9 Steps to a Lasting Paver Installation

A whitepaper listing the time-proven paver installation process for Connecticut and Southern New England

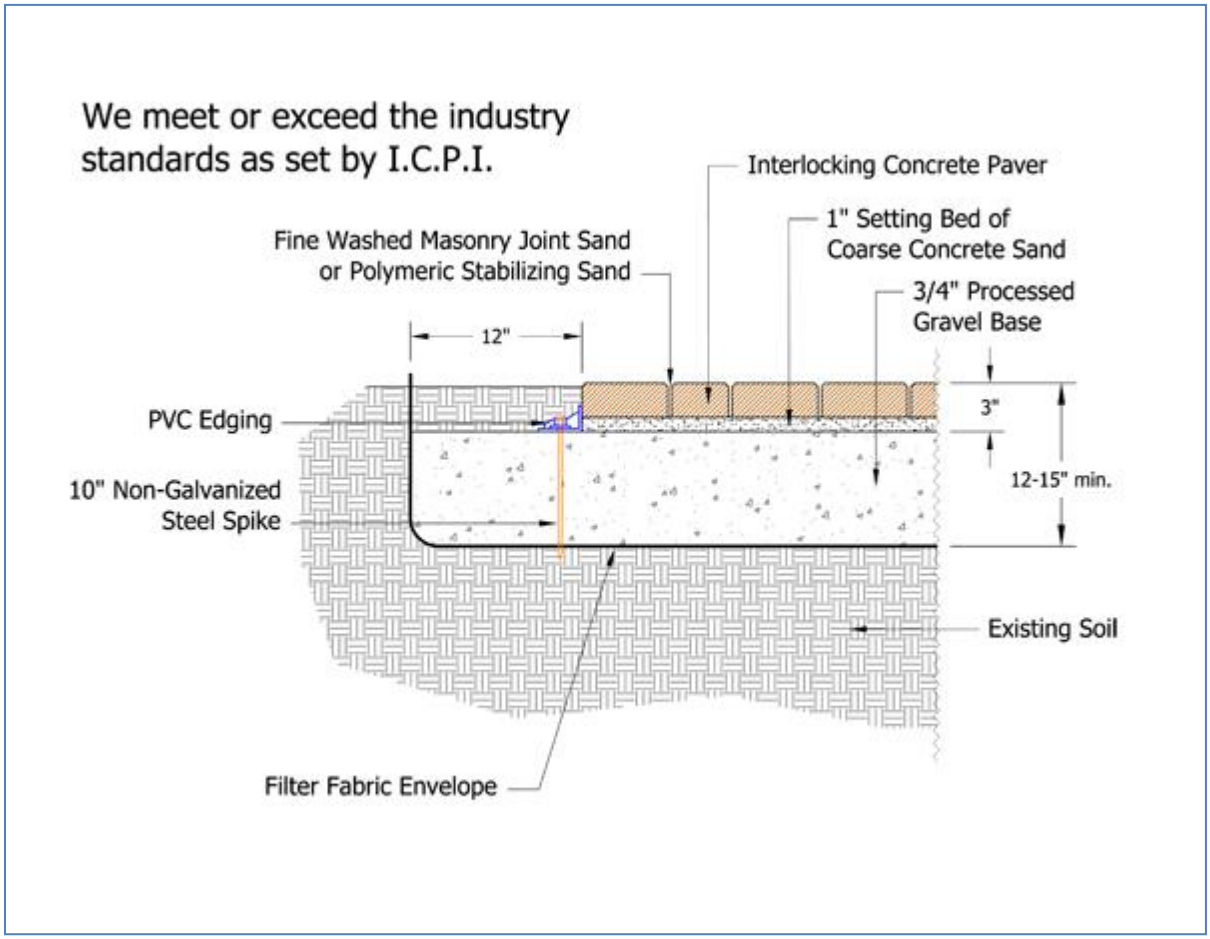
By Tom Bahler

Although this whitepaper is fairly long and in-depth, it really is the foundation of a long lasting paver project. Many times I try not to insert too many personal feelings and findings, but with 26 years of experience, I have become very passionate about this topic. What you're about to read is what 26 years of good and bad experience has taught me...

You will notice that I will reference the ICPI (Interlocking Concrete Pavement Institute) on different occasions. For easy explaination, the ICPI is basically the organization that sets the *International* guidelines and standards for our industry. International is a very key point in this because as we go along, you will begin to realize how important it is that some of these standards are exceeded for the longevity of a project.

So, with that brief intro., let's get started...

Below is a beautifully illustrated cross-section of our recommended installation process. I will go into each portion of this in more detail below.



1. Depth of Base

This is definitely one of the most critical points of the entire construction process. If the base is not deep enough, our New England winters will wreak havoc with the paver surface.

The ICPI states: *Sidewalks, patios and pedestrian areas should have a minimum base thickness (after compaction) of 4 in. (100 mm) over well-drained soils. The base for residential driveways on well-drained soils should be at least 6 in. (150 mm) thick.* ***In colder climates, continually wet or weak soils will require that bases be at least 2 to 4 in. (50 to 100mm) thicker.***

We are certainly much colder here in CT than a lot of other places in the world. Therefore, it is imperative that the base material be deeper than the recommended 4". In CT, we recommend that a paver project being completed on good, well-drained soils have at least 7"-10" of base material.

When do I need a deeper base?

There are really a couple of applications that require deeper bases.

If you notice the above quote from the ICPI, you'll see that they are talking about 'well-drained' soils. Here in CT we have soils that range from beautiful well-draining sandy soils to extremely heavy soggy clay soils. The clay soils tend to hold water and therefore heave and move more liberally than the free draining sandy types. Taking clay conditions into account, we add an additional 3" of depth to the base material. This will begin to minimize the movement of the pavers.

