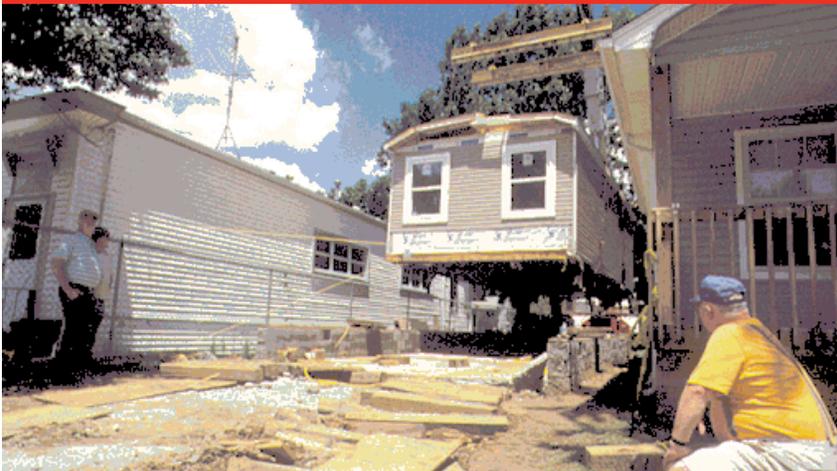


# A COMMUNITY GUIDE TO FACTORY-BUILT HOUSING



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Office of Policy Development and Research

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PATH (Partnership for Advancing Technology in Housing) is a private/public effort to develop, demonstrate, and gain widespread market acceptance for the next generation of American housing. Through the use of new or innovative technologies the goal of PATH is to improve the quality, durability, environmental efficiency, and affordability of tomorrow's homes.

PATH is managed and supported by the U.S. Department of Housing and Urban Development (HUD). In addition, all Federal Agencies that engage in housing research and technology development are PATH partners including the Departments of Energy and Commerce, as well as the Environmental Protection Agency (EPA) and the Federal Emergency Management Agency (FEMA). State and local governments and other participants from the public sector are also partners in PATH. Product manufacturers, home builders, insurance companies, and lenders represent private industry in the PATH partnership.

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# FORWARD

There is a tremendous need for new homes in America's cities and towns. To meet this demand, the home building industry has developed and adopted many technological innovations to provide new homes more quickly and more efficiently while still keeping homes affordable and of a high quality. New techniques, materials, tools, and organizational methods are particularly common in the "factory-built" housing world. Manufactured and modular housing—the most common forms of factory-built housing—are now common alternatives to traditionally constructed homes due in large part to these improvements. The U.S. Department of Housing and Urban Development (HUD) has created this publication, *A Community Guide to Factory-Built Housing*, to share these alternatives with a wider audience.

Both private and non-profit housing provider groups as well as community developers of all kinds benefit directly by these changes. Factory-built homes are increasingly built in urban and suburban areas—places where it was often difficult to build in the past. So, in addition to detailing the technical and design options that are now available, this publication also discusses the social, financial, and local considerations that a developer will need to address.

As a guide to this expanding housing market, this publication also helps you consider factory-built housing as a cost-effective solution to a city's housing needs, and describes resources and networks that can support you. Easy-to-read and comprehensive publications like this directly support the needs of home building developers, particularly those serving low-income communities. We invite you to read this and all of our community-directed reports and look out for further work from HUD in this field.

Lawrence L. Thompson

General Deputy Assistant Secretary for Policy Development and Research

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This book is written for nonprofit development groups that provide housing in urban areas, both small subdivisions within city limits as well as infill development on scattered infill sites. Infill development is constructing homes on vacant urban lots, those vacant because of destruction of a previous home or from unsold lots left over from subdivisions created in the past. The U.S. Department of Housing and Urban Development (HUD) commissioned this guide to encourage the use of new and alternative home-building technologies. One such alternative is the factory-built house—which is produced in a controlled factory setting and shipped virtually complete to the site. This contrasts with a site-built house, in which thousands of pieces of materials are delivered to the site and assembled there by a construction crew. Four types of factory-built housing technology are discussed in Chapter 1 although this book focuses on two: manufactured and modular homes.

### STATE OF AFFORDABLE HOUSING

The availability of affordable housing in the nation continues to decline, particularly in urban areas. This is attributable to many factors including increasing real estate costs and declining real incomes.

Providing affordable housing for families in need is a goal of nonprofit housing developers in urban areas. This book will help the nonprofit community housing developer or provider determine if using factory-built housing can help achieve this goal.

Overall, homeownership in America is on the rise. Fueled by strong incomes and employment growth, the national homeownership rate reached a new high of 66.8 percent in 1999 and continues to climb across all geographic regions, age groups, and racial/ethnic groups, according to HUD.

However, despite this impressive progress, rising home and land prices continue to threaten affordability for low-income individuals and families. Renters in the bottom quarter of income

distribution saw their real incomes decline between 1996 and 1998, while real rents increased by 2.3 percent. At the same time, rising home prices and interest rates are making it ever more difficult to attain homeownership.

