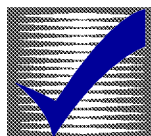




HOW-TO BOOKLET #3070

CONCRETE SLABS



TOOL and MATERIAL CHECKLIST

- Concrete Mix
- Tape Measure
- Sledge
- Wooden Float
- Garden Hose
- Plastic Sheeting
- Forming Boards & Stakes
- Long Straightedged Board
- Shovel
- Carpenter's Square
- Buckets
- Cement Finishing Trowel
- Chalkline
- Hammer
- Level
- Edger
- Nails

CUBIC FEET OF CONCRETE IN SLABS			
Area, Square Feet (Length x Width)	Thickness, Inches		
	4	5	6
50	17	22	25
100	33	41	50
200	68	84	100
300	100	124	150
400	135	168	200
500	168	208	250

LUMBER SIZES	
NOMINAL SIZE	ACTUAL SIZE
2X2	1½ X 1½
2X4	1½ X 3½
2X6	1½ X 5½
2X8	1½ X 7¼
2X10	1½ X 9¼
2X12	1½ X 11¼

Read This Entire How-To Booklet for Specific Tools and Materials Not Noted in The Basics Listed Above.

Although this How-To Booklet is titled “Concrete Slabs,” we’ve illustrated it with concrete patio basics. This way you can gain the knowledge of both projects—slabs and patios—in the same dose. Both are really constructed in about the same way, using about the same technology.

Working with large amounts of fresh concrete is a hot and heavy job. It takes some skill; however, it takes more planning and organization than special talent.

AN OVERVIEW

Before starting any concrete project, be sure you check local building code regulations so you can build the project to the correct specifications. Building codes are designed to ensure the longevity of the project. This is especially true in areas subject to ground heave caused by freezing temperatures. An improperly prepared site will result in a cracked concrete surface. Building codes respond to these conditions, so don’t ignore them.

LOCATING UTILITIES

Before any construction, determine the location of all underground utilities.

The major concern here is that deep footings may conflict with the utility service. Water, gas, sewage, and telephone lines may force you to incorporate special construction or to relocate the project. If your home is fairly new, your local building inspector probably has a copy of the utility hook-up locations. If not, check with the customer-service representatives of the local utility companies. If there is a conflict, discuss your options with the service in question.

EXCAVATING THE SITE

Lay out the dimensions of the slab and excavate as needed. The depth and width depends on the project and the specifications in local codes.

The subgrade needs to be uniform throughout to correspond with temperature and moisture changes. Level the earth surface, so there are no deep holes or protruding objects. Remove all large rocks, roots, and other debris. Then tamp the subgrade, either with a hand tamper or a mechanical tamper you can rent.

The pitch. A concrete slab must be pitched, or set at a slight angle, to ensure necessary drainage. Pitch must angle away from a house or other structures, such as a garage. This is especially important in a patio or driveway project.

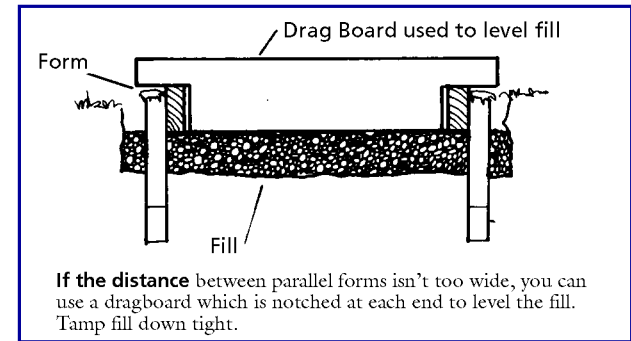
A proper pitch is usually 1/4-inch per foot, depending on the amount of rainfall in the area. Codes will tell you this. An example: if the slab extends out 15 feet from a house, the pitch would be 15 feet X 3/4-inch = 3-3/4 inches. Therefore, the edge of the slab farthest from the house rests 3 3/4-inches below the edge nearest the house.

Creating the pitch. Once you have completed the excavation, you create the pitch. Example: drive Stake A at a corner nearest the house. On this stake, mark the proposed height of the slab. Most on-grade slabs are about 2 inches above the ground. Straight out from the house, pound in Stake B at the point corresponding to the end of the slab farthest from the house. Stretch a chalkline at the mark on Stake A to Stake B. Check the string with a line level. Now measure down from the string to a distance equal to the required pitch. Retie the chalkline at this point.

