Building Affordably

A Primer on Off-Site Construction Methods and the Opportunity to Expand Homeownership

2019



Illuminating solutions. Sparking change.

BACKGROUND The homeownership supply gap

The Twin Cities metropolitan area faces a severe shortage of affordable homeownership opportunities, especially for low- and moderate-income households at 50 to 100 percent of Adjusted Median Income (AMI).¹ There is currently a gap of 6,000 units in annual production between new supply and demand in the Twin Cities market according to the 2018 Minnesota Task Force on Affordable Housing.² While market forces may close this gap somewhat, seven full years into the recovery from the Great Recession, production continues to lag well behind demand and additional approaches are needed.

Drawing on interviews with more than 50 local and national industry leaders, as well as an extensive literature review, Family Housing Fund identified off-site construction as one of a handful of cost-efficient interventions capable of creating hundreds to thousands of units in the region annually, both through production and cost savings.

THANK YOU

Thanks to Paul Fate of Paul Fate Associates and W. Matthew Perrenod of Mission Enterprise Strategies for contributing research and writing to this project.

¹ In the Twin Cities metropolitan area, 50 to 100 percent of AMI represents a range of \$47,150 to \$94,300 for a family of four. ² Report of the Minnesota Task Force on Housing, More Places to Call Home: Investing in Minnesota's Future, August 2018.

2

"The integration of architecture and technology into the factory floor is the next, great frontier in the housing industry."

Carol Galante

Former Federal Housing Administration commissioner and faculty director at the Terner Center for Housing Innovation at the University of California, Berkeley

Introduction

Rising housing costs, severe labor shortages and dramatically constrained affordable housing availability in urban areas are driving a need for innovation within the housing sector of the construction industry both in the Twin Cities and nationally.

The construction sector is a \$10 trillion industry internationally and one of the largest industries in the world. However, it is ripe for a dramatic increase in productivity and could capture \$1.6 trillion of additional value by catching up with productivity levels across the rest of the world economy. According to a 2017 McKinsey Global Institute report, "Construction sector labor-productivity growth averaged 1 percent per year over the past two decades, compared with 2.8 percent for the total world economy and 3.6 percent for manufacturing."³



3

³ McKinsey Global Institute, Reinventing Construction: A Route to Higher Productivity, February 2017, page 2. McKinsey Global Institute analysis of data from 41 countries that generate 96% of global GDP. Per the McKinsey report, the most significant opportunity to increase productivity is to move to a manufacturing-style system of production. Demand for housing, offices, schools and hotels produced on shorter timeframes, less expensively, with high performance and sustainability in mind is escalating rapidly. For example, Factory OS in California will build 300 modular apartment units in San Francisco this year for Google. Marriott International aims to use modular construction for 13 percent of its North American hotel projects this year. These early adopters at scale signal disruption and change for the field.⁴

Residential construction faces specific factors that are driving a sense of urgency and a departure from business as usual. There is a widely recognized construction labor shortage in Minnesota and across many parts of the country. The Great Recession severely impacted the housing industry, causing many contractors to go out of business and many construction workers to leave the field for other jobs. Builders are finding it difficult to recruit the next generation of laborers. In June 2018, the New York Times reported that the number of residential construction workers is 23 percent lower than in 2006 and construction prices are up 5 to 10 percent per year.⁵

This overview explores the potential of off-site construction as a strategy to increase the supply of homes affordable to low- and moderate-income buyers in the Twin Cities. It covers two types of off-site construction-volumetric modular and manufactured construction—which are not common now in the metropolitan Twin Cities. It also examines panelized construction processes as an example of technological adaptation to date. Definitions are provided for each application along with examples of work underway regionally and nationally. Each application has its own cost-savings profile, and each has its own benefits and challenges for growth and impact.

The following graph shows the estimated cost and time savings possible for both modular and manufactured housing. Shifting to production of 1,000 units of modular multifamily residential housing a year represents a \$24 million annual cost savings over conventional construction while producing 200 additional units of modular and manufactured singlefamily housing, respectively, represents a \$16.2 million savings per year over conventional construction. These 1,400 units of housing represent savings of over \$40 million.