How do we define “affordable housing”? Affordable housing is generally defined as that which costs no more than 30 percent of the occupant household’s income or is available for below the median price in a given housing market. Spending upwards of 30 percent of one’s household income is considered a “severe” housing burden. This 30 percent threshold can be deceptive because low wage-earners spending 30 percent of their limited income on housing leaves them very little for other necessities. The majority of these households are located in urban neighborhoods.

## THE FACTORY-BUILT HOUSING SOLUTION

Large, for-profit builders and developers have been reluctant to work in inner cities because many do not see the opportunity for major redevelopment. Complex approval procedures, potential community opposition, construction cost, and labor uncertainties have also steered away such residential developers. There is also the threat associated with maintaining a building site or sites filled with tools and materials in an inner city where they may be vulnerable to theft and vandalism.

Only a handful of nonprofit groups currently use factory-built homes for urban projects, but many more are looking into the feasibility of using these techniques. This book provides information on how homes are constructed in a factory; how to choose and work with factory-built home manufacturers; how to prepare the site and foundation; how to obtain permits and work with building officials; and how to handle neighborhood groups. This book will alert the reader on what to expect, how to deal with or avoid trouble spots, and how to find additional information on topics of particular interest.



Factory-built housing can be a visually pleasing alternative (courtesy, MHI).



Factory-built modules are lifted into place (courtesy, SWA).



Factory-built housing is suitable for narrow, infill lots (courtesy, MHI).

## HOW THIS BOOK IS ORGANIZED

The following chapters cover alternative ways to bring affordable, factory-built housing into urban areas. This book is organized into seven chapters:

*Chapter 1: Why Factory Built? Differences Between Factory- and Site-Built Homes* details the differences between homes built on site (known as “site built”) and those constructed in a factory (known as “factory built”). Both methods of building are explored fully. The universe of factory-built homes is described, followed by an explanation about why this book focuses on manufactured and modular housing. Pros and cons of both site- and factory-built homes are discussed in depth.

*Chapter 2: Modular and Manufactured Homes: Which is Best For Nonprofit Developers?* presents a detailed discussion of these two factory-built housing types and points out some of the differences between them. For those interested in manufactured housing, the chapter defines the HUD Code and how it works.

*Chapter 3: Learning a New Building Process* presents vital information in a step-by-step format for nonprofit developers interested in using modular and manufactured homes. It covers finding the right manufacturer and contractor; selecting the house; determining the delivery date; and placing the order. The chapter then moves into information on preparing the site, building the foundation, setting the house, completing the utility connections, and constructing site-built elements. The chapter closes with a helpful checklist.

*Chapter 4: Before and After the Home Arrives* opens with a discussion of how to make the permitting process easier in an urban area where officials may be unfamiliar with manufactured and modular housing. This chapter provides information, sources, and tips on how to work with zoning boards. It will also discuss how manufactured and modular housing affects insurance, financing, and warranty issues as well as how they affect the eventual homeowner in these areas.

*Chapter 5: Being a Good Neighbor* suggests ways to work with neighbors who may be unfamiliar with alternative housing technologies, based on misinformation about factory-built homes. Some of the same methods used to educate building officials on factory-built homes may be employed with neighborhood groups. This chapter provides helpful hints for winning over neighborhood groups, which can become allies when they learn how these new homes will help revitalize their neighborhood.

*Chapter 6: Trends in Factory-Built Homes* focuses on how today's modular and manufactured homes are offering new designs and features that make them more like site-built homes, and discusses how new technology and attention to detail yields homes that can fit into any neighborhood. Other factors making their way into factory-built home design are universal design and increased energy efficiency. All of these changes have improved the quality and cost of factory-built housing while making them more compatible with urban neighborhoods.

*Chapter 7: What Are Some of the Possibilities?* presents six case studies of nonprofit developers who have used manufactured and modular housing in urban areas. In each of these cases the developers report that they would use modular or manufactured houses again. Some already have plans for new developments.

This book brings together pertinent information in a single, easy-to-use guide. For further information, the book offers an extensive listing of websites, other books, and periodicals that can elaborate on topics of interest. To make the resources an even more valuable tool, appropriate sources are listed at the end of each chapter.



Open floor plans and natural light are factory-built housing trends (courtesy, MHI).

# 1

## WHY FACTORY BUILT? DIFFERENCES BETWEEN FACTORY- AND SITE-BUILT HOMES

There are many good reasons to consider factory-built homes over site-built homes. Among them are increased affordability, compressed production cycles, less likelihood for damage or theft of jobsite materials and tools, and a response to the shortage of reliable skilled labor.

Following is a discussion on how factory-built housing compares with site-built housing in terms of cost, production, and benefits to nonprofit developers. This chapter also explores some of the potential drawbacks of using these homes.

### WHAT ARE THE ESSENTIAL DIFFERENCES BETWEEN FACTORY-BUILT AND SITE-BUILT HOMES?

Single-family homes are traditionally constructed by “stick building,” a term that describes building the house entirely on site. All the materials needed to construct a house are delivered to the site in pieces—thousands of them—and a construction crew arrives to assemble them. The time spent on site is considerably longer in site-built housing (three to six months). This method comprises about half of all new housing construction.

The other half of single-family homes use some form of factory-built components. They are broadly divided into four groups:

- manufactured homes
- modular homes
- panelized homes
- pre-cut homes.

