

# A COMMUNITY GUIDE TO FACTORY-BUILT HOUSING



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Prepared for:  
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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

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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.



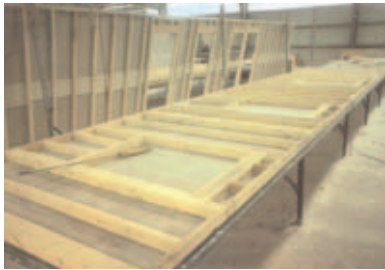
Traditional ‘stick-built’ construction (courtesy, SWA).



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 precast 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.

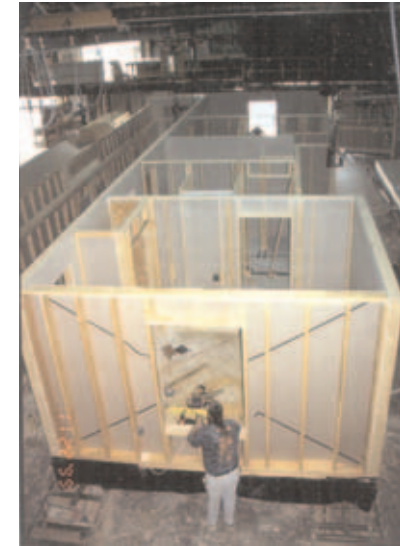
- Factory-built housing also reduces waste both in the time and costs to replace defective materials such as warped studs, damaged boards, etc. The reason for this is because most material suppliers send their choice materials to manufactured and modular home producers, due to the fact that they are 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).

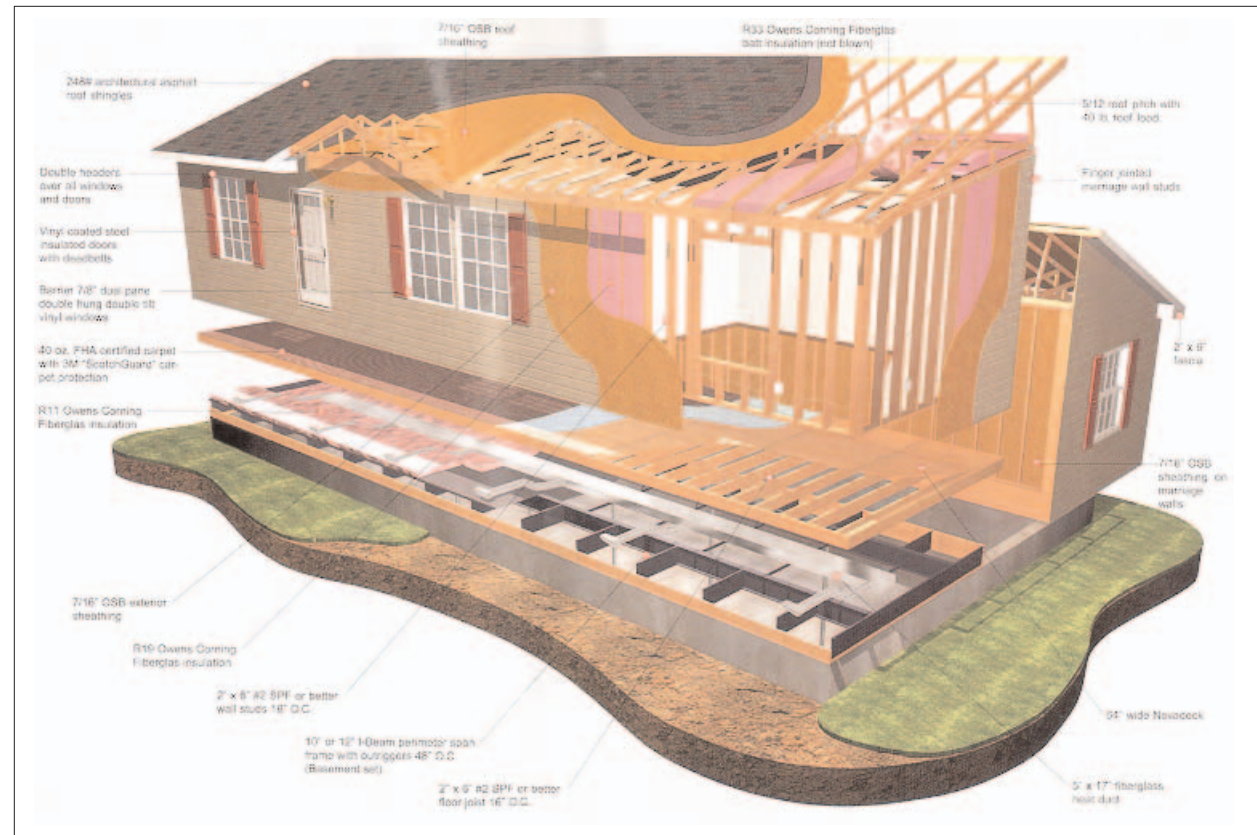


## The HUD Code and How it Works

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.

# 3

This chapter takes the nonprofit developer from finding a manufactured or modular home manufacturer or dealer, to accepting delivery of the home, and focuses on the many issues that will arise in between. The following topics will be discussed in this chapter:

- Finding a manufacturer or dealer
  - Modular manufacturers or dealers
  - Manufactured home producers or dealers
- Finding a contractor
- Selecting the house
- Determining the delivery date
- Placing the order
- Preparing the site
- Building the foundation
- Using finishing crews to complete utility connections and construct site-built elements

### FINDING A MANUFACTURER

Finding the right manufactured or modular housing producer is key to a successful project. Remember that manufacturers of both modular and manufactured homes are more accustomed to developments in suburban and rural settings, so there may be a learning curve for the housing manufacturer to become accustomed to providing housing in urban neighborhoods.

Try to get as much information on the manufacturer as possible and much is readily available from company websites or from such organizations as the Manufactured Housing Institute. If it is a public company it will be easy to track down company profiles and financial records. If it is a private company, ask for references, association memberships, Chamber of Commerce standings, and Better Business Bureau reports.

With both modular and manufactured housing companies, be sure to be clear on financing terms, lead time between placing an order and delivery, and cost breakdowns for any plan customization, as well as cost information on having exterior elements such as garages, porches, and decks constructed on site.

An important consideration to keep in mind when deciding on a manufacturer is the location of the production plant. Too great a distance between the factory and the housing site, generally up to 500 miles, can defray cost savings and can cut down on the level of personal service. Code issues with using out-of-state housing producers won't come into play with manufactured homes, which are regulated by the national HUD Code. Many modular plants serve several states and will have plans on hand that are pre-approved for different states.

## MODULAR HOUSING MANUFACTURERS

Modular homes are generally sold through independent or franchised dealers who see the project through from start to finish, or directly from the factory itself, particularly if it is for a large custom development or if it is close to the construction site. Most dealers have a building background and are hence termed "builder-dealers."

Modular manufacturers will generally offer a higher level of service than manufactured home producers and usually offer two types of service plans:

- Modular manufacturers offer a "turn-key" option where the manufacturer pulls all permits, oversees construction of the foundation, delivers the home to the site, sets it on the foundation, seals up the mating joints, and performs all finishing work, such as garages, trims, porches, decks, siding, and roofing, or patching in siding and roofing at joint areas, and even landscaping. They even coordinate with utility services to come in and complete the hookups.
- The other alternative is known as "rough set," in which the manufacturer's work ends when the house is set and sealed. It is up to the developer to find and hire a contractor to prep the site and build the foundation. The finish work is also the responsibility of the developer's contractor and subcontractors.

Since modular home manufacturers often compete directly with site builders they're apt to offer a wider range of floor plans, upgrades, and combinations and allow for more customization. There is a wide spectrum of modular home manufacturers who deal in anything from low-end no-frills models to multi-million dollar mansions. The modular companies that will probably appeal most to nonprofit groups will likely fall somewhere in between. Here are some points to consider: Because urban sites are generally small and narrow as they face the street, two-story or even three-



Modular homes are available in a wide array of floor plans and styles (courtesy, Unibilt Industries, Inc.).

story homes (especially zero-lot-line attached units) will often be desirable, because they will offer more square footage of space on a smaller “footprint.” Two-story homes also may fit in better with the surrounding neighborhood than single-story homes. Modular home producers routinely produce two-story models, and in general have more models to choose from (because they share a number of site-built home characteristics) than manufactured homes. Higher roof peaks are also standard for modular homes because manufacturers are more likely to offer “tilt-up” roof designs that allow steeper pitches. (The case studies in Chapter 7 are a good illustration of the design options available in modular homes.)

The best way to find a modular dealer is to network with other nonprofit developers who might be able to suggest manufacturers they have used. Industry publications such as *Building Systems Magazine* or *Automated Builder* also list manufacturers and occasionally publish articles about particularly innovative modular producers working in urban neighborhoods. The Automated Builders Consortium, co-sponsored by *Automated Builder*, actually promotes use of factory-built homes in urban neighborhoods. The Building Systems Councils of the National Association of Home Builders are also a good source of information on manufacturers (Building Systems Councils of NAHB, 1201 15th Street, NW, Washington, DC 20005). Of course, the Yellow Pages and the Internet are always good places to find local manufacturers.

## **MANUFACTURED HOUSING PRODUCERS**

Manufactured housing is sold through independent or manufacturer-owned retailers. Some manufactured home projects, however, have involved nonprofit housing developers working directly with the manufacturers. Conflicts of interest between the manufacturer and local dealers are mitigated because many retailers don’t work in urban areas. Working directly with the manufacturer can help nonprofit developers keep margins razor thin while maintaining housing quality.

Producers of manufactured homes run the gamut from those whose focus is the low-end, bare bones unit to the higher end “semi-custom” home. Generally the manufactured home producer will have the home delivered and assist with set up and sealing up of the homes. All site preparation and foundation work is left up to the general contractor. Any site-built elements are completed by the developer’s contractor as well.



New models of manufactured homes are particularly suitable for infill sites in traditional neighborhoods (courtesy, SWA).

Houses in a manufactured home plant generally move through the production line quickly with no room for modifications during production. Manufacturers who offer a variety of plans and options and who are willing to make some “custom” adjustments will likely be the ones who can best serve nonprofit developers in urban areas, but these adjustments must be completed and held firm well before production time, as they are included in production documents and “locked in” with enough lead time for ordering of special parts and materials.

