

“ THIS WONDERFUL WORLD
OF
MOBILE HOME LIVING ¹”

by

Gerdur Sigfusson

BA in Interior Design, Marymount University 1993

BA in Studio Art and French, Hollins College 1987

Submitted to the Department of Architecture
in Partial Fulfillment of the Requirements for the Degree of
Master of Architecture
at the Massachusetts Institute of Technology, June 1997

Signature of Author

Gerdur Sigfusson, Department of Architecture

May 23, 1997

Certified by

Wellington Reiter, Assistant Professor of Architecture

Thesis Supervisor

Accepted by

Wellington Reiter, Chairperson

Departmental Committee on Graduate Students

MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

JUN 20 1997 *Hotch*

LIBRARIES

© Gerdur Sigfusson 1997. All rights reserved.

The author hereby grants to M.I.T. permission to reproduce and to
distribute publicly paper and electronic copies of this thesis document in
whole or in part.

¹ Karr, Harrison M., *This Wonderful World of Mobile Home Living* (Beverly Hills,
Trail-R-Club of America, 1968)

To my father, Sigfús Örn Sigfússon

READERS

Bill Hubbard, Jr., Assistant Professor of Architecture, MIT

Carol Burns, Associate Professor of Architecture, GSD

A B S T R A C T

“This Wonderful World of Mobile Home Living¹”

by
Gerdur Sigfusson

Submitted to the Department of Architecture on May 23, 1997
in partial fulfillment of the requirements for the degree of
Master of Architecture

Thesis Supervisor
Wellington Reiter, Assistant Professor of Architecture

The mobile home, or manufactured home as it is called to day, comprises 25% of all new homes sold today. Although it is such a large portion of the housing market, it is plagued by a social stigma which has undeniably been a part of its history as a building type. Many factors contribute to this problem, including zoning ordinances, federal regulations and financing. All of these issues need to be and are being addressed by the industry, federal and state legislators, and homeowners. The thesis proposes to look at ways of reducing that stigma from yet another perspective, that of design. One challenge is to work within and with current manufacturing processes and legal restriction.

This research project begins with a simple question - How might the manufactured home as an existing type be rethought in order to not only better its position as an alternative to the conventional single family home but also be seen as an alternative for a broader market:

- in terms of social use:
 - a. redefinition of the family
 - b. work/living scenarios
 - c. service/served or work/leisure relationships
- in terms of spatial improvements
- in terms of land use innovations

If these dwellings were accepted as houses for the middle class and second homes for the upper middle class the result would be a transformation of the genre.

¹Karr, Harrison M., *This Wonderful World of Mobile Home Living* (Beverly Hills, Trail-R-Club of America, 1968)

C O N T E N T S

History.....	7
Current Industry.....	15
Existing Market.....	23
Proposal.....	29
Prototype.....	35
Bibliography.....	47
Illustration Credits.....	51

H I S T O R Y





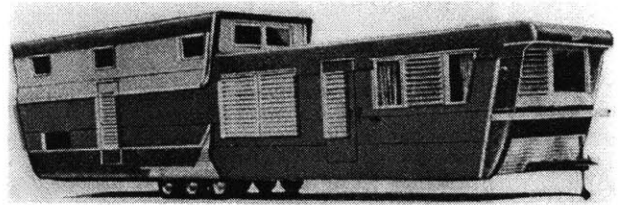
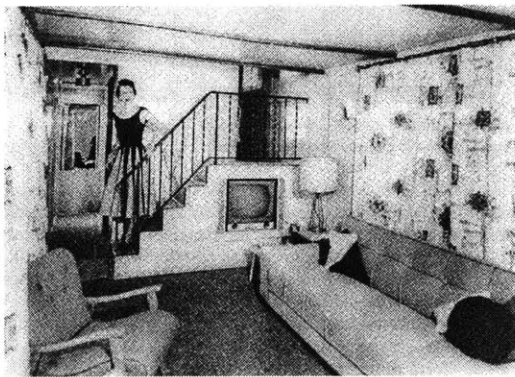
From house trailer to mobile home to manufactured home

The notion of mobile dwellings can be traced back centuries, however, the idea of a mobile home which relies on motor vehicle transportation dates to the early part of this century. The first of these dwellings were home made and meant for purely recreational use. They were small and crude in construction. The idea caught on and this type of travel and vacationing became increasingly popular. Small companies were established and production line assembly began. The first manufacturer to produce these trailers in large volume was



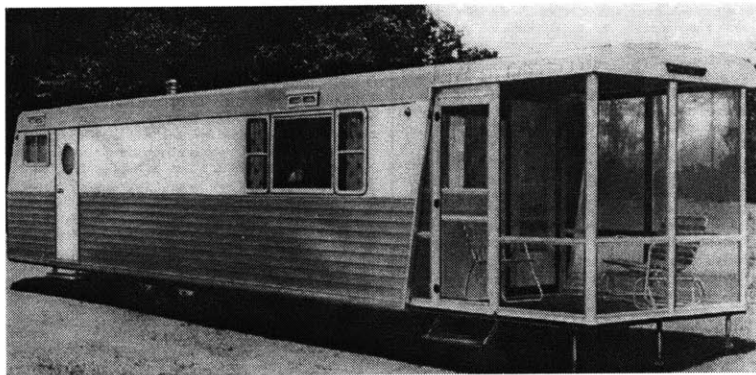
Arthur Sherman¹. By 1936 his Covered Wagon company was in full production and the industry as we know it today was established. Many similar companies followed suit and the demand for these trailers was high. Most of the designs were similar in interior arrangements/amenities and all alluded to the notion of mobility through their aerodynamic designs. Parks were established to accommodate these homes and they included all the amenities not possible in the home itself. At that time the parks were seen as a way to attract visitor and increase revenues for the towns in which they were located. As time passed, the visitors stayed longer and longer. Since these homes were very mobile instances of stealing away in the night without paying your bill became frequent. Opinions of the “trailer” people became low and persist to this day. Those that live in manufactured homes are seen as migrant and the parks in which they live are seen as devaluing the property which surrounds it. Since the spaces were rented, the owners paid no tax to the community and were seen as free loaders. Although this is not the case today, the perception persists.

The use of the trailers as recreational dwellings started to change after the depression and was then drastically altered during the 1940's when the United States entered the war. The government purchased a vast quantity of mobile homes for their defense production workers who needed to live close to the plants. The size of the trailers increased in length to over



30 feet and started to include bathrooms and permanent kitchens. All the conveniences of a true home, gas, electricity, hot and cold running water, was available, although at a much smaller scale. The distinction between the recreational vehicle or trailer and the mobile home as we know it today, began to take place during this time. The mobile home had been proven to be a cost effective solution to affordable housing. The production of trailers for recreational use (which remain a truer descendent of the old trailer than the current manufactured home) continues and is a large industry in and by itself.

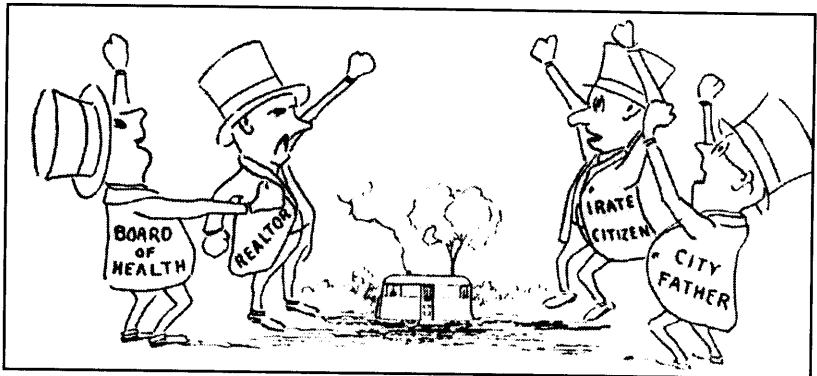
In the 1950's the mobile home continued to grow in size and popularity. It now was up to 50 feet long and 10 feet wide. It



started to shed its aerodynamic aesthetic in favor of squared corners to increase interior space. The homes now had to be transported by trucks and new legislations were enacted regarding highway travel². As the number of these homes being used as permanent housing increased, so did the problems many associate with them. The majority of these homes were purchased and used by lower income families and prejudices against these owners were evidenced in the zoning ordinances designed to locate these parks to the less desirable fringes of towns.

The 1960's produced even larger homes and saw the invention of the double wide home. This was a response to a demand for larger living spaces while travel width remained limited. As these two units necessitated assembly on site, the homes became more permanent to their site. The legal definition of these homes as vehicles meant that they did not have to conform to local building codes. The manufacturers established their own association, the "Mobile Home Craftsmen Guild" and set their own specification and system of compliance. The sales of these homes increased four fold and true mass production was now in place. In the 1970's one third of all new single family homes were manufactured homes³.

