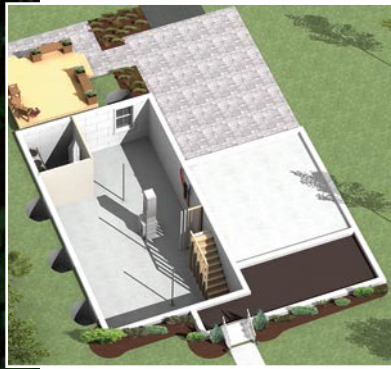




# A Better Home Right Now



## What is **PATH**? PARTNERSHIP FOR ADVANCING TECHNOLOGY IN HOUSING

PATH is the Partnership for Advancing Technology in Housing and was created in 1998 as an initiative of the U.S. Department of Housing and Urban Development.

The program comprises representatives from the home-building, insurance, manufacturing, and finance industries. PATH also maintains partnerships with the Department of Energy, the Environmental Protection Agency, the Department of Agriculture, and several other federal agencies that have direct influence on the home-building industry.

Since its inception, PATH has had a three-fold mission: Increase public awareness of advancements in housing technology to help expedite market acceptance; identify and research building codes and regulations that inhibit innovation; and promote research and development of new housing technology through private and public funding.

For more information on PATH and the latest in home-building technologies, visit PATH online at [www.pathnet.org](http://www.pathnet.org).

With good reason, concept houses have a reputation for being pretentious. Typically, they're packed with technology that serves no real purpose other than to show the public what years of research and development can accomplish. Or they act as a catalog, displaying an overwhelming assortment of building products. This ostentatious reputation is enhanced when designers push structural and aesthetic boundaries with little regard for characteristics that might serve a family well. Often, the result is a house that draws acknowledgement from many, but true appreciation and use from few. Then there's the PATH Concept Home.

This 2100-sq.-ft. house, conceived by the Partnership for Advancing Technology in Housing (PATH; sidebar right) isn't a typical concept project. Built in an impoverished neighborhood of North Omaha, Neb., it does not aspire to show what houses will look like in the future. Instead, this house was designed to demonstrate how some of the best products and systems available today can be used to improve the building process and the quality of a house while improving the lives of those who dwell in and around it.

### **A flexible floor plan allows the house to evolve with the family**

As a family's needs evolve, the demands placed on a house change. Families have children that need supervision. Children become teenagers who want more space and greater privacy. Teens become adults and move out. Elderly relatives are taken in and cared for. A house that can't adapt to these changing needs can easily become the wrong place to live. The PATH house is unique in its ability to adapt to changing circumstances through

mixed-use spaces and remodel-friendly construction details and products.

Mark Bombaugh of Torti Gallas & Partners designed the PATH house to have an "evolving life." His design perspective was one of flexibility: to create a house that is accommodating rather than static.

"Expandability within the shell is unbelievable," he says. To create room for expansion, Bombaugh placed the more-permanent features of the house strategically. "The goal was to discipline the plan to segregate service areas from living spaces. When you concentrate all the services in one area, they're more efficient in terms of how they're built and in the spaces they occupy. By doing this, you also take the majority of the floor plan and open it to allow the owner to change its layout as he or she wants."

The idea of an easily alterable floor plan is not new. Bombaugh sought inspiration from commercial office buildings, where each floor

This concept home shows how smart design, advanced building practices, and modern technologies improve livability and energy performance

BY ROB YAGID



## BUILT WITH ADVANCED METHODS AND MATERIALS, AND DESIGNED TO ACCOMMODATE CHANGE

typically is designed around a utility core to increase office-layout options. The same principle is at work in the PATH house. Because the bathrooms, the laundry room, and the kitchen occupy the same central location in the home, the utility stack that serves these spaces can be contained in one chase. From this utility core, branch lines are fed through ceilings, floors, and soffits, so many of the walls are free of plumbing runs, HVAC ducts, and electrical wires. This layout allows the homeowner to resize bedrooms or reorganize living spaces in the future with less complication or expense.

Spaces within the house have been designed to have multiple functions and to be easily converted for different uses. This is a benefit to the production builder who wants to give customers semicustom options, and to the homeowner who needs those options to sustain quality of family life without having to move or to renovate the house extensively.

