

# Introduction

This manual is intended to provide the user with a general guide to create paving surfaces using today's generally practiced techniques. All the steps, to making good quality paving, are contained in this manual from the initial site inspection to the laying of the bricks and maintenance of the finished surface.

Although care was taken to ensure that this manual has the relevant information required, the user is advised to seek professional on-site advice for any project undertaken.

## Background

Hydraform are the manufactures of the Hydraform Block-making machines for on-site production of interlocking dry stacked soil-cement blocks. As well as the Vibraform Static and Lay-As-You-Go range for the production of cement paving bricks, cement bricks, and hollow blocks.

Operating since 1988, Hydraform has sold more than 2000 block-making machines worldwide and has representative agents currently in 6 countries across the African continent.

The Hydraform Building System has been used to, provide jobs in local communities, empower people with skills and build a variety of essential structures such as houses, schools, clinics and hospitals in over 60 countries worldwide.

Paving dates back many thousands of years with examples of this dating back as far as 4000 BC. And brick paving being used in India around 3000 BC. In the latter part of last century we have seen brick paved surfaces reemerge to become a more integral and cost effective surfacing alternative in towns and cities.

As countries continue to develop and urbanize at an exponential rate, the need for cement paving blocks has become an essential part of town and city development and expansion. This, coupled with the development of machines that can produce larger quantities of cement paving bricks than ever before, has reduced the cost of brick paving to an acceptable level making it attractive to many developers.

Brick or block paving has enormous versatility. It can be used for applications such as:

- Foot paths
- Patios
- Driveways
- Parking lots
- Roads
- Intersections

Paving can also be used in areas that require exceptional loads such as:

- Airport taxi-ways and aprons
- ports
- Freight yards

The designs using paving bricks are almost limitless and have many years of service with a relative low amount of maintenance.

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1.1 Safety

Contractors are aware of the potential problems and dangers that can occur during a project, and should be able to work around them, or take the necessary remedial action.

If you are not a contractor, and are choosing to undertake the work yourself, there are some common dangers that you could face when excavating. Some of which are listed below.

• ELECTRICAL SUPPLY	HIGH RISK
• GAS PIPES	MEDIUM TO HIGH RISK
• WATER PIPES	LOW RISK
• DRAINAGE PIPES	LOW RISK

If you are faced with any of these, or any other potentially hazardous materials, and you are uncertain of how to deal with them, please contact the relevant service provider.

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1.2 Site inspection

Before you start with the pave work, a site inspection needs to take place. Ensure that the site to be worked on is adequately prepared for the block paving and that any problems are reported to the client so that the work can be rectified.

Follow the local regulations and or standards that may apply. The standard specification for the building of paved structures is available in the SABS 1200 series with SABS 1200MJ covering concrete block paving.

Inspect for the following:

- Contract drawings and specifications.
- Slopes for water drainage (min 2%).
- Earthworks surface tolerances.
- Requirements for kerbs and edge restraints.
- Locations and details of manholes and inspection eye covers.
- Locations of any utilities that may be encountered (cables, pipes etc.).
- The starting point of the paving.

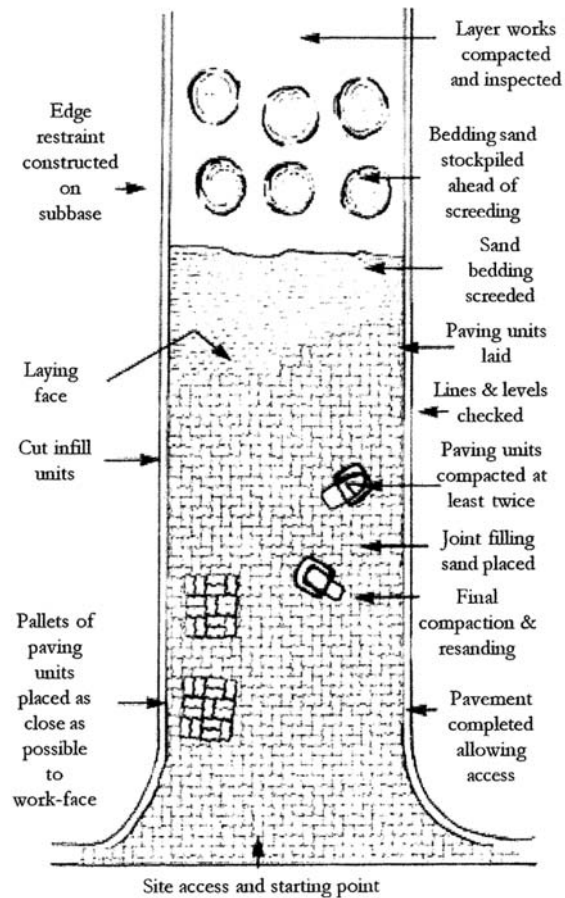


Figure 1: Typical site layout.