POTENTIAL ANNUAL SAVINGS SWITCHING

- Modular Multifamily Construction
- Modular Single Family Construction



*This assumes manufactured homes qualify for a Freddie Mac Choice loan

4

⁴ Kim Slowey, Offsite 101: Our guide to the emerging construction method, Construction Dive, July 24, 2017.

⁵ Conor Dougherty, The New York Times, "Piece by Piece, A Factory-Made Answer for a Housing Squeeze," June 7, 2018.

Manufactured Single Family Construction*



Granes lift modules into place at Valencia Grove in Redlands, Calif. Photo from Novogradac & Company.

Adaptation to Date: Panelized Construction

Large-scale multifamily housing general contractors in the Twin Cities and across the country use panelized construction in various forms, and have done so over the past 20 years. This already established application is a potential precedent for integrating a next level of scale and sophistication in off-site construction in the local industry. Panelized applications have become more technologically advanced and more fully integrated into the construction process over time. Two examples are well-regarded Twin Cities multifamily builders: Frana Companies owns its own panel shop while Weis Builders contracts with third-party panel shops. These panel factories are all highly computerized and provide products built with a high level of precision and quality.

In the panelization process, wall sections are framed with exterior sheeting attached and these become the exterior perimeter walls. Interior walls are also made in the factory as framed members. Both the exterior and interior components are bundled and trucked to the building site, ready for assembly.

Another respected general contractor based in the Twin Cities provided insights on time and cost savings that have been integrated into typical construction processes from panelized construction.⁷ Cost savings from panelization were reported as typically about 10 percent on the rough/carpentry wood package. This package is typically 15 to 20 percent of the overall construction cost. On a recent 180-unit development that cost \$29.5 million, the lumber package was \$5.2 million. Therefore, the 10 percent savings represented about \$520,000. Panelization typically saves about a month of construction time at this scale and, in this case, saved approximately \$100,000 in general conditions costs. In this example, the total of \$620,000 represents about a 2 percent cost savings in overall construction costs. Other established general contractors concurred that an average of 2 to 4 percent savings is typically achieved through panelization, compared with non-panelized stick-built practices, on multifamily development. These cost savings are now integrated into the cost profile of typical developments.

DEFINITIONS APPLICATIONS OF OFF-SIT CONSTRUCTION

PANELIZED CONSTRUCTION. According to the National Association of Home Builders, "A panelized system incorporates construction techniques that use advanced technology, quality materials and a controlled work environment to build energy-efficient homes in less time."⁶ There are several different types of panelized systems but they all imply building structural components of housing in a climatecontrolled facility. Once the panels are completed, they are loaded on a truck and transported to the construction site. Simple panelized construction techniques are already in wide use in the United States, including in Minnesota, for both single-family and multifamily housing.

MODULAR CONSTRUCTION. In this construction approach, individual components or modules are built off-site in a factory and then transported to the site and assembled there, typically with the use of a crane to lift the modules in place. The modules are permanently affixed on a foundation, stacked vertically if the building is more than one story and linked horizontally. This type of construction has sometimes been compared to building with Lego[®] blocks. Modular construction is subject to all state and local building codes, unlike manufactured housing which is regulated by Department of Housing and Urban Development (HUD) code. Modular construction lends itself to high-density, multistory applications both residentially and commercially where economies of scale can be achieved. Modular construction has had limited application in the Twin Cities but is expanding rapidly in other parts of the country, especially in urban real estate markets on the coasts.

MOBILE HOMES AND MANUFACTURED

HOUSING. These two terms share a common history and are frequently used interchangeably by the general public. In 1976, the National Mobile Home Construction and Safety Act went into effect and HUD established a federal code that sets standards for design and construction, body and frame requirements, thermal protection, plumbing and electricity, fire safety and energy efficiency as well as house systems performance. The Federal Housing Act of 1980 mandated that the term "manufactured" be used in place of "mobile" in all federal laws and literature that referenced homes built after 1976. Historically, manufactured homes have been used most heavily in rural areas and small towns but given changing trends in production, customization and financing, this form of construction warrants discussion in this report as an underutilized strategy in the Twin Cities region.

5

⁶ National Association of Home Builders (NAHB), NAHB Panelized Building Systems Council, Panelized Homes, Custom Designs, Your Building Solution.