Not all attempts at flexible design were a complete success, though. A movable partition wall in the main level's living and dining area is perhaps the most ambitious and innovative aspect of the house. Unfortunately, the prototype wall falls short of its intended purpose. The wall, which is composed of multiple 50-lb. panels that are pressure-locked between the floor and the ceiling, was created to give the homeowner the ability to change the configuration of the living area based on short- or long-term needs. However, moving or taking down the wall to expand the space for dinner parties would necessitate a significant amount of work—more than the average homeowner is capable of. With refinement, a wall system that is easily moved could have a major role in the way the spaces in a house are divided in the future.

### Panelized construction changes the building process

You'd think that having to adjust to new technology would prolong the time it takes to build a house, and

more often than not, you'd be right. But many of the products and systems used in the PATH project were created to make the building process easier and more efficient, not more difficult. Nowhere is that more evident than in the framing of the house, which was done in a week.

Lincoln, Neb.-based builder Fernando Pagés Ruiz built the PATH house from foundation to ridge with prefabricated components that decrease building time and increase quality control and safety on the job site. The foundation was built and poured in a day using insulating concrete forms (ICFs). The floors and walls were built as large panels at a nearby manufacturing plant to the specifications of the house plans ([www.level.com](http://www.level.com)). With a crane hoisting floor panels into position, a small crew maneuvered and assembled the successive sections in short order. By the end of the same day, the first-floor walls were plumbed and braced. Factory-made roof trusses also contributed to the house's quick construction and eliminated the need for interior bearing walls. This design allows for more-versatile interior layouts.

The PATH house is an example of how panelized framing can dramatically improve the way a house is built. As Ruiz explains, "Factory-built components provide a benefit that's hard to find in a lot of stick-built houses: rough framing that is as precise as cabinetry."

### Building an efficient house creates a more-affordable home

The PATH house meets LEED for Homes requirements as well as standards set by Energy Star, Environments for Living, and the National Association of Home Builders (NAHB) Model Green Home Building Guidelines. It also received an award from the U.S. Green Building Council. The house has a significantly smaller impact on the environment than the average house. But perhaps the PATH Concept Home's most noble achievements are found in the social implications of its greenness. Few will recognize that more than the

The architect of the PATH house organized living and service areas so that the house's layout can be reconfigured without extensive remodeling work.

The PATH house was built with efficient construction technology, like panelized floors, walls, and ICFs, to improve the quality of the finished home while increasing construction speed and safety.

### SPECS

**Bedrooms:** 3 to 7

**Bathrooms:** 2½ to 3

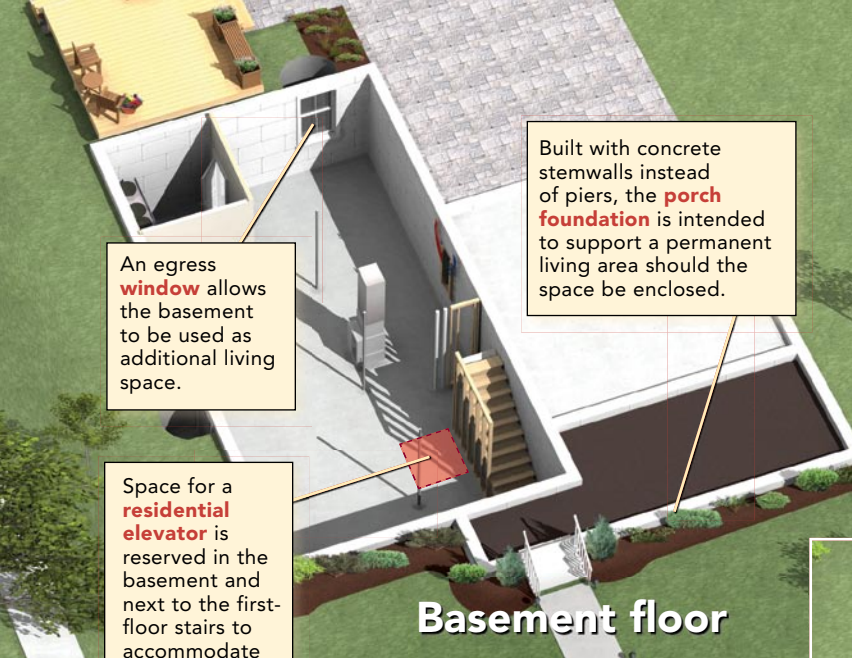
**Size (finished living space):** 2100 to 3756 sq. ft.