Because the manufactured housing industry is relatively new at providing models that are suitable for urban infill sites, here are a number of factors to consider when choosing the appropriate manufactured housing producer:



- Look for an array of designs and floor plans. First find a manufactured home producer that already has plans on hand that meet the nonprofit developer's needs, then focus on any customization that is desirable.
- If considering using two-story units with higher-pitched roofs, often a prevailing architectural style in urban neighborhoods, look for a manufactured housing producer who has used or will consider using two-story models and higher-pitched roofs (created by using a hinged-roof assembly). Although they are becoming more common, most manufacturers do not offer two-story models.
- Some of the changes that manufactured home producers may need to make to satisfy the needs of the nonprofit developer may require going through the Alternative Construction (AC) Letter process. AC letters are written approvals from HUD which allow manufacturers to produce and ship individually identified homes which may be, in some way, out of strict compliance with the HUD Code (see Chapter 2). Prior to building Noji Gardens, a manufactured home community in Seattle, Washington (and a case study found in Chapter 7), Tony To of the nonprofit developer HomeSight says the company had to obtain several AC letters because they were installing two-story units with a unique roof-hinging system that allowed for a steeper roof pitch.
- Remember that manufacturers will also face a learning curve. Mike Wolf, president of Marlette Homes in Hermiston, Oregon, who worked with nonprofit developer HomeSight on Noji Gardens, said that he had to get his own employees to buy into the novel design because it would cause some plant disruption (the chassis had to be reworked to allow for the two-story design, and the 8-in-12 pitch roof was accomplished with a tilt-up, double-hinged roof). Wolf held several meetings with the entire plant and employees became familiar with the new construction methods that would be employed. When the first unit was completed employees observed the units being set up.
- The best way to find a good manufactured housing producer for an urban site is to get a recommendation from another nonprofit developer who has used one successfully. The Manufactured Housing Institute website, [www.mfghome.org](http://www.mfghome.org), lists all state associations which can provide referrals. The Yellow Pages and Internet are also good sources of leads.

Whether manufactured or modular housing is chosen, it is essential to learn as much about the process as possible. Visit the plant (and read the "Factory Tour" at the end of this chapter).

Become educated on the assembly-line building procedures. Learn about the unique materials used. Most manufacturers have educational programs for developers who have never used manufactured homes before. Some manufacturers require developers unfamiliar with the manufactured housing process to take such courses.

## FINDING A CONTRACTOR

In the case of modular homes, if a “turnkey” option is selected through a modular manufacturer, the company will see the project through from start to finish and the services of a general contractor may not be required. Otherwise, a general contractor will need to be hired. The contractor will oversee all site and foundation-related work and may also supervise site-built elements if they will be added after the main house is delivered. The general contractor can also assist with the selection and ordering of the house. He or she can help find and supervise foundation contractors, finish contractors, HVAC contractors, and other trades.

If a manufactured home is chosen, there are several ways to locate a contractor familiar with this housing technology. The manufactured home producer can provide leads. Most states have local chapters of the Manufactured Housing Institute that will probably have manufactured home installer members. Network with other nonprofit developers familiar with manufactured housing to acquire company names. It might be necessary to seek experienced professionals who come from rural areas and are familiar with this type of construction.

If the contractor is unfamiliar with manufactured or modular housing, help him or her get up to speed. Bring the contractor in from the beginning of the project during the ordering of the home and formulating a plan to manage the site and foundation work. Have the contractor learn as much as possible about the factory-built house he or she will be working with by having a briefing with a manufacturer’s representative and by sending the contractor on a factory tour.



Site-built elements are the responsibility of the developer’s contractor (courtesy, MHI).

## SAMPLE MODULAR HOME SPECIFICATION FROM MANUFACTURER

### ❖ For Structural Integrity . . .

- 2 x 10 floor joists, 16" on center
- 3/4" tongue and groove subfloor
- 2 x 6 exterior wall studs, 16" on center
- 2 x 4 interior wall studs, 16" on center
- 2 x 4 marriage wall studs, 16" on center
- 7/16" wood subsiding on entire exterior
- 5/12 pitch engineered truss roof for ranches & two-stories (a 7/12 pitch available)
- 10/12 pitch engineered truss roof for cape cods (a 12/12 pitch available)
- 7/16" wood roof sheathing

### ❖ For Energy Efficiency . . .

- R-19 fiberglass batt exterior wall insulation
- R-30 fiberglass batt attic insulation
- Continuous attic ridge vent
- Andersen® high performance - TW, tilt-in, wood, insulated windows
- Stanley metal clad insulated exterior doors
- 52 gallon electric water heater

### ❖ For a Care Free Exterior Finish . . .

- Mastic maintenance free vinyl siding
- Maintenance free vented vinyl soffit with aluminum fascia
- Decorator vinyl shutters on front of windows
- 30# roof felt with aluminum drip edge
- Certainteed® 25 year fiberglass self-sealing shingles
- Exterior coach lights at all entry doors

### ❖ For a Luxurious Interior Finish . . .

- 1/2" gypsum drywall - walls
- 5/8" gypsum drywall - ceiling with smooth or stompmed finish
- Full 8' ceiling height
- Solid poplar hardwood baseboards and window casings
- Birch veneer doors
- Solid oak faced kitchen cabinets
- Formica post-formed kitchen countertops
- Vented closet shelving
- Plush Philadelphia wall to wall carpeting over premium 1/2" rebond pad
- Congoleum vinyl flooring
- Solid oak faced bathroom vanities
- Cultured marble bathroom vanity tops
- Delta plumbing fixtures

### ❖ For Safety and Peace of Mind . . .

- Multiple inter-connected smoke alarms with battery back-up
- Anti-scald balancing valves on all bath tub and showers
- 200 amp electrical service
- GFI receptacles in kitchen and baths

### ❖ For Comfort and Convenience . . .

- Exterior weatherproof GFI protected electrical receptacles front and rear
- Individually controlled electric zone heating
- Decorator medicine cabinets in all bathrooms
- One-piece fiberglass tub and shower units
- Washer and dryer connections in utility room
- Dual tone front door chime
- Exterior frost free hose bib (for site installation)

This sample spec delineates materials and products used in a typical modular home.

## WORKING WITH THE MANUFACTURER ON MODEL SELECTION AND

### ORDERING THE HOUSE

When choosing a house or houses to place on urban lots, a deciding factor should be how well the house blends with the houses in the surrounding neighborhood. This probably will, in some way, be required by the zoning board. Keep in mind that, while plans are myriad and customization is possible, there are more dimensional constraints with factory-built housing than there are with stick building.

Here are some tips to specifying the home that will fit in best:

- A list of “specific” requirements that a home will meet is known as a “specification” or “spec” sheet. Requirements range from levels of insulation in the ceiling, to the types of windows used, to the thickness of the wall gypsum. These need to be spelled out in detail so that manufacturer and general contractor have a complete list of specifications to work with. An example of a specification sheet for a modular home is shown on the previous page.
- Because infill projects are normally on lots whose narrow dimension faces the street, the home often requires entry on its short side. Most modular manufacturers have models that are entered in this fashion. Some manufactured housing producers have developed so-called gable-end entry plans entered from the narrow end. The industry refers to these models as “front loaders.”
- To blend in with the neighborhood, urban homes are often designed with porches, garages, decks, and basements. These can either be shipped as additional modules or built on site and the most cost-effective method can be discussed with the housing producer.
- Another issue to keep in mind is that if site-built elements are planned, the manufacturer must make the necessary adjustments for added structural loads and for construction junctions between a module and a site-built element. It is important to consult the manufacturer about what is allowable in terms of on-site additions to the house, either modular or manufactured.
- Before ordering a home, see the sections below on establishing a transport date and being sure a wide-load vehicle and the erector cranes can access the site.



Wide-load delivery vehicles must have unencumbered access to the site (courtesy, MHI).

## DETERMINING THE DELIVERY DATE

When ordering the home, a delivery date is usually set. Modular and manufactured home sections are normally transported over interstate highways with little trouble. In rural and suburban areas, transporting the home from the factory to the site is barely an item to be considered, as homes are transported mainly on highways and low-traffic roads. Sites are often large tracts of land that have been cleared to receive the homes. However, delivery to an urban infill site may necessitate permits and restrictions to certain times of the day (not during commuter rush hours, or only on Sunday mornings, for example). One New York City development received a permit to ship 18-foot-wide modules, but they could only be shipped late at night. In such urban neighborhoods it is imperative to thoroughly research transportation issues as they can cause serious delays and cost overruns if they are not understood and planned for by the manufacturer or dealer making the delivery.

Here are some of the factors that can delay the delivery of the house:

- A wide-load permit must be obtained in order to bring a modular or manufactured house into most city limits. Expect that cities will have restricted times when delivery is not allowed. These times can be during rush hours, large-scale city events, inclement weather, and certain times of the year when roads could be damaged by heavy loads. Make sure that the manufacturer or the dealer is aware of these limits.
- Many times wide-load transports require escorts, which will add to the cost of transport. In the city, escorts may be either state or local police cars or can be privately contracted. This needs to be set up as soon as a delivery date is established. Remember a city emergency could mean that the house delivery will be stopped until the roads are accessible or the police are available.
- Plan in advance to make certain that a wide-load vehicle can maneuver to the site through narrow, tree-lined streets with mazes of overhead power lines and utility poles. Be sure that cranes can access the site and are able to maneuver. Ask a trucking company representative to look at the site and be sure there is an appropriate route. A representative of the crane company should also be aware of the site's location and restrictions to access.
- Parking restrictions may be necessary to ensure clear roadway access to the site. Again, it should be the manufacturer or the dealer's responsibility to make sure that parking restrictions are in place by the scheduled delivery time.

## **PLACING THE HOME ORDER**

Once cost and design plans have been finalized and delivery conditions have been discussed, it is time to place the order with the manufactured or modular home producer.

Industry expert Steve Hullibarger says this is where nonprofit developers have to be particularly cautious. “Manufactured and modular home producers live in a different world than developers,” says Hullibarger, when it comes to how homes are sold. Hullibarger says he has seen situations where orders have been mistakenly put through and homes built before the developer thought they had placed the order. Deals and agreements should be formalized and in writing. This is more common when working with an over-eager retailer salesperson who mistakes a cost estimate or price-out for an order.

