

Do It Yourself Paver Installation

Tackling a project by yourself requires some construction skill, some math and muscle, and some weekends. The following provides guidelines for installing a patio or walkway that's not larger than about 300 sf (30 m²). If you take on construction of a larger area, or a driveway, hiring a contractor is highly recommended. They have the equipment to get the job done faster and with better quality.

Many ICPI member manufacturers provide great brochures on how to do-it-yourself, so be sure to read these. Some other sources of information cut corners by saying that a sand bed is all that's needed below the pavers. Baloney! No matter the geographic area, all paver projects require a base, typically compacted, crushed stone sized from 3/4 inch to dust. A coarse sand bed is used, the same kind as in the manufacture of concrete.

Essential tools required to do a project:

- Flat and pointed shovels
- Wheelbarrow and a rake
- Hose with spray nozzle
- Hand tamper
- Paver splitter (rented)
- Plate compactor (min. 5000 lbf or 22kN, rented)
- Chisel and 3 lb hammer
- String line and metal stakes
- A line level and a 4 ft carpenter's level
- 1 inch diameter pipes
- Screed board (straight piece of lumber)
- Broom
- Gloves and safety goggles (for cutting pavers)
- Ear plugs when operating the plate compactor

In a nutshell, there are several steps to consider.

Step 1 - Determine how much materials are needed

Step 2 - Excavate the area

Step 3 - Install the geotextile and base

Step 4 - Install the edge restraints

Step 5 - Install the bedding sand

Step 6 - Place the concrete pavers

Step 7 - Clean up and enjoy!

A detailed explanation of each step follows...

Step 1 - Determine how much materials are needed.

1.1 Determine the area (length x width) you want to pave. Mark it right on the ground using spray paint or a garden hose to mark the edge of the pavers. If the area is curved or an odd geometric shape, break it down to smaller areas, measure their areas and add them together for the total area. Add an extra six inches (15 cm) to the outside and calculate a second area for the base. This will be the area to excavate for the base since it will extend past the edge of the pavers.

1.2 Chose the paver shape and the total number of pavers needed. Some suppliers can provide tables or software to calculate this once you've decided on a shape or shapes.

Example: 4 x 8 in. pavers for a 10 ft x 20 ft patio = 200 sf x 4.5 pavers per square foot = 900 pavers. Add 11% for cutting and spares, say 1000 pavers. The supplier can tell you how many bundles or pallets of pavers will need to be purchased, since the number of pavers per bundle varies with each shape.

1.3 Measure the total length of open edges, i.e., places not against a house, curb, or other paving. This will be the total edging required. Most plastic and metal edging comes in specific lengths, so you will have some extra length of edging for making minor adjustments to the paved area. Most edging requires metal stakes, so be sure to purchase one stake for every ft of edging to be installed.

1.4 Calculate the sand bedding required. This layer is always 1 inch thick when placed. Multiply the area of paving by 0.00309 to find the total cubic yards. Example: $200 \text{ sf} \times 0.00309 = 0.62 \text{ cubic yards (cy)}$. Convert cubic yards to tons, since sand is purchased by the ton. The sand supplier can provide the conversions factors for cubic yards to tons. Example: $0.62 \text{ cy} \times 1.6 \text{ tons per cy}$ is about 1 ton of sand.

1.5 Calculate the base material required. Patios and walks will need at least 4 in. thick base. This may be thicker in colder climates or in continually wet soils. (Your supplier can provide guidance on base thickness.) Calculate the number of cubic yards needed, then convert that result to tons. *Remember*, the base is 6 inches longer on each side than the 10 x 20 ft area of paving. Therefore, the base area will be 11 x 21 ft or 231 sf.

To install a 4 in. thick compacted base, multiply the total square footage by 0.01235. So $231 \text{ sf} \times 0.01235 = 2.8 \text{ cubic yards of base}$.

Again, the aggregate base supplier can provide conversion factor from cubic yards to tons, since base is purchased by the ton. Example: A crushed stone supplier said that a cy of base = 1.8 tons. So $2.8 \text{ cy} \times 1.8 \text{ tons} = 5 \text{ tons}$.

1.6 Calculate the geotextile required. The geotextile goes between the compacted soil and base. The area of the base x 1.08 gives the total area of geotextile. Example: $231 \text{ sf base area} \times 1.08 = 250 \text{ sf of geotextile needed}$. For small jobs like this, a single piece of geotextile (typically 12 ft wide) will cover the bottom and sides of the excavation. If the bottom and sides of the excavation can't be covered with just one piece of geotextile, then overlap two pieces by at least 12 inches. Add this overlap area to the 250 sf needed.