Although the industry tried to regulate itself, a number of problems persisted which led to the establishment of the



H.U.D. Code in 1976. This is a federal code which is based on the performance of the home. It has changed very little to this time and is currently being scrutinized by the industry and consumers. One aspect which is hotly debated today is the metal chassis on which the mobile home is built. It is the basic legal defining element of the mobile home, the thing that separates it from its cousin the modular home and that allows it to be federally regulated as opposed to conforming to state and local building codes. The issue of debate is the need for such a chassis as a permanent part of the structure. Depending on the source, it is estimated that between 3 and 10 percent of mobile homes are ever relocated once on site. Acknowledging this fact H.U.D. has allowed for the removal of the hitch, the axle and the tires from the home once on site, however the removal of the chassis has not been allowed and will mostly likely not change in the near future.

Issues of taxation, financing and zoning still plague the manufactured homes, even though they now comprise 25% of all dwellings in this country. The practice of financing and taxing the homes as vehicles has been reduced dramatically and zoning ordinances have been modified to deter discrimination based on construction. However these houses are still not perceived as legitimate homes and are not yet on par with the conventional housing market.

¹ Kronenburg, Robert, *Houses In Motion*, New York, 1995, p.75.

² Porter, George, *Manufactured Housing Installation & Repair*, Nassau, DE, 1997, p.7.

³ *ibid*, p.8.

C U R R E N T
I N D U S T R Y



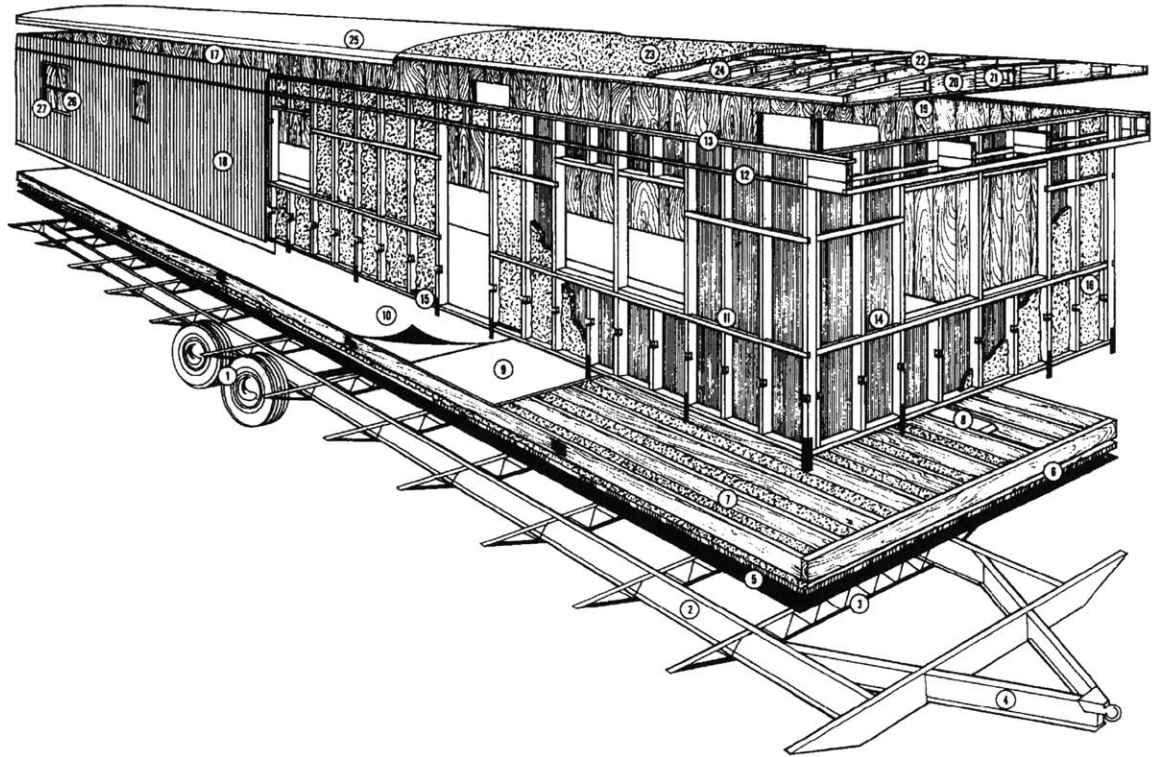


Figure 5.1.
Exploded view of
a mobile home.

The Chassis

1. Chassis—heavy-duty axles, leaf springs, and tires comprise the running gear.
2. Frame—"I" beam—heavy-duty steel welded frames, 8", 10", or 12" "I" beams depending on length of frame.
3. Rigid steel outriggers and center cross members.
4. Hitch—sturdy "I" beam hitch members—optionally removable for cleaner appearance.

The Floor System

5. Bottom board—tightly sealed on bottom of floor.
6. Floor insulation—all-weather insulation for temperature control, blanket fiberglass installed under entire floor for complete weatherproofing.
7. Floor joists.
8. Heat duct—aluminum-framed duct.
9. 5/8" decking particle board glued and fastened to floor joists.
10. Roll goods—cushioned vinyl floor in non-carpeted areas.

The Wall System

11. 2" x 4" studs.
12. Dadoed belt rails for unitized sidewall construction.
13. 1" x 4" top and bottom plate.
14. Interior paneling—prefinished fire rated interior paneling glued and stapled to sidewall studs for unitized construction.
15. Rugged metal anchor bonding ties sidewalls to floor for additional strength.

16. Sidewall insulation—heavy-density fiberglass insulation.

17. Trim to harmonize with exterior decor.
18. Rigid exterior metal is prefinished aluminum with baked-on enamel finish.

The Roof/Ceiling System

19. Decorative ceiling board.
20. Gusseted truss-type rafters for extra roof strength.
21. Blanket fiberglass insulation between rafters.
22. Steel straps full length of roof over rafters support insulation and galvanized roof between rafters.
23. Thick fiberglass roll insulation over rafters.
24. Vapor barrier on warm side of roof to prevent condensation buildup.
25. Galvanized steel one-piece roof.

Windows and Doors

26. Large aluminum-framed windows with screens and optional storm windows.
27. Egress windows for emergency exit from every sleeping room.

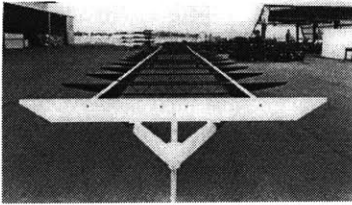
Mechanical Service Systems

28. Electrical, plumbing, heating, and construction conform to or exceed the Federal Mobile Home Construction and Safety Standards.

Manufactured homes today range widely in quality, price, size and style. The most limiting characteristics of manufactured homes regard the size and shape. It used to be that manufactured homes were only designed and marketed to the lower class but today the homes range in price from \$20,000 to well over \$100,000. Most are still located in "parks" or developments specially designed and zoned for the homes. However, some states have started passing anti discriminatory regulations based on construction type. Often, these regulations have limitations on minimum size, thereby discriminating against single wide homes and excluding lower income families. Other city or neighborhood ordinances regarding aesthetics exclude the manufactured home because of size, proportions, height, and exterior surfaces.

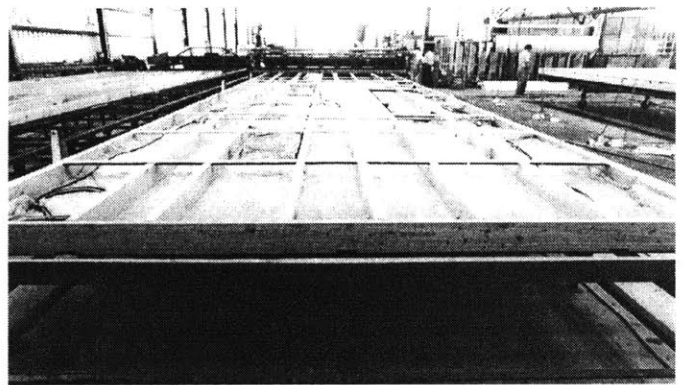
CONSTRUCTION

Manufactured homes are either single or multi section (single or double wides). They are referred to as H.U.D. Code homes in the industry to distinguish them from modular homes. The major difference between manufactured homes and modular homes, which are often made in the same factories, is the metal chassis which is a permanent part of the manufactured home. This is the single legal defining element of the manufactured home. Modular homes are also built on a metal chassis but designed to be slid off on site. The metal chassis is required for transport as it must support the entire load which is supported only at one point by the wheel assembly en route. The wheels, axles and hitch are removable once on site and installed.

