An innovation guide under More Homes, More Choice: Ontario's Housing Supply Action Plan

ontario.ca/housinginnovation

Building a modular house

Ontario

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Introduction

Defining a modular house

A modular house is built using one or more prefabricated, three-dimensional components or modules. It is constructed partially or completely off-site in a manufacturing facility, then transported to a property and assembled there, like building blocks.

Often, the interior of a modular house is finished or almost finished at the manufacturing facility. For example, wiring and plumbing can be installed in the modules before being moved to the building site.

Benefits of a modular house

There are many benefits to building a modular house. For example, a modular house can:

- be built according to a predictable timeline in a controlled environment, so timing and quality are not subject to the weather
- be less likely to be impacted by labour shortages and the coordination of trades
- be one storey or several storeys high
- be designed in any style or layout according to the owner's wishes
- save construction time
- be energy efficient
- produce fewer carbon emissions and less waste during construction than traditional on-site construction
- be just as beautiful, functional and sustainable as any well-built conventional house

Image 1: A module being lowered by crane onto a foundation.

Housing innovation

More Homes, More Choice: Ontario's Housing Supply Action Plan recognizes that fresh approaches to tackle Ontario's housing crisis will give people more options to access housing that is affordable. The ministry has created a series of housing innovation guides to help homeowners and homeseekers navigate building processes and financing options.

These guides make it easier for people to explore different housing options, and to help homeowners, homeseekers, property owners and landlords navigate complex design and building processes to create more housing supply, including rental housing, and make housing more affordable for Ontarians.

Image 2: A module being lowered by crane onto a foundation while workers help to secure the module in place.

Sections of the guide

This guide covers relevant provincial and municipal rules and requirements you need to know that can help you to make an informed decision on whether a modular house is a good option for you. You will learn about:

- the approval process to build a modular house in Ontario
- the various kinds of services and packages that are available to you
- the ways you can get involved in the process

In this guide, the information being provided **does not** relate to:

- manufactured building shells with no finished exteriors/interiors
- houses or buildings that can be relocated or moved, such as temporary classrooms
- houses on wheels, such as caravans or recreational vehicles
- manufactured prefabricated parts of houses that are taken to the site and become part of traditional on-site construction (for example, pre-assembled roof trusses)
- financing options for modular houses
- how to hire professionals and companies to build your modular house

Did you know?

Prefabricated, or "prefab" construction refers to any part of a building (for example, a flat panel or three-dimensional module) that is primarily constructed in a factory and then transported to and installed at the site.

Any home that is constructed in a factory and then assembled on site is considered prefab. In other words, all modular houses are prefab. However, not all prefabs are modular.

Spot the difference

Can you pick out the modular house below?


Image 3


Image 4


Image 5

All three examples are modular houses!

Modular houses have evolved over the last few decades. New products and technologies allow modular houses to look and function like conventionally-built homes.

The design of your modular house will depend on the company you choose and your own budget. It can be a good option for someone looking to build a house from the ground-up or for someone who wants or needs more certainty about the move-in date and final price of their home.

Design, construction and assembly process

The main difference between modular houses and conventionally-built houses is the construction and delivery process. In conventional construction, building materials are brought to the lot and the house is built on-site.

With modular construction, three-dimensional modules are constructed in a factory and then moved to the site, usually on a flatbed truck. After they arrive on-site, the modules are placed on a foundation, connected to each other, and then fully finished.

Choosing a builder

When choosing a modular house builder or manufacturer, you should carefully select one that meets your needs.

Full service

Some companies are full service that manage every step of the process, taking on the role of general contractor, including:

- getting the necessary permits
- creating custom interior/exterior designs
- providing foundations or building a fully finished basement on your lot
- arranging for transport and installation of the modules on the lot foundation
- completing assembly and finishing work on your lot

Some companies even complete the landscaping on your property.

Limited service

Other companies offer limited services. For example, some only provide the manufactured modules and deliver them to the site, while other companies will take on other aspects (but not all) of the build.

If you have experience with building, you can use this option to save money. You can also hire a general contractor to coordinate with the module builder and oversee any construction work that does not take place in the factory.

The building process and your involvement will vary depending on the company you choose to build your modular house.

The kind of warranty your new home may be eligible for also depends on who does what.

Did you know?

Prefabricated "kit" homes pre-date modular houses and even Ontario's Building Code. These homes were a popular mail order option for handy, do-it-yourself property owners beginning in the early twentieth century.

The Canadian Aladdin Co. Ltd. (Aladdin) offered kit homes to Ontario customers from around 1905 to 1952. Eaton's and Sears also provided these kits across North America.