To keep everything clear, controlled, and in writing, Hullibarger recommends using a purchase-order system well known to builders and most developers. This system should be clearly understood by both manufacturer or retailer and nonprofit developer. Basically the home is not officially ordered until the manufacturer or retailer receives the purchase order. The purchase order number should appear on the invoice.

Although the home will speed through construction, the nonprofit developer can still add provisions whereby changes can be made. Change orders will be severely limited but some manufacturers and developers can add in absolute cut-off dates for changing orders or even for canceling them.

Manufactured and modular home producers are usually paid in full either at the time of shipment or within 15 days of shipment date.

## **ONCE THE ORDER IS PLACED, PREPARATIONS MUST FALL IN LINE**

Once the home is ordered, those involved in the development team, the contractor, and the various subcontractors should be notified in advance, ready, and in place at delivery time or at the time their services are needed so that the house can be set, sealed, connected, and secured in a timely fashion.

The entire construction schedule will revolve around the delivery date of the home. Aside from transport issues that may arise, the manufacturer will be far more precise about providing an up-front delivery date than any builder can predict when a home will be finished.



Foundations are generally the responsibility of the developer's contractor (courtesy, Venture, Inc.).

The length of time between ordering the house and its delivery and set up can be very short compared to site-built construction (which can run from three to six months). So it is imperative to be sure everything proceeds like clockwork and that all the trades are lined up to appear when they're needed.

## PREPARING FOR THE FOUNDATION

Nonprofit developers who have built on urban lots know how to ensure that the lot is ready for the foundation of any new house. Above-grade debris such as trees and rocks must be cleared, as well as any other site obstructions. Also of concern on lots that once contained houses are such buried items as septic tanks, foundation sections, fuel tanks, and abandoned supply lines, which can slow down site preparation. These and any other below-grade items must be unearthed and hauled away.

One modular homebuilder has devised a creative solution to deal with large items discovered below grade. Doug Sholz, president of modular home producer Unibilt Homes, which is working on an urban infill development program in Toledo, Ohio, says they plan for these items by building partial basements. These three-part systems include basement space (room for mechanical systems and for storage), crawlspace, and an empty space to bury debris.

Access to the site is a major concern when working with factory-built homes. The location of the foundation will have an impact on access. The site must be able to accommodate the vehicles necessary to truck the home or modules and to set them on the foundation. A transport company representative can help plan for this. A representative of the crane company should also be sure to order a crane that is the proper size and radius for the home or module.

## INSTALLING THE FOUNDATION

It should be noted that although slab-on-grade foundations are the norm for much new site-built construction, they are not applicable to modular or manufactured homes, which have an integral floor already built in. Manufactured and modular homes must be placed on piers, crawlspaces, or full basements.

The foundation should be constructed by the general contractor or by a subcontractor who

specializes in foundations. Just as a specification sheet drawn up with the manufacturer will list in detail everything involved in building the home, a specification sheet should also list in detail the design characteristics of the foundation. This is done through an architect or engineer.

It is imperative that the foundation be precise in its layout, dimensions, and structural properties. With a site-built house it is relatively easy for builders to make slight adjustments for foundation errors or imprecise measurements. With factory-built homes, an entire home or module of an exact dimension is set on the foundation at once, leaving little room for error.

To ensure accurate dimensions, the foundation contractor who is not accustomed to building for modular or manufactured homes should consider the following tips:

- Measure, re-measure, and then painstakingly stake out the foundation so that it will accommodate the factory-built home (the dimensions of which can be obtained from the manufacturer or retailer).
- Use a laser level to ensure that tops of forms or blocks are flat and level all around.
- If using a poured foundation, brace the forms extra firmly to avoid any shifting during the pour.

Another option is to use precast concrete foundation panels with steel-reinforced concrete studs, reinforced top and bottom beams, and concrete facings. These systems offer dimensional consistency and precise measurements. A typical panelized foundation can be erected in four to five hours with no on-site concrete work. Cost savings can be realized because precast systems, at about \$45 a linear foot, are competitive with concrete block walls. They also go up much quicker, saving on labor costs. Cold-weather erection is common as no concrete pouring or curing is necessary. This enables work to be done during the colder winter months when many factory-built housing manufacturers offer discounts or at least are somewhat more flexible in pricing.

The goal should be to have the foundation completed and inspected by the local building inspector a few days before the scheduled home arrival date. On the delivery day, everything should be in place so that the house can be completely installed on the foundation and buttoned up tightly so that by the end of that day the house will be secured.

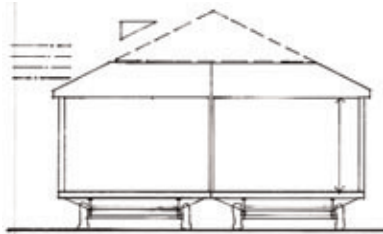
## **MODULAR HOME FOUNDATIONS**

Modular units are usually placed on foundations that are either crawlspaces or full basements. The developer's contractor is typically responsible for excavation, construction of the foundation, and



Precast concrete foundation systems (courtesy, SWA).





HUD-Code home sections joined on site (courtesy, SWA).

final grading. A modular home will likely be built using a standard non-slab foundation system identical to a site-built home consisting of a monolithic pad perimeter concrete pour, plus either poured walls or a post-and-beam system for the interior of the home, set at the maximum distance the floor structure is calculated to span. Full walls are poured at mating lines, where the modules join.

If the “turnkey” approach is selected, the modular manufacturer will provide for the construction of the foundations. If not, it’s up to the developer’s general contractor or foundation subcontractor to build the foundation.

## MANUFACTURED HOME FOUNDATIONS



Permanent foundations for manufactured homes (courtesy, SWA).

The foundation for a manufactured home can be similar to the foundation used for a modular home. In rural areas, manufactured homes are often placed on block pier foundations, which are not considered permanent. On urban infill lots, this technique WILL NOT BE ACCEPTED and should not be used. Rather, permanent poured concrete or block foundations should be used. Permanent foundations are recommended for other reasons. First, eventual owners can qualify for a conventional mortgage loan, homeowner’s insurance, and FEMA flood insurance. Wind and seismic

bracing is possible without having to use strap ties. Also, the foundation will not require the tell-tale, less desirable “skirt” used when houses are placed on blocks.

The main difference between perimeter foundations for modular and manufactured homes is that the manufactured home will require interior footings and concrete or block posts to support the steel chassis beams. Where the floors join at mating walls, support posts and footings are placed per the manufacturer’s instructions. The footing size at every mating-line support is governed by the weight load data, which can be obtained from the manufacturer.

Permanent foundations for manufactured homes need to respond to the nature of this building technology—especially in the way that the floors are constructed. A typical manufactured home has floor joists made of 2x6s or 2x8s, spanning 14 to 16 feet. The floor system is supported inboard from the ends. The supports are the two steel chassis beams running the length of the manufactured home, which also provide a convenient place to attach the wheel assemblies (see drawing on previous page). To hold up the outside walls (which in turn hold up the roof), Z-shaped steel plates called “outriggers” are welded to the chassis beams approximately every 6 feet. A small steel channel runs crosswise between the chassis beams, welded to their bottom flanges, at each outrigger. The whole assembly varies from 16 inches to 20 inches deep.

Supporting the chassis beams on a permanent foundation requires cross-beams spanning from the basement wall to the center support beam. These beams add cost by increasing the thickness of the floor system, which in turn increases the basement excavation depth and wall height. A complex grid of steel framing is visible in the basement.

A much cheaper solution is to strengthen the outriggers and steel channels to create a side-to-side supporting frame that will hold up the chassis beams without cross-beams. This system is used by most producers of manufactured homes to be set on permanent foundations because it requires only minor modifications to standard floor construction and doesn’t add much cost. Verify that a floor system of this type is available before a manufacturer is selected.

More expensive floor systems have been devised to allow basement stair openings to be placed anywhere. The best known of these is the Lindsay floor system, used by several manufacturers. The heavy Lindsay system is as deep or deeper than a typical system, and is patented. Only



Manufactured home section installed on foundation (courtesy, MHI).



Modular home is slid on steel beams onto foundation (courtesy, Venture, Inc.).

the wheel wells and the 2-inch-deep steel shackles interrupt an otherwise flat basement ceiling after the home has been set.

In making overall cost comparisons, thicker floor systems are typically cheaper to build, but can add other costs (deeper basement excavation and sidewalls, more siding between floors, longer stairs). Systems that limit stair locations cannot be used with many floor plans. A system that results in a flat basement ceiling is often preferred to one that exposes the steel beams.

## **INSTALLING THE HOME**

Once the foundation is ready and the utilities are in place and ready for hook up, the manufactured or modular home can be delivered and set up by a professional setting crew. The most common ways to set manufactured home sections or home modules are: using roller systems and rolling the sections or modules over the foundation walls, or to lift and place them with a crane. The manufacturer will also send along installation manuals with each home.

## **WHAT TO LOOK FOR AND INSPECT UPON DELIVERY OF THE HOUSE**

Once the manufactured or modular home arrives on site, it should be thoroughly inspected. Check for any indications of damage including nicks, dents, cracks, and loosened seams. Minor cosmetic damage is typical and not covered by warranty. Such imperfections are fairly common, shouldn't be alarming, and are usually easily fixed by the developer's contractor or the manufacturer's finishing crew. Check inside for drywall problems such as seam cracks or punctures that may require re-taping or re-mudding, appliance or fixture damage, or flaws in flooring or paint.

If serious damage is noted, prepare a list and fax or email it immediately to both the transport company and the housing manufacturer's office. This way the manufacturer cannot later assert that the damage was caused during the time the home was under the buyer's warranty. Send in a report on the condition of the delivery even if there is no damage. When selecting a manufacturer, ask how they typically respond to damages due to shipping; and if they have a set policy, ask for a written copy.

