



CONCRETE

The Foundation of Every Home



ABOUT



Concrete Ontario, originally the Ready Mixed Concrete Association of Ontario (RMCAO), is the voice and resource of the concrete and construction industries across Ontario. Representing over 96% of all concrete production and manufacturing, Concrete Ontario continually promotes concrete's sustainable advantages and benefits to infrastructure and society.



The Residential Construction Council of Ontario (RESCON) is Ontario's leading association of residential builders and is committed to providing leadership and fostering innovation in the industry. RESCON works in co-operation with government and related stakeholders to offer realistic solutions to a variety of challenges facing the residential building industry. RESCON members build the communities and homes of the future.



Concrete Ontario and RESCON are dedicated to constructing durable, sustainable residential infrastructure. Together, we are eager to address the housing and climate crises through a collaborative initiative, making a positive impact. Our partnership leverages our collective expertise to explore innovative technologies, eco-friendly building materials, and energy-efficient designs. By doing so, we aim to not only provide lasting housing solutions but also contribute to a more environmentally responsible future.



**Ontario must
build**

1.5 M

**homes over the
next 10 years
to address
the supply
shortage**

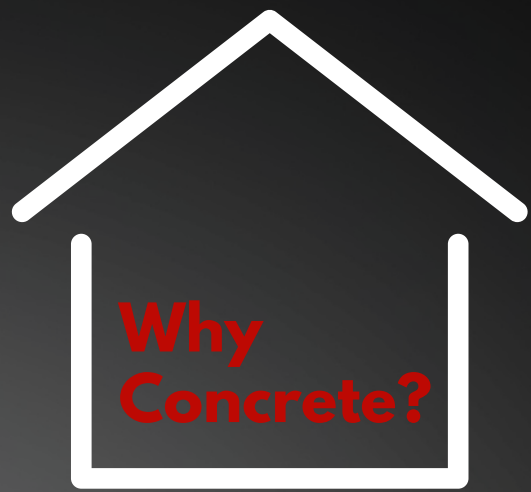


The escalating housing crisis in Ontario underscores the pressing need for home construction to ensure a secure living environment for current and forthcoming generations.

In early 2022, Ontario's Housing Affordability Task Force unveiled a comprehensive set of 55 recommendations with the primary objective of enhancing the accessibility of homes for both rental and purchase throughout the province. Their initial recommendation was to establish a target of constructing 1.5 million new homes within the upcoming decade.

By constructing 1.5 million new homes in the next decade, Ontario can bridge the housing gap, offering a broader range of affordable housing options, aligning with the rest of Canada, and accommodate the pace of population growth.

Moreover, in light of the climate crisis marked by heightened natural disasters, **the significance of concrete in residential applications has never been more pronounced.**



Concrete is readily accessible and available in Ontario, with more than 270 ready-mixed plants and 100 mobile mixers. It is a dependable resource accessible to all municipalities, effectively contributing to meeting Ontario's current and future housing demands.

Concrete serves as the fundamental basis for every home, valued for its adaptability, long-lasting attributes, and extensive utility in applications like residential footings, foundation walls, interior slabs, and garage floors.

Constructing with concrete provides high-quality construction, creates an enhanced living environment for your family, ensures safety during natural disasters, and benefits home energy efficiency, all while contributing to the long-term value retention of the home.

In light of recent advancements in low-carbon technologies and the enhanced transparency brought about by Environmental Product Declarations (EPDs), concrete has established itself as a sustainable and enduring choice for developers and families, offering reliability in the present and the future.

LONGEVITY

Concrete is celebrated for its strength and enduring qualities. In residential construction, it serves as a dependable foundation, offering essential structural support to ensure the safety and stability of homes. Residential concrete structures typically enjoy a long lifespan, often lasting for many decades with minimal maintenance needs. Unlike other building materials, concrete doesn't succumb to issues like rot, warping, decay, or vulnerability to fire and pests. This extended durability reduces the demand for costly repairs and replacements.