⁷ Interview with Chad Weis, general manager, Eagle Building Company.

Benefits and Challenges of Each Type of Off-Site Construction for Affordable Ownership

. MODULAR CONSTRUCTION

Modular construction has the potential to create significant cost savings and is gaining momentum nationally but still represents only a 3.02 percent share of commercial and multifamily construction.⁸ The West Coast has been a national leader in the expansion of modular construction. The even more dramatic shortages of affordable housing and labor, and the resulting rising costs of construction in those markets, have driven a sense of urgency for innovation. California and the Seattle area have witnessed an increase in larger scale modular developments and large-scale factory startups. For example, Factory OS, based in Vallejo, Calif., is a new 250,000-square-foot factory that has committed to producing high-quality four- and five-story apartment buildings with 20 percent overall cost savings and 40 percent time savings, as compared with other typical practices. Factory OS is now in partnership with Google to build an initial 300 homes for the technology company. Other large-scale factory operations are springing up as well with an emphasis on integration of technology, design and construction.

BRIDGE Housing in California, a large nonprofit affordable-housing developer, recently completed two Low Income Housing Tax Credit developments using modular construction with investment from U.S. Bank. BRIDGE Housing CEO Cynthia Parker stated, "As additional successful examples of modular come online, as developers, architects, general contractors and lenders get more comfortable with the technique, I think we will see an increase in the number of affordable homes that are built using modular construction."⁹

Examples of modular construction in the Twin Cities metro area are primarily detached single-family construction in urban neighborhoods. For example, SMART Homes has teamed up with the Dynamic Homes factory out of Detroit Lakes, Minn. (approximately 200 miles from the Twin Cities) as well as a Wisconsin-based factory, to build infill homes on the North Side of Minneapolis and on the East Side of St. Paul. A representative from SMART Homes emphasized that achievement of more substantial cost savings through modular requires building at scale.

BENEFITS OF MODULAR CONSTRUCTION

It's Cheaper. The ability to achieve economies of scale is a critical factor in maximizing cost savings through modular construction. After building 12 to 15 single-family homes on infill lots in different neighborhoods across the Twin Cities, representatives from SMART Homes have determined that they save, on average, 3 to 7 percent over typical construction.¹⁰ Transportation costs are estimated at \$5,000 to \$8,000 per home.

Modular projects can be completed 30 to 50 percent sooner than with traditional construction.

6

Larger multifamily affordable rental developments in California provide examples of modular construction at scale. BRIDGE Housing has produced four- and five-story developments using modular construction that are demonstrating 20 percent cost savings and roughly 30 percent time savings. Factory OS is using this model of four- to five-story apartment developments and is targeting 20 percent cost savings with a stretch goal of 30 percent cost savings.

It's Faster. The Modular Building Institute (MBI), an industry trade and research association, has conducted comparative analyses on multiple larger scale modular projects, both commercial and residential. MBI has determined that modular projects can be completed 30 to 50 percent sooner than with traditional construction. This is because construction of modular buildings can occur simultaneously with site and foundation work. The closer proximity of labor and materials, more efficient use of labor and reduced weather delays also save time.¹¹

⁸ Teresa Garcia, Novogradac & Company, "Could Modular Housing Be Affordable Answer to Rising Construction Costs?" October 3, 2017, Volume 8, Issue 10. ⁹ Ibid.

¹⁰ Interview with Gary Findell, managing partner, Smart Homes.

¹¹Modular Building Institute, What is Modular Construction, available at www.modular.org.

Factory OS is targeting 40 percent time savings on current multifamily housing developments and has established a stretch goal of 50 percent time savings on future developments. This time savings also results in reduced construction period financing for the developer and more rapid occupancy for the owner.

It's Smarter. Modular buildings are constructed to meet the same building codes and architectural specifications as conventional construction. MBI argues that modular construction is better engineered since it "relies on advanced Building Information

Factory OS is targeting 40 percent time savings on current multifamily housing developments and has established a stretch goal of 50 percent time savings on future developments.

Modeling (BIM) for visualization to assess the energy performance and identify the most cost-effective efficiency measures."¹³ The ability to use BIM is enhanced because modular construction allows close and early coordination of systems, materials and people.