Aladdin precut the lumber at their Ontario factory and then shipped all the construction materials, detailed blueprints and construction manuals to the customer's nearest railway station. Kit houses included everything from flooring to studs, exterior walls and cladding, doors and windows, rafters, shingles and insulation. All nails, screws and hardware were included, with a few extras just in case.

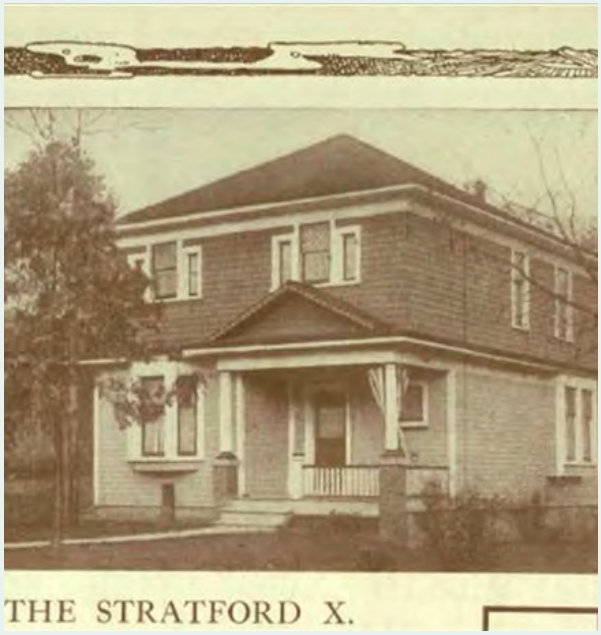


Image 6: The "Stratford X" home kit, priced at $3,434.93. Canadian Aladdin Company Catalogue #16, 1920, p. 29.

As with today's modular houses, the foundation and site needed to be prepared before the kit house's arrival. However, Aladdin went the extra mile to provide detailed instructions on foundation construction.

Kit prices in the 1920s ranged from approximately $1,000 for a small bungalow to over $6,500 for a spacious, two-storey model (about $12,000 to over $78,000 in 2021 dollars).

Home warranty

In Ontario, most purchasers of newly built homes are entitled, by law, to warranty coverage from their builder under the Ontario New Home Warranty and Protection Plan. This warranty plan covers problems with workmanship, water damage and other major structural issues. It also provides deposit protection and delayed closing/occupancy compensation.

Almost all newly constructed homes in Ontario have statutory warranty coverage of up to $300,000 over a seven-year term. The warranty remains with the home for seven years, even if it is sold during this period.

Some new homes, however, do not qualify for this statutory warranty coverage. Tarion can provide the information you need to determine if your modular home will qualify for statutory warranty coverage.

What is Tarion?

Tarion Warranty Corporation (Tarion) is the administrator of the warranty plan under the *Ontario New Home Warranties Plan Act, 1990* (ONHWPA). Tarion's website outlines the types of homes covered by the warranties and protections, as well as details specific to modular houses.

The vendor (typically the builder/company that sells you your house) is responsible for providing warranty coverage. However, if the vendor in unwilling or unable to meet their warranty obligations, Tarion steps in to manage warranty claims.

Some of the most important factors that will determine your modular house's eligibility for the warranty plan under ONHWPA are listed below; however, please consult the Tarion website for the full list of eligibility criteria:

- the house must be new
- the modular home must be built on a permanent foundation
- the builder or vendor must be licensed by the Home Construction Regulatory Authority (HCRA)

The statutory warranty coverage would **not** apply if you:

- supply or purchase the materials and/or prefabricate the modular home yourself
- are building a home that cannot be occupied in all seasons

The statutory warranty coverage may not apply if you hire a builder to build and assemble the modules but take responsibility for building the foundation yourself. It depends on the contract you have with your builder — you should contact Tarion to find out for sure.

If your project does not qualify for statutory warranty coverage, you will need to rely on any warranty provided by the builder or manufacturer that is part of your contractual agreement instead. It may be difficult to get financing from a lending institution unless the house qualifies for statutory warranty coverage.