The pitch will affect the angle of the slab, but not the thickness. Therefore, you will have to excavate high spots at the high points and backfill this earth to the low spots so the height remains uniform throughout. The string across the stakes will serve as a guideline.

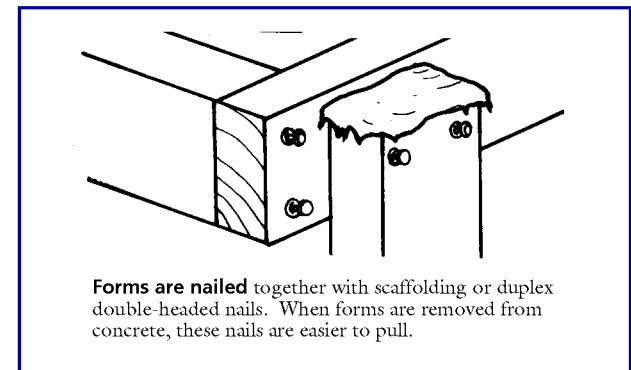
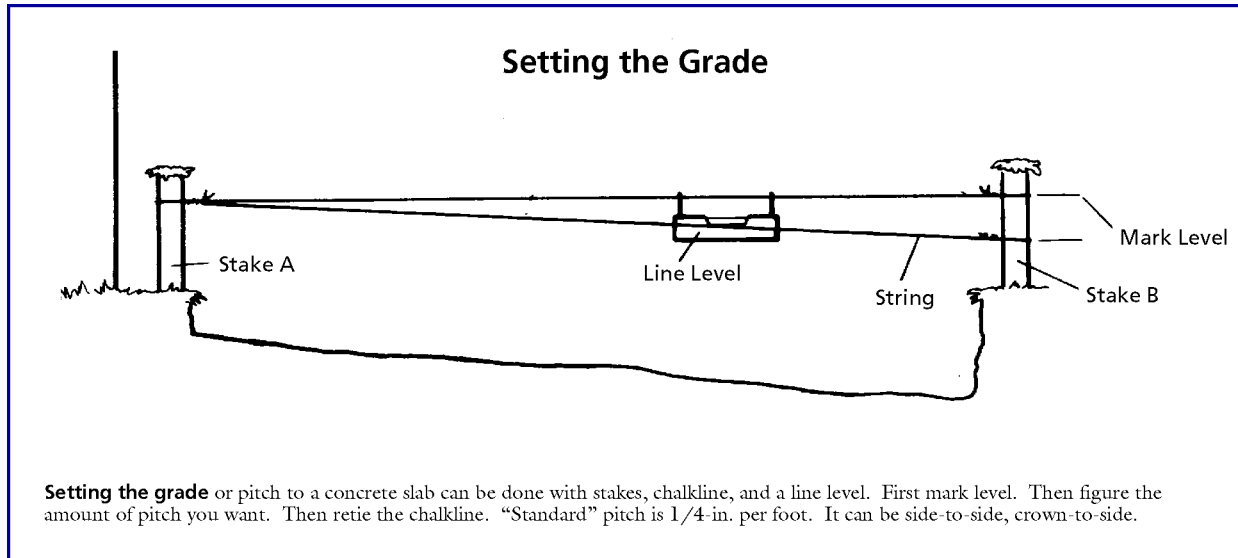
BUILDING THE BASE

Base materials of sand, gravel, and rock are placed at the bottom of the excavation to prevent settling and heaving and to aid drainage. They also provide a level surface on which to place the concrete.



The depth of the base is often regulated by codes. Find out how much base you need, as you would for concrete, but order twice as much as your figures indicate. This is because the base materials will compress to half of their original size when they are tamped. The order of placement:

- 1 Place the gravel in at least 2 layers. Tamp each layer firmly so that the top of the final layer is 2 inches below the bottom edge of the concrete placement.
- 2 Add sand. Keep adding and tamping until you have a level layer that reaches to the top of the concrete pour. Follow this order no matter whether your installation requires a footing or not. The depth of any given layer may vary by code. The level can be checked with a strikeboard called a dragboard. It is illustrated in this Booklet.



