Edmonton Region

Canadian Home Builders' Association

Cold Weather Concrete Practices (September 2018)

This document is a summary of good practices for pouring concrete for residential foundations in winter conditions in the Edmonton Region. Caution should be exercised in translating these practices to other regions of the province or country.

Step 1 – Excavation

1. Excavate to prepare to pour the foundation. Important to remember that frost can go down to about 1.5 metres (5 feet).
2. Excavation work needs to be finished in a timely fashion so that footings can be poured as soon as practical. This is so that the builder is not pouring on to frozen ground.
    - Main focus is to get to unfrozen and undisturbed soil.
    - Do not pour footings onto frozen or snow-covered ground.
3. Watch the forecast. If bad weather is anticipated, the bottom of the excavation can be covered (e.g., tarps and/or blankets/insulation barrier/etc.) to keep frost and snow out.
4. If the bottom of the excavation is frozen, the builder will need to do one of the following:
    - Wait for the ground to thaw;
    - Remove the frost by insulating the ground or provide heat to the ground;
    - Excavate below the frost (e.g., excavate another 0.3 m. (12”)) and place a deeper foundation; or
    - Pile the home.

Step 2 – Concrete Walls Foundation

Pouring:

1. Proper cold weather concrete practices need to be utilized to ensure that the concrete will not freeze, builders need to:
    - Ensure the concrete mixture aligns with forecasted weather conditions;
    - Ensure all foundation forms are snow and frost free before pouring,
    - Ensure during winter months (e.g., October to May) that concrete suppliers include “winter heat” in their concrete,
    - Request appropriate additives to the mixtures to ensure shorter initial set times, and
    - Add rebar to the top and bottom of the foundation to control cracking.
2. 20 Megapascals (MPa) or lower may not be appropriate for cold weather pouring. Builders should confirm with their concrete supplier the appropriate class of concrete for the placement and exposure conditions anticipated.

After Foundation is Poured:

1. Depending on the conditions following the pour, builders may protect the concrete by the use of insulation placed over the wall (e.g., insulated tarps, batts of insulation, straw, foam panels, etc.).
2. Builders can also use temporary heaters (however, caution is needed as prolonged use of propane or kerosene may chemically react with the concrete).
3. Leave forms in place as long as possible and cure the wall in accordance with Section 9 of the Alberta Building Code to allow the concrete to gain suitable strength;
4. CSA and the Alberta Building Code state that concrete must cure for 3 days at or above 10 degrees centigrade or for the time necessary to attain 40% of the specified strength, at this point the wall may remain dormant until favorable conditions exist for the concrete to continue to gain strength and finish curing.
5. In extreme cold (lower than -15 C) it may be necessary to re-tarp the foundation immediately following form stripping to avoid thermal shock to the concrete.
6. Once the foundation walls are up, there may still be a 7 to 10 day period where the foundation is fully exposed to the elements.
    - In these conditions, the ground below the foundation may freeze and expand.
    - Edmonton Region clay soils can expand upwards of 75 millimetres (3 inches) but will return to design elevations once heat is applied to the basement space or outside temperatures improve.
7. As garages are often never intended to be heated, frost penetration is usually deeper and will come out of the ground at a different rate then the home itself.
    - A garage footing and wall system has the advantage that both the house and garage can progress in one pour therefore limiting the time for frost jacking. However, a pivot point must be provided to allow for differential movement.
    - A grade beam and pile system placed approximately two weeks after the foundation walls will not change elevation when the frost comes out, but the use of a slip joint must be utilized.
8. Frost must be out of the soil under the home prior to the placement of the basement floor.
    - A prod (e.g., a piece of rebar) can be used to probe the ground underneath and/or around a pad footing to determine if the soil is free of frost.
    - If a floor is placed where there is still frost under the pads, extensive cracking to the slab may occur – even if the perimeter of the basement hasn't moved.
9. During the defrosting period, tele-posts should be checked daily to ensure that loads are transferring correctly.
10. If the house is at drywall stage the builder will not board the home until the frost is out however they may load the home with board.

General Business practices:

1. Order soil bearing tests to ensure stable soils and required bearing pressure. In the event of unsuitable material, disturbed soil, and/or where there is water/moisture at the bottom of the excavation, test findings may result in the need to alter footing designs.
2. Allow for soil expansion and contraction in your design.
3. Ensure that the correct additive mixtures and strengths account for the environmental conditions of the concrete pour.
4. Ensure that employees, subcontractors and suppliers are competent in their field of expertise.
5. If something new or unusual is encountered seek out relevant expertise.
6. If someone asks about the correct method for pouring concrete in cold weather, they should be directed to their contractor or home builder for clarification on the procedures employed.

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Note: Concrete Alberta has reviewed this guideline of common practices and approaches to pouring residential concrete in cold weather conditions. This is a sound methodology for cold weather concreting when used in conjunction with industry standards and codes such as CSA A23.1 and Part 9 of the Alberta Building Code.