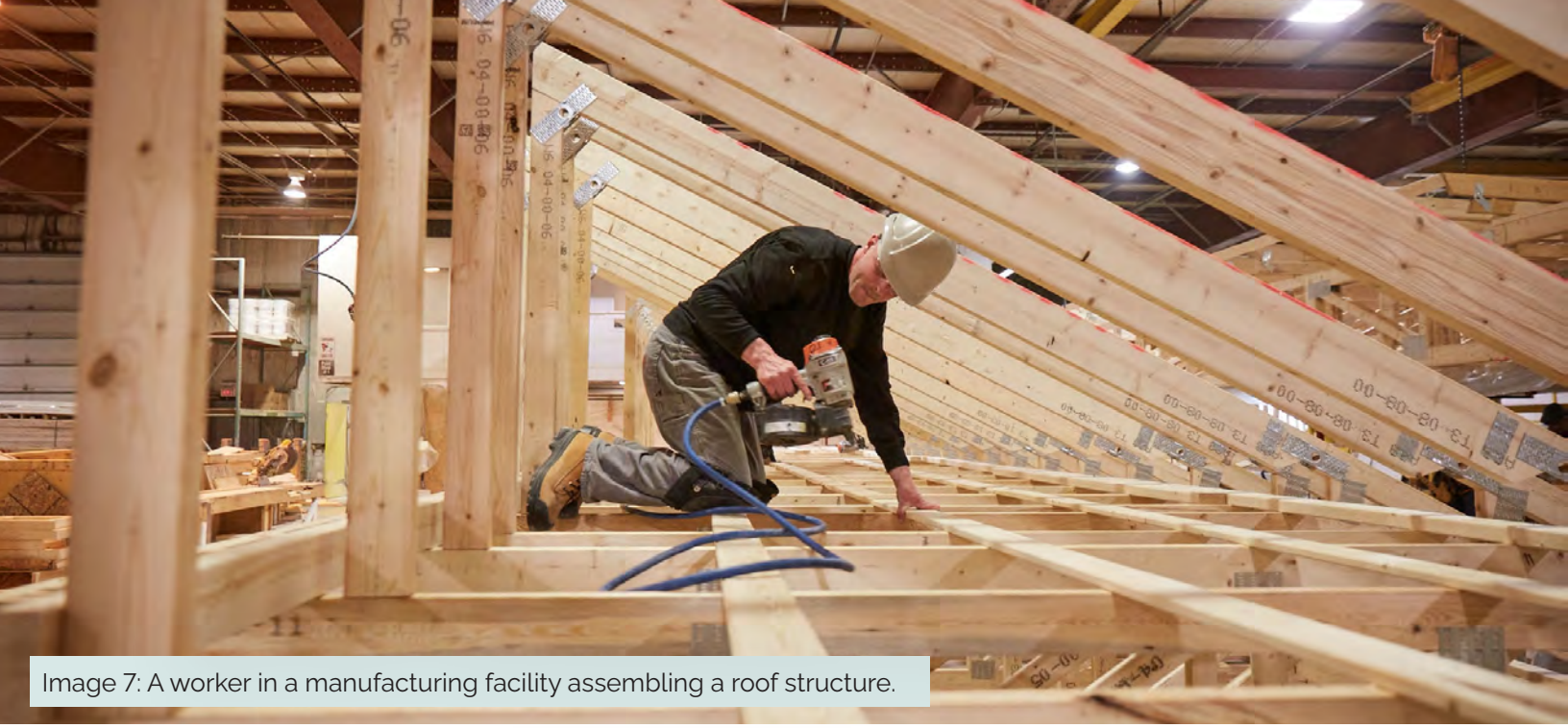


Image 7: A worker in a manufacturing facility assembling a roof structure.

Home Construction Regulatory Authority

If you are considering a modular house, we encourage you to check the Ontario Builder Directory to ensure your prospective builder or vendor is licensed by the Home Construction Regulatory Authority (HCRA). With a few exceptions, all builders and sellers of new homes in Ontario must be licensed by HCRA.

Design

You need to consult with your municipality as a first step of the design process to understand any applicable local requirements.

Depending on the builder and the package you go with, one option is to choose the design of your modular house from an existing template. Then, with support from the modular company's designer, you can modify the design to create a unique home that meets your needs.

You can also start from scratch and work with the company's architect to design a completely custom-built home.

Extensive pre-planning is key to saving time and money on your modular house project. The end design needs to be finalized early in the process. While this helps to ensure that each stage of the project is completed on time, within budget and in coordinated stages, it can limit your ability to make design changes later in the construction process.

Construction

Modular houses, like all other houses, can be almost any size. Depending on the complexity of the design, for example:

- a small house can be a single module
- a one-storey house can consist of two or more modules
- a larger two- or three-storey house may contain four or more modules

Each module is built in a climate-controlled facility, typically using automated, precise manufacturing processes to enhance quality control. Usually, workers are employed on a permanent basis and can complete all duties with minimal delays. Modules are built using an assembly line production process, moving in sequence between various tradespeople until completion. After one trade finishes work on one module, they can move on to the next. This reduces downtime in the production process and helps to ensure the modules are completed to schedule.

Assembly

Once the modules are inspected and ready for installation, they are transported to your property and set on the foundation by crane. For more information about inspections, please see page 12.

The distance from the manufacturing facility can have a significant impact on the cost and timing of your building project. The greater the distance from the factory to your lot, the greater the cost.

Although rare, mishaps can happen during transportation that may affect the timing of your project should you require repairs or replacement parts.