BUILDING THE FORMS

Concrete takes the shape of the mold in which it is placed. In most cases, the mold is made of 2X4, 2X6, or 2X8 lumber supported by 1X2, 1X4, or 2X4 stakes.

The forms must be substantial or they can't support the weight of the concrete without bulging. Always set form boards on a true perpendicular to the subgrade. Set all stakes straight up and down so that the edges of the cured slab are plumb. If they are not, the slab will be substantially weakened. Forms for curved forms are illustrated. The forms are sawed in a series of saw kerfs so the boards may be curved.

Isolation joints. Isolation joints are used to separate a new concrete placement from other already existing materials such as wood, brick, old concrete. The joint is preformed material that is about 1/2-inch wide. It allows for differing rates of expansion and contraction.

Construction joints. In some installations, the entire slab is not placed at once. The forms are built. Then a section is closed off with a temporary form board called a stop board. The section is filled with concrete, screeded (leveled), and finished. Once the concrete has set, but not before it has cured, the stop board is removed and the joint edge is oiled. Then either the rest of the form—or another portion of it—is filled with concrete.

The joint between the initial and the later sections is called a construction joint. This joint also can function as a control joint, so plan the position of all construction joints to correspond to control joint dimensions dictated by your specific project.

Oiling form boards. You can oil the form boards by brushing on old crankcase oil with an old paintbrush.

This way, the form boards will not stick to the concrete when you remove them, and the oil on the boards seals the wood so the water from the concrete is not absorbed into the wood, weakening the concrete at this point.

ORDERING THE CONCRETE

For large concrete projects—as a “slab” would suggest—we recommend that you order the concrete from an already-mixed concrete company rather than attempting to mix it yourself. You can, of course, mix it yourself, but be prepared for lots of heavy, hot work.

There are some limitations in getting concrete from a truck to the forms, and you should consider this before you order the mix to your project. Some examples:

Will the truck be able to get to the forms?

Most trucks have chutes that can let the driver move the mix by as much as 20 feet. If the truck can not get close enough, you will have to move the material in wheelbarrows to the final location.

If you are dealing with a fair amount of concrete, it would be smart to have the concrete dealer come to the location and give his opinion.

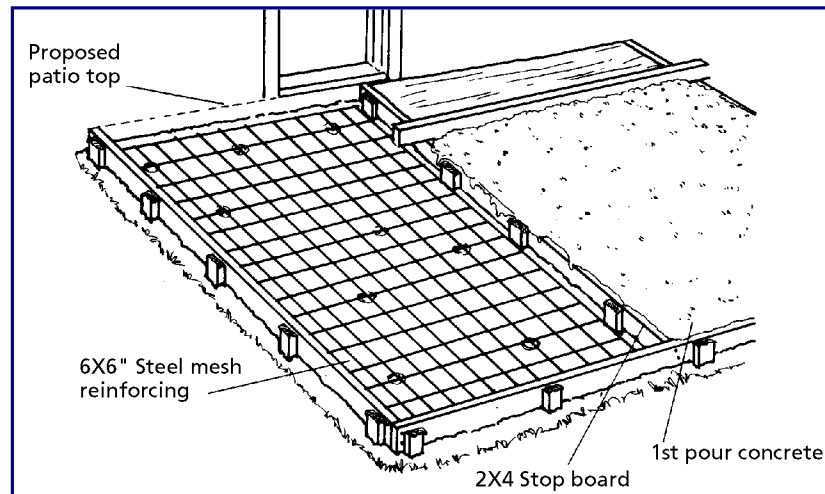
Be aware that concrete trucks are very heavy. Fill areas around new house construction, or even around older homes, may be too soft to support the weight. The result is a stuck truck, or, worse, a tipped over truck. Plan a route that will cause the least amount of damage to your property.

If you have to move concrete some distance by hand, explain this to the dealer, since the truck may be at the site longer than normal. Some dealers may charge for this extra time.

Ordering and Scheduling. You need only the dimensions of the project for the dealer to figure how much concrete you need. Give him the length, width, and depth. If you can, schedule the delivery in the morning. This will give you plenty of daylight time to work the concrete properly.