It's Greener. Sophisticated factory-built construction results in less waste of material, fewer disturbances on site and a tighter end product. Factory construction implies more efficient use and reuse of materials, tighter control of inventory, and protection of materials from the elements. It avoids materials getting wet on site.

It's Safer. Factory employees are able to work year-round in a climate-controlled environment that is also a safer work environment. This lends itself to more satisfied and productive employees.



CHALLENGES FOR MODULAR CONSTRUCTION

Pipeline. Investing in a large factory operation that is capitalized to run year-round with high fixed costs implies having a steady pipeline of projects within a cyclical and unpredictable real estate market. This is one of the most significant hurdles to success for these factory operations. Given the cyclical nature of housing development, some operations are diversifying product lines beyond family and senior housing to include hotels, student housing and other facility development.

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7

Upfront Investment. The startup of a sophisticated and automated facility requires a substantial investment in real estate, equipment and material. Investment is predicated on a clearly demonstrated pipeline of projects, an excellent business plan, a strong balance sheet and the reputation of trusted principals.

¹² Graphic by Modular Building Institute

¹³ Modular Building Institute, available at www.modular.org.

Transportation. The logistics and costs of transporting large and sometimes unwieldy modules is a significant challenge.

Balancing Standardization vs. Customization. Striking the right balance between the need for standardization to keep costs down and assure a level of predictability with the need to customize for any given client and product is a substantial challenge.

Need for Continuous Innovation. In the young, dynamic field of off-site construction, successful operations will need to commit to a culture of innovation and continual research and development. Technology and product manufacturing companies are used to disruption, but the construction and real estate industries have not necessarily demonstrated this same capacity to readily adapt and change.

EXAMPLES

Dynamic Homes and partners. Dynamic Homes is based in Detroit Lakes, Minn. and has been producing modular housing since 1970, including single-family homes, duplexes multifamily housing, and commercial structures. The company prides itself on building a tighter, stronger home with 66 percent less air infiltration, greater overall energy efficiency, and a 50 percent reduction in heating and cooling costs. Dynamic is owned by Ho-Chunk, Inc., the economic development corporation of the Winnebago Tribe of Nebraska, and has built a considerable amount of tribal housing. The tribal housing built by Dynamic has received the highest energy-efficiency ratings given by Minnesota Power through its Triple E Program.¹⁴

Dynamic has done substantial single-family work with SMART Homes in the Twin Cities. Together, they have built 12 modular infill homes on the North Side of Minneapolis and St. Paul and are working on another half dozen this year. They have also started to plan multifamily development projects. SMART Homes representatives report modest savings for single-family homes, approximately 3 to 8 percent on average. Other advantages are a higher quality home that is tighter, stronger and more energy efficient. Site assembly is also much faster and the process produces considerably less waste compared with site-built housing.¹⁵

Dayton's Bluff Neighborhood Housing

Services (DBNHS) has been building modular homes in partnership with SMART Homes for several years. DBNHS is developing an ecovillage using modular homes and a combination of other environmentally sustainable practices including solar farms, urban agriculture and a neighborhood farmers' market. Factory OS. This is a new factory opening in Vallejo, Calif., at the site of a historic shipbuilding warehouse. Rick Holliday, the founder, has been building housing for 30 years and thinks the United States is "ridiculously underperforming on housing, while we are having a housing crisis."¹⁶ The factory is 256,000 square feet. Factory OS's core business line will be production of four- to five-story apartment buildings. Its geographic target will be the Oakland and San Francisco metro areas, primarily near mass transit stations.

Factory OS plans to build 2,000 to 3,500 units per year. The company's initial targets are to build 20 percent less expensively, 40 percent faster and have 300 local people trained and employed to run the factory. Stretch goals are to build 30 percent less expensively and 50 percent faster. The company plans to pay employees \$50,000 to \$60,000 a year with full benefits and has been working closely with building trade unions. Holliday states that the factory must make a profit, invest in innovation, and continuously attract new capital.