Once the modules are on-site and set in place, they are fastened together and anchored to the foundation. While the modules are being assembled, some of the work to connect the mechanical systems may also need to be completed. This can take a few days or weeks to complete, depending on the number of modules. Then, the finishing work of the house is completed, which can include:

- electrical and plumbing hook-ups
- installing siding or roofing
- interior finishes
- other work that wasn't carried out at the factory

The length of time it takes to move into the house after the modules are delivered depends on:

- the scope of the project
- the extent to which the modules were completed in the factory
- the size of the house

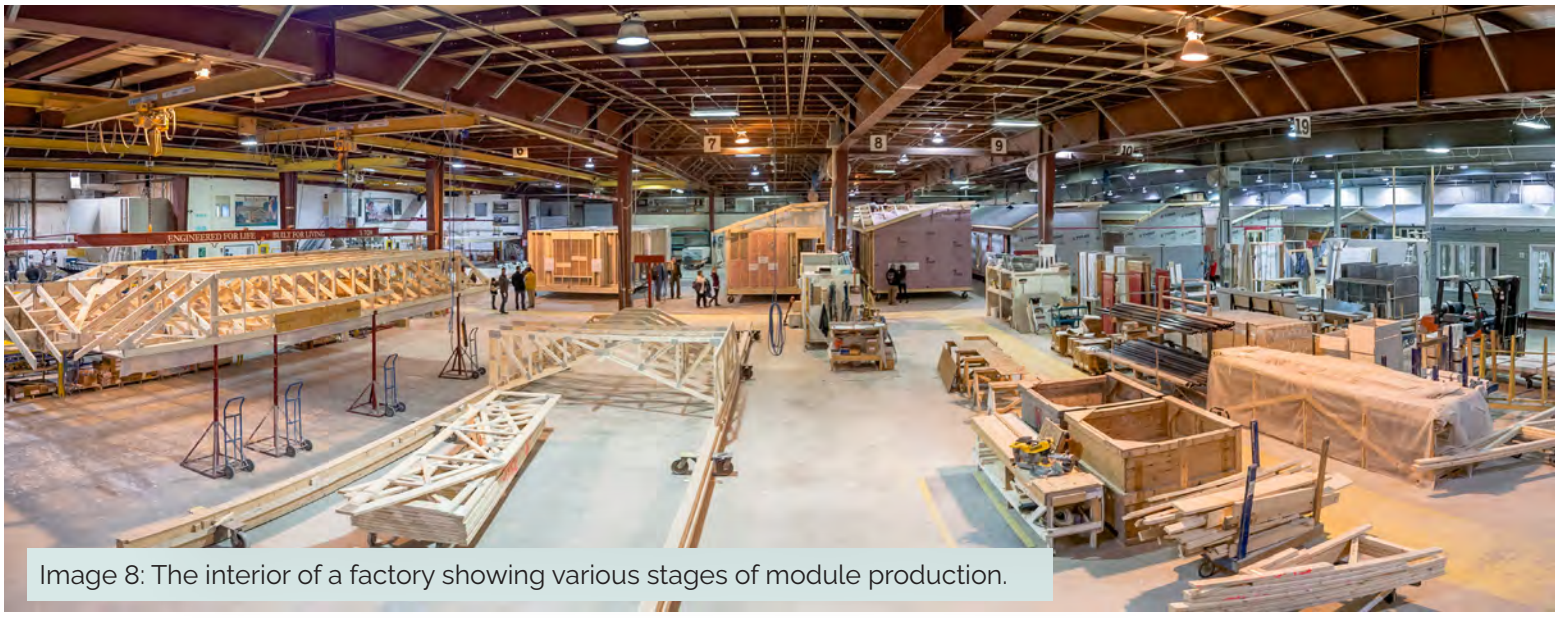


Image 8: The interior of a factory showing various stages of module production.

The provincial role

The *Ontario Planning Act* authorizes municipalities to pass zoning by-laws that allow them to determine land uses, including supply and type of residential land within their jurisdictions.

Through the *Building Code Act* and the Building Code, the province sets out uniform building standards for all of Ontario including those related to modular houses. Municipalities have the responsibility to administer and enforce the Building Code in their own jurisdictions.

Image 9: Workers securing a second storey module into place after being moved by crane.

The municipal role

Municipal rules and requirements

It is important that you and your builder understand the municipality's zoning by-laws. Municipalities make rules allowing residential building projects in some areas and not in others. They also make rules regarding the maximum size your house can be and can help you determine if the lot is suitable for the type of modular house you are considering.

You can generally find a contact number for your local building and planning department on your municipality's website.