**Cost:** \$65 per sq. ft. (reduced by donated products and prototype systems)

**Location:** Omaha, Neb.

**Architect:** Mark Bombaugh, Torti Gallas & Partners

**Builder:** Brighton Construction, Lincoln, Neb.



An egress **window** allows the basement to be used as additional living space.

Space for a **residential elevator** is reserved in the basement and next to the first-floor stairs to accommodate homeowners with mobility needs.

Built with concrete stemwalls instead of piers, the **porch foundation** is intended to support a permanent living area should the space be enclosed.

## Basement floor

The **utility core** houses all the major plumbing lines, electrical wires, a radon stack, and HVAC ducts that service the first and second floor. Having the utilities contained in this compact area makes remodeling easier because many of the living-area walls are empty.

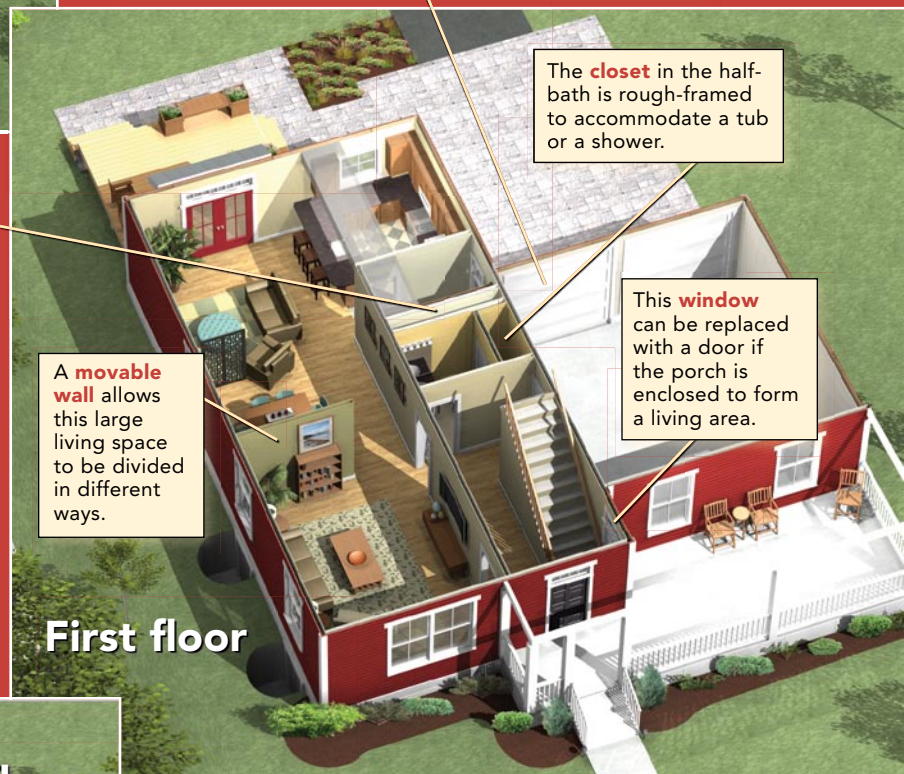


**Construction detail:** Building a house with factory-built floors, walls, and roof trusses is faster and safer than stick-framing, and it significantly reduces construction waste. Because prefabricated building components are assembled in factory settings, quality-control measures are at a much-higher level than on a job site. This results in more-precise framing. [www.ilevel.com](http://www.ilevel.com)

**Construction detail:** The foundation was built using American PolySteel insulating concrete form (ICF) panels. These large ICFs were preassembled off site under tight quality-control measures. The ease and speed with which they can be assembled allowed the construction crew to build and pour the foundation in only one day. [www.polysteel.com](http://www.polysteel.com)



The **attached garage** is designed so that it can be built with a rear, side, or front entrance without affecting the rest of the house's layout. This allows a builder to use the same house plan in a variety of site locations with minimal impact on overall house design.



The **closet** in the half-bath is rough-framed to accommodate a tub or a shower.

This **window** can be replaced with a door if the porch is enclosed to form a living area.

A **movable wall** allows this large living space to be divided in different ways.