Factory-built homes are constructed almost entirely in a factory and arrive at the site 30 to 90 percent complete. In manufactured and modular homes, 70 to 90 percent of the work—framing, insulation, roofing, siding, doors and windows, electrical, plumbing, appliances, and interior finishes such as painting and carpeting—are completed in the protected, secure environment of the factory. The house sections or modules are then delivered to the site and the house is set onto a foundation.

Delivery of a factory-built house and having it set can be the most challenging aspect for nonprofit developers that typically use site-built housing. But having an entire house or several sections or modules either rolled or lifted onto a foundation and sealed up and secured in one day’s

time immediately demonstrates the differences and the advantages over site-built housing.

Factory-built homes can be very similar in appearance to site-built homes. Many of the same materials are used and product innovations that continue to update site-built homes also lead to advancements in factory-built homes.

## TYPES OF FACTORY-BUILT HOUSING

Before factory-built is compared to site-built housing, it would be helpful to review the four types of factory-built housing:

**Manufactured Homes** (these are usually referred to as “HUD-Code” or “mobile” homes but will be referred to in this book as manufactured homes) are built entirely in a factory in accordance with a federal building code adopted and administered by the U.S. Department of Housing and Urban Development (HUD) and known as the “HUD Code.” The HUD Code is a preemptive code, which means that it supercedes any state or local codes that apply in the area where the house will be sited. Homes arrive onsite complete with appliances, carpet, paint, lights, and with the utilities ready to be hooked up on site. They are typically 80 to 90 percent complete (those consisting of two or more sections or two stories, require extra on-site completion). The term “mobile home” does not apply today when most manufactured homes are not mobile at all. Many are placed on permanent foundations and are considered real property.

**Modular Homes**, like manufactured homes, are also constructed in a factory. Modules are shipped to the site either ready to be finished inside and out or complete with interior amenities, appliances, paint, carpet, and more. They are typically 70 to 85 percent complete. These homes are built in accordance with the model building code adopted by the state. Local codes, if different than state codes, apply only to home installation as well as site-built elements, such as foundations, garages, decks, and porches. A modular home is built in sections, transported to the home site, and set on a foundation. Many are two or three stories high and can consist of two to six modules or sections. Modular homes comprise a smaller part of the factory-built market than manufactured homes.



Traditional ‘stick-built’ construction (courtesy, SWA).



Factory-built housing is delivered by truck (courtesy, MHI).



Modular housing arrives on the site as nearly finished modules (courtesy, MHI).



Panelized walls, floors, and roofs are factory-built and assembled on site (courtesy, SWA).



Precut homes require on-site assembly of precut pieces (courtesy, SWA).

**Panelized Homes** are constructed with factory-built panels for whole walls, usually with sheathing and occasionally with windows, doors, wiring, and outside siding. The panels are constructed in a factory according to a model design, transported to the site, and then the panels are assembled according to the design on a conventional foundation or slab. Panelized homes require more on-site labor than modular or manufactured homes.

**Pre-Cut Homes** are another type of factory-built home in which building materials are cut into the correct sizes at a factory, according to design specifications, transported to the site, and assembled there. Pre-cut homes include kit homes, log homes, and dome homes. Of the four types of factory-built homes, pre-cut homes require the most on-site labor.

### WHY THIS BOOK FOCUSES ON MANUFACTURED AND MODULAR HOMES

This book focuses on manufactured and modular homes because they are particularly well suited for urban infill sites. They require the least on-site work—the site must be cleared and the foundation put in place, then the house module or modules arrive on site, are either rolled or lifted by crane, and set into place on the foundation. The house can be set, closed up, and secured in one day. In most cases, houses can be constructed in a factory in a more cost-effective and efficient way than they can be built on site.

For anyone wishing to obtain information on other types of factory-built homes, the Internet and industry trade groups are good sources, and many are listed at the back of the book.

### CONSTRUCTION DIFFERENCES BETWEEN SITE-BUILT AND MODULAR/MANUFACTURED HOMES

While a site-built home is constructed entirely on site, a factory-built home is built in an assembly-line process in a factory. Homes leave the factory nearly complete and are trucked to the building site. At the site, the foundation and utilities are already in place and ready for the delivery of the house sections or modules. The sections or modules are either lifted by crane or rolled and set into place on the foundation.

After the home sections or modules are set and secured on the foundation, they are sealed

up weather tight. The gable ends of the house where the sections “mate” are covered with siding, and the utilities are connected. Site-built elements such as garages, porches, or decks are either entirely built on site or sent along with modules as prefabricated add-ons, which will be connected to the house.

## ADVANTAGES OF USING MODULAR OR MANUFACTURED HOMES

There are many advantages to using modular or manufactured housing. Most of these issues will be discussed in greater detail throughout this book. Cost comparisons are listed in the following table to help the nonprofit developer decide whether or not to use modular or manufactured homes.