Before you sign a contract with a modular house builder and ideally before you make a land purchase, discuss the following with the local planning and building department of the municipality you want to build in:

- zoning requirements and standards that apply
- any other applicable agreements and approvals that are required before you can build
- for rural areas, whether the house will connect to existing sewer and/or water or whether a well and/or septic system will need to be installed

Zoning

A zoning bylaw controls the use of land in your community. Zoning requirements and standards that could affect your plans may include:

- permitted land uses
- minimum lot sizes
- minimum sizes and maximum heights for houses
- minimum or maximum lot coverage by built structures

- lot length, lot width and setback (how far from the edge of the property the building can be)
- massing (height and size)
- parking
- building character
- tree protection
- requirements regarding well location and private septic system installation (where applicable)

Zoning requirements vary from municipality to municipality. If your proposed building, use or design does not comply with your municipality's by-laws, you will not be able to build it unless you obtain a zoning by-law amendment or minor variance.

You should always speak to planning staff in your municipality before submitting a zoning by-law amendment or minor variance amendment to determine whether the city staff will support it and f or advice and information. You may also wish to seek the help of a professional planner.

To find out more about what's involved in seeking a by-law amendment or a minor variance, read the *Citizen's guide to land use planning*.

If you are planning to use a modular home as a secondary residential unit on your property, you may also wish to read one of the Ministry of Municipal Affairs and Housing's other guides: *Build or buy a tiny home* or *Building a laneway house*.

For a list of the key considerations when planning a modular house project, see page 18.

Building Code and inspections

Getting a building permit

Traditional site-built construction involves a single site, whereas modular construction involves two sites: one in the factory where the modules are manufactured and one where the modules are assembled and finished.

For any house construction project, you will need to obtain a building permit. When building a modular house, you or your builder must apply for a building permit from the municipality where the house will be located.

Whether the builder is you, your contractor or the company you have hired, at a minimum, the following must be submitted to get a building permit:

- a completed application form and any other forms and supporting documents requested by the municipality
- construction drawings (most municipalities require at least two sets of drawings)
- payment of the building permit fee and other applicable fees

The permit applicant will need to demonstrate that the project will meet the technical requirements of the Building Code as well as other "applicable laws" listed in the Building Code. An example of applicable law is a municipal zoning by-law.

If your proposed house does not meet local zoning requirements, you will not be able to get a building permit.

Did you know?

If you are planning to buy a modular home manufactured or purchased from a supplier outside of Ontario, you will need to confirm that it meets Ontario's Building Code. Just because it is sold to someone in Ontario does not mean the modular home meets Ontario's Building Code. Learn more about meeting Building Code requirements on page 14.

Both the factory-built modules and the activities that cannot be done in a factory (for example, construction of the foundation, the basement and site preparation/grading) must also be covered in the building permit.

Servicing

Your modular house will need access to services (for example, water, hydro, sewage, garbage collection).

Depending on whether your property is already connected to municipal water supply and sewer services, you will want to confirm that you have access to drinkable water and may need to install a septic system.

You may also need approval from the local conservation authority to build a house and will certainly need approval to install a well or a septic system.

Inspections

There are two main inspection sites for modular houses:

- one at the factory where the modules are built
- one at the property where the house is assembled

Module inspections

Modules constructed in a factory must be inspected in the factory to ensure that they meet Building Code requirements by either:

- third-party inspectors accredited by the Standards Council of Canada, or
- building officials from the municipality where your house will be installed, who agree to come to the factory to inspect (or appoint representatives to do so)

Image 10: Workers in a factory preparing different parts of roof structures.

Canadian Standards Association (CSA Group)

If the modules for your house are being built in a factory certified by an accredited certification body, the factory maintains strict quality control measures according to *CSA A277: Procedure for factory certification of buildings.*[1]

Accredited inspectors ensure compliance with *CSA A277.* This standard provides requirements for:

- certification of the factory quality program
- certification of the modules
- auditing the factory quality program
- in-factory inspection of the modules

To meet applicable CSA standards for modules, factories must be accredited by a certification organization that is authorized by the Standards Council of Canada (SCC) to perform compliance inspections in the manufacturing facility.

A home built in a certified factory will have a label, often on the electrical panel, indicating the building code(s) the home meets. A specification sheet provides additional technical information about requirements for wind, snow and rain, for example. Your local building inspector will check for these certifications.

It is helpful for everyone if the building permit drawings and other information clearly show which parts of the house are to be completed and certified in the factory and which parts are subject to local inspections.