## First floor



## Second floor

The **master bedroom** can be enlarged by moving its entry door down the hall so that the small bedroom becomes part of a master suite.

A **bonus room** above the garage can be used for storage or finished off for additional living space.

The **porch** can be enclosed to create an office or a first-floor bedroom while still providing the family with a covered entryway.

A "**flex room**" can be used as an office or a media room, or it can be converted into a bedroom.

**Construction detail:** Air-sealing the roof yields greater energy savings. DuPont AtticWrap helps to keep conditioned air inside the house. It also serves as a weather barrier while still allowing the roof to breathe. This reduces moisture buildup in the house. AtticWrap is installed over the roof's rafters and under 2-in. furring strips to create a channel between the wrap and the sheathing. This channel allows circulating air to keep the roof cooler and drier. [www.dupont.com](http://www.dupont.com)



family that lives there and experiences firsthand the financial benefits of living in an efficient home.

The corner of 25th and Parker, where the PATH house sits, is in the heart of a neighborhood that has been shaped by poverty and crime. It's a place some residents of Omaha fear to go. Although the city is putting forth efforts to redevelop the area, money will continue to be a limiting factor for most residents.

While building sustainably and reducing the house's carbon footprint are important goals, these achievements pale in comparison to the significance of creating a house that conserves the funds needed to provide for a family.

### Energy-saving products enable efficient building systems

The individual energy-saving products in this house are noteworthy, but more impressive is the integrated role each plays in the house's overall energy performance.

The PATH house achieves a tightly insulated envelope with BioBased Insulation ([www.biobased.net](http://www.biobased.net)), a soy-based foam that's sprayed into walls and ceilings. This application process eliminates voids that can reduce insulating performance, which are common with fiberglass batts that often aren't installed correctly. Studies have also shown that spray-foam insulation improves the strength of wall assemblies.

The concept house also reduces outside-air infiltration and conditioned-air loss with DuPont AtticWrap ([www.dupont.com](http://www.dupont.com)), a product that does for roofs what house-wrap does for walls. AtticWrap slows the speed at which a roof can be sheathed, but it helps to air-seal the home. It also acts as a secondary weather barrier that channels any water leakage to the eaves, eliminating water intrusion that can lead to mold and rot. AtticWrap also helps to create a drier attic space by allowing moisture vapor from interior air to diffuse outside the house.

The combined thermal performance of these two products greatly affects the performance of the house's HVAC system.

Resource savings also come from an electric Seisco on-demand water heater ([www.seisco.com](http://www.seisco.com)). The family living in the PATH house won't have to pay to keep water heated when it's not being used. Also, because the service areas and PEX plumbing runs are consolidated in short, dedicated runs, hot water is delivered to the tap quickly. The arrangement of this design and the use of these products make



### 1. Carpet that's better for the environment has many lives.

The nylon carpet used in the concept house is recyclable. If the carpet is removed from the house, it can be reused to make new carpet over and over. This closed-loop manufacturing process helps to divert more than 200 million pounds of carpet from landfills every year. [www.shawgreenedge.com](http://www.shawgreenedge.com)

## SMART PRODUCTS CREATE HEALTHFUL, QUALITY HOUSES



### 2. Walls can be green, no matter what paint color you choose.

The interior of the house is finished with low-VOC paint that resists the growth of mildew. [www.behr.com](http://www.behr.com)

### 3. Hidden chases simplify low-voltage wiring.

The PATH house uses plastic chases installed behind baseboard molding to organize phone, stereo, computer, and television wires. These chases provide easy access to the wires should the homeowners want to remodel or reorganize a room's layout. [www.wiretracks.com](http://www.wiretracks.com)

### 4. Built-ins are easy to move.

Cabinetry takes the place of closets in the flex room and the entry foyer. The ability to move or remove cabinetry simplifies future remodeling.

The materials and products integrated into the PATH project complement the concept house's overall goals. They enable the house to be remodeled with less cost and complication, and promote a more-healthy living environment for the family that resides there.



### 5. Preassembled window casing saves time.

The windows were trimmed with preassembled WindsorONE molding. The carpenter on site simply levels and plumbs the unit in the opening, then nails it in place. [www.quikcase.com](http://www.quikcase.com)

### 6. Wireless switches simplify lighting control.

These switches eliminate the need to run wire from a switch on the wall to a fixture on the ceiling. Pushing a button sends a coded radio-frequency signal to a receiver in a fixture's electrical box. The switches can also work with plug-in receptacles. Wireless switches eliminate the need to snake wire during remodel work. [www.lightningswitch.com](http://www.lightningswitch.com)

the plumbing system more efficient while also enhancing comfort and convenience.

