



## BASIC CONCRETE FACTS

Concrete is a mixture of aggregates, cement, and water (& sometimes admixtures).

"w/c" is shorthand for Water Cement Ratio

A .45 w/c ratio with air entrainment is ideal for a residential driveway application.

Hydration is the chemical process in which the "plastic" concrete becomes hardened.

Adding more water on the jobsite (more than designed) decreases the concrete strength and increases the opportunity for a host of problems to occur.

Bleed water is the settling of solids, letting lighter liquids rise to the surface.

Aggregates can affect the overall quality of the concrete. Maximum size, grading, particle shape, hardness, organic impurities, silt/clay, amount of fine aggregates in the mix, & moisture absorption all effect the quality/durability.

Slag (by product of the steel industry) and fly ash (by product of the coal burning power plants) are cementitious materials, therefore can replace some of the cement in a mix design to a certain degree. Both are used in our market frequently and both help projects qualify for green building materials credits.

Hot weather/temperatures speed up the hydration process, which makes concrete set faster. Conversely, cold weather/temps slow the hydration process & set time.

Retarders (admixtures) are used in hot weather to slow the hydration process allowing contractors to get the concrete placed before it "gets away from them".

Water reducers (admixtures) are used to increase the slump without adding more water to get the concrete workable (and to keep the w/c credible).

Air is added (entrained air admixtures) to the concrete mix for exterior concrete flatwork to prevent freeze-thaw damage. **All** exterior flatwork should have air entrainment (6 – 8 % air approx).

Accelerators (admixtures) are used to increase the hydration process in cold weather to speed up concrete's ability to set up (enabling contractors to get the final finish done in a timely manner).

A slump test reveals the concrete's consistency or workability or stiffness. Slump does NOT indicate the quality of the concrete. Workability means the ability to place, handle, consolidate or compact and finish.

Concrete requires a sound even base. Make sure the base is consolidated & consistent.

The rock (gravel) and sand make up about 60+ % of the concrete. It is therefore important to use a durable and sound aggregate for the concrete.

When placing concrete, over-vibration can cause the mix to segregate. Try to place concrete right where it needs to be & not move it around too much for best results.

Wood bull floats DO NOT seal the surface on concrete flatwork; steel floats typically DO seal the surface on concrete flatwork. For exterior concrete flatwork, do not use steel floats.

Troweling seals the concrete surface, making it tight and dense.  
Troweling only occurs after all the bleed water has appeared and evaporated.  
Power trowels should never be used on exterior concrete flatwork.

Troweling before the bleed water has appeared when finishing concrete, can lead to surface scaling later.

When applying a curing compound it is very important to cover the entire concrete surface and thick enough for good coverage.

Curing should occur **immediately** after finishing the concrete. Curing optimizes strength gain by preventing the concrete from drying out before hydration has occurred.

Evaporation retarders can “buy some time” for the contractor on windy or hot days, to protect the “plastic” concrete from drying out before the hydration process has time to use the water in the concrete.

Curing compounds, blankets, foggers, mats, plastic sheets are all examples of curing methods.

The most important precaution in cold weather is to NOT allow the concrete to freeze.

The majority of the strength gain in concrete occurs in the first 28 days.

All residential driveways (exterior flatwork) should be sealed properly after they have been in place approximately 30 days.

Sealers for exterior concrete are extremely important in our freeze/thaw market. Sealers keep water out of the pavement after the concrete has hydrated or “hardened”.

Concrete is a locally available construction material, which helps contribute to the local economy.