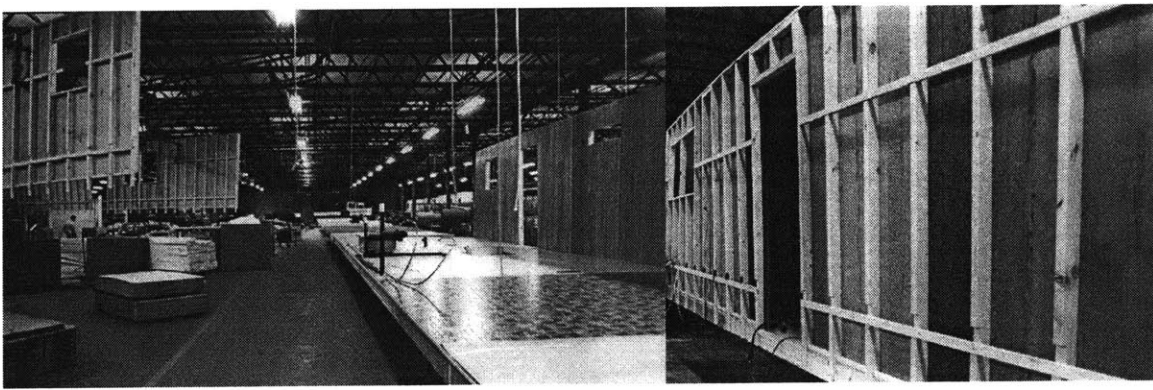


The metal chassis is the same dimension as the floorplate of the home. Currently, the maximum dimension is 16' wide by 80' long. It is made up of two "I" beams and cross members. The "I" beams are located approximately 4' from the edge of the chassis on each side. The cross members consist of outriggers and members which run between the "I" beams. The outriggers are tapered beams and carry the load of the exterior walls to the "I" beams. The members running between the "I" beams vary in construction, but are generally channels connected to the lower edge of the "I" beams or open web joists. The whole assembly is welded and bolted together, either at the factory or at the location of another manufacturer from which it is delivered assembled. The depth of the chassis is determined by the length of the home. Today's larger homes generally require 10" to 12" in depth. The wheel assembly, axles and wheels, are located approximate 1/6 the distance from the hitch.

Throughout the process of assembly the home has been wheeled from one station to another. Each part of the process has a particular location in the factory and so in a single day a number of homes move through each station.



On top of the metal chassis is a wooden floor frame which is equal in size to the metal chassis. It is made up of 2x6's, or in some cases 2x8's, which serve as floor joists spaced at 16" intervals. This frame houses all the electrical, plumbing, and ducts required to service the home. The direction of the members can either be longitudinal or latitudinal. Longitudinal systems have the advantage of allowing heat ducts to run the length of the home with more ease. Latitudinal systems, however, allow the heat ducts to run to the edge of the home with more ease but require that the main duct needs to run under the frame, within the metal chassis. This frame is attached to the chassis by lag screws.



The walls of the house are made horizontally on a platform and then hoisted into place. The home is built from the inside out. Therefore the interior walls and all appliances and fixture are put into place first. The exterior walls are the last to go up. The interior finish is applied to the exterior wall frames. After they are put in place, electrical wiring and insulation is installed and finally exterior siding is applied. The exterior wall are generally made of 2x4's and the interior walls of 1x2's. The reason for the thinness of the interior wall was space economy and price, however, today as the homes get larger and the market demands better quality, the manufacturers are starting to use 2x4's for the interior walls as well as the exterior walls. The roof which has been built away from the main assembly is then hoisted into place and bolted on. Aside from the chassis and wheel assembly, these homes are constructionally much the same as a conventional wood frame houses although assembled more efficiently and more rapidly.



The height of the home is also legally limited. The whole house must be less than 13'-6" high during transport. The space between the road and the bottom of the metal chassis is 21", allowing a 26" diameter tire. The finished floor of a house which has a 12" chassis and an 8" sub floor assembly is then 42" from the ground. Pitched roofs are the current fashion in the industry. As a result, many homes have low interior ceiling heights ranging from 7'-0" (at the perimeter mostly) to 8'-6" in the middle of the home.

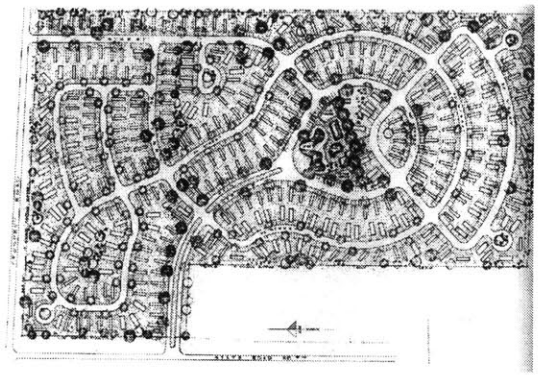
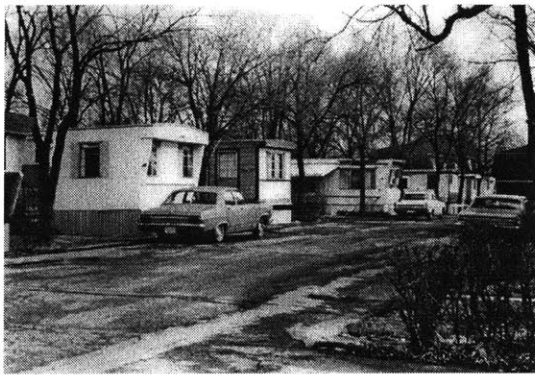
The assembly of a single home can take as little as one day to as much as a week, depending on the manufacturer and the quality of the home.

OWNERSHIP

One issue that still plagues the industry and as a result the demand and acceptance of manufactured homes is ownership. Until fairly recently, manufactured homes were sold and financed much the same way a car is. This is due to the fact that these homes were legally classified as vehicles and taxed in the same manner. The loans were short term and depreciation was rapid. The amount of the monthly payments was often high and difficult to manage for the owners who were generally lower income. The resale value was also affected because of this system. Today, financing resembles home mortgaging, though with some differences. Ownership of the land on which the home sits is often not the same as the home. The land is owned by the "park" or development and leased to the homeowner. The park supplies all hook ups and required services. Some developments, mostly the high scale ones, are starting to sell the land directly to the homeowner, much as a traditional development.

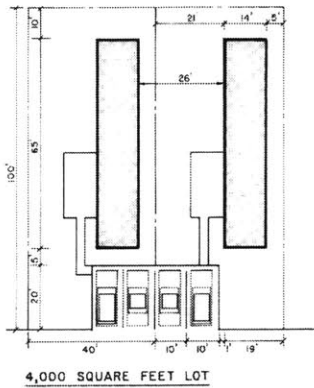
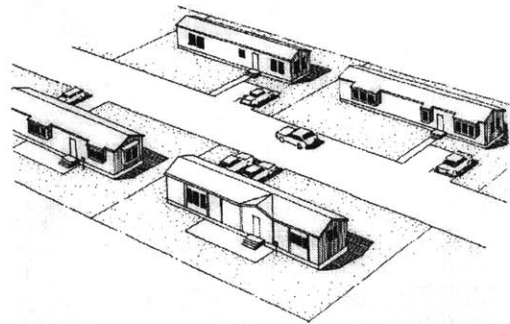
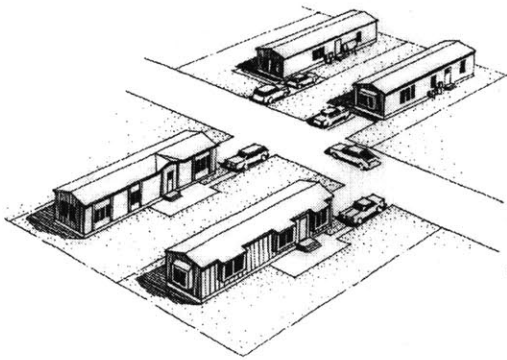
E X I S T I N G
M A R K E T





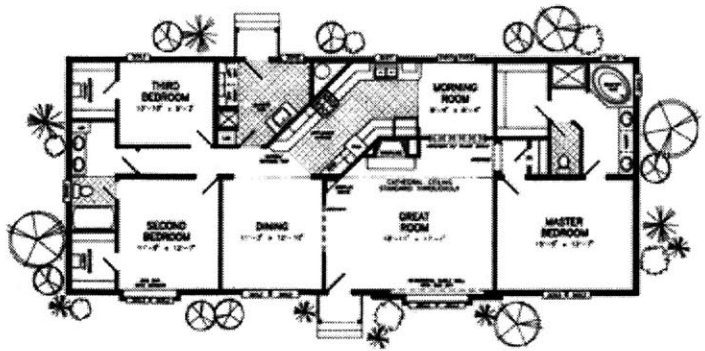
Majority of manufactured homes are located in specially allocated parks, segregating them to fringe areas and sustaining the already prevalent notion of illegitimacy. Although the homes themselves have graduated first from trailers to mobile homes and now to manufactured homes, the parks or developments are still often referred to as trailer parks. As the manufactured home developments try to emulate conventional housing developments, zoning restrictions are being altered or lessened. However, the NIMBY syndrome still persists and true integration will be slow.

Regardless of the quality of the manufactured home development, transportation and set up issues, the size and proportion



of the homes and a long standing convention dictate a siting configuration which is far from conventional and historically not desirable. The homes are generally set up with a short end parallel to the street and the long sides perpendicular to it. This layout creates confusion regarding front, back, and side yards and generates problems of privacy. Traditionally, front facade and entry occupy the same “face” of a home and are part of a subtle but clear transition from public space. In the case of the manufactured home development, the main or important facade and the entry occupy a position on the “side” of the home. As a result, what is traditionally “front” and “back”, now is on the side, and visa versa. The traditional back yard is all but obliterated as it becomes your neighbors’ “front” yard. The homes’ only usable outdoor space is its “front” (on the side) yard and as your neighbors’ “back” facade is at such close proximity, it in essence becomes public and therefore practically unusable. In some cases, the long sides of the homes do face the street. While the “front” in this case does face the street, the effect is equally unsatisfying because the proportion of the rectangle is overly attenuated.