The Terner Center for Housing Innovation

at the University of California, Berkeley will operate a Housing Innovation Lab at the factory. Center initiatives will include Collaborative Learning Resources, Future-Ready Design, Lowering Building Costs, Standardized Design, Lean Manufacturing, Smart Home Technology and Greener Construction.¹⁷ Katerra Inc. Katerra's value proposition is "better, faster, cheaper"—not lesser quality, but rather, a superior product at a reduced cost. The company was started in 2015 with primary investors and leadership from the technology industry, an industry that is constantly disruptive. Founder Michael Marks ran Flextronics and grew it from a \$90 million company to a \$23 billion company. Katerra's leadership wants to control the building process from top to bottom, being the architect of record, the general contractor of record and procuring materials from all over the world.¹⁸

Katerra is based in Menlo Park, Calif., with a 250,000-square-foot factory in Phoenix. Its construction portfolio includes multifamily, industrial, retail and hospitality buildings. After raising a billion dollars from tech investors to start, Katerra is now a \$3 billion company with 4,500 employees. The company is building other factories and says it needs factory capacity within 500 miles of major markets.

Katerra builds assemblies in the factory but is not a volumetric¹⁹ modular developer because the company has not found a way to transport large modules cost effectively. On average, 55 to 60 percent of the construction on its projects is being done in the Katerra factory. This is a well-capitalized company with a business model that is distinct from Factory OS or Dynamic Homes. It represents the diversity of entrepreneurial approaches that can be expected in this rapidly growing and changing sector.

8

¹⁹ Volumetric modular construction refers to the production of factory-finished, ready-to-stack modules

¹⁴ Dynamic Homes, Why Build Dynamic, available at www.dynamichomes.com/why-build.php.

 $^{^{\}rm 15}$ Interview with Gary Findell, managing partner, Smart Homes.

¹⁶ Factory OS, The Future of Affordable Housing, available at www.factoryos.com.

¹⁷ Factory OS, Innovation Lab, available at www.factoryos.com.

¹⁸ Interview with Justin VanLeuvan, director of business development, Katerra, Inc.



A manufactured home. Photo courtesy of the Manufactured Housing Institute.

2. MOBILE HOMES AND MANUFACTURED HOUSING

Housing expert Dr. George McCarthy, president and CEO of the Lincoln Land Institute, has studied manufactured housing and makes a compelling case for the importance of manufactured housing as a valuable piece of the puzzle in solving affordable housing challenges. He says that homes built in factories represent the largest unsubsidized affordable housing stock in the United States. Nearly 8 million families, with a median income of \$29,000, reside in manufactured homes. According to McCarthy's research, the quality of manufactured housing has improved dramatically and rivals site-built housing; meanwhile, despite preconceptions, manufactured homes do appreciate in value.²⁰

SUMMARY CHARACTERISTICS OF MANUFACTURED HOUSING IN THE UNITED STATES: 21

Minnesota, with four factories in the state, only built 713 manufactured homes in 2017. Meanwhile, Texas was the largest producer with 17,676 homes in 2017

• Regulated by HUD code and not state and local building codes.

Built in three standard sizes—single wide, double wide and triple wide.

Built completely inside a climate-controlled factory.

Built on steel beams and transported in complete sections to the home site.

Wheels, hitch and axles are removed when the home is placed on a permanent site with blocks, piers, slab or foundation walls. 77 percent of new manufactured homes are titled as personal property or "chattel" rather than real property, which limits financing options and typically implies higher interest rates and shorter loan terms.

Approximately 22 million people live in 8.5 million manufactured homes across the country.

The average sales price of a new manufactured home without land is \$70,600.

10 percent of new single-family home starts are manufactured homes.

93,000 homes were produced in 2017.

The median household income for those living in manufactured housing is \$30,000.

Site-built homes average \$107 per square foot for construction costs while manufactured homes average \$49 per square foot, nationally.

 20 Interview with George McCarthy and from "From Social Stigma to Housing Solution: The Case of Manufactured Housing,"

a lecture by George McCarthy at the Lincoln Land Institute, June 25, 2015.

²¹ Manufactured Housing Institute, 2017 Manufactured Housing Facts, Industry Review, March 2018.