[1] In the future, it is expected that Ontario will update its Building Code to reference the most recent *CSA A277* standard (2016), *Certification of prefabricated buildings, modules and panels.*

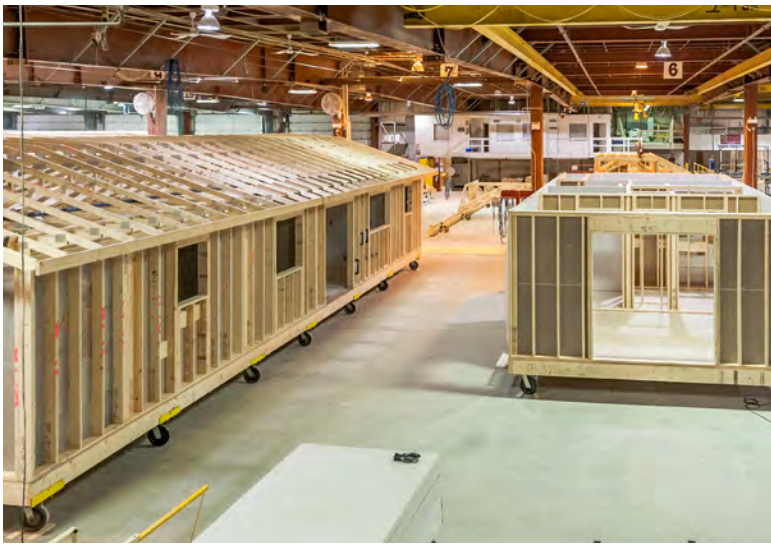


Image 11: Two partially completed modules in a manufacturing facility.

Municipally-led module inspections

When modules aren't built under factory certification, they must be inspected by building officials from the municipality that issued the building permit. Alternatively, if the Chief Building Official agrees, the modules can be inspected by a qualified professional on behalf of the municipal building official.

The permanent location of your modular house is also important to consider. If the modules are built in a different municipality, the building officials from the municipality where your new house will be situated must consent to the module approval process.

The following are some options the municipality may agree to if the municipality thinks that it is appropriate:

- Allowing their building officials to travel to the factory to inspect the modules at the project's expense. Inspectors may need to make several trips to the manufacturing facility during construction before they approve the modules.

Image 12: Exterior of a modular house.

- Appointing a representative to inspect the modules to determine if they meet Building Code requirements.
- Accepting reports by consultants (such as engineers or architects) retained by the building permit holder that show how the project meets Building Code requirements.
- Using an alternative means of inspection (for example, live video).

It is important for you to discuss with your local municipal building official early in the process to understand what local operational policies may apply if the modules are not built in a certified factory.

Inspections are conducted at several stages. Inspectors examine framing, insulation, plumbing, interior finishes and other items contained in the Building Code, as well as Fire Code requirements.

In some cases, depending on the materials and construction methods used, it may be appropriate for reports prepared by appropriate building professionals (for example, an engineer or architect) to be provided to the Chief Building Official.

If you are buying modules from someone who is not certified you will want assurance that the building permit for the modules can be approved before you fully commit to the project.

Inspections of the modular house at its permanent location

Everything included in the building permit will need to pass inspections by municipal building officials, such as:

- the foundation of your house
- the basement (if applicable)
- grading
- installation of the modules on the site

Electrical and plumbing permits and inspections will also be needed. If your property is in a rural area that does not have municipal water and sewer services, your private water supply and wastewater disposal system will also need to pass inspection.

As with any house, after your modular house is completed, the municipality will issue an occupancy permit if its inspectors have determined that all requirements have been met. After this has been issued, you can move in.

Meeting Building Code requirements

All houses, including modular houses, must meet Building Code requirements so that they are equally safe, healthy, weather resistant and energy efficient.

However, houses are built differently based on their location or region. Regional differences include climate conditions, such as temperature, wind, snow and rain. They may also include different structural standards for resistance to earthquakes.

Building Code provisions only set the minimum requirements, but some builders offer packages that exceed minimum requirements (for example, withstanding extreme weather conditions). Packages may also promote lower environmental footprints from the materials that are used or the heating/cooling systems installed in the modular house. Modular home builders generally take pride in making more efficient use of materials, reducing both financial and environmental costs.

Once the modules arrive on the site where the house will be located, municipal building officials must ensure that the modules are assembled and built according to the plans that were approved in the building permit. If the modules were built in a certified factory, the compliance documentation for the modules should be provided to municipal building officials at this point.

Image 13: A crane lifting a module off a flat-bed truck.

The building officials also need assurance that the modules are properly attached to each other and to the foundation, and that any finishing work is completed according to Building Code requirements.

Ultimately, the building official is the person who is responsible for ensuring that the house meets Building Code requirements. If the building official finds something that does not comply with the requirements of the Building Code, they have the power to require that you (as the homeowner) or the builder make changes at your or the builder's expense. For example, the building official may notice that a module was damaged during the transportation process and needs to be repaired. Depending on the level of damage, the manufacturer may be required to rebuild the module entirely.