**TABLE 1: COST COMPARISONS OF HOUSING CONSTRUCTION TYPES**

<b>COST CATEGORY</b>	<b>Site-Built</b>	<b>Modular</b>	<b>Manufactured</b>
<b>Construction Costs</b>	\$77,140	\$65,560	\$47,277
structure	\$71,123	\$59,543	\$41,260
foundation	\$6,017	\$6,017	\$6,017
cost per square foot	\$38.57	\$32.78	\$23.64
<b>Land Costs</b>	\$35,314	\$35,314	\$35,314
improved lot	\$34,113	\$34,113	\$34,113
site preparation	\$1,201	\$1,201	\$1,201
<b>Financing Costs</b>	\$2,895	\$1,298	\$610
construction financing	\$2,895	\$1,298	—
inventory financing	—	—	\$610
<b>TOTAL COST</b>	<b>\$115,349</b>	<b>\$102,172</b>	<b>\$83,151</b>

Table note: From “Factory and Site-Built Housing—A Comparison for the 21st Century,” NAHB Research Center, 1998.

## Cost Savings

- Modular and manufactured homes are constructed in a more efficient and cost-effective way because they're built in a centralized, controlled environment and not subject to the many varying conditions of site construction. These can add significant cost overruns and extend even the most carefully devised production schedule. Such factors include inclement weather conditions, non-availability of sophisticated production tools, working in awkward places, subcontractor delays, damage to building products and materials stored onsite, delivery problems, plus employee illness, injury, or unreliability.
- When the house is ordered, the price is set and is reliable. There won't be unexpected price increases due to material price fluctuations or having to substitute another product when one specified is unavailable.
- Housing production factories are most often in rural areas where prevailing wage rates are lower than rates in areas where the house will be sited. Labor costs are also reduced because highly skilled laborers are not needed when jobs are organized into more simple, repetitive tasks, with sophisticated and automated tools, highly efficient working platforms, and immediately accessible materials. Workers are generally employees of the housing production organization and can be more easily scheduled, managed, and trained in methods that yield greater productivity and efficiency. They go to work in the same place every day on a permanent basis, no matter the weather.
- Industry data shows that the labor cost component of a modular or manufactured home is typically 8 to 12 percent of the total house construction cost, while the labor cost of a site-built home is upwards of 40 to 60 percent of the total cost. This savings on labor can be significant, particularly in an urban environment where labor is both expensive and scarce.
- Factories purchase in bulk and generally receive deep discounts on building materials, which are passed on to the buyer. Manufactured home producers indicate they can save up to 30 percent of cost on standard building materials through high-volume purchasing. Modular home producers enjoy similar benefits but not to the same extent, as their inventory usage is often lower.
- The costs of construction waste disposal—for years now a budget line-item rather than an "extra" expense—are also greatly eliminated. With manufactured or modular homes most of the waste is

disposed of in the plant or recycled. City disposal rates can be particularly steep.

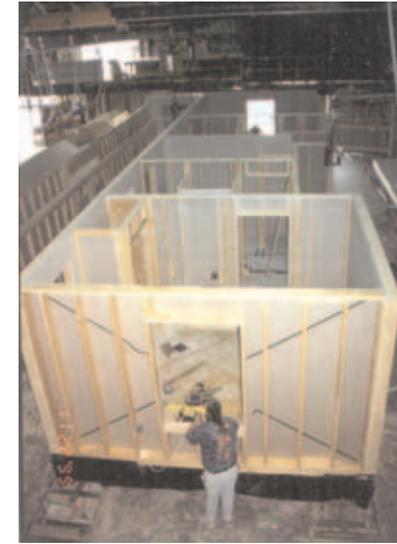
- Factory-built housing also reduces waste both in the time and costs to replace defective materials such as warped studs, damaged boards, etc. The reason for this is because most material suppliers send their choice materials to manufactured and modular home producers, due to the fact that they are volume customers.
- Production cycles are shorter—a site-built home can take more than three months from start to finish. Site work, production, and set up of a modular or manufactured home can take a month or less—depending on the complexity of the multi-section units. Shorter production cycles can mean savings on construction loan interest.

### **Quality Control**

- Homes built in a controlled environment are not affected by weather conditions, many of which can impede site-built construction and contribute to material degradation.
- Quality control is inherent in having homes produced in a factory setting with professionals who build houses on a daily basis. Factory builders are employed by the housing production company, repeat the same tasks daily, and are managed and supervised by skilled tradespeople. They also benefit from ongoing training. Factory operations benefit from a federally or state supervised quality control program with independent inspection agencies.
- Home-building machinery used in the factory is often state of the art, which not only speeds construction but can also result in greater precision. Computers often are used along with lasers to ensure nearly perfect cuts and joints. Employees use the latest in tools and technology to cut, fit, and connect framing, plumbing, finishes, and other house parts.
- Construction crews are not scattered around different sites and are not “pulled off” one job to work on another, which can lead to construction errors and delays.

### **Benefits to Nonprofit Developers of Urban Sites**

- Factory-built housing significantly reduces the need for months of street or adjacent lot parking where only the most limited space, if any, is available. It also reduces the difficulties associated



Protected environment of the factory helps control costs (courtesy, SWA).

with scheduling trades and materials delivered into the city.

- Transportation constraints imposed by state highway regulations limit modular and manufactured homes to 76-foot lengths (86 feet in Texas), approximately 11-foot heights, and widths of 14 to 18 feet (wider with special permits). Therefore, they are designed as long, narrow structures, which are perfectly suited for urban lots that are most often narrow and deep.
- Especially attractive to nonprofit developers of urban sites is that with modular and manufactured homes most building materials are not stored on the jobsite where they are exposed to theft and vandalism. This is also true for the tools and materials belonging to the construction crew. Since the house itself is set and sealed in a day, it and its contents are less vulnerable, and on-site work is restricted to foundations, module connections, and such add-ons as porches and garages.



