



SIX STEPS TO PROPERLY PREPARE, PLACE AND MAINTAIN EXTERIOR CONCRETE

There are six steps to follow to achieve a high quality, durable exterior concrete project. It is not acceptable to follow some or most of the steps. Anything less than following all six steps could result in an unsatisfactory project. We recommend that you review the following six steps with your contractor and discuss these procedures before you sign a contract or begin a concrete construction project. Your investment in a new concrete project should result in your satisfaction and enjoyment of the project.

Step #1

CREATE A PROPER SUBGRADE:

The subgrade is the existing soil after topsoil is removed. All soft soil that cannot be uniformly compacted must be removed.

- The subgrade needs to be a consistent and uniform thickness of compacted material. Suitable materials include compactable gravel, sand, fractured stone or crushed recycled concrete.
- Slope the subgrade away from structures at 1/4" per lineal foot [same as the concrete slab] to ensure surface water drainage.
- Do not place concrete on a frozen or wet subgrade.
- Plan for water discharge from roofs, rain gutters and downspouts. Rain gutters and downspouts should direct water away from buildings and off of concrete surfaces. Downspouts should be connected to underground drainage pipe and pitched to a suitable area or connected to a municipal storm water sewer. It is desirable to maintain a dry subgrade under the concrete slab.

Step #2

INSURE A PROPER DESIGN:

- A concrete thickness of 4" is suitable for most car and pick-up truck traffic. Heavier traffic use will require additional thickness and/or reinforcement. Concrete at 5" thickness will double the tensile strength of the concrete when compared to 4" concrete slab. We recommend exterior concrete to be 5" thick.
- Control joints or saw cuts should be placed as soon as possible and never more than 24 hours after the concrete is placed. In hot weather concrete conditions, 24 hours may be too late.
- Control joints must be a minimum depth of 1/4 the slab thickness but never less than 1 inch.
- Control joints should be spaced 2 - 2 1/2 times the thickness of the concrete converted to feet. Control joints in a 4" thick concrete slab should be spaced consistently at 8 -10 feet.
- Control joints should not be spaced greater than 15 feet no matter the concrete thickness.
- The Aspect ratio of control joints should be a maximum of 1:1.5 length to width ratio
- As with the subgrade, slope the concrete surface away from structures 1/4" per lineal foot.
- Isolation joints are required at structures and fixed objects. Isolation joints run the full depth of the concrete slab to isolate the fixed object from the new concrete slab.

Step #3

USE THE PROPER CONCRETE MIX DESIGN:

- The proper Exterior concrete mix for the state of Wisconsin [and the entire mid-west] should be designed to obtain a compressive strength of 4500 psi @ 28 days.
- The concrete mix should have a maximum water/cementitious ratio of .45
- The concrete mix should be an air-entrained concrete mix. The air content of the concrete when placed should be 6 percent, plus or minus 1 1/2 percent.
- The concrete slump should be approximately 4 inches, plus or minus 1 inch. [Assuming the customer does not request slump altering admixtures]
- The concrete mix should include stone and sand that meet the current Wisconsin Department of Transportation specifications on concrete aggregates. Ask about a low chert stone mix option if your project will include decorative concrete or if you want the best in appearance.
- All exterior concrete placed in Wisconsin should include reinforcement or a method for crack containment. Typically, wire mesh or polypropylene fiber is used.

Note: The air content and strength of the concrete mix will be affected by any re-tempering with water added to the concrete at the jobsite. Avoid excess water in the concrete mix - do not add additional water to the mix unless it is needed to properly consolidate and place the concrete. Never spray water onto the concrete during placement or immediately after placement.