FIRE RESISTANCE

Concrete, being a non-combustible material, possesses innate fire-resistant qualities, providing a safeguard for homes and their occupants in the event of a fire. This attribute holds particular significance in residential constructions, where safety takes precedence. Especially during the construction phase, when sprinkler systems may not yet be in place, concrete can offer developers peace of mind, assuring them that an unintentional fire will not jeopardize the progress of the building development.

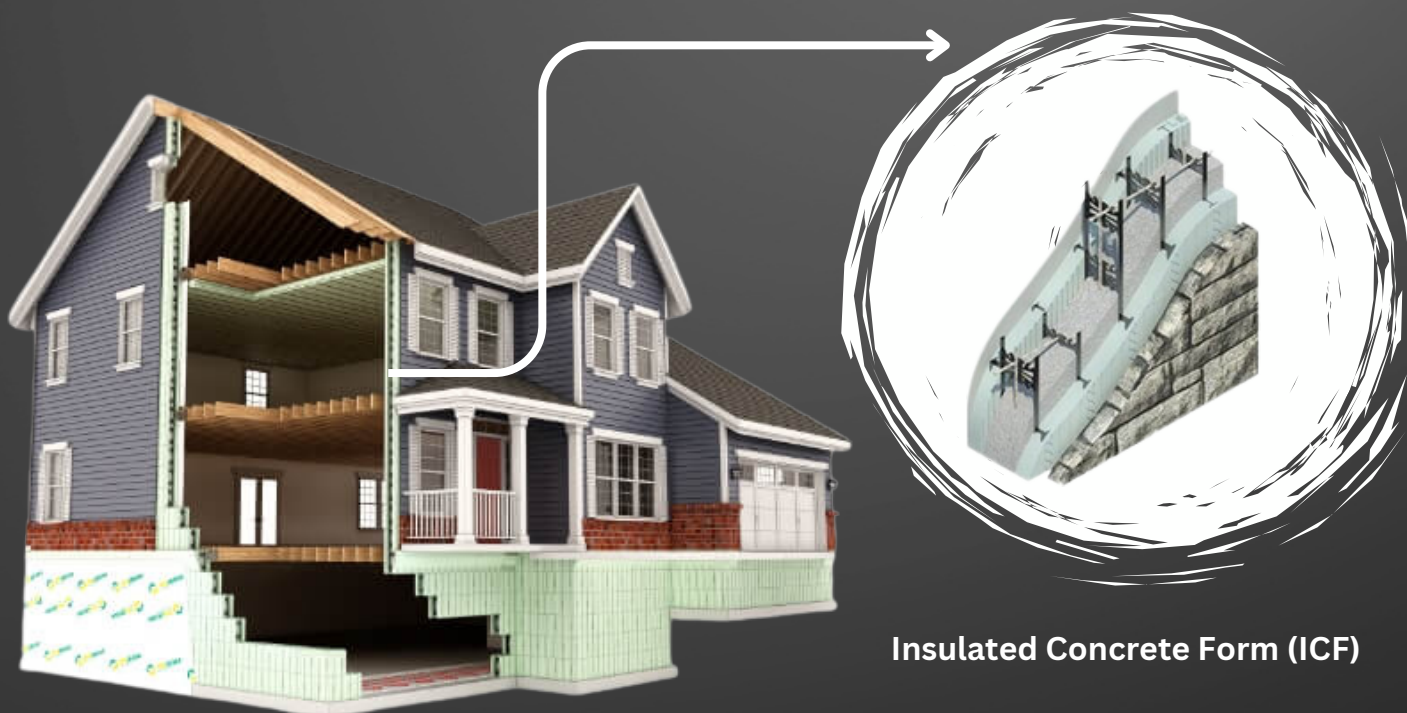


ENERGY EFFICIENCY

Concrete boasts remarkable thermal mass characteristics, effectively moderating indoor temperatures through the gradual absorption and release of heat. This can play a pivotal role in enhancing the energy efficiency of homes by curbing heating and cooling expenses. When coupled with insulated concrete forms (ICF), a new benchmark for high energy efficiency can be attained.