## UTILITY CONNECTIONS AND SITE-BUILT ELEMENTS

If a “turnkey” service approach from a modular home manufacturer is selected, a finishing crew sent by the manufacturer will complete utility connections, do additional finish work, and construct any site-built elements. If a turnkey approach is not used, then it is the responsibility of the developer’s general contractor or subcontractors to schedule this work. For connections to water, electricity, gas, and sewer, the manufacturer may be able to recommend someone familiar with all jobs. Or contact local utilities to set up a time for this work to be completed.

After the home is set, manufacturers will usually provide builders with a list of finish work that requires completion. Ask for explicit instructions for the general contractor. These tasks can include installing exterior finishing materials on the site, building garages, decks, or porches. Most of these tasks can be performed by the same tradespeople who would do them on a conventional stick-built home.

## WORKING WITH INSPECTORS

Both modular and manufactured homes have the majority of inspection work done in the plant, consistent with the laws and codes that govern. Local building inspectors should be made aware of this, as they do not always realize that they don’t have regulatory authority over factory-inspected elements. It would be advantageous to get copies of the manufacturer’s inspection policies so they realize the extent to which the home has been inspected, and what needs to be inspected on site.

Modular homes generally must meet the same code requirements as site-built homes. In most cases they are built according to a state-wide or locally amended code. Plans have to first be inspected and approved by the state or its agents. During production, licensed third-party inspectors and occasional state-sponsored inspectors will check the modules during all phases of construction and put an approval seal on each module before it leaves the plant. Installation, finish work, utility connections, and any site-built elements fall under the local code jurisdiction and local building department procedures. There can be misunderstandings, conflicts, and delays if the local inspector and developer disagree about who has code jurisdiction over what. It is best to discuss and resolve all issues with the local inspector long before the factory-built sections arrive on the site.



Finishing crew constructs site-built elements such as porches (courtesy, Unibilt Industries, Inc.).

Manufactured homes are treated in much the same way except that they meet, instead, the requirements set forth by the HUD Code, which is also preemptive and, as such, overrides any state or local codes. The completed units do not need to be inspected on site. HUD's state inspectors or third-party inspectors are present to inspect and authorize the placement of a HUD seal on the homes as they are produced. As with modular homes, foundation work, utility connections, and site-built elements fall under local code standards.

## SUMMARY

As is clear from the discussion above, there are several steps between deciding to use a manufactured or modular home and the day the home is delivered. Once a manufacturer has been selected, most of the preparations involve finding a knowledgeable general contractor (if a turnkey approach is not used), preparing the site, making certain that the foundation is in place and ready for delivery day, verifying that any necessary permits for delivery have been secured, making sure that the setting crew does its required work, inspecting the home for serious damage due to transport and setting, and working with inspectors on site-built items that require their oversight. The checklist on the next page should be a useful tool for the reader.

## RESOURCES

### Publications

"Adelante Modular project Houses Seven Families." *Automated Builder*, April 1999, p. 25.

Bevier, Charles. "Maximum Modular Muscle." *Building Systems Magazine*, July/August 1999, p. 17.

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 that design and product choices abound. Focuses on some of the hurdles they face along the way.

Bevier, Charles. "Signs of Momentum in Modular Housing." *Building Systems Magazine*, March/April 2001, p. 4.

*Resources continue on page 46*

## FACTORY-BUILT HOME CHECKLIST

### Finding a Manufacturer

- Modular manufacturer
- Manufactured home producer
- Price
- Design flexibility
- Design variety
- Experience with urban sites
- Reputation

### Finding a Contractor for On-Site Work

- Experience with modular or manufactured housing
- Location

### Selecting the House

- Compatible with neighborhood
- Accommodate lot shape
- Design modifications
- Accommodate site-built additions
- Apply for and obtain building permit

### Determining the

#### Delivery Date

- Factory lead time
- Transportation time
- Escort car
- Delivery permits within city limits
- Site access
- Parking restrictions

### Placing the Order

- Specifications review
- Price
- Deposit
- Balance due

### Preparing the Site

- Demolition of existing structures
- Removal of surface debris
- Underground debris removal
- Initial grading

### Building the Foundation

- Foundation design
- Material choice
- Layout and construction

- Utility stub installations
- Inspection by building inspector

### Home Delivery

- Contractor availability
- Subcontractor availability
- Transport company requirements
- Setting and sealing
- Damage inspection
- File inspection report

### Home Finishing

- Complete utility connections
- Finish exterior envelope
- Finish interior
- Construct steps, decks, porches, garage
- Finish grading
- Walkways and driveways
- Landscaping
- Final inspection and Certificate of Occupancy

Bevier, Charles. "Upgrade Your Speed, Volume, Quality with Modular Technology." *Building Systems Magazine*, January/February 2001, p. 27.

Bodensteiner, Peter. "BUILDER 100: Top 20 Manufactured Home Builders." *Builder*, May 2000. A list of the "who's who" of manufactured home builders. [www.builderonline.com](http://www.builderonline.com).

Carlson, Don. *How and Why to Buy a Factory-Built Home*. CMN Associates, Inc., 2001.

Hullibarger, Steve. "Affordable Seattle: How One Developer is Taming the Cost of Infill Housing." *Modern Homes Development*, May 2000. A close look at Noji Gardens, a very successful affordable housing development in urban Seattle. Using two-story manufactured homes, HomeSight, a nonprofit affordable housing developer, brings quality housing to an underserved population.

Hullibarger, Steve. *Developing with Manufactured Homes*. Manufactured Housing Institute Press, January 2001. *Developing with Manufactured Homes* illustrates how the manufactured housing industry functions and how the homes are constructed. Includes a comprehensive section on urban infill housing.

"Modular Technology Provides Pennsylvania Habitat Home." *Building Systems Magazine*, May/June 2000, p. 20.

*Permanent Foundations Guide for Manufactured Housing*. U.S. Department of Housing and Urban Development, September 1996. Presents technical construction advice on the permanent installation of manufactured homes. Covers site preparation and foundation design to ensure adequate structural performance for manufactured homes. Can be downloaded here: <http://www.huduser.org/publications/destech/permfound.html>.

Romigh, Kelly. "Task Force Raises Quality Consciousness in Modular Industry." *Building Systems Magazine*, March/April 2001, p. 26.

"65 Questions to Ask Systems Manufacturers." *Building Systems Magazine*, May/June 1999, p. 94.

Steven Winter Associates, Inc. *Manufactured Home Installation Training Manual*. U.S. Department

of Housing and Urban Development Office of Policy Development and Research, Washington, D.C., April 1999. A technical guide to installing manufactured homes divided into four parts: Site preparation, foundations, installation, and resources.

### **Websites**

**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.

**www.mfghome.org.** The official site 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.



## A Factory Tour

To see how factory-built homes are constructed, following is a “tour” of a house being built. The tour considers both manufactured and modular home construction techniques.

Inside the factory, home sections are created on separate assembly lines.

- First a basic plan is chosen and reworked if necessary. A specific plan is then prepared using Computer Aided Design (CAD) software. Some stock plans are pre-approved by either HUD or approved agencies for manufactured homes (or, in the case of modular homes, a state agency). If there are plan variations they may need to be resubmitted to the appropriate agency for approval.

- All manufactured homes are required to be built with a permanent chassis that will attach to the running gear that will be used to transport the home. (1, 2) The flooring frame is attached to the chassis system and the subfloor laid atop that. Modular homes are made using floor framing systems similar to those used for site-built homes. The floor is finished.

- Interior walls are framed into the home.

- Exterior walls (3) are constructed in a jig to ensure straight, true walls.

- Sections are inspected several times during construction by manufacturer’s quality control inspectors and by a third-party government-approved inspector.

- The roof is built separately from the home sections (4, 5), often using factory-made truss systems. The roof is then lifted onto and secured to the wall systems.



1



2



3



4



5



6



7



8



9



10



11



12

Photos courtesy of MHI, Randall Homes, Unibilt Industries, and SWA.

- Once the main structures are in place, plumbing lines are installed (6) and pressure tested for leaks. Plumbing lines are then insulated for further protection and fixtures are installed. Electrical lines are added through previously drilled holes and voltage tested. Wires leading into the home are caulked to be weather-tight.
- Exterior walls are insulated (7), generally using code-required batt insulation, then sheathing is applied (8). For extra comfort and energy conservation, additional exterior insulation may be specified. Windows and exterior doors are installed and sealed up tightly (9). Siding is then factory applied (10). Exterior walls can also be finished to receive siding materials and trim on site.
- Roof decking is set atop the trusses, then covered, generally, with composite shingles.
- Inside, drywall is installed, taped, mudded, and sanded, and generally painted or papered (11). Cabinets are either purchased or built in the factory and installed, as are all appliances and kitchen and bath fixtures and fittings. Carpet is put in place—sometimes in the plant, sometimes in the field.
- The home receives a final inspection and a sticker is applied (a HUD label for a manufactured home; a state-approved seal for a modular home).
- The home is prepared for shipping, often wrapped in a moisture-resistant barrier to protect it from the elements during transport.
- The home is then shipped off (12) in sections to the waiting site.

# 4

Obtaining permits for manufactured and modular homes might be more time-consuming than securing permits for site-built homes, because local authorities may be unfamiliar with these building technologies. This will vary from city to city.

In some cities manufactured homes are, in fact, zoned out. This is changing but can present a big hurdle if this is the case. Some resistance by building and zoning officials might stem from erroneous preconceptions. Officials may perceive a manufactured home to be nothing more than a trailer and, as such, not up to standards. Modular homes are often grouped with manufactured homes, thus suffering from the same negative perception.

The information in this chapter is more applicable to nonprofit developers using manufactured homes that are zoned out in some urban areas.

## **WORKING WITH BUILDING OFFICIALS**

Chances are city building officials will have little, if any, experience with manufactured and modular homes and this can translate into significant delays in moving a project through the approval processes.

Brad Lovin of the North Carolina chapter of the Manufactured Housing Institute was involved in a pilot house situated in Raleigh, where manufactured homes were previously zoned out. Lovin says to obtain the permit they had to go through public hearings, committee meetings, several committee votes, and even before the town historic commission (he explains that the home wasn't even in a historic area). The city required the developer to submit pictures of surrounding homes and show their plan along with the existing houses to be sure the home would visually fit into the neighborhood. The city council kept a close eye on progress, requiring photographic evidence as the project progressed.