The spatial configuration just described has direct implications on internal privacy as well. In order to shield itself from its neighbors, the manufactured home has few and small openings. The result is a closed and rather claustrophobic interior situation. The industry’s justification of the smaller and fewer



openings due to constructional unfeasibility related to transportation issues is no longer valid. The homes are constructed much in the same manner as conventional homes and because of the ever increasing widths and lengths of these homes, legal transportation speeds have been reduced to the level that less rigid homes can easily withstand.

This type of neighborhood layout is directly linked to the proportion and size of the manufactured home. For decades it has been seen and treated as a moving container whose composition is dictated by the logics of transportation as opposed to a dwelling dictated by the logic of peace-making. Whether single or double wide, the home becomes instantly recognizable by its proportion and dimension as a mobile home and as a result stigmatized by built up prejudices.

The implications of proportions and dimensions hereto dictated by transportation and the results of current siting practices are severely felt in the interior of the home. The claustrophobic feeling brought about by the lack of openings to the exterior is enhanced by the ceiling height of the home. Currently, the ceiling heights range from 7'-0" at the perimeter to 8'-6" in the middle. The maximum overall height of 13'-6" and the current desire and fashion for pitched roofs results in a great number of homes compensating for ceiling height in this manner. There are homes which have a consistent 8'-0" ceiling height, however the feeling of being inside a closed tube is no less.

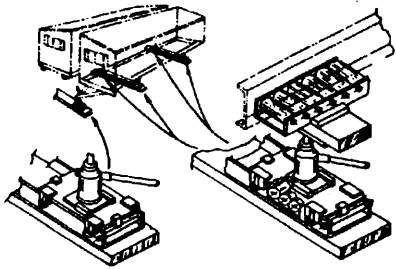
P R O P O S A L



HEAVY DUTY—LIGHT WEIGHT

Now your mobile and modular home setup crews can cut set-up time in half with Perfect-A-Line's new setting system. This lightweight system—the heaviest piece weighs 23 pounds—is constructed on rolling chariots for horizontal movement, and 12-ton capacity hydraulic jacks for vertical movement.

This affords you quick, exact settings every time. This system is ideal for transporters and manufacturers. Maximum load capacity is 40 tons. (Optional rolling chariots are available in lengths up to 25 feet. Individual parts of the system are also available.)
Part No. 5625



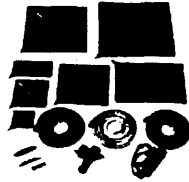
Perfect for use with Wilson's Sit-Way or OSHI Sit-Itch. Available in 2 pt., 3 pt., 4 pt. and 8 pt.

AIR BAG SYSTEMS



Enhance your professional image!

Any job you are doing with a bottle jack can now be done safer, quicker and easier with an air bag system. Three sizes available, all made with Neoprene Rubber and Nylon that is five times stronger than steel but 40% lighter. Every bag has a 10 year life expectancy. Will not rust.



23



Low-Speed Offtracking

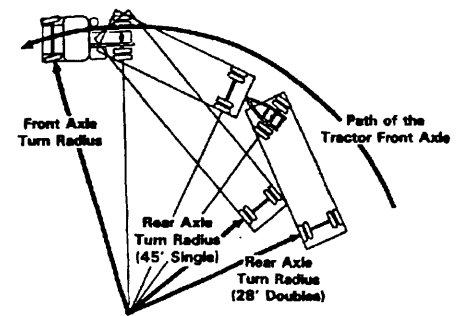
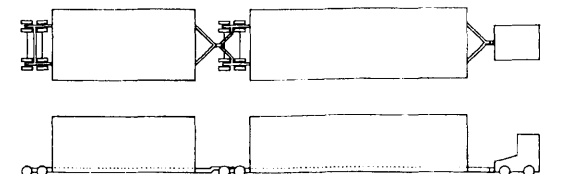


Figure 10



The proposal takes the idea of joining two units on site, as is done with double wide homes, and apply it to a single wide. That is to say, have one truck transport two units which are then “married” or joined on site. The system is a combination of the twin trailers and a gooseneck trailer, both already in use in other industries. As a result, a home equivalent in square footage to a conventional manufactured home can be reconfigured in proportion and size and the units placed about 9” closer to the road during transport which increases the interior ceiling height. These twin trucks have not been popular because of the accident rates associated with them. These trucks are generally traveling on major highways at maximum legal speed (or more). In the case of manufactured home transport, special permits must be attained, days and times of travel are restricted, follow and lead cars are used, and

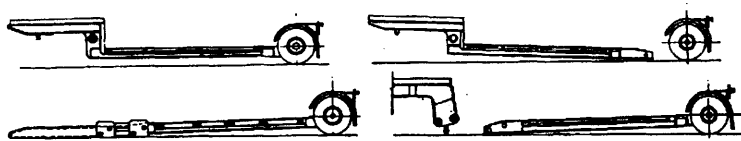


Fig 23: Detachable goose-neck

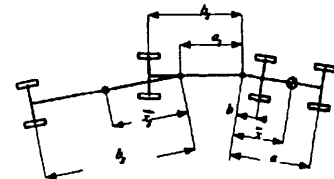
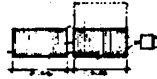
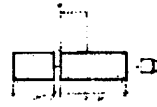
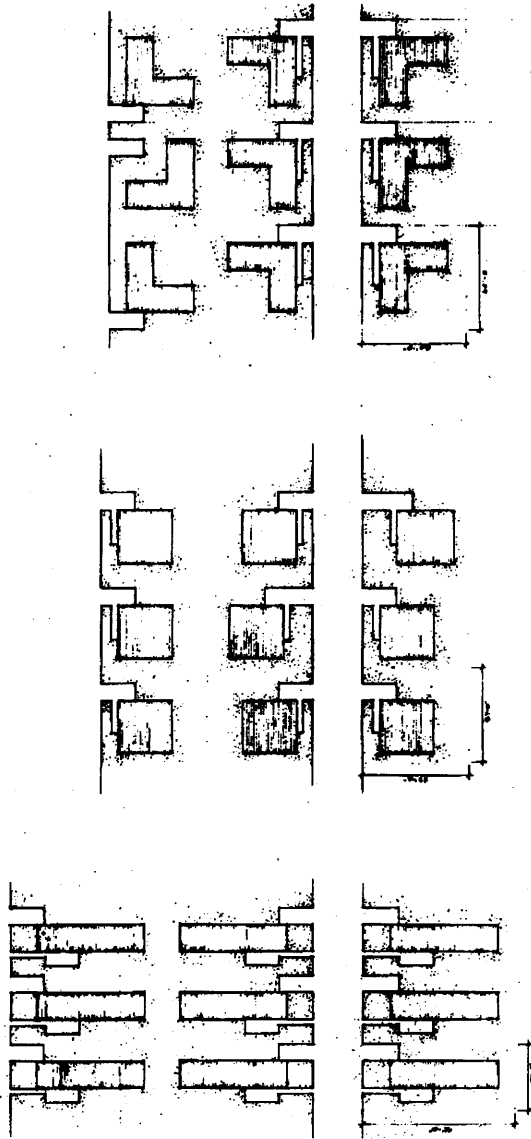


Fig. 4.11 The typical layout of a tractor-trailer vehicle

speed of travel is well below legal speed limits. With all these safeguards already in place, the use of a double trailer or double unit is not only feasible but also can be advantageous. The turning radius of a truck with a double trailer is tighter than for a trailer carrying the same length single trailer. Access to small neighborhood roads is therefore less burdensome and often possible where it was not before. In addition, siting the smaller units on the lot is facilitated. Transportation cost is not increased for the same size home but most importantly, the double trailer system allows for configurations which would solve a number of the issues discussed earlier.

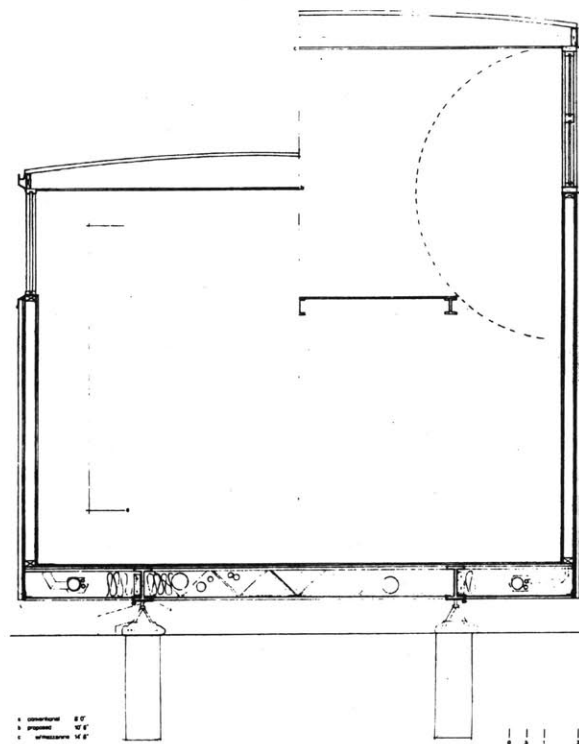
To further increase the ceiling height of the home, the subfloor system of the chassis and the wooden floor frame are reconfigured to reduce redundancy of systems. The systems housed in the wooden frame, the plumbing, electrical wiring, and vents, would be located within the space of the chassis, which until now has only served the function of bearing the load of the house. The outriggers which normally taper from the I beams would no longer do so. The older system of open web joists would be used to facilitate the piping and to increase stability. The whole chassis would be made stable, more so than today, by plates which are joined with it on top and bottom. While exactly what that material would be is not specified here, structural consulting suggests that it is indeed possible. The material would have to be strong enough to leave little deflection inside the home while light and cheap enough to make it feasible. The spacing of the cross members could



also be reduced. Structural analysis would determine the balance of spacing and strength of plating material. The depth of the chassis could be reduced for further interior gain as the load and span has been reduced with the splitting of the unit. Plumbing would be limited to the area between the beams, while electrical and air vents would be allowed on the perimeter in an effort to reduce the cutting of the I beam and hence cost.

