

CONCRETE FACTS ABOUT DRIVEWAYS AND GARAGE SLABS



A durable, scale resistant, quality concrete driveway or garage slab can be achieved by strictly following these recommended construction procedures.

Site Preparation:

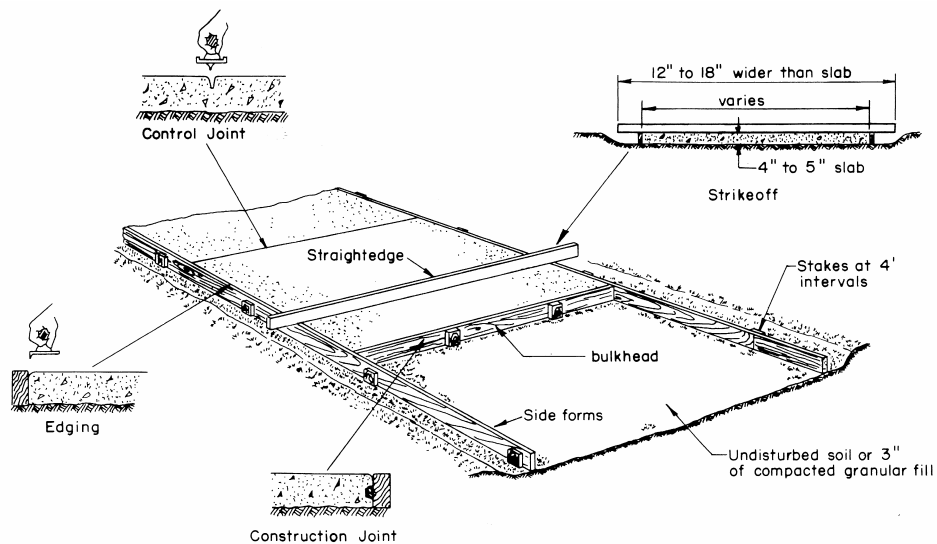
The base for a driveway and garage must provide uniform support for the slab, preferably undisturbed native soil with a thin granular base course. All vegetation, bricks, large rocks etc should be removed and the site graded. Do not drill "piles" below the slab since these create extreme non-uniform support conditions and are sources of future cracking.

All back-fill material must be unfrozen and well compacted. If your local soil is sandy, a granular base is often not needed. However, a 75 mm thick layer of compacted base course gravel or crushed stone may be used to give uniform support to the concrete. Fine grade accurately; this is what assures a uniform slab thickness.

Forms should be constructed with plastic or wood and well anchored with stakes trimmed flush with the top of form. Oil forms to make removal easier.

Slab thickness should be a minimum of 100 mm (4 inches) where the driveway will be used by passenger vehicles only. If larger vehicles, such as larger trucks, RV's etc will park on the driveway, a thickness of 125 mm (5 inches) or more is recommended. Check your local bylaws about any specification for the driveway approach portion.

Full depth isolation joints must be placed wherever the slab abuts a wall, stairs, garage floor or street pavement or curb. Greased smooth 20M dowels should be installed across only those joints where traffic will cross. Do not tie slab to walls, grade beams etc. with reinforcing bars. Let the slab float, breaking bond around the edges.



Reinforcing steel or fibres incorporated into the concrete is not required yet is often used. Such reinforcement does not prevent crack formation but, if used, can reduce the number of control joints or permit wider joint spacing.

Your choice of concrete mixes:

To satisfy the national Building Code, specify a mix that meets CSA Standards A23.1 & A438 for C-2 Exposure – freeze-thaw with de-icing salts.

One choice is **DURAMIX**[®], a special mix that's proven itself in Manitoba conditions for years. Ask for it by name. It can be supplied only by a member of MRMCA. Its characteristics include:

- Portland cement content, minimum 300 kg/m³
- W/C ratio 0.45
- Air content 5 - 8 %
- Slump: 80 mm +/- 30 mm

Or choose an equally effective paving mix option with the following characteristics:

- Minimum strength 32 MPa
- W/CM ratio 0.45
- Flyash option, up to 20% cement replacement
- Slump 100 +/- 30 mm
- Air content 5 – 8%

IMPORTANT:

Except for floors in heated garages, all pavement concrete must include entrained air.

Do not use a trowel, fresno or other steel tool on air entrained mixes. Local experience has shown that a single hand floating of a garage floor slab gives an acceptably smooth surface without damaging the air-void structure within the concrete.

Placing, Finishing & Jointing

Place concrete on unfrozen soil and assure air temperature is 5°C and forecast to rise higher.

Do not add water to the concrete as delivered to raise the slump above that specified.

By adding just 5 litres of water to one cubic metre of either mix you will:

- Increase the slump by about 25 mm
- Increase potential shrinkage & cracking by 10%
- Reduce strength significantly
- Reduce surface freeze-thaw resistance
- Make salt damage more likely.