Factory-built home installed on a narrow, deep lot (courtesy, MHI).

## POTENTIAL DRAWBACKS OF MODULAR AND MANUFACTURED HOMES

While modular and manufactured housing offers some great advantages to nonprofit developers of urban infill sites, there are some other factors to consider when deciding whether such a house is the right choice. More detailed discussions of some of these issues are found in subsequent chapters.

- Community developers and their contractors have to learn a new construction process. There is a learning curve involved in all aspects of the work from ordering to obtaining permits to site preparation and foundation work to setting up and securing the home.
- Transportation costs of the sections or modules can mitigate cost savings. Many housing plants are in the outer suburbs or rural areas, so trucking them into the city can add costs. While there is no rule of thumb on how far is too far, most say having a plant more than 250 to 500 miles from the construction site can significantly mitigate savings.
- Some projects might require the use of a crane for setting the sections or modules. Using a crane-set method might increase building costs. Depending on the maneuverable space on the lot, the radius and size of the crane will vary. Crane rental costs averaging \$500 or so per day will be less burdensome once all involved become more efficient at erecting homes.
- Obstacles might arise when trying to obtain approval from building officials and zoning boards. Neighborhood groups unfamiliar with factory-built housing might also voice opposition.
- The sheer logistics of bringing wide-load shipments and positioning cranes in an urban area with narrow streets, overhead wires, utility poles, mature trees, potholes, neighborhood activities, traffic, and more can pose some difficulties. Other considerations include time and, sometimes, seasonal delivery restrictions as well as taking into account each city's "escort" policies for transporting a factory-built house within city limits. This is particularly true for extra wide loads.
- While there is a variety of house plans and design options, there are some restrictions due to the size of the factory-built sections.
- Because there is little on-site work needed to set, connect, finish, and add to modular and manufactured homes, subcontractors may be unwilling, or may charge a premium, to do the work.



Factory-built sections can be secured against on-site theft (courtesy, MHI).

## SUMMARY

There are clear advantages to factory-built housing over site-built housing, many having to do with containing cost and ensuring quality construction. As elucidated in this chapter, understanding the differences should help the reader to decide whether modular and manufactured houses are a viable alternative to site-built houses for their particular development project. The factory environment contributes to both cost savings and higher quality and helps to keep house construction on schedule. Of the factory-built technologies available, manufactured and modular homes appear to offer the best options for nonprofit developers of affordable housing on urban sites. The matrix comparing factory-built and site-built housing is provided as an aid in the decision-making process.

**TABLE 2: COMPARISONS OF SITE-BUILT AND FACTORY-BUILT HOUSING**

<b>Most Typical Characteristic</b>	<b>Site-Built</b>	<b>Factory-Built</b>
Construction location	On site of finished home	In controlled factory setting
Pre-site construction	None	70-90%
On-site construction time	3-6 months	1-2 days
Quality control	Middle	High
Set date of completion	Varies	Guaranteed
Foundation	Permanent, concrete or concrete block	Generally permanent, concrete or concrete block
Applicable codes	Local or State	State or HUD-Code
Acquired from	Local contractor	Manufacturer or dealer
Site prep and finish work	Local Contractor	Local contractor or "turnkey" finish crew
Limit to builder location from site	Varies	500 miles
Design variations	Wide	Moderate to narrow
Share of housing market	Half	25-35%
Zoning restrictions	None	None to moderate
Market appeal	Wide	Wide

Adapted from "Factory and Site-Built Housing—A Comparison for the 21st Century," NAHB Research Center, 1998.

## RESOURCES

### Publications

"Affordable Housing, Manufactured Homes." University of Illinois, Urbana-Champaign, College of Agriculture, Consumer and Environmental Service. Circular 1336. A consumer-oriented nine-page booklet outlining basic information on manufactured homes along with tables showing manufactured home owner demographics, finance sources, and important features checklists.

"Factory and Site Built Housing—A Comparison for the 21st Century." NAHB Research Center. U.S. Department of Housing and Urban Development, Office of Policy Development and Research, Washington, D.C., October, 1998. This report provides a comparison of manufactured, conventional site-built, and modular homes. The comparisons address industry structure, production cost, characteristics of occupants and purchasers, unit designs and construction materials, regulatory processes, code requirements, and buyers.

### Websites

**[www.gsd.harvard.edu/jcenter/](http://www.gsd.harvard.edu/jcenter/)**. The Joint Center for Housing Studies is a leading center of research studies on U.S. housing. It creates an annual survey, "The State of the Nation's Housing." This document and its "The Future of Manufactured Housing," can be downloaded from this site.

**[www.huduser.org](http://www.huduser.org)**. Go directly to the search category and search on "manufactured" or "modular" to pull up industry reports and information pieces on these home types, most of which are downloadable.

