizing the current manufactured housing infrastructure and modifying the different components, stock piles, and materials, an affordable prototype is possible. Prefabricated homes offer more predictable costs and quicker returns for the investor. An affording design that can utilize the advantages of each industry



has the potential to make the American Dream an affordable Reality.

A Careful marketing strategy could help this modular pre-fabricated dwelling succeed where other predecessors have failed because of the many variations allowed in the design.¹⁰ ^{The failure of} These variations predecessors was not only the design, but the marketing of the home. (Living In Motion) Projects like include options ranging from materials to different additions. There is the possibility of modifying the Buckminster Fuller's "all-in-one packaged" Wichita house and Dymaxion were advertised as futuristic icons. existing manufactured housing industry to support these options, allowing the consumer or the owner If they had been designed and marketed as houses that could fit into various contexts, then they may have succeeded. and environmentally approved materials would be made available to choose for the interior and exterior of the dwelling. And as the household expands, so can the home. Additions could be plugged into the core-unit and or the site to expand the living conditions both horizontally and vertically. The core-unit could be grouped with others to form a chain or stacked to make a larger complex. As these additions are made, the original units could be up-fitted to change functions and or programs.

Frank Lloyd Wright once said, "We are very slow to take things on that occur at home."¹¹ ^{The Future} And yet ^{of Architecture (29)} the house was, and remains to be, the main vehicle for architectural experimentation. Each of the following [book]lets represents a demonstration of different possibilities and studies allowed by this portable modular dwelling.



A stacked apartment complex in downtown Richmond, Virginia

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[Notes and Credits]

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