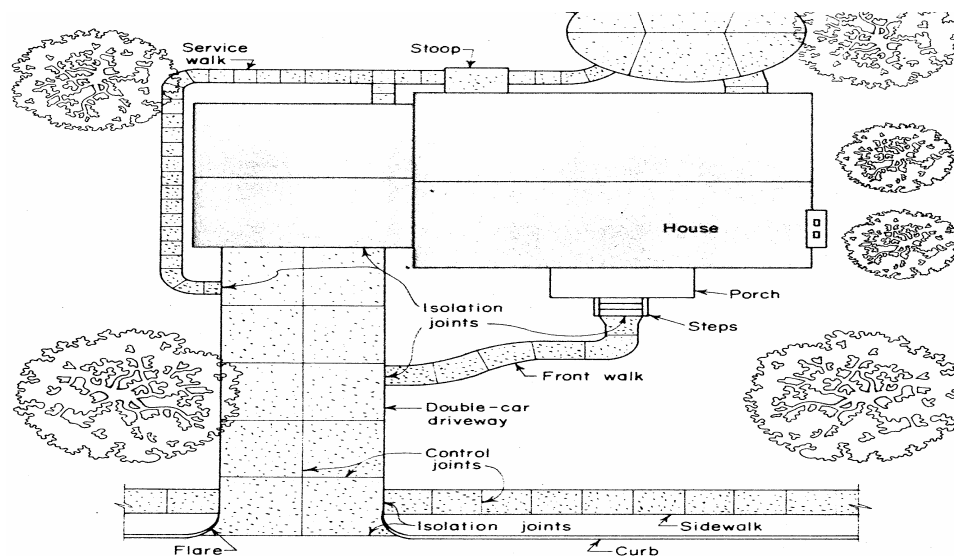
If you need more workability in the mix, ask your supplier to adjust the mix properly at the plant.

Discharge concrete down the chute as close as possible to its resting place. Do not move concrete laterally. Do not use a garden rake to move the concrete. That may separate the paste from the stones. Use a square-end shovel for this purpose or a come-along tool.

Level concrete with a straight-edge and vibration. [Figure 1.] Darby or bull float immediately. Do not tool the surface if any bleed or rain water is present. Let it evaporate. Failure to wait will result in a scaled surface. There is usually very little bleed water from air entrained mixes. Do not sprinkle cement powder to absorb surface water. If evaporation rates are high any time of the year, use a mono-molecular evaporation retarder such as Con Film or Sure Film between finishing operations to minimize risk of plastic shrinkage cracks. Do not work these products into the concrete with floats or trowels since their high water content will weaken the surface.

Never use a steel trowel or fresno on air-entrained concrete. Such tools collapse the protective air content at the surface, leading to scaling. Use them only on non-air entrained concrete for floors in heated garages. All air entrained concrete must be given a skid resistant texture. Use either a broom or brush as soon as the texture will remain on the surface or, in a garage, give a floated texture when the surface can be accessed with knee boards. Use an edging tool along the forms.

To control random cracks, locate contraction joints no further apart than 2.5 metres in both directions. Joints must be made $\frac{1}{4}$ the slab thickness, no deeper. One option is to place plastic crack inducers on the base and pour the concrete over them; straight-line cracks will appear above them. More commonly, control joints grooves are either tooled into the surface during finishing or saw-cut within 16 hours. Late saw-cuts will result in both the cuts and unsightly random cracks. Be on time with saw-cuts.



Curing for Strength and Durability

Curing of concrete involves **TIME, TEMPERATURE and PROTECTION FROM MOISTURE LOSS**. Without proper curing, the internal chemistry within any concrete mix, especially one with flyash, will be incomplete without good curing, resulting in loss of strength and durability. All concrete must be cured.

TIME: Minimum of 7 days, at 10°C.

TEMPERATURE: If the concrete temperature will drop below 10°C within 3 days, concrete must be protected with insulating materials such as insulated blankets or straw. A single sheet of poly is not thick enough to keep concrete warm. At completion of curing period, remove covering to permit concrete to air-dry several days before subjecting to frost action.

PROTECTION FROM MOISTURE LOSS:

Curing methods recommended include:

- Sprayed white curing compound; coat surface completely immediately after texturing.
- Continuous water spray
- Covering with wet burlap or blanket
- Ponding of water
- Cover with plastic sheets or insulated tarp

In Manitoba's climate, after September 15th, the use of sprayed curing compounds or sealers is not recommended. Use the wet blanket, insulated tarp or poly sheet option since they can eventually be removed, letting surface air dry before freezing. If frosts are forecast for the following nights, use insulated tarps or straw.

To enhance the look of the surface and to make surface cleaning easier, a high-quality clear sealer may be applied later. Such sealers do not replace the need for early curing by one of the above methods. Some products combine both curing and sealing functions and are to be applied immediately the surface texture is completed.

Caution

To avoid scaling damage, do not apply de-icing salts or fertilizer to concrete the first winter after installation.

Ensure that chemicals applied do not include magnesium chloride salt or sulphate fertilizers.