In most cases, the truck will bring a bit more concrete than is needed. Since the truck may have to be rinsed and dumped, you should have an area available in which to dump the excess. If just a little mix is left over, you can put it in a wheelbarrow and keep it until the mixture has been placed. You may need a shovelful or two in places that looked full during placement.

Concrete reinforcement. There are two types: wire mesh that looks like hog fencing, and rods. Sometimes rods are used throughout the slab, although this type reinforcing usually is confined along the edges of a slab to reinforce the edge and wire mesh is used inside the rods. Or, rods are used where there will be heavy stress on the

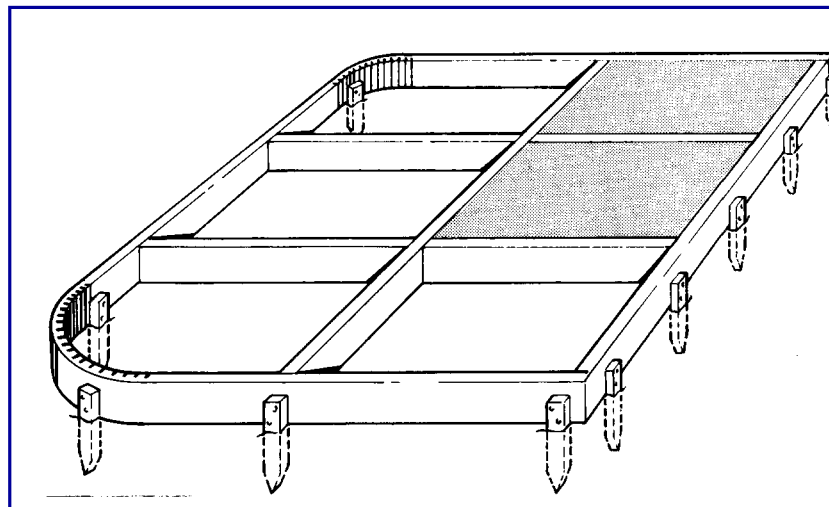


When placing a large slab, such as a patio, you can put the project into sections with temporary form stops. Use reinforcing rods at the joint to tie the two sections when the second unit slab is placed. This illustration shows all elements of slab construction: the forms; reinforcing mesh; stop board; screed. Once the slab has been final finished, cover the surface with plastic sheeting and keep the concrete wet for a week or so. Or, cover the concrete with straw or burlap. Purpose of the covering is to keep the green concrete damp so it cures properly. Remove forms in about 2 weeks.