**[www.mfghome.org](http://www.mfghome.org)**. The Manufactured Housing Institute website is a centralized source for anyone contemplating using manufactured homes. This site houses information on manufactured homes, including downloadable publications, news updates, photo galleries, and special reports. A special research section lists all completed, current, and future research projects being undertaken.

**[www.mhousing.com](http://www.mhousing.com)**. A gateway to information on manufactured housing. Has an entry for consumers and one for professionals.

**[www.modularcenter.com](http://www.modularcenter.com)**. Provides information on modular homes, lots of house plans, and links to modular home producers and "modular" architects in all areas of the country.

# 2

## MODULAR AND MANUFACTURED HOMES: WHICH IS BEST FOR NONPROFIT DEVELOPERS?

There are many differences between using site-built and factory-built homes, discussed in the previous chapter. This chapter takes a closer look at the comparison of manufactured and modular housing (the two types of factory-built homes that are the focus of this book, and are well-suited for urban-infill sites). While these homes share many similarities, there are some definite differences to be considered.

### ESSENTIAL DIFFERENCES BETWEEN MANUFACTURED AND MODULAR HOMES

Nonprofit developers who want the ability to customize and do not want to participate much in the construction process may prefer to use modular homes. Those who want to get the lowest prices and quickest turn-around times might opt for manufactured homes. The sections below explain the differences in working with these two housing systems.

#### **Manufactured Homes**

“Manufactured homes” refers to housing built in a factory in accordance with strict federal building standards enforced by the U.S. Department of Housing and Urban Development (HUD).

For many years manufactured housing was synonymous with “mobile homes” or “trailers.” Unfortunately this perception continues to persist even though it’s not accurate. The first manufactured homes were, in fact, designed to be towed from location to location and hooked up for temporary use. This was true until the late 1960s. A new era for manufactured homes dawned in 1976 when they came under stringent federal regulation by the pre-emptive “Manufactured Home Construction and Safety Standards” known as the HUD Code. Until the 1980s, nearly 75 percent of manufactured homes were single-section units 12 to 14 feet wide. Most were sited on leased land in a community of manufactured homes. These are the “trailer parks”: the image that many people think of when they consider manufactured homes.

Things have changed rapidly in this market. Since 1998 more than 60 percent of manufactured homes are two or more units joined on site in a variety of ways. About 75 percent of these homes are sited on private land rather than in manufactured home communities. Many new manufactured home communities offer high-quality houses that rest on permanent concrete foundations, many of them with basements. These trends have caused a dramatic rise in the number of manu-

factured homes being financed with conventional 25- to 30-year mortgages rather than higher-interest personal property or “chattel” loans of much shorter duration (7 to 15 years).

Manufactured homes have traditionally been relegated to rural areas and manufactured home communities within suburban areas. Urban areas have not been hosts for manufactured home developments for several usual and indirect reasons, including zoning restrictions and the price and scarcity of land. Building a single-unit home on a narrow lot often did not provide adequate square footage required by some zoning regulations and desired by most prospective buyers.

Then came the advent of two-story manufactured homes, which are currently being erected in several large cities across the U.S. The technological advances in integrating the manufactured home chassis and the floor system have led to the ability to “stack” units into two-story homes. The opportunity to create steeper roof slopes, in line with existing homes in urban neighborhoods, has also led to manufactured homes looking more like traditional stick-built housing and being able to integrate into city neighborhoods.

Manufactured home design and construction has come a long way in the past few years. Here are some of their defining features and qualities:

- Manufactured homes are built on a non-removable steel or wood chassis with axles and wheels similar to a trailer. Sections are transported to the home site on their own wheels. Once onsite, wheels and axles can be removed but the chassis must stay in place under the HUD-Code guidelines.
- Manufactured homes are designed from an overall-engineered-structure approach. Each model and floor plan is designed as a complete unit. Specifications for floor joists, wall systems, headers, trusses, etc. are approved upon the complete calculation, by an engineer, of how every piece of the house works in conjunction with every other piece.
- Manufactured home producers offer a wide array of plan designs. Customization, however, can be a time-consuming process, particularly when designing the two-story and pitched-roof homes best used in urban areas. It may be necessary to get a special HUD approval called the Alternative Construction Letter, or AC Letter. These are written approvals from HUD that allow manufacturers to produce and ship individual homes which may be, in some way, out of strict compliance with the HUD Code.
- Although construction of the factory-built elements are governed by the HUD Code, any on-site construction, such as foundations, porches, garages, etc., will be governed by state and local codes.



Old-style ‘trailer’ or ‘mobile’ homes (courtesy, MHI).