Whether it's heated or not, water is an extremely important resource. Americans consume an exorbitant amount of it, roughly 400 billion gallons every day. Transporting and treating that water takes a lot of energy and money. The average American homeowner spends \$500 a year on water and sewer bills, which is a considerable amount for a family surviving on a marginal income. Many houses, including the PATH house, rely on low-flow toilets, fixtures, and appliances to reduce water consumption. The PATH house goes a step farther, though, by incorporating a Pontos gray-water reclamation system into the plumbing setup ([www.hansgrohe.com](http://www.hansgrohe.com)). New to the U.S. market, the gray-water system sterilizes wastewater from showers and bathroom sinks with ultraviolet light. The clean water is then used to fill toilets, run washing machines, and irrigate lawns, cutting a house's water usage nearly in half and consequently reducing utility bills.

### A healthy house promotes better living

The materials and products used in the PATH house not only were intended to be environmentally friendly but also were designed with the family's health in mind.

To ensure healthful indoor-air quality, the PATH house relies on a balanced system based on quiet, compact exhaust fans and fresh replacement air supplied through the HVAC system. Panasonic WhisperGreen ([www.panasonic.com](http://www.panasonic.com)) fans are located throughout the house and in the attached garage, an area often overlooked for mechanical ventilation. While the fans draw stale air out of the house, a Honeywell ([www.honeywell.com](http://www.honeywell.com)) controller automatically brings fresh air into the home for 20 minutes every hour.

Mold, which can contribute to a host of health problems, can take up residence on many construction materials. The PATH house was built to reduce mold growth by managing moisture and eliminating its food sources. Instead of standard drywall faced with paper, which is a mold favorite, paperless drywall was used throughout the house. The kitchen and bathroom countertops all are made of solid-surface products that are nonporous and resistant to mold growth ([www.corian.com](http://www.corian.com)). A

natural floor from Forbo Flooring (Marmoleum; [www.forbolinoleumna.com](http://www.forbolinoleumna.com)), which is bactericidal, was used in the kitchen. The walls and ceilings were finished with low-VOC paints as well as Earth Plaster, a decorative product from American Clay ([www.americanclay.com](http://www.americanclay.com)). Earth Plasters are mold resistant and are made from natural clay and pigments as well as recycled aggregates. Finally, Shaw Anso nylon carpet ([www.anso.com](http://www.anso.com)) was used throughout the second floor. This nylon carpet isn't bactericidal, but it's designed to be a cradle-to-cradle product. In other words, 100% of it can be recycled into new carpet when it wears out or when the homeowners choose to change it. That's healthfulness on a large, environmental scale.

### This house matters

The PATH house stands apart from the typical concept project in form and function, but not completely in purpose. A concept house always has an agenda.

The PATH house was designed and constructed to scale back what's considered the boundaries of mainstream building and to help push a conservative building industry into accepting new technology. Builders build houses that people want to buy, and people are drawn to the familiar. These tendencies can inhibit progress in the building industry. This house shows that innovation doesn't have to take the form of eccentricity and that builders can adopt advanced building materials and systems without fear of being rejected by the marketplace. The house also shows that homeowners can live in a high-performance house that's comfortable and affordable without being viewed as odd.

The lessons from this project have a slightly different impact than the house itself. When the parade of photographers and writers no longer lines Parker Street and when the video cameras stop rolling, the house will remain. For the family that lives there, it simply means living in a quality home that will serve their needs. But for the community in which the house sits, it will continue to be a symbol of progress and of something good. Maybe that will build a little hope in a community searching for better days, because as Mark Bombaugh puts it, "If you're successful in something, people pay attention, and that's the way things begin to change." □

Rob Yagid is an assistant editor. Photos by Daniel S. Morrison, except where noted.

### FineHomebuilding.com

Visit the Magazine Extras section of our home page to hear manufacturers explain the benefits of the products in this house and to get tips on designing HVAC systems for high-performance homes from the PATH Concept Home's HVAC designer.

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