



# Design Manual

[ for a better way to build ]



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# Contents

What We Build	2
<i>Common Modular Questions</i>	
What is modular construction?	3
What size are modules?	4
What are layout options?	5
How do modules fit together?	6
How green is modular?	7
What materials can be used?	8
How much time is saved?	9
How much does modular cost?	10
What is the future of modular construction?	11

# What we build:



Single Family



Multi-family



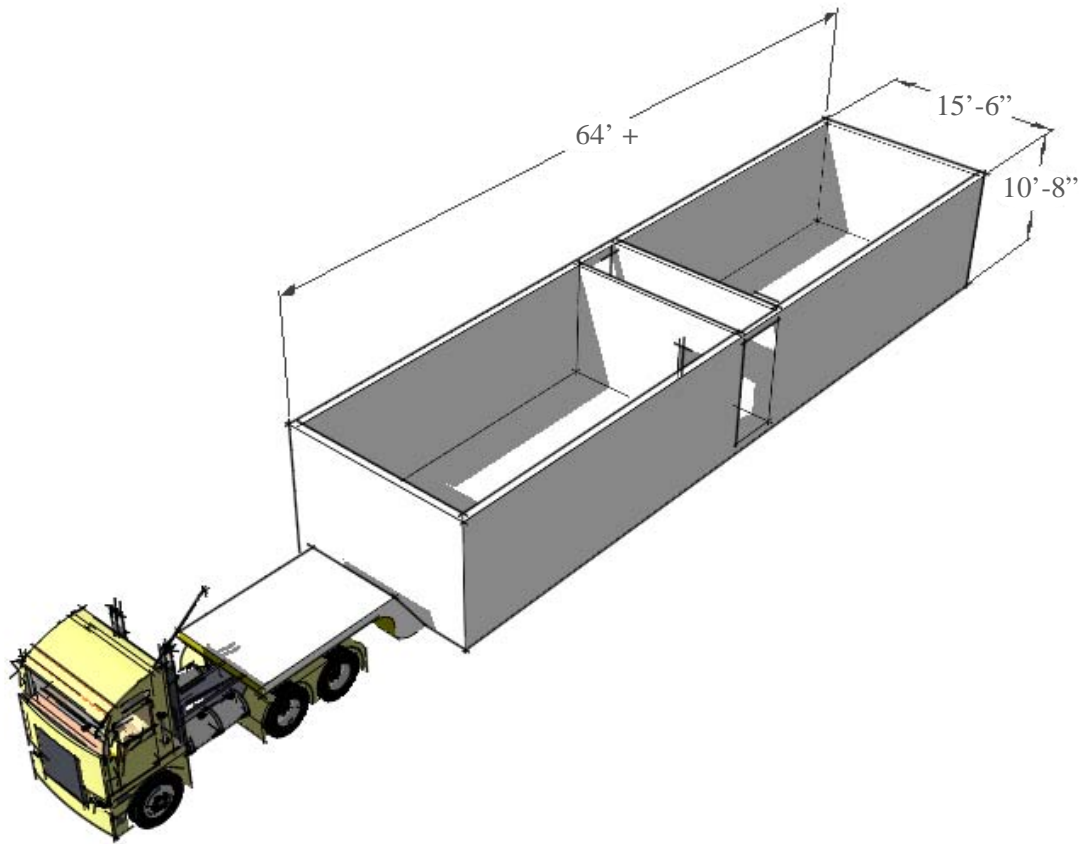
Office

# What is modular construction?



The primary distinction of modular building is that a large portion of a project is constructed in a factory setting before being quickly assembled onsite, finished and enclosed. Modular construction is also often called “off site construction,” “pre-fabricated construction,” or “systems construction.” The amount of construction that is performed in the factory versus in the field can vary greatly from project to project. Keiser’s method of modular construction is similar to onsite stick frame and panelized construction in many ways, but with the added benefits of construction in a climate-controlled, factory environment.