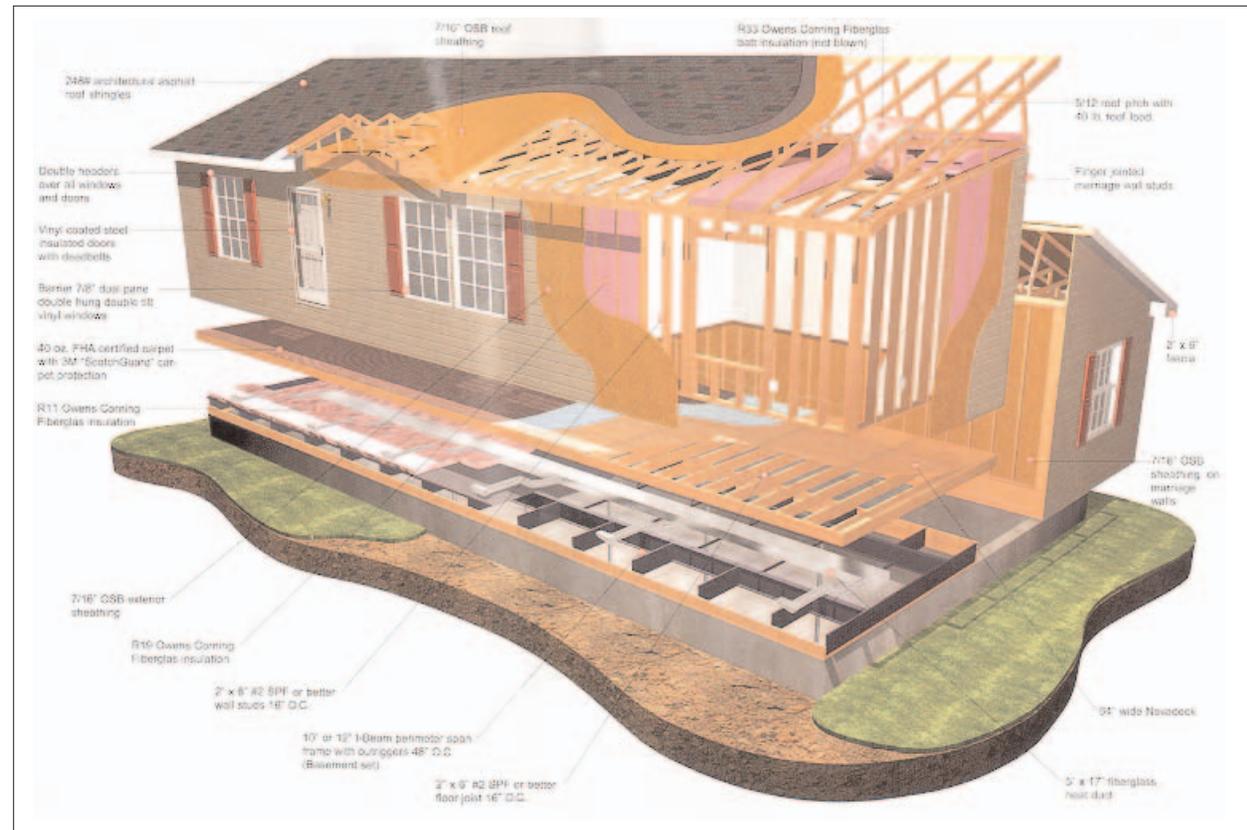
Contemporary manufactured homes can fit virtually any neighborhood (courtesy, MHI).

## The HUD Code and How it Works

The HUD Code, also known as the “Federal Manufactured Home Construction and Safety Standards,” refers to the national code that regulates a manufactured home’s design and construction, strength and durability, transportability, fire resistance, energy efficiency, and quality control. It also sets performance standards for the heating, plumbing, air-conditioning, thermal, and electrical systems.

The HUD Code is administered by the U.S. Department of Housing and Urban Development, using either state agencies or independent third-party inspection agencies for enforcement. It is the federal counterpart to nationally recognized private sector model building codes such as the Building Officials and Code Administrators’ National Building Code (BNBC), the International Conference of Building Officials’ (ICBO) Uniform Building Code (UBC), the Southern Building Code Congress International’s (SBCCI) Standard Building Code (SBC), and the International Code Council’s (ICC) International Building Code (IBC). The HUD Code is unique since it is specifically designed for compatibility with the factory production process.

The HUD Code is a “pre-emptive code,” which means that it pre-empts any building standards in the area where it will be sited. Standards are the same across the country because it is a federal code.



Sample construction elements in a manufactured home (courtesy, Hart Housing).

- Manufactured homes generally have fewer design features than site-built and modular houses but more upscale manufacturers are increasing their offerings by adding amenities like skylights, bay windows, wood-burning fireplaces, custom cabinets, refrigerator and range, microwave ovens, trash compactors, garbage disposals, built-ins, washer/dryers, etc.

## Modular Homes

In comparing modular and manufactured homes, modulares share some characteristics with manufactured homes, but are more similar in appearance and finished construction to site-built houses. Here are a few of the defining features of modular homes:

- Modular homes claim a much smaller market share than manufactured and site-built homes—though they have a larger urban market share than manufactured homes. Like manufactured

homes, modular homes are constructed almost entirely in a factory and assembled at the site and placed on a permanent foundation—either a basement or crawl-space foundation.

- Modular home producers compete more directly with site builders in terms of design flexibility, amenities, and the ability to customize. This is an important consideration for nonprofit developers in urban areas who may require customization to maximize space, to fit homes on small lots, and to ensure production of a house that fits aesthetically into the neighborhood.

- Modular homes are governed by the building code adopted by the state and amended by the community, although some states do not permit these codes to be amended at the local level. Local or municipal codes only apply to foundation work, home installation, and site-built elements such as garages, porches, decks, and other finishing materials and touches. So, for building code purposes, modular homes are similar to site-built homes.

