

What Every Homeowner Should Know About Concrete



WHAT IS CONCRETE?

In its simplest form, concrete is a mixture of paste (cement & water) and aggregates (sand & stone). The paste coats the surface of the fine (sand) and coarse (stone) aggregates and binds them together into a rock-like mass known as concrete. In addition to paste and aggregates, concrete may also contain highly specialized chemical admixtures that enhance the specific properties of concrete. Chemical admixtures are used to improve both the workability and/or the durability of concrete.



Photo courtesy of CAC

Within this process lies the key to a remarkable trait of concrete: it is plastic and can be molded or formed into any shape when newly mixed, and is strong and durable when hardened. These qualities explain why concrete is a primary building material throughout the world that is used to construct everything from skyscrapers, bridges, highways and dams to sidewalks, curbs, patios and houses.

WHAT ARE THE KEYS TO A SUCCESSFUL PROJECT?

The key to achieving a strong, durable concrete for your projects are as follows:

- Utilizing high quality raw materials
- Ordering the proper concrete for the application
- Skillful placement and finishing
- Following proper curing practices and protecting the concrete

The first step in any concrete project is utilizing high quality raw materials. All members of the Ready Mixed Concrete Association of Ontario (RMCAO) utilize only raw materials that meet CSA standards for concrete production (visit www.rmcao.org for a list of local concrete producers).

The second step is being aware of the minimum concrete specifications required for your concrete application. In Ontario, these requirements are dictated by the **Ontario Building Code** and **CSA A23.1 – Concrete Materials and Methods of Concrete Construction**. You should be aware of these minimum requirements and you should ask your contractor what they propose to use for your project. If they suggest anything less than these standards, or if they don't know what the minimum requirements are, you should find another contractor.

The third step in the process is hiring a quality contractor to complete the work. You should use a contractor that has been trained to an industry certification standard such as the ACI Flatwork Finishers Certification Course and ask for a list of previous projects and references. Make sure to visit projects that have gone through at least two winters and look for any signs of deterioration.



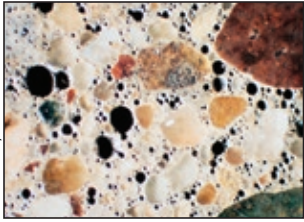
Photo courtesy of RMCAO

The final, and most important, step is to ensure that your contractor follows proper curing practices and cures the concrete effectively. 7 days of curing is recommended for all exterior concrete flatwork and 3 days of curing is required for all other concrete. Failure to complete this step properly will negate all of the good work done during the previous steps.

Care must also be taken to maintain and protect your concrete investment. Avoid the use of deicing chemical during the first 12 months and consider the application of concrete sealers to further protect the concrete.



WHAT IS AIR ENTRAINMENT?



All concrete exposed to freeze-thaw action must be air entrained using chemical admixtures. Proper air entrainment involves the placement of very tiny air bubbles (≤ 1 mm in diameter) within the concrete at a very tight spacing. These bubbles act to reduce the stresses created within the concrete when water expands during its transformation to ice during cold weather.

WHAT ARE SOME OF THE KEY THINGS TO LOOK FOR DURING CONCRETE PLACEMENT?

- Has the subgrade been properly prepared and compacted? While the minimum aggregate thicknesses vary depending on the application, you should see free draining aggregate that is properly compacted as a sub-base. If the tires of the concrete truck are leaving large ruts in the sub-base then the material has not been properly compacted or it hasn't been placed in sufficient thickness.
- Ensure that the area is properly drained and sloped to prevent water build-up. Flowing water and frost heaving are the most common reasons for early deterioration. Ensure that both the concrete and the sub-base are properly drained.
- Ordering of the proper concrete. Ask to see the concrete delivery tickets from the ready mix truck to verify that the proper concrete has been ordered.
- Place the concrete within 120 minutes of batching. The standard "shelf life" of concrete is 120 minutes. This means that we have 2 hours from the time that we first mix the concrete until we must place the concrete. The time batched is always included on the concrete delivery ticket. Note: Chemical admixtures (set-retarders) can be used to extend this 120 minute placement time.



- Do not allow the addition of water to the concrete after the concrete placement has started. Retempering of concrete may be allowed once the concrete truck arrives on site to address minor slump variations but once the concrete placement proceeds past the 10% portion of the load, additional water should not be added. Water addition leads to higher concrete permeability and lower strengths. Slump enhancement with chemical admixture is acceptable after the 10% discharge point and will not adversely affect the concrete quality.
- Has the contractor prepared a control joint layout to prevent uncontrolled cracking? All concrete shrinks as it cures and proper control, isolation and construction joints must be used to prevent unsightly random concrete cracking.
- How will the concrete be properly cured? What curing method will be utilized to protect the concrete and how long will the protection be applied? Discuss this with the contractor prior to concrete placement and ensure that the proposed methods and times meet the Ontario Building Code requirements for your application.



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References:

- 1 CSA A23.1-09 – Concrete Materials and Methods of Concrete Construction, Canadian Standards Association International
- 2 Design and Control of Concrete Mixtures – 7th Canadian Edition, Cement Association of Canada
- 3 Ontario Building Code – 2006, Ontario Ministry of Municipal Affairs and Housing – Housing Development and Buildings Branch
- 4 What Every Homeowner Should Know About Concrete, Concrete Construction, 1985

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