Once the project got through the lengthy approval process, the house was erected and sold. Lovin says that the project was recently commended by the mayor. "We're glad we were able to get through the process so that now it will be feasible for others to build manufactured homes," says Lovin. He cautions nonprofit developers not to underestimate the time it might require to talk the project through with building officials.

**HUD-CODE HOME ACCEPTANCE IN CONTINENTAL U.S.**  
**State Laws Regulating Local Zoning of Manufactured Housing**  
1999



Have no specific, mandatory state legislation addressing exclusion of manufactured housing

Prohibit exclusion from specified districts, i. e. within agricultural areas or urban growth boundaries

Exclusion not prohibited but some protection is available for manufactured housing

Prohibit exclusion of some (or all) units, unless based on criteria applicable to other types of housing

Prohibit exclusion from single-family districts if aesthetic, installation, age size and/or other standards are met

Prohibit total exclusion from the jurisdiction, but permit special criteria to be applied to manufactured housing

Adapted from *Home Builders Guide to Manufactured Housing*, U.S. Department of Housing and Urban Development, 2000.

## TIPS ON THE APPROVAL PROCESS

Expect to invest some time up front when first proposing to build a modular or, more significantly, a manufactured home. Following are some practical measures that can be followed when confronted with opposition. Or better yet, to avoid opposition altogether:

- If zoning board hearings are necessary, work carefully on the presentation to the board. When describing the home, call it a “single-family” home as often as possible. Point out how either the infill house or urban development will breathe new life into a downtrodden area and help beautify a neighborhood. And mention how it will bring needed affordable housing to an area.
- Consider hiring a consultant. The first time around might be daunting so consulting with an expert can yield tips that can save both time and money and help the nonprofit developer handle



Developers should show examples of factory-built homes that fit with the neighborhood (courtesy, MHI).

building officials and zoning boards unfamiliar with and skeptical about factory-built housing.

- Ask the housing producer for assistance. Some manufacturers, such as manufactured home producer R-Anell Custom Homes, Inc., in Denver, North Carolina, offer builders and developers a pack of materials they may need to secure a permit. And it can be tailored to a specific project. For example it will cite zoning regulations and show how the roof pitch, square footage, and appearance meet single-family zoning requirements.
- Come with information. Pamela Beck Danner—an attorney who specializes in manufactured home permits—recommends bringing in supporting materials, particularly visual aids. If there are concerns about what the manufactured home will look like, bring examples of units that are representative of styles in the neighborhoods where the home will be sited. Manufacturer’s brochures are helpful, as are testimonial letters from satisfied customers. Be prepared to show how well a manufactured home can blend with the neighborhood to overcome any fears and negative preconceptions.
- Bring in official documentation. For a manufactured home, bring in the HUD Code, show the language stating that it is a pre-emptive code and that the home will be built to a federal standard and approved as such. Do the same with modular homes, bringing in documentation showing that homes are built to a state-approved code with which they are familiar.
- Get the neighbors involved (see next chapter). When Brad Lovin of the North Carolina chapter of MHI set out to build a manufactured home in an impoverished area of town in need of quality affordable housing, he mitigated some of the official resistance by getting a neighborhood group that supported the urban renewal aspect of the project to come to open meetings and rally for the cause.
- Enlist the local news media. Often they are looking for new and creative solutions to housing problems. They can help promote market acceptance by featuring positive stories on television, radio, and print media. Public officials are generally amenable to being associated with a publicized good cause.

## WHAT IF PERMITS ARE WITHHELD OR IF MANUFACTURED HOMES ARE ZONED OUT?

If zoning clearly states that manufactured homes are not permitted and city officials withhold approval, apply for a variance. According to Pamela Danner, if all else fails, have the zoning

board or zoning officer issue an opinion in writing stating the reason why the permit was not issued. Take the case to the county attorney and see if he or she will help, which, says Danner, has been successful in several cases.

Discrimination against manufactured housing is no longer permissible in certain states and localities. These laws are slowly being phased out across the country. Thanks, in part, to years of pressure from the manufactured housing industry and its one of trade associations, the Manufactured Housing Institute, some states and localities are revising local codes to allow for manufactured homes provided they are placed on a permanent foundation and meet the same construction and, if required, aesthetic guidelines as site-built homes.

There was a flurry of activity to implement non-discrimination codes in the early 1980s after California became the first state to do so. Several areas, mainly in the Midwest and Pacific Northwest, quickly followed suit. Slowly over the past decade, more nondiscrimination statutes have been ushered in.

To help keep builders and developers up to date, the Manufactured Housing Industry has a valuable resource tool—a page on its website that tracks and regularly updates state laws and court decisions regarding the zoning, placement, and tax treatment of manufactured homes. This website can be accessed at [http://216.167.103.115/DR\\_state\\_laws.html](http://216.167.103.115/DR_state_laws.html). Follow the prompts to see the latest state updates. If the city or state where the home is sited has addressed the discrimination issue, print out pertinent information and offer it to building officials and zoning boards.

## **WILL USING MANUFACTURED OR MODULAR HOMES AFFECT FINANCIAL SOURCES, WARRANTIES, AND INSURANCE?**

### **Financial Sources**

For community development corporations and other nonprofit groups using manufactured or modular housing, there should be little impact on financing programs. Nonprofit developers interviewed for this book indicated that there was no change in their financing arrangement because they were using factory-built homes and that they used the typical financing arrangements they have in place.

There is one vital caveat here: Without favorable appraisals, financing may be severely affected. Appraisers must be educated about modular and especially manufactured homes. Some nonprofit developers report resistance from appraisers when it comes to using modular or manufactured homes. According to Paulette Huber with Neighborhood Housing Services of Toledo, Ohio, nonprofit developers might need to work diligently with appraisers on a one-on-one basis to educate them about modular and manufactured homes. She suggests reassuring them about overall neighborhood development using these housing technologies, and showing drawings, photos, specifications, and the use of permanent foundations for manufactured homes.

Steve Hullibarger of the Home Team adds that the appraiser should use manufactured home comps that are recent and local. As there are huge variations in manufactured homes, and even wider variations in how they are sited, the information that the appraiser uses should be accurate to reflect the house to be built. Failing the use of manufactured home comps, the appraiser can use site-built homes as comps. As in all appraisals, which use market comparables as an indicator of value, adjustments are made for location, square footages, bedrooms, baths, obsolescence, etc. But value adjustments should not be made by the appraiser strictly on the distinction that the subject property is a manufactured home.

For the eventual homeowners, modular homes and manufactured homes converted to real property generally will not have problems in terms of obtaining typical mortgage financing. The terms should be comparable to site-built housing. FHA, VA, and FMHA loan programs are also available to purchasers of modular and manufactured homes. Recently, Fannie Mae and Freddie Mac have stepped up their support of manufactured homes, and Fannie Mae now offers a booklet touting the positive attributes of manufactured homes.

### **Warranties**

Most modular and manufactured home producers offer homeowner warranties that cover the home's structure and all factory-installed components such as plumbing, heating, and electrical systems. There will be separate warranties for appliances, roofing, windows, doors, carpets, and more. A notebook with this information neatly compiled should be given to the homeowner.

Warranties can last from one to two years and some manufacturers offer up to five years of coverage against structural defects.

At the housing plant, manufacturers use detailed checklists to ensure that homes leave the factory undamaged and in pristine condition. If damage is found, the home will be repaired before it is transported.

The transport aspect is one to research seriously. Though the home will presumably leave the plant undamaged, a long highway trip can mean a home may arrive on site in less than perfect condition.

Check in advance with the manufacturer's transport company. Have the company assure that there is a good route from the plant to the building site. Be sure to get a comprehensive written warranty and understand the provisions therein. Remember to check the terms of the warranty, as certain problems that arise later might be warranted by the manufacturer and either will be repaired by the manufacturer or be reimbursable to the nonprofit developer if they contract for repairs.

Once on site, the home should be carefully inspected, as mentioned in Chapter 3. Note, in writing, any visible damage inside and out. Also list any differences in design or materials that weren't contracted for. Immediately fax or email a list of any damages or uncontracted materials to both the manufacturer and the transport company.

## **Insurance**

General contractors and subcontractors who have not worked with manufactured or modular homes should be able to safely continue with the general builder liability insurance they use and should not have to reconsider any insurance issues.

In fact, says insurance expert Bill Stegman of the Foremost Insurance Company, going from using site-built to factory-built homes can actually result in less insurance exposure. Many risks associated with building are assumed by the production plant.

For the owner, homeowner insurance is the same for modular and site-built homes and should be the same for manufactured housing, says Stegman. Though rates for factory-built homes were once 20 percent higher than rates for site-built homes, they are now much more comparable. Foremost does not distinguish between factory- and site-built homes, says Stegman.



Insurance rates may vary slightly but are tightly regulated and there is not a lot of difference among companies. Insurance should be discussed with an insurance professional prior to starting the project.

## SUMMARY

Being informed about the permitting process, and the differences in inspections and approvals of manufactured and modular homes, will aid the nonprofit developer when working with local zoning boards and building officials. Keeping these parties informed and sharing information to belay preconceptions about factory-built homes should smooth the way. Remember, these officials may have a learning curve regarding manufactured and modular homes if they are unfamiliar with these affordable housing alternatives. Another part of the equation regards warranties, insurance, and financing. Today, there are more options available in each of these realms for manufactured and modular housing.

## RESOURCES

### Publications

"Adelante Modular Project Houses Seven Families." *Automated Builder*, April 1999, p. 25.

Beamer, Wayne. "Zoning: The Current State of Affairs." *Manufactured Home Merchandiser*, May 2000. Industry experts are interviewed for their insights into the current state of zoning when it comes to manufactured homes. Of interest to those contemplating building in urban areas.

Bevier, Charles. "Signs of Momentum in Modular Housing." *Building Systems Magazine*, March/April 2001, p. 4.

Bevier, Charles. "Upgrade Your Speed, Volume, Quality with Modular Technology." *Building Systems Magazine*, January/February 2001, p. 27.

*Building Industry Technology Roundtable on The Manufactured Home*. National Association of Home Builders (NAHB), February 1999. Twenty-page manual is a summary of information gathered at an industry roundtable attended by major builders, manufactured and modular home producers,

and product manufacturers. Meeting was co-sponsored by *Professional Builder* and the NAHB Research Center, and covers information gleaned in the following areas: Land planning and zoning, products and design, labor issues, new markets, and future areas of research.