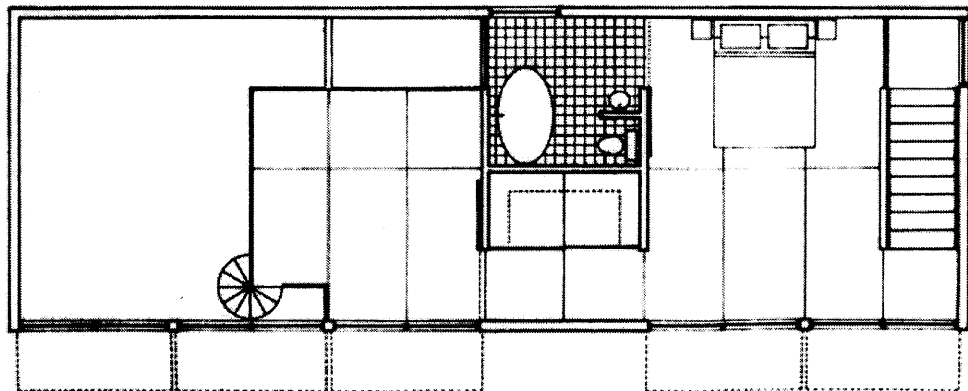
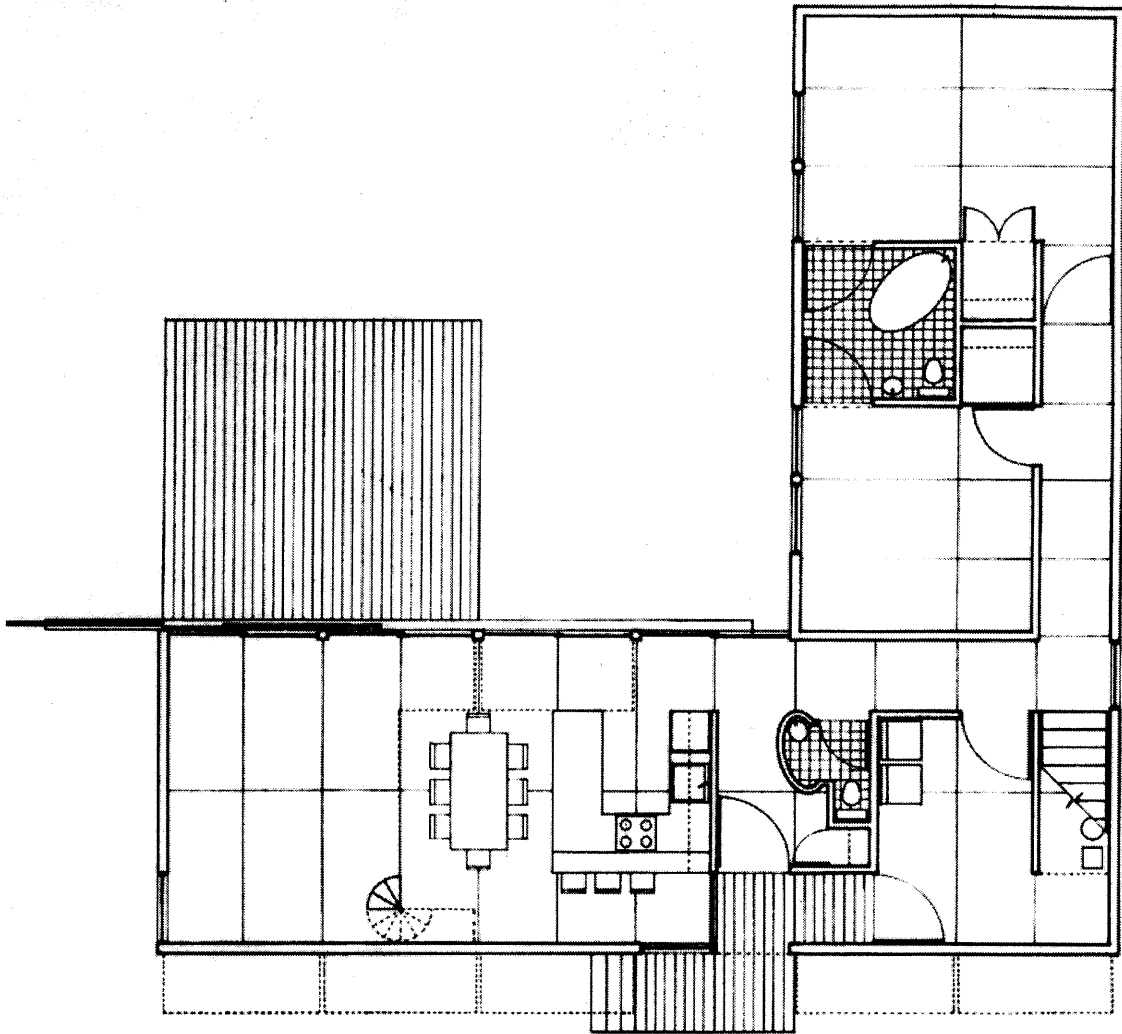
The idea of a pitched roof, while popular, is altered to gain additional height. The roof would be a shallow barrel type similar to those once found on manufactured homes with a depth of 12".

The gain of interior vertical space has thus been increased to 10'-6". It is possible to allow for even further gain with the use of a hinged section of wall or clerestory which would increase the height to 14'-6" and therefore allow for a mezzanine level and increased natural light. Systems of hinging already exists in the industry. They are used to achieve higher pitched roofs by folding each panel down during transport and fixing it in place once on site. Instead of hinging the roof, a section of wall just under the roof is hinged and folded into the home during transport then flipped up and fixed once on site. The roof would be temporarily attached during transport then lifted on site to accommodate the folded wall section, then permanently fixed in place. The ceiling height under and on the mezzanine is 7'-0" and would be appropriate to function such as kitchens, bathrooms, and bedrooms.



P R O T O T Y P E

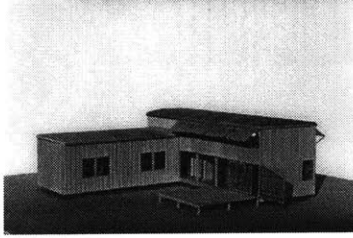
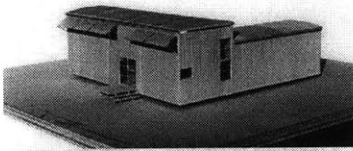