In addition to deeper base, the clay soils may need to be chemically modified. This is done with either a type 'S' mortar or lime. Both of these ingredients will react with the wet clay soils and assist with the drying process. By changing the physical characteristics of the clay particles, the lime and mortar allows them to be better draining and more structural. This is beneficial in securing a stable and dry sub-base.

Another application that requires a deeper base is a driveway or parking lot for vehicular traffic. ICPI states: *The base for residential driveways on well-drained soils should be at least 6 in. (150 mm) thick. In colder climates, continually wet or weak soils will require that bases be at least 2 to 4 in. (50 to 100 mm) thicker*. Again based on our experience with New England winters and

the movement associated with the freeze/thaw process, we recommend that a driveway base be between 12"-15" thick depending on the soil type.

2. Filter Fabric

What is filter fabric, and what are the benefits of using it? Both are great questions, and ones that we hear often.

Filter fabric or Geotextile Fabric is defined by the ICPI as: *Woven or nonwoven fabrics made from plastic fibers used for separation, reinforcement, or drainage between pavement layers.* Basically this is an extremely durable and heavy duty envelope that contains our base. It prevents the migration of our base material into the sub-soil, and keeps everything contained.

So you ask, why do I need it in my project? **LONGEVITY.** Again the ICPI states: *When geotextiles are used they preserve the load bearing capacity of the base over a greater length of time than pavement without them.*

3. Base Material

The type of base material that should be used under any paver construction is known as a 3/4" minus or 3/4" processed gravel. This material is formally known as ASTM C2940, and adheres to the standard set by the ASTM. Basically in layman's terms what this means is the larger aggregates in the mix should be

angular and around 3/4" in diameter. This allows for the proper drainage of the base. The rest of the mix will vary anywhere in size from <3/4" all the way down to the fines (small almost dust like particles). These different sized particles assist in the compaction of the base.

Note: Stone Dust (as we know it here in New England) will not drain properly. Do NOT take shortcuts on the base material.

4. Compaction

Compaction, Compaction, Compaction!!! I cannot stress enough how critical this step is. If this step is skipped or not done properly, I can guarantee you that your project will not last. There are a number of ways that you can properly compact base material. We recommend using a vibratory roller wherever it is possible. If you don't own one of these, check with your local Rental Center. Where a roller doesn't fit the bill, a large plate compactor will do the trick. It is very important to research the specific manufacturer's recommendations for how thick of a lift (thickness in which the processed gravel is spread at one time) can be compacted properly.

5. Sand Setting Bed

ICPI refers to this layer as: *Bedding Sand or Bedding Course: A layer of coarse, washed sand screeded smooth for bedding the pavers. The sand can be natural or manufactured (crushed from larger rocks) and should conform to the grading requirements of ASTM C 33 or CSA A23.1 with limits on the percent passing the No. 200(0.075 mm) sieve.*

What we do in this step is spread a 1"-1½" layer of sand over the compacted base material in preparation to lay the pavers. The pavers will be installed directly on top of this layer. Do not compact the setting bed yet… it will be done later after the pavers are installed.

It is imperative to use the correct materials or shifting and settling could occur. Again, never use stone dust to fill the joints. It breaks down during the compaction process.

6. Install Pavers

This is where the fun begins. Up to this point you have been installing extremely critical components of a proper paver installation, but they are all invisible to the eye in the end. Now is where you get to see the results of your hard work. The pavers are installed on top of the setting bed. Paver, color, and pattern are left up to the homeowners' discretion and imagination.

7. Edging

This is one of the final steps that we take to ensure that you have a long lasting project. The excess bedding sand along the outside edge of the pavers should be removed at this point. A flexible PVC edging is placed tightly against the edge of the pavers and held in place with 10" non-galvanized steel spikes driven in every 8-12". The ICPI quotes *Edge restraints are a key part of interlocking concrete pavements. By providing lateral resistance to loads, they maintain continuity and interlock among the paving units.*

Basically, they assist in the retention of the pavers as they move side-to-side during the freeze/ thaw cycles. They also keep the pattern tightly fit and locked together.

8. Sweeping and Compacting

The final step of the actual paver installation is now ready to take place. This is where the actual 'interlocking' process takes place.

Again quoting the ICPI: *After an area of pavers is placed, it should be compacted with a vibrating plate compactor, which should be capable of exerting a minimum of 5,000 lbs. (22 kN) of centrifugal force and operate at 75-90 hertz. At least two passes should be made across the pavement to seat the pavers and force sand into the joints at the bottom of the pavers.*

Dry joint sand is swept into the joints and the pavers compacted again until the joints are full. This may require an additional two or three passes of the plate compactor. If the sand is wet, it should be spread to dry on the pavers before being swept and compacted into the joints. Joint sand may be finer than the bedding sand to facilitate filling of the joints. Bedding sand also can be used to fill the joints, but it may require extra effort in sweeping and compacting. Compaction should stay within 6 ft (2 m) of an unrestrained edge or laying face. All pavers within 6 ft (2 m) of the laying face should have the joints filled and be compacted at the end of each day.

This is an extremely important step because if the joints are not filled properly, the pavers will not interlock like they should. This is where I like to explain the actual term 'interlocking'. Pavers are not like Legos or Lincoln Logs where they physically interlock. Rather the fractured aggregates in the joint sand act as wedges and shims to hold the project in place.

9. Backfill

The last and final step to all paver projects and one not to be taken lightly is the backfilling of the paver edges. Topsoil should be installed over the edging, bringing the level of it up even with the pavers. This helps keep the UV rays of the sun from breaking down the PVC and causing it to become brittle. Don't mound up the soil as it will create a dam for the water and will cause other issues.

This brings us to the end of our paver discussion. We welcome your comments as always. Happy Paving!