- Because they are seen as code-complying homes versus mobile or chattel property (like an automobile), modular homes are far less likely to be restricted by local building or zoning regulations than are manufactured homes. Even so, modular homes often do suffer from comparisons with manufactured homes and are often considered “trailers without wheels,” which is inaccurate.

- Modular homes are required to be shipped bearing a seal indicating that the home meets state building code standards in the same way a manufactured home bears the HUD-Code seal.

- Modular homes do not have an integral chassis requirement, as do manufactured homes. This allows modular home manufacturers to offer nearly as wide a design palette as site-built homes. In fact, one company, Westchester Modular Homes in Wingdale, New York, designs modular mansions in the New York suburban area. Offerings up and down the design and price range are available. Some modular housing producers have teamed up with architects to deliver complete design and build packages.

## SUMMARY

The essential differences between modular and manufactured homes are a product of how these housing types have typically been constructed, and the markets that they have appealed to. Manufactured homes have traditionally targeted the lower end of the housing market, and have placed an emphasis on affordability. Producers of modular homes offer affordable models as well,



Modular homes are compatible with most traditional style neighborhoods (courtesy, Unibilt Industries, Inc.).



Site-built additions to modular homes, such as porches and garages, are governed by local codes (courtesy, Unibilt Industries, Inc.).

but have also appealed to middle-income and even high-income homebuyers. The following table consolidates modular and manufactured home qualities for easy comparison.

**TABLE 3: COMPARISONS OF MODULAR AND MANUFACTURED HOMES**

<b>Most Typical Characteristic</b>	<b>Modular Homes</b>	<b>Manufactured Homes</b>
Construction location	In controlled factory setting	In controlled factory setting
Pre-site construction	70-85%	85-90%
On-site construction time	1-2 days plus finishing	1-2 days plus finishing
Quality control	Excellent	Excellent
Set date of completion	Guaranteed	Guaranteed
Foundation	Permanent, concrete or concrete block	In rural areas impermanent block piers; in urban areas permanent concrete or concrete block
Exterior wall construction	2x4 or 2x6 wood stud	2x4 or 2x6 wood stud
Exterior wall sheathing	7/16" Oriented strand board	1/2" Fiberboard
Floor framing	2x8 or 2x10 wood joists	2x6 wood joists with steel chassis
Floor sheathing	5/8" or 3/4" plywood or OSB	5/8" particleboard or OSB
Roof framing	Prefabricated trusses	Prefabricated trusses
Roof sheathing	7/16" Oriented strand board	7/16" Oriented strand board
Roof slopes	4-in-12 or greater	Generally 4-in-12 or less
Applicable codes	State, with local for site work	National HUD-Code; with local for site work
Code inspection	Third-party in factory, with local for site work	Third-party in factory, with local for site work
Acquired from	Manufacturer or dealer	Manufacturer or dealer
Site prep and finish work	Local contractor or "turnkey" finish crew	Local contractor or "turnkey" finish crew
Limit to builder location from site	250-500 miles	250-500 miles
Design variations	Moderate	Moderate to narrow
Sections per house	2 or more, 1-3 stories	2 or more, 1 or 2 stories
Transportation to site	Flatbed trailer	Integral chassis with wheels
Share of housing market	5% to 8%	20% to 30%
Zoning restrictions	None to moderate	Moderate to significant
Market appeal	Wide, with some prejudices	Primarily affordable or retirement

Table note: From "Factory and Site-Built Housing—A Comparison for the 21st Century," NAHB Research Center, 1998.

## RESOURCES

### Publications

Bevier, Charles. "Modular Momentum: How Four Builders in Four States are Out-Classing the Competition." *Building Systems Magazine*, July/August 2000. Highlights four builders who discover

that they save money by building modular homes and who have discovered the variety of design and product choices. Focuses on some of the hurdles they face along the way.

“Factory and Site Built Housing—A Comparison for the 21st Century.” NAHB Research Center. U.S. Department of Housing and Urban Development, Office of Policy Development and Research, Washington, D.C., October, 1998. This report provides a comparison of manufactured, conventional site-built, and modular homes. The comparisons address industry structure, production cost, characteristics of occupants and purchasers, unit designs and construction materials, regulatory processes, code requirements, and buyers.

*Home Builders’ Guide to Manufactured Housing.* NAHB Research Center. U.S. Department of Housing and Urban Development, Office of Policy Development and Research, Washington, D.C., May 2000. Provides information about manufactured homes to an audience of site builders and land developers.

*Understanding Today’s Manufactured Housing.* Manufactured Housing Institute. A 20-page guide to manufactured housing with basic information on these housing types, the HUD Code, dealing with inspections, siting and placement, using these homes to revitalize urban areas, and impact on property values.

## Websites

**www.mfghome.org.** The official website of the Manufactured Housing Institute is a centralized source for anyone contemplating using manufactured homes. This site houses information on manufactured homes including downloadable publications, news updates, photo galleries, special reports. A special research section lists all completed, current, and future research projects being undertaken.

**www.mhousing.com.** A gateway to a wealth of information on manufactured housing. Has an entry for consumers and one for professionals.

**www.huduser.org.** Go directly to the search category and search on “manufactured” or “modular” to pull up excellent reports and information pieces on these home types, most of which are downloadable.