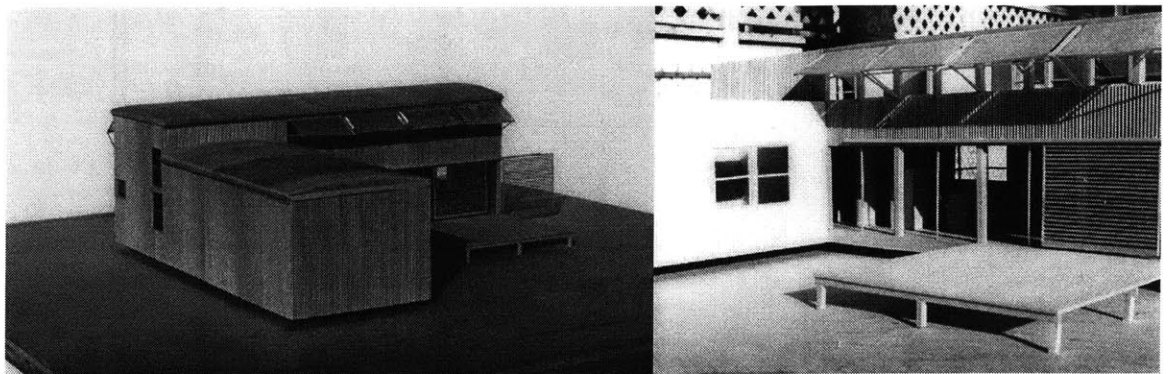
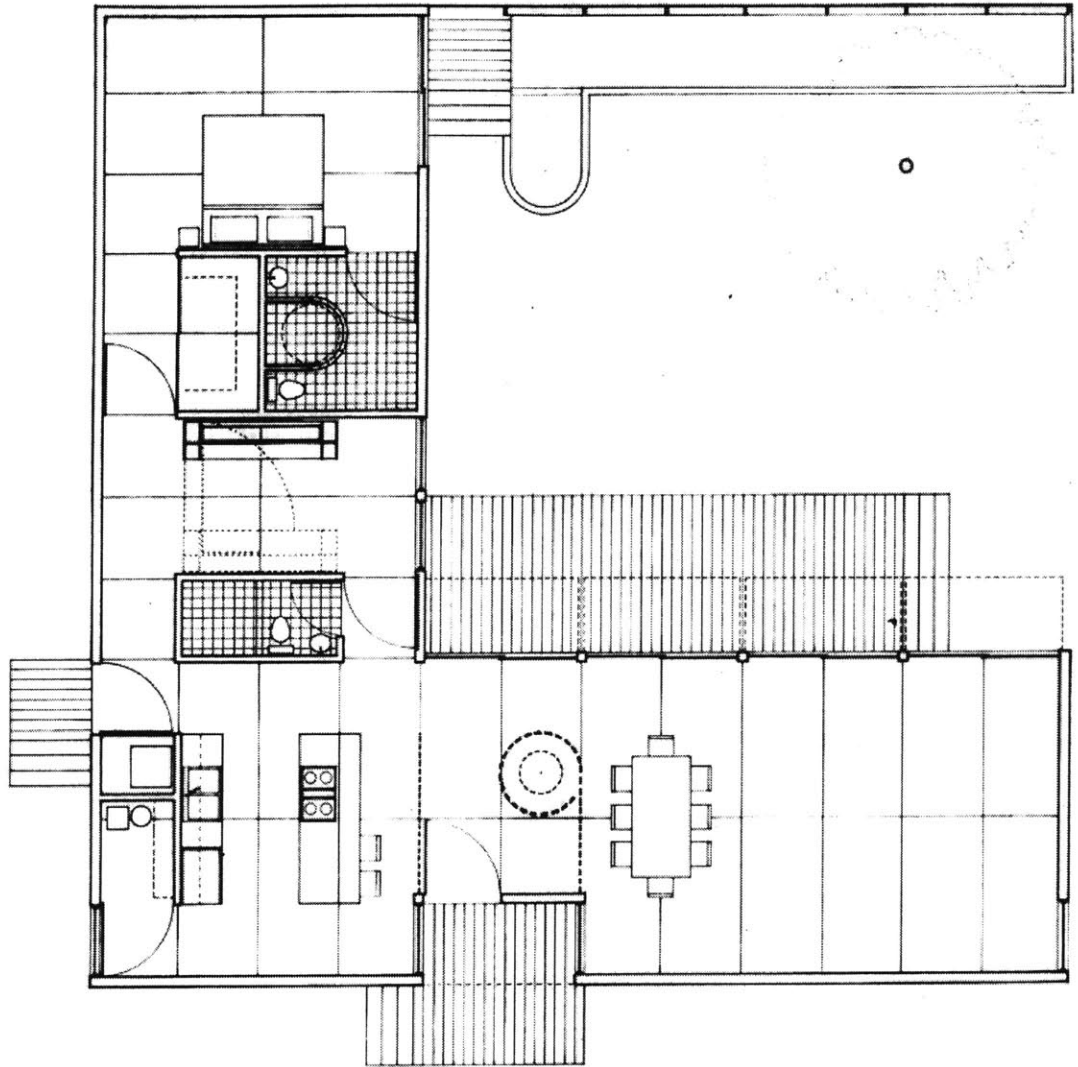


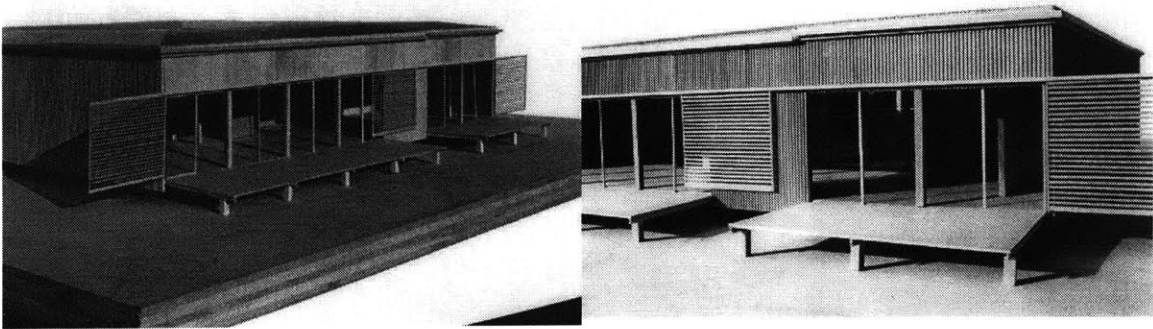
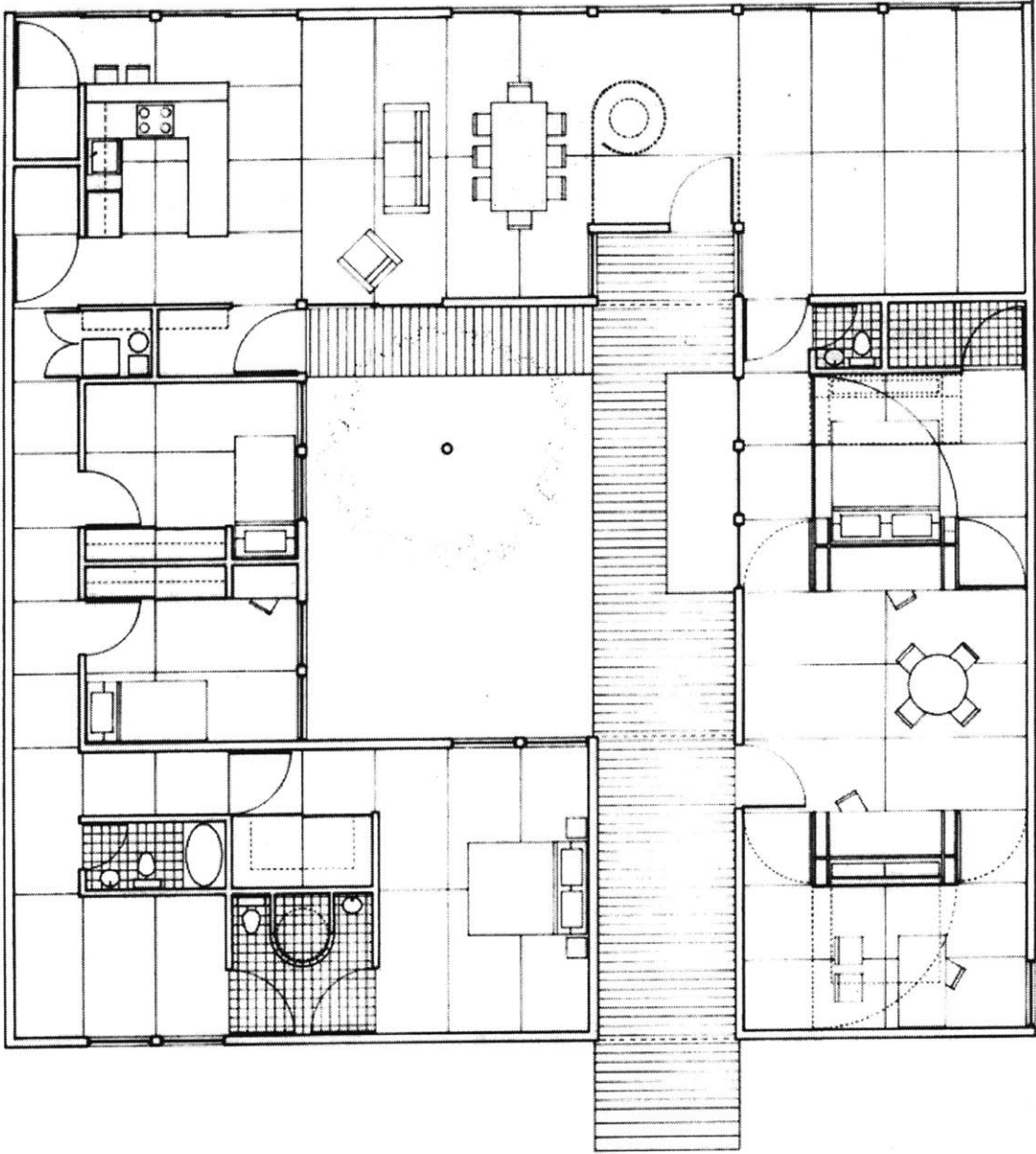
IMPLICATIONS FOR SITING