Step #4

PROPER PLACING AND FINISHING OF CONCRETE

- Place the concrete as near to the final position as possible to avoid segregation or contamination of the concrete.
- Use only proper concrete tools when placing concrete that do not separate or segregate the mix. Use flat shovels and concrete cum-a-longs. Do not use gravel shovels or garden rakes.
- All concrete should be unloaded and placed within 90 minutes from the time the truck was loaded. Hot-weather concrete conditions call for a shorter placement time limit.
- No finishing operations should be performed when there is moisture or bleed water on the concrete surface.
- Protect the concrete from the hot sun, high winds, or freezing temperatures until the concrete has gained adequate strength and is properly cured.

Step #5

PROPER CURING AND SEALING OF CONCRETE

- The concrete must be cured as soon as possible after finishing and final set. Curing greatly increases the strength and durability of the concrete surface. Proper curing increases the resistance to freeze-thaw cycles as well as providing protection from lawn fertilizers and de-icing chemicals. Curing the concrete is a process where satisfactory moisture content and temperature are maintained for a minimum of ten days but preferably 28 days.
- There are several acceptable methods of curing. During warm weather, the most common method is the use of a liquid concrete cure and seal product applied to the surface of the concrete at the manufacturer's recommended application rate.
- During cool or cold weather conditions, the concrete must be maintained at a minimum of 50 degrees for a minimum of ten days but preferably 28 days. Enclosures can be constructed around the new concrete or insulating blankets may be used. Concrete must be maintained at the minimum 50 degrees because the hydration of the cement is a chemical reaction that is temperature sensitive.
- VanDerVart Concrete Products has several types of curing compounds and curing products. Contact us to review the options and determine the best option for your project.

Step #6

PROPER AFTERCARE OF CONCRETE

- Keep cars and light pick-up trucks off of freshly placed concrete for 5 – 10 days. In cool or cold weather conditions, an extended period of time is likely required for the concrete to obtain the desired strength.
- In most cases, trucks or heavy load vehicles require a minimum of 28 days before using the concrete.
- New concrete should be sealed after the 28 days of curing. Clean the concrete surface and then allow 24 hours to dry thoroughly. Sealing is the process where a protective coating or penetrating water repellent is applied to the surface of the concrete to keep moisture and contaminants out of the concrete. Sealing the concrete will help to protect the concrete from surface failures.
- The sealer must be compatible with the curing compound or curing method. This step can ensure years of attractive, trouble free and durable concrete.
- Clean and reseal concrete every several years depending on the amount of surface use and the sealer that is applied.
- Sawed control joints should be filled with a semi-ridged joint filler after sealing. This process prevents water and deicing products from entering the concrete at the control joints.
- Rain gutters and down spouts should direct water away from buildings and off of concrete surfaces. Downspouts should be connected to drainage pipe underground and pitched to a suitable area or connected to a municipal storm water system. It is always desirable to maintain a dry subgrade under the concrete slab. If water ponds adjacent to concrete or undermines the concrete, the concrete subgrade may settle or heave causing cracking of the concrete. If water collects under the concrete during the fall and winter season, significant frost heave will likely occur during the winter season in Wisconsin.
- Prevent snow and ice from accumulating on the concrete surface especially during the first winter. Don't use de-icing chemicals on your concrete, especially the first winter. Sand is a good anti-slip product that can be broadcast onto the concrete safely. Heated sand is available each winter season from all VanDerVart Concrete Products locations.
- Do not use de-icing products that include ammonium sulfate, ammonium nitrate or magnesium chloride. These products will chemically attack the concrete - especially at the saw joints if they are not filled with a joint filler as above.
- Prevent lawn fertilizers from accidentally being placed on concrete. Some fertilizer ingredients contain chemicals that will stain or chemically attack the concrete.

These six steps list industry established guidelines for proper exterior concrete construction projects. Following these steps will help to ensure a high-quality and durable exterior concrete project. Contact us if clarification is needed on any of the six steps. Please request your contractor to order ready-mixed concrete and materials from VanDerVart Concrete Products. Our staff is available to assist you in the selection of aftercare products to protect your investment in concrete.

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