## 2. CONSTRUCTION (Base course)

Points to be addressed are:

- Positioning the required bedding sand
- The installation of edge restraints and kerbing
- Compaction of the Sub-base
- Laying/Screeding of the bedding sand

### 2.1 Excavation

Make sure that the area to be paved is clear of all material such as rubble and debris that could have an effect the smoothness of the finished surface. Dig off the surface to a depth of  $\pm 200\text{mm}$  (if the paving is to be level with the existing ground). Excavate approximately 300mm over the required edge to make space for the edge restraints or kerbing that may be required. Use the following way to calculate how deep to dig:

(AVERAGE DEPTH OF BRICKS + 40mm BEDDING LAYER + 100mm SUB BASE)

**Figure 2.** Use a spade to remove rubble and to level uneven ground in preparation for the bedding layer.



Figure 2:

**Figure 3:** Once leveled out, the ground may then be compacted.



Figure 3:

## 2.2 Compaction

Once the surface has been graded to the correct level and slope you can then proceed with the compaction of the sub-base using a suitable vibrating compactor. With the larger type of compactor, only one pass will be necessary. Whereas with the smaller, plate type, compactor two passes will be required.



Figure 4: Compaction

## 2.3 Laying of edge restraints

If the paving to be done is not “wall to wall” you will need an edge restraint. This can be constructed by laying bricks lengthways on a concrete bed on top of the compacted sub-base. These bricks will need to be mortared into place in order to restrain the body of the paved surface.

## 2.4 Laying of the bedding sand

For bedding sand use a coarse grit/river sand, 25–40mm in thickness. Stockpile the bedding sand so as to have even amounts for when screeding. See figures 1 & 4



Figure 5: Stockpiling the bedding sand

## 2.5 Screeding of the bedding sand

Spread the stockpiled bedding sand a few meters at a time with the use of a screeding rail (25mm x 25mm square tubing or 25mm Ø pipe).

Place the screeding rails approx. 2m apart on the prepared surface. Their height should be level with the uncompacted bedding sand. Use a screed board to screed the bedding sand. Slide the screed board towards you along the rails. Avoid a sawing action as this creates an uneven surface.

If depressions or pockets appear behind the screed board, fill them with loose sand and pass over the area again. Multiple passes result in an even uncompacted surface. Remove the screeding rails and fill in the grooves that remain and smooth off the surface with a trowel.

Do not permit walking on the screeded sand as this will result in an uneven surface.

### 3 CONSTRUCTION (Surface course).

#### 3.1 **Laying of the paving blocks.**

Where an average load bearing paved surface is to be made, class 25 block will be required. This means that the blocks have a wet strength of a minimum of 25MPa. Where the surface is required to have exceptional load-bearing capabilities then a class 35, ( $\geq 35\text{MPa}$ ), block must be used.

Start in a corner and work your way out in both directions. Where there is a slope, work uphill to counter the effects of gravity and the movement of the workers. Allow a gap of 3mm between each block for the filling of the joint. Blocks should be placed next to the previously laid blocks vertically rather than horizontally as placing blocks next to each other horizontally will result in bedding sand being trapped in between and therefore enlarging the joint.

#### 3.2 **Adjusting the pattern.**

Use a string line to check the alignment for squareness once an area has been completed. Make adjustment with the use of a lever to move sections of the paving. This must be done before compaction as it will be difficult to move the paving afterwards.

#### 3.3 **Block cutting.**

Block cutting for the filling of areas next to edges will require you to measure the gap and mark the block so that it can be cut with an angle grinder or an industrial guillotine and then the gap filled in (Figures 6a & b). As much as possible, avoid the use of concrete infilling. Where this is unavoidable, make sure that the concrete is of a higher strength than the paving units.



Figure 6a  
6



Figure 6b

### 3.4 Vibrating the blocks into place

Compact the paved surface with at least 2 passes of the plate compactor. This should be done before the spreading of the joint sand.

Remove blocks that may have settled incorrectly. If too high, remove bedding sand. If too low, add bedding sand.

## 4 JOINTING AND VIBRATING

Once the above has been completed, dry jointing, (fine plaster type), sand must be swept into the joints between the blocks. Once the joints are visibly full, sweep off the excess sand, then use the compactor to pass over the paving two or three times.



Figure 7: Filling in the joints

Figure 1 is an extract from the CONCRETE MAUFACTURERS ASSOCIATIONS' "CONCRETE BLOCK PAVING – BOOK 4"