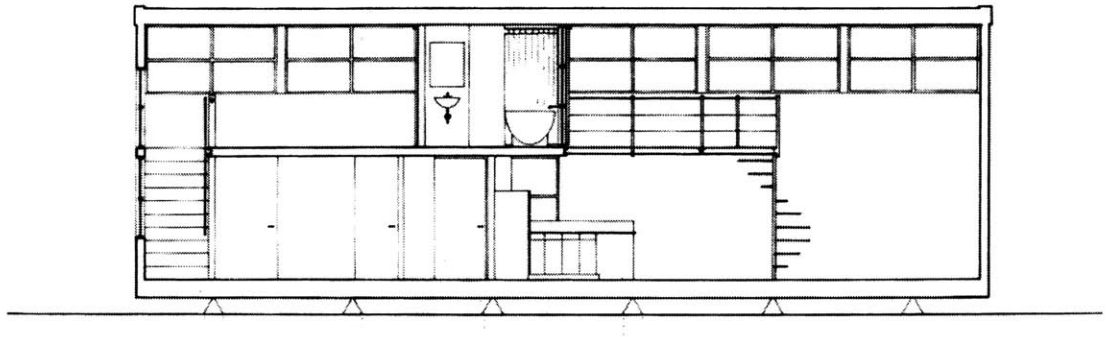
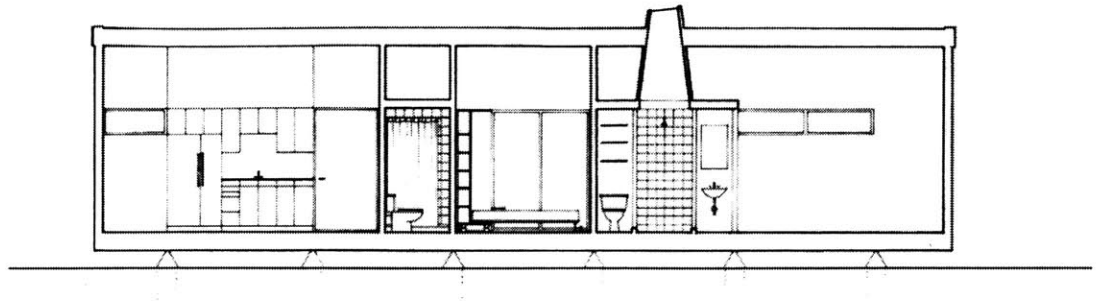
The primary configuration for a home delivered on one truck (in two parts) is an “L” shape. The shorter length results in a more manageable facade. The relationship of this home to its neighbors and the street is dramatically different from current models. The house creates a series of thresholds from the public space of the street to the private space of the backyard. It allows for a connection, both visually and spatially, between the interior and the exterior.

The use of four parts delivered on two trucks allows for a courtyard house. Similar to the “L” house, the courtyard house sets up a series of thresholds from front to back, from public to private. The courtyard delivers visual and spatial extensions to the private rooms which encircle it, while the rear yard does the same for the public spaces of the house.

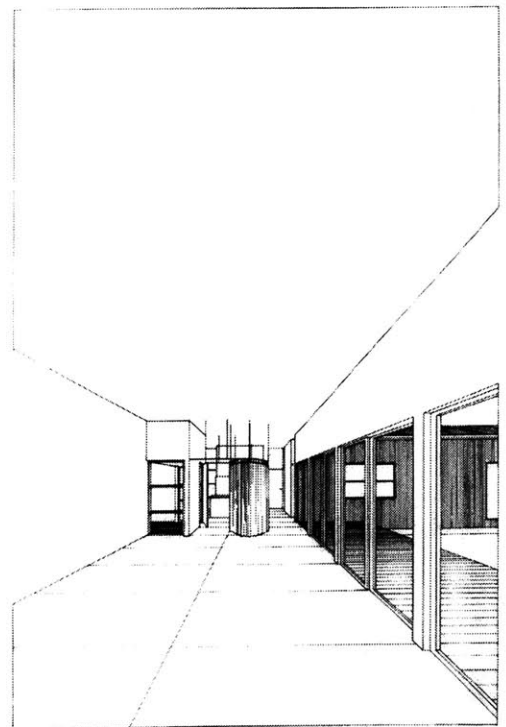








top: section of single story home
bottom: section of home with mezzanine



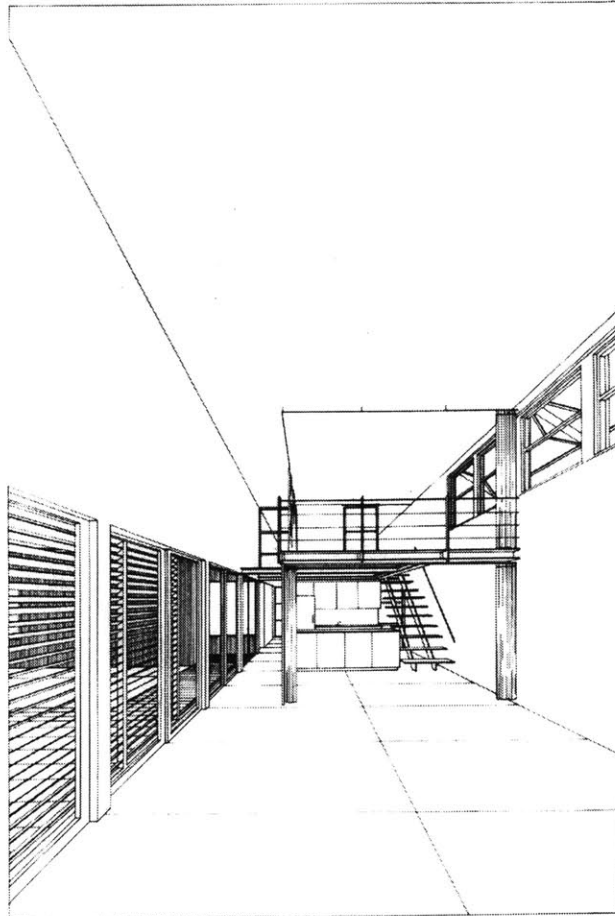
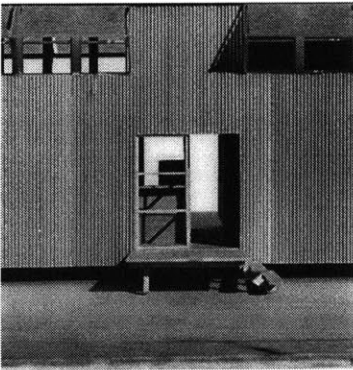
SPATIAL IMPROVEMENTS

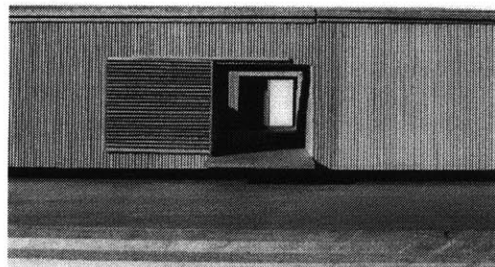
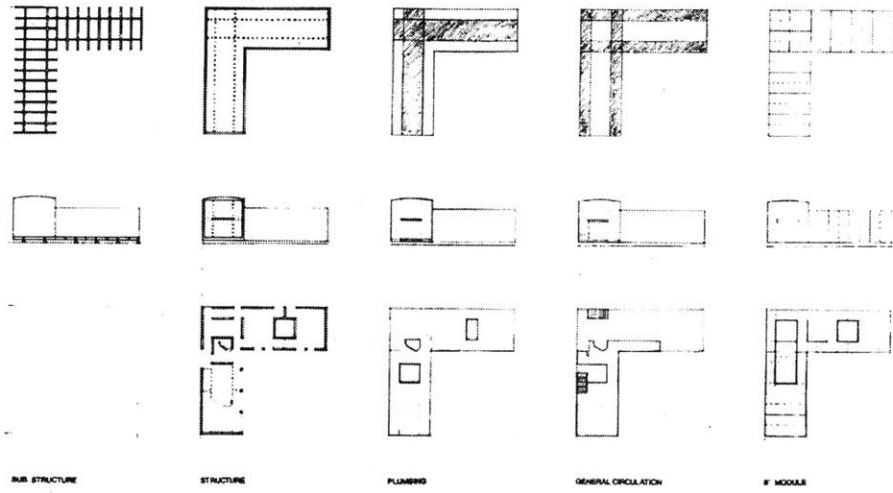
The clerestory and the mezzanine improve the interior dimensions of the home and differ dramatically from conventional manufactured homes. The space is no longer linear and horizontal, but extends vertically spatially and visually.

The openings to the exterior have been increased. The openings are primarily directed to the private exterior spaces. The clerestory opens to the street, allowing natural light and spatial connections while retaining privacy.

Literal and phenomenal transparencies occur throughout the home. The use of the 4' module, which is partially a response to construction, allows for visual and spatial continuity through openings and doors at the peripheral zones.

The recessed porch/entry into the home is the first of a series of layered spaces connecting front to back. The kitchen is sometimes exposed and advertised at the entry, bringing relations of public and private into high relief.





SOCIAL USE

The 8' and 4' grid and plan modules are devised to create a system which allows for flexibility in terms of design options for the potential owner as well as flexibility of use once built. This notion of flexibility is continued in the components of the home, many of which have multi-purposes. Add-on amenities, such as fireplace and skylight, are also provided.