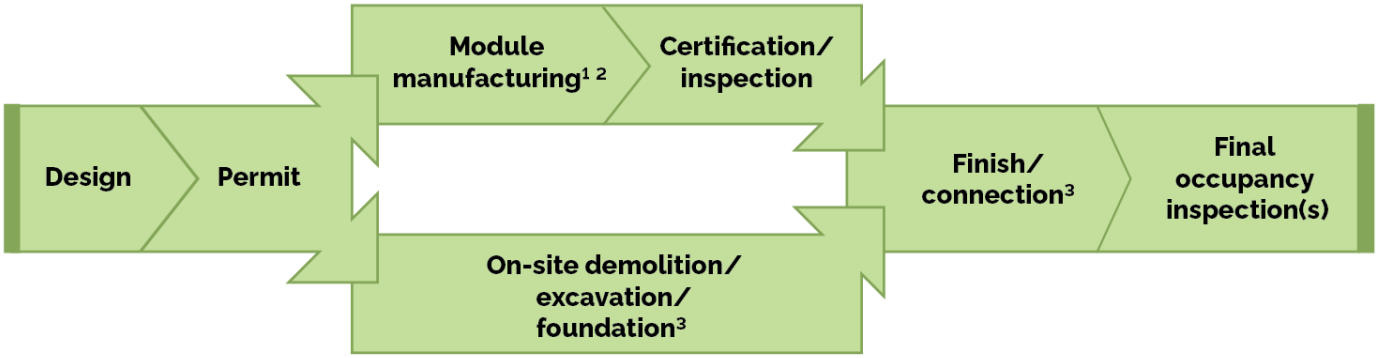
Starting on-site construction

Most municipalities allow some on-site construction activities to begin (for example, excavation, grading and foundation construction) once the preliminary house design has been completed.

If the weight, dimensions and shape of the modules do not change significantly from the general design, these municipalities allow the detailed design and module construction to be carried out at the same time as the preparation of the site.

However, some municipalities may want to have the complete building permit package finalized and approved before allowing any on-site work to begin.

Comparing the modular house building process with a site-built house



[1]Module manufacturing includes framing, plumbing, electrical, heating ventilation/air conditioning (HVAC), vapour/air barriers and insulation.

[2]Modules are also inspected throughout the manufacturing process.

[3]Each step includes one or more inspections.

Diagram 1: The process of building a modular house from design to final occupancy. The main advantage of the modular house building process is that various stages can occur simultaneously, including module manufacturing, on-site demolition and excavation work, and module inspections.

[3]Each step includes one or more inspections.

Diagram 2: The process of building a site-built house from design to final occupancy. Typically, site-built construction follows a more linear process, so no two stages can occur at the same time.

Building Code technical requirements

Building Code technical requirements that apply to all houses, including modular houses, include:

- foundation, anchorage and grading
- room sizes and floor areas
- stairs, guards and handrails
- ceiling heights
- hallway widths
- door width
- windows
- plumbing
- energy efficiency
- heating, ventilation and air conditioning (HVAC)
- electrical
- accessibility
- fire safety

Image 14: A worker in a manufacturing facility installing roofing on a module.

If the modules are being built and certified according to *CSA A277*, most of these requirements will be covered during construction in the factory. Other technical requirements must be verified at the building site, such as the foundation, the way the building is anchored to its foundation, and the grading of the property – since these activities must occur on your property.

No matter how complete the modules are when they leave the factory, some of the plumbing and electrical work will need to occur after the house is assembled. As the homeowner, you will need to arrange for utility hook-ups for electrical, gas, water and potentially septic services before moving in. Some modular homebuilding companies provide this as part of their "turn-key" service.

In addition, any finishing work that is not completed during the manufacturing process will need to be completed after assembly.

Some companies have their own crews or hire contractors to complete this work (it can be part of your contract). Otherwise, you will need to arrange for this work to be completed before final inspection and move-in.

Other examples of finishing work may include:

- testing the electrical system and installing light fixtures that have not been installed
- making final ductwork connections
- installing the furnace and the central cooling unit
- repairing cracks that may have occurred during transportation
- touch-up painting

Finally, any site-built structure in addition to the modular house (for example, garage, front porch or deck) must be built according to the building permit and pass local inspections.

Modular house checklist

The following checklist summarizes the important things to consider when planning a modular house project:

- ☑ Have you consulted with your municipality regarding zoning and other bylaws, permits and other requirements to make sure that your house can be built where you want it to be built?
- ☑ Have you confirmed how your modular house will be serviced (for example, water, wastewater, hydro)?
- ☑ Have you chosen a builder that is certified according to *CSA A277: Procedure for factory certification of buildings*, as referenced in Ontario's Building Code? **If not:**
  - what assurance do you have that the house will meet Ontario's Building Code?
  - have you consulted with your municipality to determine how the work completed off-site will be inspected?
- ☑ Is the house you want to build eligible for a warranty under the *Ontario New Home Warranty and Protection Plan* or a different kind of warranty?
- ☑ Have you and your builder consulted with your municipality's building department to determine what is needed to apply for a building permit?
- ☑ Will your municipality allow the house's foundation, anchoring and other site work to begin before or while the modules are being built?