Hullibarger, Steve. *Developing with Manufactured Homes*, Manufactured Housing Institute Press, January 2001. *Developing with Manufactured Homes* illustrates how the manufactured housing industry functions and how the homes are constructed. Includes a comprehensive section on urban infill housing.

Romigh, Kelly. "Task Force Raises Quality Consciousness in Modular Industry." *Building Systems Magazine*, March/April 2001, p. 26.

"65 Questions to Ask Systems Manufacturers." *Building Systems Magazine*, May/June 1999, p. 94.

"Victory At Last," *Modern Homes*, March-April 2001. Discusses the newly-passed Manufactured Housing Improvement Act and what its impact will be on the manufactured home industry.

Watson, Kami, "Show Me the Money: A Primer for Understanding Manufactured Housing Finance," *Modern Homes*, March-April 1999. Information on financing of manufactured homes. Considers different financing options and lists manufactured housing lenders.

### Websites

**[http://216.167.103.115/DR\\_state\\_laws.html](http://216.167.103.115/DR_state_laws.html)**. Direct link to the Manufactured Housing Institute's compiled list of state statutes on nondiscrimination laws. The section is updated regularly so if a state or locality does not have nondiscrimination laws in place, check back.

**[www.mfghome.org](http://www.mfghome.org)**. The official site 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](http://www.mhousing.com)**. A gateway to a wealth of information on manufactured housing. Has an entry for consumers and one for professionals.

# 5

## BEING A GOOD NEIGHBOR

Any successful affordable housing development is a good neighbor. With manufactured and modular houses the developer will probably need to conduct outreach and education for those in the established neighborhood. Neighbors should be presented with important information about the factory-built housing that will be coming to their neighborhood. Based on the misinformed pre-conception that a “trailer home” will be built, many might have concerns that need to be addressed. It’s important to stress that factory-built homes can be an asset to the neighborhood, and fit in with its existing character.

Neighborhood opposition can be a stumbling block for some nonprofit developers wishing to use factory-built homes. Brad Lovin of the North Carolina chapter of MHI reports that a pilot manufactured home slated for a traditional neighborhood met with such strident opposition that a new site had to be chosen.

On the other hand, neighborhood approval can help guarantee a project’s success. When the MHI pilot home was knocked out of one area, the developer chose a new one where neighbors were actually enthused about the turn-around of a blighted piece of land and rallied behind the project. Lovin said they even helped persuade city officials to allow the home in despite a restrictive zoning ordinance.

Working with neighborhood groups is somewhat similar to dealing with zoning boards, as discussed in Chapter 4. Information, visuals, and reassurances that the new home is meant to help revitalize the neighborhood can be powerful tools.

### REACHING OUT TO THE NEIGHBORS

Any nonprofit developer of affordable housing is already aware of neighborhood sensitivities. Factory-built housing can magnify neighborhood concerns. Several of the nonprofit developers interviewed for this book reported that they were unprepared for the neighborhood opposition that arose when it became public knowledge that factory-built housing was coming to their neighborhood.

The previous chapter discussed the need to explain factory-built housing to uninformed zoning and design-review boards. Many of the same strategies apply here.

Following are some additional suggestions culled from the many good ideas of nonprofit

developers who actually succeeded in getting their manufactured and modular housing projects built despite initial protest.

- Meet with the neighborhood groups and answer their questions. Bring pictures and hand outs so they can see what the homes will look like.
- Emphasize that the houses will be placed on permanent foundations, when this is the case, and won't be something the owner will hitch to a trailer and drive south for the winter.
- Bring in plans of houses that are more in line with their neighborhood architecture. Remember, they'll be picturing older style manufactured homes with lackluster boxy shapes, skirting, and the telltale flat roof. Explain the technology that allows manufactured housing producers to create homes with high roof pitches with two-story models and a variety of styles.
- If all else fails, take some of the more vocal opponents on a trip either to another site where a manufactured or modular home was successfully used or to a housing plant. A trip to a home site helped assuage the concerns of neighbors who opposed HomeSight's Noji Gardens project in downtown Seattle. HomeSight deputy director Tony To says looking at other quality homes not only helped the neighbors drop their opposition but actually got them excited about revitalizing the look and value of their community.

### **ACT IN A NEIGHBORLY MANNER**

Once the neighborhood comes on board, remember to maintain a good relationship:

- Be considerate with parking and vehicle traffic caused by incoming construction and delivery trucks and workers.
- Keep noise to a minimum.
- Make sure the site is cleaned up at the end of each workday.
- Keep the closest neighbors abreast of what is happening; for example, give them a heads-up if a lot of trucks will be present for foundation pouring and give them advance notice of the day the house is arriving and being set.



Well-designed factory-built homes can be sympathetic with existing housing (courtesy, SWA).



Keep neighbors informed on when house will be delivered (courtesy, MHI).

## SHOW HOW MODULAR AND MANUFACTURED HOMES CAN IMPROVE

### APPRECIATION

One of the common concerns about having modular and especially manufactured homes in a neighborhood is that they will devalue surrounding properties. But experience suggests that manufactured and modular homes placed on permanent foundations and built with an attention to style and amenities appreciate in line with other area homes.

Several studies of property values and manufactured homes have been conducted by Auburn University-Montgomery, the University of Michigan, and the North Carolina Manufactured Housing Institute. In the Auburn study, manufactured homes generally appreciated in value and do not have a significant impact on the value of adjacent site-built homes.

Industry consultant Steve Hullibarger has been tracking manufactured home sales for two decades now and reports that appreciation rates have kept up with site-built neighboring homes. In general, Hullibarger concludes that manufactured homes resembling site-built homes are accepted by the market at the same prices as site-built homes. Manufactured homes that look like old-style mobile homes are pariahs in most markets.

Hullibarger has 1,261 manufactured homes in a database, all on individual urban lots, all converted to real property. The first units were sited 20 years ago and Hullibarger has tracked resale amounts for the 273 units that have changed ownership. A recent review of the data yields the following observations:

- Manufactured homes that look like plain manufactured homes lag behind the market in valuation.
- Many new manufactured homes were originally sold for less than comparable site-built homes. Lower hard costs permitted this to happen in many cases. Developers were able to move homes more quickly because lower costs meant lower sale prices, with equal margins.
- Some developers priced their new homes at the market and achieved absorption in normal time frames, with larger profit margins.
- Manufactured homes that are finished to be indistinguishable from site-built homes assume parity with their site-built brethren in the neighborhood. In the early 1990s they declined in value, along with neighboring homes. In the late-'80s and late-'90s, they rose in value like site-built homes.



Factory-built homes that look site-built retain their value (courtesy, SWA).

## SUMMARY

Just as zoning boards and building officials unfamiliar with modular and manufactured homes may need to be better informed to overcome negative stereotypes about these housing technologies, so too must neighbors be assured that the factory-built housing proposed will fit into the architectural character of the neighborhood and not threaten property values. Meeting with neighborhood groups, sharing information, and inviting them to visit other factory-built housing developments will go a long way in winning them over to the idea. When a neighborhood group turns into a proponent of factory-built housing, it can be a key ingredient in the project's success.

## 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 that design and product choices abound. Focuses on some of the hurdles they face along the way.

Hullibarger, Steve. *Developing with Manufactured Homes*, Manufactured Housing Institute Press, January 2001. *Developing with Manufactured Homes* illustrates how the manufactured housing industry functions and how the homes are constructed. Includes a comprehensive section on urban infill housing.

Hullibarger, Steve. "Manufactured Homes In Single-Family Subdivisions." *Urban Land*, January 1996. Contains good examples of manufactured home communities using innovative design ideas that helped them fit into existing neighborhoods.

Hullibarger, Steve and Wang, Paul. "Building Fast and Easy. Manufactured Homes Have Revitalized Many Oakland, California Streets." *Urban Land*, June 1998. Discusses how several low-income areas with vacant, overgrown lots were revitalized using manufactured homes. Good information on both the benefits and potential pitfalls.



Site-built porches lend scale to factory-built homes (courtesy, MHI).

## 6



Adjustable sink height aids use by the disabled (courtesy, SWA).

## TRENDS IN FACTORY-BUILT HOMES

Many of today's factory-built homes are breaking out of the box—the boxy, flat-roofed configuration that continues to unfairly characterize modular and particularly manufactured homes. For decades modular homes have been competing with site-built homes in terms of size, design quality, and interior appointments such as wood floors, fireplaces, custom cabinets, upscale appliances, luxury baths, and solid-surface counter tops.

More manufactured homes are coming into a new age with a range of interior design offerings plus the advent of two-story models, high-pitched roofs, cathedral ceilings, permanent foundations, and the addition of site-built extras like garages, porches, decks, and exterior trim.

Exterior elements on today's manufactured homes are also a long way from the shallow, single-line 2-in-12 roof pitches that cried out "mobile home." Today's modular and manufactured home manufacturers now offer roof pitches from 5-in-12 to 12-in-12, often with multiple roof lines. Decorative windows, bay windows, columns, porches, and fancier exterior trim are also boosting curb appeal.

The HUD-Code at one time was updated so infrequently that it was difficult to keep up with the technological advancements that continue to abound. The recent adoption of The Manufactured Housing Improvement Act will help keep manufactured homes current by promoting continued advancements.

Following are some of the best new items on the menu for manufactured and modular homes:

### UNIVERSAL DESIGN

Medical and technological advances are enabling more seniors to live independently and longer. In addition to being healthier, today's seniors are wealthier on average than their predecessors, and tomorrow's will be even wealthier than today's.

And these healthier seniors want to be able to age in their own homes. A national survey of 2,000 Americans ages 45 and older, carried out by the American Association of Retired Persons (AARP) in 1999, showed that 83 percent of participants want to stay in their homes as long as possible. Further, 63 percent expect to stay in their residence for the duration of their lives. Site-built and factory-built housing builders are becoming increasingly aware of designing homes

suited to occupants of all ages and abilities.