The plans of the three houses were designed for three separate family types as a way to test the process. They were chosen using a system of unbiased selection which was made up of a number of categories as follows:

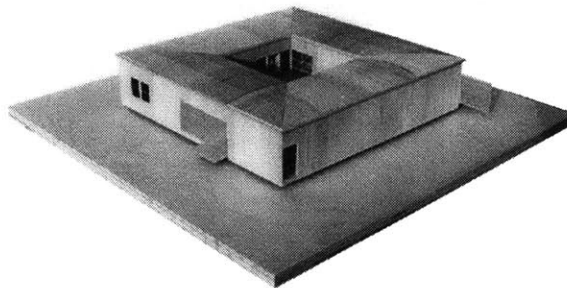
- family type
- gender of each member
- age
- occupation
- hobby
- entertain/not entertain
- geographic location

An item from each category was selected at random, forming the following test case scenarios:

single person with two children	Northern Virginia
female 65-70 economist	gardening yes
female 15-20	
female 10-15	

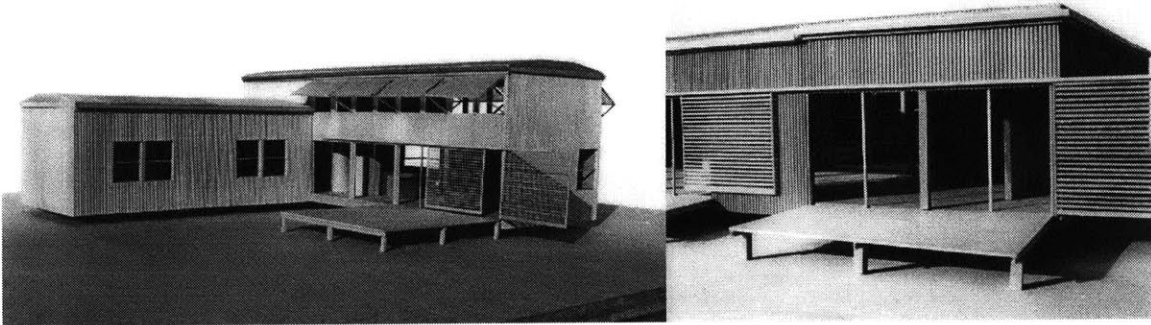
couple with no children	Arizona
male 70-75 retired	car tinkering yes
female 55-60 piano teacher	reading

couple with two children	Delaware
female 50-55 nurse	computers yes
male 45-50 accountant(home)	none
male 5-10	
female 15-20	



The house for the retired couple is an “L” on one floor. A transformable bed/shelf unit allows for the option of overnight guests. The entry consists of a curtain system which encloses the clothes closet and allows for spatial and visual continuity from the kitchen to the living room when pulled aside. The circular clothes closet remains in place as an object.

The house for the single mother with two children is also an “L” but also includes a mezzanine level. The components of the plan are more permanent while allowing flexibility in use. Within the more public area, four spaces are created which can be used separately or together.



The courtyard house designed for the couple with two children has many of the flexible characteristics of the house for the retired couple. In addition, an office with both an internal and separate external entrance is designed to be easily converted into guest rooms.

B I B L I O G R A P H Y

- Bartley, Ernest R. and Frederick H. Bair, Jr., *Mobile Home Parks and Comprehensive Community Planning*, Gainesville, University of Florida Public Administration Clearing Service, 1960.
- Behrend, Herbert, P.E., *Mobile Home Park Plans and Specs*, Chicago, Mobile Homes Manufacturers Association, 1970.
- Brand, Stewart, *How Buildings Learn*, New York, Viking, 1994.
- Bruce, Alfred and Harold Sandbank, *A History of Prefabrication*, Raritan, N.J., John B., Pierce Foundation, 1945.
- Carr, A. L., *A Practical Guide to Prefabricated Houses*, New York, Harper & Brothers, Publishers, 1947.
- Cebon, D, C.G.B. Mitchell, ed., *Heavy Vehicles and Roads*, London, Thomas Telford, 1992.
- Cherner, Norman, *Fabricating Houses from Component Parts*, New York, Reinhold Publishing Corporation, 1957.
- Condon, Kaye, *The Complete Guide to Mobile Homes*, New York, Dolphin Books, 1976.
- Data Requirements for Monitoring Truck Safety*, Washington, D.C., Transportation Research Board, National Research Council, 1990.
- Davidson, Harold A., D.B.A., *Housing Demand: Mobile, Modular, or Conventional?*, New York, Van Nostrand Reinhold Company, 1973.
- Drake, James, *Motorways*, London, Faber and Faber, 1969.

- Drury, Margaret J., *Mobile Homes: The Unrecognized Revolution in American Housing*, New York, Praeger Publishers, 1972.
- Ellis, J.R., *Vehicle Handling Dynamics*, London, Mechanical Engineering Publications Limited, 1994.
- Fenton, John, *Handbook of Vehicle Design Analysis*, London, Mechanical Engineering Publications Limited, 1996.
- Galfetti, Gustau Gili, *Private Retreats*, Barcelona, Editorial Gustavo Gili, S.A., 1995.
- Gartner, Scott and William R. Green, "Transforming the Single-Wide Mobile Home", *The Journal of Urban Technology*, Summer 1996, 13-27.
- Gibson, Constance B., *Policy Alternatives for Mobile Homes*, New Brunswick, New Jersey, Rutgers University, 1972.
- Guidelines for Improving the Mobile Home Living Environment*, Washington, D.C., U.S. Department of Housing and Urban Development, 1977.
- Hewes, Laurence I., *Highway Engineering*, New York, John Wiley & Sons, Inc., 1963.
- The Immobile Home Syndrome*, Arkansas, The University of Arkansas, 1973.
- Jones, John Hugh M.S., *The Geometric Design of Modern Highways*, New York, John Wiley & Sons, Inc., 1961.
- Kronenburg, Robert, *Houses in Motion*, New York, St. Martin's Press, 1995.
- MacDonald, Donald, *Democratic Architecture*, New York, Whitney Library of Design, 1996.
- Manufactured Housing Alternatives*, Alberta, Municipal Affairs Innovating Housing Grants Program, 1983.
- Manufactured Housing Financing 1985*, Arlington, Va, Manufactured Housing Institute, 1985.
- Mobile Home Proects; Site Planning Guidelines*, Ontario Ministry of Housing, 1977.
- Mobile Home Projects: Site Planning Guidelines*, Ontario, Ministry of Housing, 1977.

Mobile Homes: A Selected List of References, Washington, D.C., National Association of Home Builders of the United States, 1971.

New Trucks for Greater Productivity and Less Road Wear, Washington, D.C., Transportation Research Board, National Research Council, 1990.

Penne, R. Leo, *Manufactured Housing: An Industry Reconnaissance*, Washington, D.C., National League of Cities, 1986.

Porter, George, *Manufactured Housing Installation & Repair*, Nassau, DE, Manufactured Housing Resources, 1997.

Powell-Nutt, Thomas E., Michael Furlong, and Christopher Pilkington, *The States and Manufactured Housing*, Cambridge, The Joint Center for Urban Studies of MIT and Harvard University, 1980.

Providing Access for Large Trucks, Washington, D.C., Transportation Research Board, National Research Council, 1989.

Stein, Benjamin and John S. Reynolds, *Mechanical and Electrical Equipment for Buildings*, New York, John Wiley & Sons, Inc., 1992.

Suchman, Diane R., *Manufactured Housing: An Affordable Alternative*, Washington, D.C., The Urban Land Institute, 1995.

Thornburg, David A., *Gallopig Bungalows*, Hamden, Connecticut, The Shoe String Press, Inc., 1991.

Truck Weight Limits, Washington, D.C., Transportation Research Board, National Research Council, 1990.

Twin Trailer Trucks, Washington, D.C., Transportation Research Board, National Research Council, 1986.

Wallis, Allan D., *Wheel Estate*, New York, Oxford University Press, 1991.

Why the Wheels: the Immobile Home, Berkeley, Institute for Local Self Government, 1972.

I L L U S T R A T I O N S C R E D I T S

Page		
7		author
8	left	1939 Palace Coach (Housing Crisis and Response, p. 19)
	right	Covered Wagon (Gallopings Bungalows, p. 17)
9	left	(Gallopings Bungalows, p. 68)
	right	(Gallopings Bungalows, p. 152)
10	left	1930 Bi-Level trailer (Wheel Estate, p. 127)
	right	(same)
11		1954 Prairie Schooner (Coach (Housing Crisis and Response, p. 47)
12		(Wheel Estate, p. 75)
15		author
16		(Building Tomorrow, p. 102)
17,18		(same)
19		(same, p. 116)
20		(Wheel Estate, p. 217)
23		author
24	left	Freedom Acres (Wheel Estate, p. 4)
	right	(Guidelines for Improving the Mobile Home Living Environment, p. 34)
25	all	(same, p. 17)
26		Liberty Home Sales Brochure
29		author
30	top	(Handbook of Vehicle Design Analysis, p. 447)
	bottom	author
31	left	(same)
	right	(Vehicle Handling Dynamics, p. 183)
32-45		author

27.03.20