BENEFITS OF MANUFACTURED HOUSING

It's Cheaper. Manufactured homes are being built at prices that are up to 50 percent less than the square-foot price of site-built homes. When additional amenities are added, including garages, pitched roofs, porches and upgraded finishes, this can drop to 20 to 25 percent less than site-built homes but still represents a substantial savings. The cost savings come from efficiencies in the factory-building process. Factories provide a climate-controlled environment with an assembly line approach using standardized material. Major contributing cost-savings factors include reductions in labor time and costs, economies of scale in procurement of materials and equipment, and construction-period time savings.

It Saves Labor. Factory employees can be trained and deployed more efficiently than is the case with site-built construction. Factories also provide more predictable and steady employment in climate-controlled settings. There are fewer weather delays and the close proximity of equipment and employees makes for a more efficient operation.

It's Efficient. High-capacity off-site factories can buy building materials and appliances at scale. Given the high volume and steady flow of business, manufacturers are able to negotiate deep discounts on building products and services.

It's Faster. The construction period is typically shortened from six or nine months to a month or two with manufactured homes. This lowers the cost of construction financing. This shorter timeframe also minimizes vandalism and theft from the site.

CHALLENGES WITH MANUFACTURED HOUSING

Perception. While significant progress has been made in the quality of manufactured homes, this part of the off-site industry continues to suffer from perceptions of inferior quality and concerns (most unsupported) about holding and accumulating real estate value.

Transportation Costs. The cost of transporting manufactured housing is estimated at approximately \$5 per mile per section. For example, a medium-priced double-wide manufactured home would cost \$2,000 to transport 200 miles.²²

Municipal and State Codes. The fact that manufactured homes are regulated by HUD code rather than state and local codes can lead to skepticism and result in a lack of exposure to quality improvements and positive changes in the industry on the part of regional regulatory bodies. It should be noted that the HUD code does include regional variations reflecting different climate zones.

Financing. There are two primary ways to finance the purchase of a manufactured home. Conventional mortgages are available to qualified buyers who will own both their home and the parcel of land it sits on. Chattel loans, or personal property loans, are typically used for homes on land not owned by the buyer, such as in a manufactured home community, or when only the home is financed and not the land. Personal chattel loans demand higher interest rates with shorter terms. Appraisals for manufactured homes are typically done using manufactured home comparables rather than site-built comparables. This keeps appraised values down and contributes to the perception that manufactured homes won't hold their value and appreciate over time—which is more properly a function of financing and land tenure rather than of the housing stock itself.²³

Manufactured home production and use is expanding in Minnesota but the expansion has been primarily in rural areas and small towns. Given the increasing sophistication of financing and production in this part of the industry, manufactured housing will continue to grow as an option for expanding affordable homeownership opportunities in the region.

²² Interview with Chris Nicely, chief executive officer, Next Step Network.

²³ Interview with Danny Gardner, vice president, Affordable Housing Lending and Access to Credit, Freddie Mac.

EXAMPLES

Freddie Mac Choice Program. Government Sponsored Enterprise reform was enacted as legislation in 2008. The Duty to Serve program was specified in this legislation. For the Federal Home Loan Mortgage Corporation, or Freddie Mac, the Duty to Serve program is focused on supporting underserved and low-income homebuyers and renters across the country. Primary focus areas for Duty to Serve include manufactured housing, rural communities, affordable housing preservation and energy conservation.

equity over time. It would also serve to raise the bar on minimum quality standards for the industry.

Next Step. Next Step is a well-respected national nonprofit member organization that works to promote manufactured and factory-built housing as a viable path to affordable homeownership. Next Step grew out of a desire to make manufactured housing a practical, sustainable solution to the housing affordability crisis facing many rural Americans and to increase opportunities

This financing innovation has the potential to dramatically change the landscape for manufactured homes, shifting more heavily to real property financing with much better terms and the ability to more predictably build home equity over time.