To serve this growing market, manufacturers are coming out with a range of “Universal Design” plans. Universal Design is so named because it allows people of different (universal) abilities to use the same equipment, doors, ramps, kitchens, bathrooms, etc. Nationwide Homes now offers Universal Design features that can be adapted into some of their more popular models. Such features include 36-inch-wide entries into bedrooms, baths, and closets, which allows clearance for a wheelchair or walker. Hallways are 42 inches wide. Light switches 48 inches from the floor level, no more than half-inch thresholds at all exterior doors, 5-foot turning radii in all bathrooms, bathroom grab bars, and a 30-inch knee space beside bathroom lavatories mean wheelchair users can access all important home amenities. Varying counter heights, use of lazy Susans in cabinets, and dishwashers raised 9 inches above the floor for easier loading and unloading, all result in kitchens that are user-friendly for all.

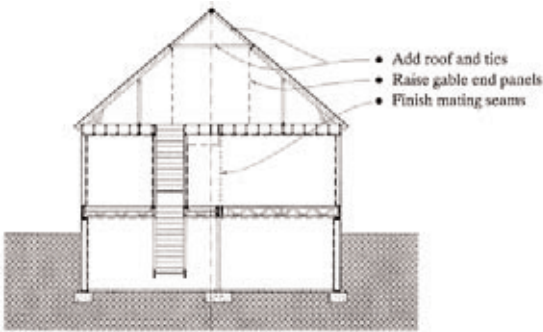
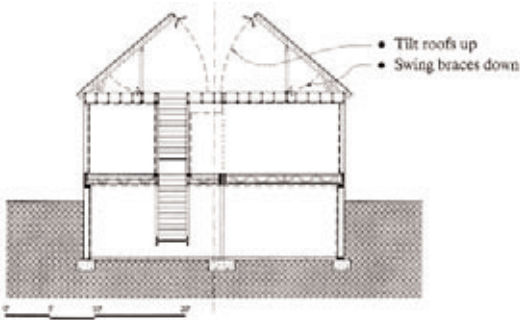
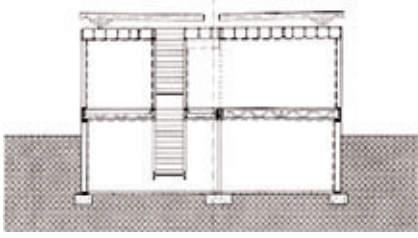
Even homes that are not constructed with the disabled in mind may now sport some common-sense safety items. Brighter lights can aid those with dimmed vision. Carpets and rugs installed with double-sided tape can prevent slippage for young and old. Other modifications include installing rocker-type light switches on stairwells top and bottom, handrails on both sides of the stairs, adding hand rails or grab bars in the bathrooms for better balance (or adding reinforced blocking for future addition of these items), higher toilets, and larger or walk-in showers. Ask modular and manufactured home producers if they offer Universal Design features in their houses.

## **DESIGN IMPROVEMENTS**

Increasing attention to aesthetic features is helping manufactured and modular homes blend harmoniously with established communities. In fact, many are indistinguishable from their site-built neighbors.

One of the least attractive features of a manufactured home is the common flat or low-pitched roof. This type of roof was a necessity to ensure that manufactured homes met transport guidelines to clear underpasses. Although modular homes have included tilt-up roofs for more than a quarter century, manufactured homes have only offered them in recent years because of their added cost and complexity. The flat roof problem is intensified in urban areas where steeper-





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Tilt-up roofs, which arrive on site as flat sections and are then raised and secured into place, provide steeper pitches and room for additional living space (courtesy, SWA).

pitched roofs are often characteristic of older neighborhoods.

Tilt-up roofs have revolutionized the factory-built home industry. No longer are all manufactured homes destined to have flat roofs. In modular homes, the high-pitched roof allows for second-floor or attic spaces, which increase square footage—especially important on a narrow urban lot.

Another impediment to using manufactured homes in urban areas, particularly on infill sites, is the relative rarity of two-story models. Two-story modular homes are very common. Finding a manufactured housing producer that offers two-story models may still be a challenge, but they are becoming more common and availability is helping push manufactured homes onto urban infill sites.

Urban infill projects are often on narrow lots, with the narrow end of the home as the point of entry. Such models are becoming more available from manufactured and modular home producers. A gable entry with a steep roof pitch is often a staple design in urban neighborhoods. This style, fitted with a welcoming porch, is a favorite for urban dwellings.

Other features that help modular and manufactured homes to blend into existing neighborhoods are site-built elements such as garages, decks, and porches. These elements can also be factory produced but are generally built on site. While these options can upgrade the look and function of a manufactured or modular home, they add another step to the home-construction process.

Modular and even manufactured home producers can modify homes for a better fit in urban neighborhoods, which often sport neo-Victorian and other eclectic housing types. Different window shapes, prefabricated trim, a variety of gable and window trims, designer roof lines, porches, decks, and colors all help a new factory-built house to fit in.

Interior design and space-saving features such as built-ins, cabinets, and under-stair space are helping maximize space and heighten design. On the outside, manufactured homes can be given added curb appeal with neighborhood-compatible materials such as masonry and cedar, and topped off with tile, shake, or other roofing materials. There are even factory-applied stucco systems now developed for manufactured homes. The housing developer should inform the manufacturer if any of these features are desired so that the manufacturer can make necessary adjustments if such products are heavier or denser than standard choices, or if they require special substrates or long purchasing lead times.

## UPGRADED ENERGY EFFICIENCY

Modular and manufactured home producers have an impressive and ever-expanding array of strong, energy-efficient construction materials available to customers who want better performing homes. The fact that factory-built homes are built under controlled factory conditions and have better construction quality contributes to their potential for having added energy efficiency.

Samson Homes, Louisville, Kentucky, in conjunction with FischerSIPs, also in Louisville, recently unveiled a line of modular homes constructed entirely of structural insulated panels (SIPs). SIPs are two sheets of 7/16-inch (or other thickness) oriented strand board (OSB) with 3 to 10 inches (nominal) of expanded polystyrene (typically) foam insulation sandwiched in between. Panels provide both structure and insulation for the home and can be finished inside and out. The company purports that houses built with SIPs use up to 50 percent less energy than site-built wood-frame homes, although other published tests place the savings at lower, but still significant, levels.

Since nonprofit housing agencies help those in need of affordable housing, it has become increasingly important that homes not only be built as cost effectively as possible but also that they be cost effective to operate.

Two nonprofit groups in the Midwest are currently at work on urban modular home projects that have been upgraded to ENERGY STAR™ status. The ENERGY STAR Homes program is an energy efficiency ratings system jointly run by the U.S. Department of Energy (DOE) and the Environmental Protection Agency (EPA).

Not only can an ENERGY STAR home result in reduced operating costs, but it can also save money by reducing the size and cost of mechanical and distribution systems. An ENERGY STAR home can also be attainable for more potential homeowners because it can be financed with a preferential mortgage that considers lower operating costs. This permits greater loan-to-income ratios and reduced downpayment requirements, resulting in the borrower being able to buy more house for his or her income.



Structural insulated panels improve energy efficiency (courtesy, SWA).



Modular Energy Star home (courtesy, Neighborhood Housing Services of Toledo).

## Change to HUD Code May Speed Innovation in Manufactured Homes

On December 27, 2000 President Clinton signed the Manufactured Housing Improvement Act into law (P.L. No. 106-569). The Act has been long in coming to the manufactured housing industry, which spent years lobbying for legislation of this sort.

Bringing any innovation to manufactured homes has been hampered by the long periods between code updates. The Act will help keep manufactured homes up to date by stipulating that a private sector consensus committee make recommendations to the HUD Secretary at least every two years. The new law also requires that each state institute a uniform installation program and a dispute resolution program within five years of the law's enactment.

## SUMMARY

As housing products, modular and manufactured homes are now undergoing new developments and improvements. In some cases, the changes are making these factory-built housing alternatives more responsive to the existing architectural character of established urban neighborhoods. The houses are also better designed inside, with more amenities available than before. Two other improvements are also adding value to modular and manufactured homes: Universal Design is making it possible for residents to “age in place,” because their homes are designed to accommodate people with different physical abilities. And a focus on energy efficiency is making these homes more affordable over their life-cycle by lowering operating costs. When choosing a modular or manufactured home producer to work with, ask if such new features are available.

## RESOURCES

### Publications

*Air of Importance: A Study of Air Distribution Systems in Manufactured Homes.* Alternative Energy Corporation, Research Triangle Park, N.C., May, 1996. The first research study on how air distribution systems in new manufactured homes affect overall HVAC system performance.

Bevier, Charles. “Innovations in Modular Technology: Survival of the Fastest.” *Building Systems Magazine*, January/February 2000. Discuss innovations that not only enhance the appearance of modular homes but also make them even quicker to erect.

Carlson, Don. *How and Why to Buy a Factory-Built Home.* CMN Associates, Inc., 2001.

Steven Winter Associates, Inc. *Energy-Efficient Modular Homes: A Guide for Affordable Housing Providers.* U.S. Department of Energy, Chicago Regional Office, Chicago, September 1999. Written for nonprofit, affordable housing organizations (CHODOs) in the Midwestern U.S. Intended to educate CHODOs on how to build a Five-Star modular home.

Vermeer, Kimberly and Josephine Louie. *The Future of Manufactured Housing.* Joint Center for Housing Studies, Harvard University, Boston, Massachusetts, January 1997. Discusses research on

the origin of manufactured homes; the quality and costs of the homes; installation, zoning, and code issues; and forecasts on the future of manufactured housing.

### Websites

**www.nahbrc.com.** Go directly to the “search” feature and search on “manufactured,” and “modular,” to bring up lots of good, informative pieces most of which are downloadable. Topics of interest include, “Two Story HUD-Code Homes,” “Steel Frame Modular Housing,” “On-Site House Factory,” “Manufactured Housing Ground Anchor Systems,” “Manufactured Housing Disaster-Resistant Pier Systems,” “Tilt-up Roofs for Manufactured and Modular Home,” “Hybrid Modular/Panelized Housing,” and “SIPs Modular Housing.”

**www.pathnet.org.** Website focuses on technological innovation in the housing industry. A number of the books and research manuals listed above can be accessed and downloaded at this site.

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## WHAT ARE SOME OF THE POSSIBILITIES?

The following six case studies provide information on how a range of housing providers have used modular or manufactured homes to provide affordable housing.