Insulated Concrete Form (ICF) construction is a cutting-edge building technique that combines structural integrity with exceptional energy efficiency. Unlike traditional construction methods, ICF utilizes insulated forms made of materials like expanded polystyrene (EPS) or foam, which are stacked together to create the walls of a building. These forms are then filled with concrete, forming a solid and well-insulated wall structure.

The thick layer of insulation within the walls acts as a thermal barrier, significantly reducing heat transfer and maintaining stable indoor temperatures. This results in reduced heating and cooling costs, as the building requires less energy to maintain a comfortable environment year-round. Additionally, the airtight nature of ICF structures minimizes drafts and air leakage, further enhancing energy efficiency and indoor comfort. ICF represent the future of residential construction and must be considered in an age of climate change.





SOUND INSULATION

Concrete exhibits exceptional soundproofing attributes, making it a valuable choice for crafting tranquil and comfortable living environments, especially in densely populated urban settings. Its capacity to insulate against external noise disturbances ensures that residents can enjoy a quieter atmosphere, fostering a more serene and pleasant living experience. This soundproofing quality becomes particularly crucial in urban areas where ambient noise can be a constant challenge to residential comfort and well-being.

WEATHER RESISTANCE

Concrete demonstrates remarkable resilience in the face of diverse weather conditions, including extreme heat, cold, rain, and snow, rendering it suitable for homes situated in a variety of climates. Furthermore, given the heightened risk of natural disasters resulting from climate change, concrete offers the assurance of safety for all families, contributing to peace of mind.

CRITICAL CONCRETE COMPONENTS OF RESIDENTIAL CONSTRUCTION



1

Footings

15 MPa 0.70 w/c
w/ air

2

Interior slabs on ground

20 MPa 0.65 w/c

3

Foundation walls

15 MPa 0.70 w/c
w/ air

4

Garage floors

32 MPa 0.45 w/c
w/ air Class C-2



SUSTAINABILITY

Concrete plays a central role in the construction of new homes, being the foremost choice for footings, foundation walls, and floor slabs. Additionally, the sustainability of concrete is continually advancing through innovative practices and the adoption of materials with reduced carbon footprints. With the transparency provided by industry-wide average Environmental Product Declarations (EPDs), as provided by Concrete Ontario, developers can maintain their reliance on concrete in Ontario for the creation of secure, enduring, and sustainable residential infrastructure.

In the context of typical concrete residential applications governed by Part 9 of the Ontario Building Code, as indicated on the previous page, the Ontario Industry-Average EPD report comprises a total of 40 EPDs. Among these, 20 EPDs utilize Type GU cement, which is presently undergoing a phase-out process in Ontario and switchover to Type GUL cement. Consequently, the following EPD analysis will center on the prevailing industry-standard Type GUL cement EPDs, given that Type GU cement is no longer widely accessible.

GUL cement provides a substantial reduction in carbon emissions, up to 10% less than Type GU cement, making it an indispensable element in the development of low-carbon concrete and a cornerstone of a sustainable future.

Residential application EPDs are compared with their designated baselines in Table 1.

TABLE 1 Comparison of possible GWP factors for Part 9 residential concrete in Ontario

