

# Driveway Construction

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Disclaimer: This article documents the construction of our driveway. Construction contains many inherent risks related to materials, site topography, and safety; to name a few. Safe construction practices must be followed to minimize these risks and dangers. Use of the information in this paper is AT YOUR OWN RISK. It is meant as a public service and represents the author's personal knowledge and approach, not to replace your own experience, common sense or instinct.

## I. INTRODUCTION

### A. General

Our driveway, like many in the country was path covered with crushed rock. Over the years, some of the crushed rock sunk into the mud when it was wet. But most of it washed away during heavy rains or annual floods. On the hillside of the driveway, we would commonly see 1 to 2 foot deep ruts form. It was a constant battle to smooth out the driveway and costly to put down extra loads of crushed rock.

So after a couple decades we began experimenting to find a better solution and this article documents our approach.

Our 700-foot driveway consists of two approximately equal parts, the flats and the hill. The flat part was fairly level, but in the spring we normally experience a major flood that covered the flats and eroded the crushed rock driveway. The hill was fairly steep (15 degree incline) and any heavy rain would make ruts in that portion of the driveway.

## II. THE HILL

My wife actually came up with this idea. We had some spare bricks left over from the brick patio we tore up and replaced with a wood deck. She recommended using these old bricks to make a driveway.

The process was fairly simple. We just smoothed out the driveway and began laying the bricks on the bed of the old crushed rock driveway. We started at the bottom of the hill and worked our way to the top. It was a simple process and our children even helped. We used a pattern that was one row with the bricks placed horizontal and the next row vertical and repeated the pattern. The holes



in the bricks always faced up.



There are two types of bricks available today. Those are baked natural clay bricks and concrete bricks. The bricks we used were baked extruded clay bricks. They have more strength than the concrete bricks that are commonly used today. This strength is important to minimize the breakage caused by driving over them with heavy vehicles and the stress generated each spring when the ground thaws.

It is important to lay the bricks with holes up. During the annual spring thaw, the bricks would sink into the ground a little and then the mud would harden. This held the bricks in place, like little fingers in each of the brick holes. It anchored the driveway in place.

After laying the bricks we covered the driveway with a thin layer of fine crushed rock. This rock made its way into the holes in the top of the bricks and the small cracks between the bricks.

We installed the brick driveway around 26 years ago and it is still holding up quite nicely and is very low maintenance. Each

spring when the thaw occurs, we drove to the sides to even out the driveway and prevent it from mounding in the middle.

### III. THE FLATS

We constructed the concrete driveway 11 years ago and it seems to be holding up pretty well. We poured the concrete down on the existing crushed rock driveway. The ground was fairly compacted by several decades of driving on it. I considered this base met the requirements of an adequate compacted sub-base.

I used treated lumber as forms, segments of heavy rebar as stakes and thin strips of plywood as expansion joints.

My local brick supplier cut up heavy rebar into 2-foot segments. I needed around a dozen of these.

I cut up a thick sheet of 4x8 plywood into 5-inch strips lengthwise (8 feet). These I used as control joints or expansion barriers. As the ground freezes and thaws, concrete will expand and crack. Placing an expansion strip every 9 to 10 feet minimized cracking. These expansion joints are left in place and over time rotted away.

I used 10-foot and 12-foot long 6-inch wide treated lumber as forms.

I didn't skimp on the strength of the concrete, I tend to use the strongest available. So I generally order 5000psi mix with fiber. Fiber reinforcement help reduce early stage cracking, known as plastic shrinkage cracking. This concrete mix might cost a little more, but I consider it worth it.

I set up the forms on each side of the roadway and drove the rebar into the ground with a sledgehammer. Most of the stakes were driven on the outside of the forms, but I had one or two on the inside to prevent the boards from falling inward. The width of the driveway was always 8 foot as dictated by the 8-foot long plywood expansion joints. [2 boards and 2 expansion strips formed a pouring rectangle.] I constructed the driveway over several weeks, doing a few feet at a time – basically one concrete load at a time. I began pouring concrete at the far end of my driveway and worked my way towards the main road. This prevented heavy vehicles from going across the new driveway before the concrete had adequate time to cure.

After a segment of concrete was poured, I used a straight 10-foot long 2x4 to rough smooth the concrete. The forms gave me a good straight edge. If the concrete level were too low in a spot, I used a shovel and stole concrete from a high spot. Then I would finish the concrete with a twelve-foot long lightweight aluminum float. [It easily separated into 3 pieces for storage/movement.] Normally I just used the float configured with a 6-foot handle. But when I needed the extra reach, I fully extended it to 12 feet.

Once the concrete began to set, I broke apart the forms and set them up for the next pour. I used a large pipe wrench to turn and simultaneous lift the rebar from the ground.