Image 15: Exterior of a modular house.

- ☑ If you are buying modules that you are completing yourself or hiring a contractor to complete, you must follow all the requirements in Ontario's Building Code. Some key considerations include:
  - rooms and floor sizes
  - stairs, guards and handrails
  - mezzanines
  - ceiling heights
  - hallway widths
  - door width requirements
  - windows
  - plumbing
  - energy efficiency

- heating, ventilation and air-conditioning (HVAC)
- accessibility
- electrical facilities and lighting
- fire safety
- emergency access
- exiting
- smoke alarm
- carbon monoxide alarm

☑ After the modules are built, they will be transported to the building site, connected, finished and any electrical, plumbing and other work will be completed

☑ Per the building permit, comply with requirements to construct the other parts of your building that were not built in the factory (for example, decks, porches, front steps)

Image 16: Drywall being installed in the interior of a module.

Did you know?

Modular construction also works for multi-residential buildings, especially when units need to be constructed quickly. Each module is built off-site and can contain several nearly finished apartments that can be fastened together side-by-side and stacked on top of each other.

The City of Toronto's Modular Housing Initiative, for example, aims to increase the supply of affordable housing across Toronto by finding efficient ways to build small-scale infill housing for people experiencing homelessness.

Image 17: A three-story multi-residential modular building located at 321 Dovercourt Road, Toronto, Ontario.

Pictured in image 17 is a three-story modular building located at 321 Dovercourt Road in Toronto. It includes 44 studio apartments, common rooms, a dining room, program space and administrative offices. The building was designed by Montgomery Sisam Architects in Toronto and fabricated by NRB Modular Solutions in Grimsby.

After the modules were manufactured in Grimsby, they were transported and installed at the City of Toronto-owned site. The entire process, from design to installation, took five months to complete. The building opened on January 28, 2021.

It also helped that multiple levels of government worked together to make these projects happen.

As the Honourable Parm Gill – then Parliamentary Assistant to the Ontario Minister of Municipal Affairs and Housing – noted regarding the 321 Dovercourt Road project:

"COVID-19 has heightened the need to get critical housing projects approved and completed faster. That's why the Minister of Municipal Affairs and Housing, at the request of the City of Toronto, issued a Minister's Zoning Order to help get this innovative project completed and get vulnerable people into the housing they need today."

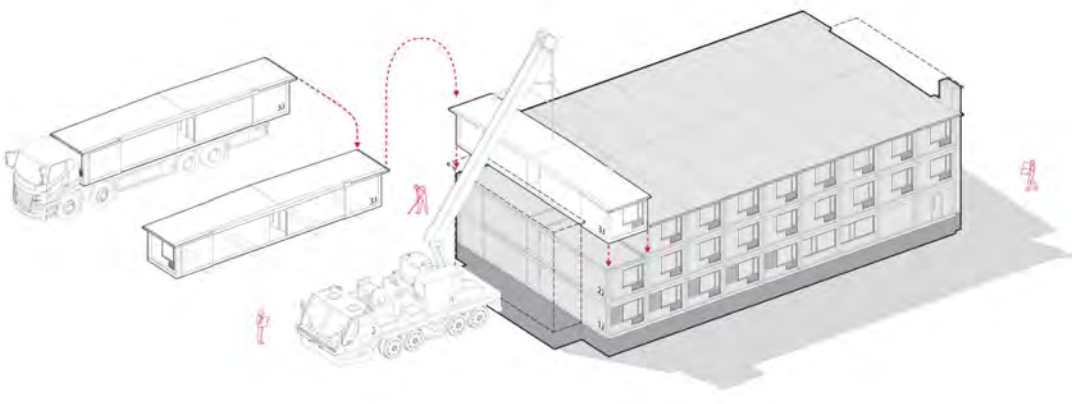


Diagram 3: A diagram illustrating the rapid assembly process of multi-residential modular housing. Image by Montgomery Sisam.

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- Images 1-5, 7-11, 13-16: Quality Engineered Homes Ltd.
- Image 6: Canadian Aladdin Company Catalogue #16 , 1920, p. 29
- Image 12: Guildcrest – a division of ProFab
- Image 17: Tom Ridout, Montgomery Sisam Architects
- Diagram 3: Montgomery Sisam Architects

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