Step 2 - Excavate the area

2.1 Before you do any digging, call the local utility location company and have them mark all underground utilities in the area of the paving. Most areas have one number to call and the phone number is often prominently displayed in the local phone book. Make the call at least 3 business days before you plan to dig. Utility location companies won't locate buried lawn sprinkler lines. So you will need to do that. They tend to be near the surface and can be damaged from digging.

2.2 Check the slope. The ground to receive the base and concrete pavers should drain away from the house. There should be at least a 1/4 in. drop for every foot away from the house.

2.3 Remove the existing sod and soil using flat shovels and some help from neighbors. Example: 4 in. base (compacted) + 1 in. thick sand + 2 3/8 in. thick pavers = 7 in. depth for excavation since there will be slight settlement of the sand when pavers are compacted into it.

Be sure you have plans for relocating the excavated soil and sod. The slope of the soil excavation will be the slope of the pavement, so check the slope of the bottom of the excavation by pulling level string lines and checking depth from them with to the soil with a measuring tape. Once the area is excavated, use a hand tamper and compact the soil, recheck slope with a carpenter's level and adjust as needed. There should be a 1/4 in. drop per foot away from the house.

Step 3 - Install the geotextile and base

3.1 Place the geotextile on the compacted soil. Cover the compacted soil with the geotextile and turn it up along the sides of the excavation. It can extend beyond the top. Fold it back and trim it off after the base is installed.

3.2 Place and rake the base smooth over the geotextile. Make sure the base material is moist, but not soaked with water. Place about 2 inches, rake it smooth, and compact it with a 5,000 lbf (22 kN) plate compactor. This can be rented at a building equipment rental store. Place another layer and rake it smooth. Pull string lines over the base set at the final surface elevation and slope of the surface. Compact the loose base layer so that about a 3 inch space is between the string line and the top of the compacted base. Check the space with a measuring tape. Do this checking on the base with at least two string lines spaced over the base. This will leave enough space for the bedding sand and pavers.

Step 4 - Install the edge restraints

4.1 Install the edge restraints. Place the edging without staking it around the perimeter. Stake one section in place, then cut the edging to enclose the area of the pavement. You can always lay course of pavers to determine the location of the edging. Anchor the edging with metal stakes, hammering in one stake every

foot into the holes in the edging. Popular plastic and metal restraints should have instructions that provide further guidance and tips on installation. ICPI doesn't recommend using pressure-treated wooded edge restraints. They warp and eventually deteriorate.

Step 5 - Install the bedding sand

5.1 Place at least two, 1 inch outside diameter pipes directly on the base. Place them several feet apart and parallel to each other. Spread the sand between the pipes. Use a shovel and rake to smooth it out. The sand should be moist but not saturated.

5.2 Use a straight piece of wood to screed the sand smooth. This involves pulling the wood across the pipes several times until an area of sand is perfectly smooth. Do this for the entire area. Remove the pipes and fill the indentations with sand. Level these areas with a square trowel. Don't walk or disturb the screeded and leveled sand.

Step 6 - Place the concrete pavers

6.1 Start at a corner. It should be square, i.e., 90 degrees. Place a border course around the entire edge, then place the pavers in the desired pattern. Your supplier can suggest different patterns with drawings. Patterns can include running bond, parquet, random, and herringbone patterns to name a few. Some shapes can create some interesting patterns, especially with different colors.

6.2 Continue to place pavers on the sand while maintaining consistent joint widths. Don't drag the pavers into the sand. Just place them by using the pavers on the sand as means to locate the one you're placing.

6.3 Cut pavers as needed. Your paver supplier or building equipment rental store can provide a cutter. Practice cutting with a few pavers so you get a feel for using the machine before cutting units for your project. Cut pavers to fill in at the edges next to the border course. The cutter allows a minimum length for cutting, so keep that in mind as you cut and fill gaps.

6.4. Compact the pavers using a plate compactor. Make at least four passes over all the pavers, starting at the outside of the pavement and working around the edges toward the inside. Then compact back and forth like mowing the grass. Remove and replace any pavers that crack or chip from the compaction equipment. Adjust joints so they are consistent. A large screwdriver is effective in aligning paver joints.

6.4 Spread dry joint sand over the surface and sweep some into the joints. Bagged mortar sand works well. Vibrate and compact the sand into the joints, sweeping and compacting as you go. A second person can help sweep while you compact, or vice versa. Filling the joints with sand will take several passes with the plate compactor. You can use the bedding sand, but it will take some additional time to work it into the joints with continual sweeping and compacting. After compaction, the sand in the joints might settle, especially after a few rainstorms. Apply some extra sand to fill these joints as needed.

Step 7 - Clean up and enjoy!

7.1 Remove excess sand by sweeping. There are many products to clean, seal, remove efflorescence, and stabilize the joint sand (great for random patterns with large joints). Contact your supplier for information on these products. Sealers will keep out weeds and ants, and sealers make stains easier to remove.

Place the furniture, plants, grilles, etc., and enjoy!