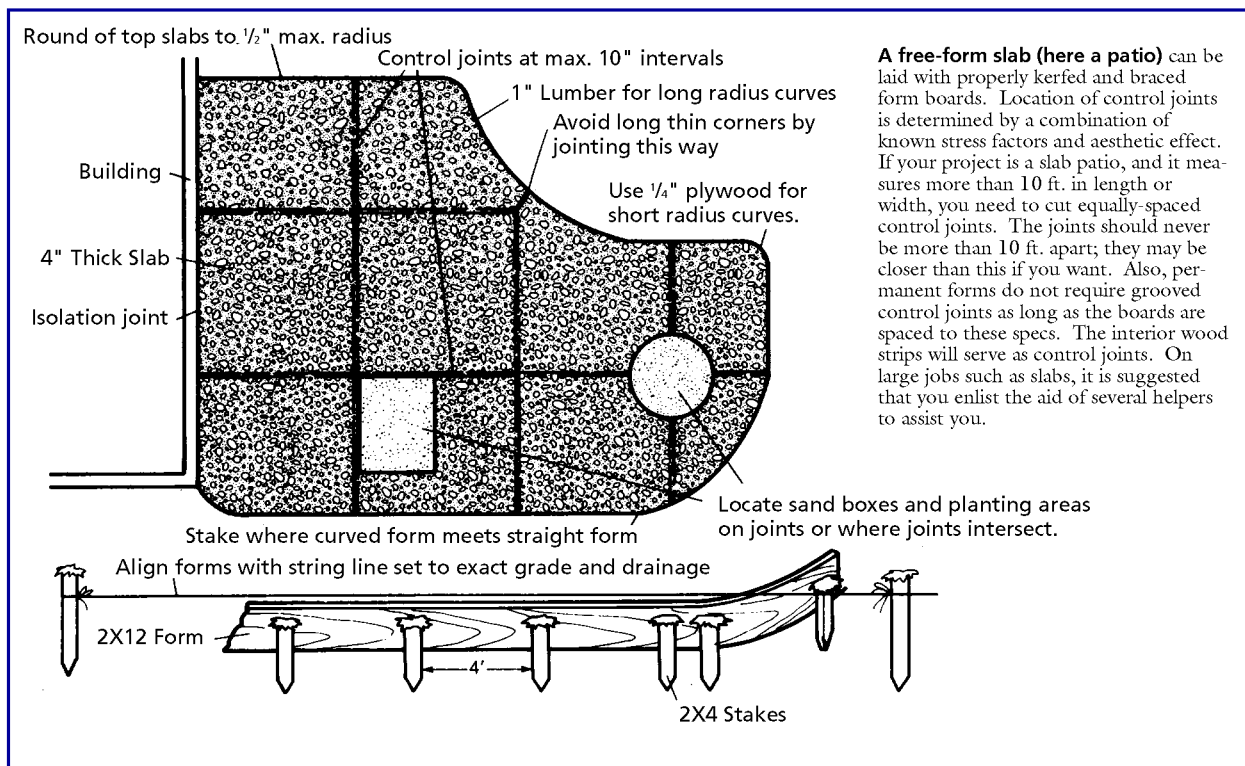
concrete surface. Wire mesh probably will be plenty of reinforcement for any concrete slab that you will place. Check with codes on this, which may dictate mesh (or rod) size.

Concrete finishing. There are several steps to concrete finishing:

- 1 After the fresh concrete has been leveled (screeded) in the forms, let it set until the surface of the concrete looks shiny—or you note that the excess water is gone and the concrete can withstand foot pressure. The concrete should feel gritty under trowel pressure.
- 2 Float the surface. A wooden float is used for this. If the float has handle and is large, it is called a bullfloat. If the float looks like a finishing trowel, it is called a float. A float removes excess water from the surface of the concrete and knocks down the small ridges left by the screeding operation. Push and pull the bullfloat across the surface. Lift it after each stroke. On small jobs, use the hand float working it in a circular motion. Don't dig the edges into the concrete.
- 3 Edge the concrete with an edging tool. Edging provides a round smoothed edge to keep the slab from chipping. Run the edger back and forth, using the wood form as a guide for the tool.
- 4 Cut control joints. You can use the trowel or a grooving tool for this job. The groove should be $1/4$ the thickness of the concrete slab. Use a straightedge for a guideline to run the trowel or grooving tool.
- 5 After floating, finish the concrete. You can do this with a steel concrete trowel. Move the trowel in a circular motion. Easier than a trowel is a broom finish. Brooming is done after edging and floating the slab. Simply run a push broom with stiff bristles evenly on the surface of the fresh concrete. Pull the broom toward you; lift it after each stroke. Light pressure is plenty good enough on the broom for depth of grooves.



A **curved edge** is no more difficult to set than a straight one. A series of saw kerfs are cut into the form board every $1/4$ in. to a depth of one half the board thickness. This makes the form flexible so it can be bent; it is still strong enough to withstand the thrust of the concrete mixture, which is plenty. Space the form stakes fairly close together; you want plenty of lateral support to hold the form boards stiff. If the design calls for wooden spacers, install these at the time the forms are set, but after the excavating and fill work has been done. Drive nails through the thickness of the spacers near the fill to help hold them tight.



A **free-form slab (here a patio)** can be laid with properly kerfed and braced form boards. Location of control joints is determined by a combination of known stress factors and aesthetic effect. If your project is a slab patio, and it measures more than 10 ft. in length or width, you need to cut equally-spaced control joints. The joints should never be more than 10 ft. apart; they may be closer than this if you want. Also, permanent forms do not require grooved control joints as long as the boards are spaced to these specs. The interior wood strips will serve as control joints. On large jobs such as slabs, it is suggested that you enlist the aid of several helpers to assist you.

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