Application	Concrete Mix	GWP Factor (kgCO ₂ /m ³)	Percentage change from baseline
	Concrete Ontario - Baseline 20 MPa concrete with air & 0.70 w/cm GU 10 SL	227.16	
*Footings	20 MPa concrete with air & 0.70 w/cm GUL	228.78	1%
	20 MPa concrete with air & 0.70 w/cm GUL 15 SL	205.21	-10%
	20 MPa concrete with air & 0.70 w/cm GUL 25 SL	189.50	-17%
	20 MPa concrete with air & 0.70 w/cm GUL 35 SL	173.79	-23%
	20 MPa concrete with air & 0.70 w/cm GUL 50 SL	150.22	-34%
	Concrete Ontario - Baseline 20 MPa concrete with air & 0.70 w/cm GU 10 SL	227.16	
*Foundation walls	20 MPa concrete with air & 0.70 w/cm GUL	228.78	1%
	20 MPa concrete with air & 0.70 w/cm GUL 15 SL	205.21	-10%
	20 MPa concrete with air & 0.70 w/cm GUL 25 SL	189.50	-17%
	20 MPa concrete with air & 0.70 w/cm GUL 35 SL	173.79	-23%
	20 MPa concrete with air & 0.70 w/cm GUL 50 SL	150.22	-34%
	Concrete Ontario - Baseline 20 MPa concrete without air GU 10 SL	220.29	
Interior slabs on ground	20 MPa concrete without air GUL	221.84	1%
	20 MPa concrete without air GUL 15 SL	199.19	-10%
	20 MPa concrete without air GUL 25 SL	184.08	-16%
	20 MPa concrete without air GUL 35 SL	168.98	-23%
	20 MPa concrete without air GUL 50 SL	146.32	-34%
	Concrete Ontario - Baseline 32 MPa concrete with air & 0.45 w/cm (C-2) GU 10 SL	326.46	
Garage floors	32 MPa concrete with air & 0.45 w/cm (C-2) GUL	328.90	1%
	32 MPa concrete with air & 0.45 w/cm (C-2) GUL 15 SL	293.29	-10%
	32 MPa concrete with air & 0.45 w/cm (C-2) GUL 25 SL	269.55	-17%
	32 MPa concrete with air & 0.45 w/cm (C-2) GUL 35 SL	245.81	-25%
	32 MPa concrete with air & 0.45 w/cm (C-2) GUL 50 SL	210.20	-36%

*Part 9 of the Ontario Building Code requires minimum 15 MPa for footings and foundations walls, and 20 MPa has been chosen as it is available in the Ontario Industry-Average EPD Report. It should be noted that 20 MPa is also commonly used for these applications and in this case the carbon impact is overstated compared to the minimal requirement of 15 MPa.

Examining the data provided in Table 1, it is evident that the Ontario residential market has the capacity to aim for carbon reductions of 10-17% when compared to the industry-average EPDs. Should more ambitious goals be pursued, it is feasible to achieve reductions of 23-36% with additional planning and adjustments to schedules.

While the above information reflects industry-average EPDs, concrete producers in Ontario also have facility-specific EPD data which is more accurate and clearly defines the impact from a specific ready-mixed plant. As mentioned previously, with over 270 ready-mixed plants in operation in Ontario, concrete is readily available and the carbon impact can be evaluated and minimized.

With additional innovations such as carbon capture, carbon injection, and numerous innovative lower carbon materials coming to market, the ready-mix industry and Concrete Ontario look forward to working with Municipalities and developers to help with their sustainability goals.





IMPORTANCE OF BELOW GRADE CONCRETE

While sustainability is a significant factor in residential construction, it should not serve as the sole determining factor in shaping future development decisions. Misinformed recommendations have been put forth advocating for a reduction in concrete usage in the design of new homes, achieved by minimizing below-grade construction and potentially substituting alternative materials.

Recommendations like these underestimate the significance of resilient construction, adopt a risky narrow focus on carbon emissions, and fail to encompass the holistic sustainability perspective provided by a life cycle analysis.

The carbon footprint of ready-mixed concrete can be efficiently minimized, as demonstrated in Table 1. The advantages of below-grade construction go well beyond the basic idea that homes will become more sustainable without concrete. By taking into account the housing crisis and the pressing issue of climate change, it becomes evident that concrete and below-grade construction play indispensable roles in Ontario's residential market.

BASEMENTS - A FUNCTIONAL SAFE HAVEN

Concrete positioned below ground level is resistant to pests and rot, rendering it a crucial component of any home. Replacing concrete with alternative materials not only endangers the structural stability of a residential residence but also increases the risk of premature material degradation, leading to costly renovation needs.

The complete removal of below-grade concrete construction eliminates the possibility of having additional bedrooms, rental income, and, ultimately, a secure shelter-in-place option for families during natural disasters.

In summary, the removal of below-grade concrete construction can impact a property's functionality, financial viability, and its ability to provide a secure shelter during natural disasters. It is important for property owners and builders to carefully consider the implications of such decisions and explore alternative solutions if they are necessary. Balancing safety, functionality, and economic considerations is crucial when making changes to a property's construction.





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