Freddie Mac is rolling out an important innovation in financing for consumers of manufactured homes. Working closely with the banking and appraisal industries nationally as well as its regulator, the Federal Housing Finance Agency, Freddie Mac developed "Choice," a real property lending product targeted to manufactured homes, and is finalizing a pilot roll-out. The manufactured home industry has developed construction specifications that include affixed garages, porches, pitched roofs, better cabinetry and other amenities that will enable appraisers to use site-built comparables with similar features.²⁴ This financing innovation has the potential to dramatically change the landscape for manufactured homes, shifting more heavily to real property financing with much better terms and the ability to more predictably build home

for lower income families to build personal wealth over time.²⁵ Next Step is increasingly working in larger metropolitan areas and reports growing interest in manufactured homes beyond small towns and rural areas. Representatives from Next Step acknowledged that modular housing tends to be more widely accepted in urban areas compared with manufactured housing because potential owners are more comfortable with state and local codes, would like to have foundations and basements, and find financing is easier.²⁶

Next Step works closely with lenders, regulatory agencies and communities to build acceptance and assure quality. Next Step has a large contract with Freddie Mac to work on its Duty to Serve mandate, including the new Choice lending product.

Clayton Homes, Redwood Falls, Minn.

Clayton Homes is one of the largest manufactured-homes companies in the United States, producing nearly half of the manufactured homes built in the United States. Owned by Berkshire Hathaway, Clayton Homes markets itself as providing high-quality products that can serve a range of incomes.

Redwood Falls has had a Clayton Homes factory since 2004, when Clayton Homes merged with a long-standing Redwood Falls company, Schult Homes, which was founded in 1934. Schult Homes built trailer homes for four decades and then moved into permanent structures in 1974.

The current Redwood Falls operation has a factory floor of approximately 125,000 square feet and produces "20 floors" or 10 doublewide homes in a typical week. Many of its 220 employees have been with the company for over 10 years. Sixty percent of its production is manufactured homes and 40 percent is modular. The biggest cost differential between the two products is the cost of a foundation for a modular home, which adds approximately \$25 per square foot. Modular also tends to include more upgrades, such as a steeper 5/12 roof pitch instead of 3/12, and may have more custom features. Clayton Homes representatives believe the new Freddie Mac Choice product will be path-breaking for the industry, and the new minimum specifications and expanded real property lending will boost the standing and attractiveness of manufactured housing.

The manufactured homes produced in Redwood Falls can sell for as little as \$65,000 for single-wides (not including land costs). On the other end of the cost spectrum, manufactured homes have sold for as much as \$500,000.

²⁴ Interview with Mike Dawson, vice president, Single Family Housing, Freddie Mac.

²⁵ Next Step, available at www.nextstepus.org.

²⁶ Interview with Chris Nicely, chief executive officer, Next Step Network.

CONCLUSIONS

Off-site construction, especially modular construction, is on the cusp of a major breakthrough in the U.S. construction industry. The profound loss of skilled construction labor is a primary driver of that change and disruption. A second major driver is the palpable shortage of affordable rental and ownership housing and the ability to save approximately 20 percent in construction costs and 40 percent in construction time in larger multifamily developments. A third driver is the growing demand for sustainable, smart, high-performance buildings. While modular construction has the greatest cost-savings potential for multifamily construction, the opportunity it represents for increasing the pace and reducing the cost of single-family development should not be underestimated, given the substantial underproduction of homeownership units in the region.

The Twin Cities has competitive advantages that give us the opportunity to become a regional Midwestern leader in the off-site construction industry, including:

According to Forbes magazine, while three-quarters of venture capital dollars are invested in California, New York and Massachusetts, the Twin Cities is one of 10 emerging cities effectively embracing and investing in startups.²⁷

The Twin Cities is considered a top-tier metropolitan area nationally for the capacity and sophistication of its architectural, design, 3D, BIM and overall construction industry talent and resources.

The Twin Cities and Minnesota already have a thriving and diverse manufacturing sector. $^{\rm 29}\,$

The Twin Cities has a major university with schools of public administration, architecture and business that are ranked No. 9, No. 23 and No. 29 in the country, respectively.²⁸

The Twin Cities and Minnesota have one of the most advanced affordable housing industries in the country, with strong finance, nonprofit and for-profit delivery capacity, public policy and public/private partnerships.

The Twin Cities region has the highest number of Fortune 500 companies per capita in the country.

Meanwhile, in the case of manufactured housing, rapid changes in quality and design standards are already underway in an industry that already has a proven track record of building homes at affordable price points.

Manufactured housing should be part of a Twin Cities regional homeownership strategy, no longer relegated to rural communities.



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