**Project Name:** Wellington Heights

**Location:** Cedar Rapids, Iowa

**Developer:** Rural Housing Institute (RHI) and Mid-America Housing Project

**Home Manufacturer:** Iowa Quality Homes, subsidiary of RHI

**Design:** Three infill homes are two-story "Queen Anne" Victorian style in keeping with the neighborhood. Total square footage of the three-bedroom, two-bath homes is 1,320. Features include a peaked roof, garage, front porch, and shutters.

**Why chose modular:** Mid-America was aware of modular construction and used modular homes for several reasons. The homes' dimensions were a perfect choice for deep, narrow lots. It was also believed that the cost would be lower than site built.



Modular units feature site-built porches and steep-pitch roofs (courtesy, Rural Housing Institute).



**Working with permit officials:**

The modular producer was much more accustomed to working in rural areas where “anything goes.” City codes were much stricter and there were tighter constraints to design.

**Reception by neighborhood:**

Plans were taken to the neighborhood, which had a well-organized homeowner group. Brought in an artist’s rendering of the plan and made several minor design changes after the meeting.

**Point of interest:**

Rural Housing Institute, a nonprofit developer in rural Iowa, became interested in using modular homes. The organization worked with several manufacturers but found that they were unable to accommodate the customization they wanted. So they opened their own 20,000-square-foot modular housing plant. The land was acquired through grants and was in an industrial part of town. The plant was built from scratch. While starting up was not an easy prospect, they’re now producing homes and plan to produce 45 this year. They have worked out great deals with local Iowa manufacturers like Pella Windows and Amana to obtain products at low costs.

**For more information:** See [www.ruralhomes.org](http://www.ruralhomes.org).

**Project Name:** Hazel Park  
**Location:** Hazel Park, Michigan  
**Developer:** Venture, Inc., a subsidiary of Oakland/Livingston Human Services Agency, Pontiac, Michigan

**Home Manufacturer:** Redman Homes, Topeka, Indiana

**Design:** This project consisted of four homes: two ranch homes at 1,230 square feet; two two-story Colonials at 1,560 square feet. These fit into an eclectic neighborhood filled with many home styles.

**Why chose modular:** Quick site wrap-up left little exposure to theft or vandalism of both homes and tools in this inner-city project. Also allowed the nonprofit developer to start and wrap up the project in minimum time.

**Working with permit officials:** No problems here. City planner was supportive of the plan following a presentation to the city council where sketches were shown and



Single-story modulars fit into this neighborhood of eclectic home styles (courtesy, Venture, Inc.).



assurances were given that they were not “mobile” homes. The newspapers also picked up on the story and presented it in a positive way.

**Reception by neighborhood:**

Neighbors were happy that these unsightly empty lots were being revitalized. On the day the homes were set, neighbors assembled their children, set up lawn chairs and watched the procedure. Lemonade was passed out.

**Point of interest:** The prevailing concern for these homes was that they be energy efficient. To reach an ENERGY STAR rating, they used basement walls made of reinforced concrete with insulation applied to interior of walls. Redman Homes agreed to do extra sealing between marriage walls with particular attention to sealing the area between the sill plate and foundation wall. All lighting fixtures have compact fluorescent light bulbs.



**Project Name:** ROAR Project

**Location:** Toledo, Ohio

**Developer:** Wallick Construction, Columbus, Ohio, along with Renaissance Ottawa Area Residences, a nonprofit housing group in Toledo.

**Home Manufacturer:** Unibilt Industries, Inc.

**Design:** This large-scale scattered infill project consisting of 50 homes is, at press time, more than halfway completed. The homes are all variations of three basic neo-Victorian styles in sizes ranging from a 1,300-square-foot three-bedroom, one-and-a-half bath home to a 1,500-square-foot four-bedroom Colonial. Homes have front porches and garages and feature fish-scale siding, gable details, varying window sizes, and different colored siding.

**Why chose modular:** Main reason was to get the house up and secured quickly to deter thieves and vandals. Quicker production time also helped save money on interest on the construction loan.



Modular homes in foreground are virtually indistinguishable from older house at left (courtesy, Unibilt Industries, Inc.).



**Working with permit officials:**

This plan was developed in conjunction with the mayor of Toledo who used his influence with city officials and inspectors to help push the project through the permit and the building process. Revitalization of a neighborhood in need was the main goal.

**Reception by neighborhood:**

There was no opposition and neighbors were happy to see the project getting underway.

**Point of interest:** To fit into the neighborhood and to maximize square footage, these houses were designed with partial basements built to store the home's mechanical systems. The basic plan called for one-third basement, one-third crawl space, one-third under garage as is. This also helped solve another problem relating to urban sites—dealing with what lays underground, for example, fuel and septic tanks, old foundations, and more. These items didn't necessarily have to be unearthed and disposed of but rather left buried underground.



**Project Name:** Pilot House  
**Location:** Raleigh, North Carolina  
**Developer:** Joan Troy, Roxboro, and Downtown Housing Improvement Corporation, Raleigh  
**Home manufacturer:** R-Anell Homes, Denver, North Carolina  
**Design:** This home is a one-story bungalow built in the style of the surrounding homes. The 1,512-square-foot, three-bedroom, two-bath home has a front porch and a storage unit attached to the back of the house.

**Why chose manufactured:** This project was sponsored by the North Carolina chapter of the Manufactured Housing Institute to show how manufactured housing could be a viable alternative to site-built housing on urban infill lots.

**Working with permit officials:** This project faced multiple hurdles on its way to completion. First of all, "mobile" homes are zoned out in the area. After months and countless hours of work, this has now



Bungalow style manufactured home uses siding and trim that replicates those of older homes (courtesy, North Carolina MHI chapter).



been changed. There were public hearings and multiple meetings with city council and other boards including the historic commission; and the house wasn't even in a historic area. The developer had to photograph homes in the neighborhood and bring in artistic renderings of their plan to show that it would fit in. They had to document and photograph every phase of construction as well.

**Reception by neighborhood:**

Plans were thwarted on a site in one neighborhood following neighborhood objection. A new site was found and the neighbors proved amenable. The neighborhood groups also showed up in front of the city building and zoning boards to lend their support.

**Point of interest:** While getting through the permit process was arduous, the city council ultimately voted six to two to rezone land in downtown Raleigh to allow the use of manufactured homes.

**Project Name:** Next Generation of Manufactured Housing (NextGen) House

**Location:** Danbury, Connecticut

**Developer:** NextGen is a demonstration house sponsored by HUD's Partnership for Advancing Technology in Housing (PATH) program, along with Steven Winter Associates, Inc., Norwalk, Connecticut, and the Danbury Housing Authority, Danbury.

**Home Manufacturer:** New Era Homes, Strattanville, Pennsylvania.

**Design:** NextGen is a 1,300 square foot, gable-ended Cape Cod home featuring three bedrooms and two baths and is built on a permanent, poured-concrete foundation. To blend in with the neighborhood, the home was designed with a front porch, front, side, and back entrances, and a tilt-up roof with a 12-in-12 pitch.

**Why chose manufactured:** This demonstration home was built to show that advanced technologies could be successfully included in a



Tilt-up roof and traditional Cape Cod design make this manufactured home perfect for its New England setting (courtesy, SWA).



manufactured home. This home was developed for use on infill sites.

**Working with permit officials:**

Manufactured homes are not zoned out in Danbury and the house went through the permitting process just as any other single family home.

**Reception by neighborhood:**

No neighborhood opposition.

**Point of interest:**

The NextGen house was built to demonstrate the adaptability of manufactured housing. Some of the innovative energy and resource-efficient features of the home include: low-emissivity (low-e), argon-filled windows; a programmable ventilation system; a Cosmo hot water heater with a fan coil unit that handles the home's heating and hot water needs without a separate heat pump or furnace; energy-efficient appliances; compact fluorescent lighting fixtures; and increased insulation in the floor. Another NextGen house is scheduled to be built in Schenectady, New York, and more are in the pipeline.

**Project Name:** Noji Gardens

**Location:** Seattle, Washington

**Developer:** HomeSight, Seattle

**Home Manufacturer:** Marlette Homes, subsidiary of Oakwood Homes Corporation, Hermiston, Oregon

**Design:** This 6.5-acre subdivision was divided into 75 lots averaging 5,000 square feet. Noji consists of variations on two different models. A two-unit townhome yields two 1,400-square-foot dwellings. The second model is a single-family three-bedroom, two-bath home with an integrated front porch. Neo-Victorian design features may include eyebrow and other decorative window shapes, exterior trim, 8-in-12 pitch roofs, all in varying colors to give the neighborhood character.

**Why chose manufactured:**

Manufactured homes were chosen primarily for one reason: cost savings. And it's paying off.

HomeSight immediately realized savings of 10 to 15 percent on the first phase of building. Estimates on cost savings go as high as 30 percent. Other reasons for selecting manufactured homes are the scarcity of good construction labor.

**Working with permit officials:**

HomeSight and its advocates spent years developing this project, including time going over the plans with HUD. Seattle didn't specifically rule out manufactured homes in any city ordinances but getting through the city building officials was slow. HomeSight got through partly on its



Noji Gardens manufactured homes are set on permanent foundations (courtesy, SWA).



established reputation as a large nonprofit developer, because the project had political support, and because it took care in presenting public officials with the benefits of using manufactured homes in this urban setting. Officials were ultimately swayed by the fact that the homes would be two-story Neo-Victorian homes with 8-in-12 pitch roofs that blend in with the surrounding neighborhoods.

**Reception by neighborhood:**

Went through a neighborhood design review. Held public meetings to show neighborhood advocates what they were doing. Showed them pictures of what they envisioned and neighbors agreed that they looked like “regular” houses. Neighbors were happy to be having this tract of land revitalized. They continue to be impressed by the quality and appearance of the homes.

**Point of interest:** Noji Gardens is one of the first owner-occupied urban manufactured home communities. HomeSight was extremely vigilant in its operation and is realizing significant cost savings over site-built housing. Mike Wolf, general manager of housing manufacturer Marlette Homes, says he is so impressed with the way the project is progressing that they’re pursuing this type of project in other urban areas. The advent of hinged pitched roofs and the ability to stack modules to create two stories led to HomeSight selecting manufactured homes.