# What size are modules?



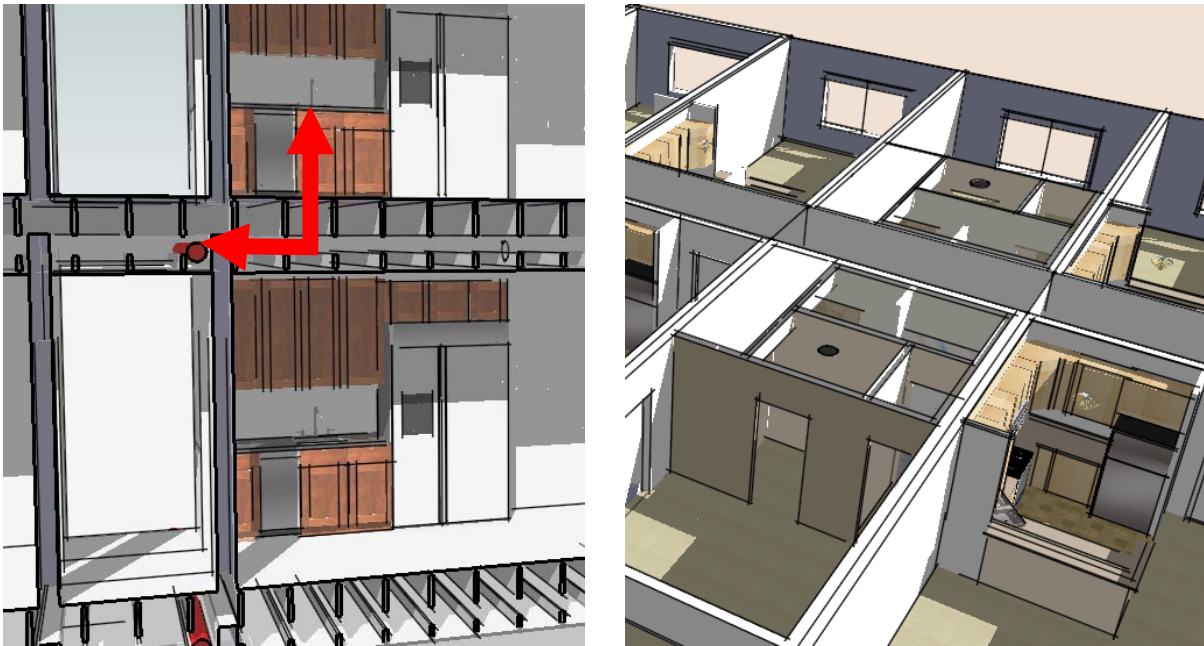
The limitations of module size vary slightly from state to state due to road requirements, but for most of New England, boxes can be as large as 10 feet 8 inches high, 15 feet 6 inches wide, and 64 feet long. This basic configuration is ideal for double loaded corridor buildings over parking garages. At the early stage of a project, it is best to have a Keiser representative perform a site inspection and identify any constraints related to trees, power lines, or access. Site constraints rarely rule out the viability of modular construction, but they may inform the size of modules used and the layout of a building on a specific site.

# What are layout options?



Sure, it is good to line up major structural lines and demising walls to realize maximum efficiency, but don't limit yourself to thinking that spaces in modular buildings have to follow rigid rectangular modules, either horizontally or vertically. While module sizes are limited due to transportation requirements, the rooms within Keiser's modules are virtually unlimited in size and shape. Vaulted ceilings, expansive lobbies, and other unique spaces are possible when modules are opened to each other. Further, beams can be hidden within ceiling and floor planes rendering seams between modules invisible. The floor plan above is of a 95 unit senior housing project Keiser completed in Somerville, Massachusetts in 2010.

# How do modules fit together?



Although modules can open to one other as illustrated on the preceding page, the majority of building modules include a roof and ceiling and are most often stacked vertically. In order to provide space between floors, ceiling joists are typically smaller in order to provide a cavity between the ceiling joists of the module below and the module above. Plumbing, electrical, and mechanical services can be located in this space perpendicular to the direction of framing. Open web joists, truss joists, and steel can also be used if needed. Double walls between units enhance STC ratings and provide ample shear wall locations.

# How green is modular?



High-efficiency components and green design practices are integral to the Keiser approach. Your project will be Energy Star qualified and LEED ready without little or no premium for the components supplied by Keiser. There simply is no substitute for creating high-efficiency building envelopes in a climate controlled factory setting. Other sustainable design elements like solar panels or geothermal heating can be incorporated in the same manner you would with any construction type. The building above is a modular “Net Zero” home designed in collaboration with Kaplan Thompson Architects of Portland, Maine.

# What materials can be used?



Of course, more expensive finishes cost more than basic production specifications, but this is not unique to modular. Modular construction can accomplish any fit and finish you like, both inside and out, from flooring and plumbing fixtures to windows and exterior appearance. Further, the more that is specified to be installed in the factory, the more time and money you will typically save. The home above is an example of the many homes built by Keiser on Nantucket and Martha's Vineyard.

# How much time is saved?



Anything that can be built conventionally can be built faster with modular construction, both residential and commercial, without compromising quality. Design time can typically be compressed because Keiser provides many of the necessary drawings for permitting. Once construction starts, framing of the modules can begin at the same time as site work. That way, the modules are ready for delivery as soon as a foundation is ready to receive them. Construction time savings are frequently 25-35%, saving owners construction interest and allowing them to occupy buildings faster. The image above is of a building enclosed in Ipswich, Massachusetts after only three days of assembly above the foundation.

# How much does modular cost?



Just like conventional construction, the cost of modular construction can vary greatly. Using larger boxes as shown on previous pages helps minimize factory, transportation, and finish costs and will increase the competitiveness of modular pricing. Even in today's low-cost construction environment, basic Keiser specifications typically provide a cost-effective alternative to field-built construction before design and construction time savings are considered. Further, modular construction becomes dramatically more cost effective per square foot the larger the project is and the more work is performed in the factory.

# What is the future of modular?



Modular builders in Europe recently constructed a 25-story, mixed-use tower with modular technology, primarily in order to reduce construction time. Combining modular technology with steel framing, rain screen facades, and other technologies is making modular construction an increasingly attractive solution to complex construction projects. Talking with a Keiser sales representative can answer any outstanding questions you may have, from pricing and rapid delivery to the superior quality of buildings constructed in a clean, climate-controlled environment. Touring our factory will give you ideas of how we can help make your construction project even better.



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