

GUIDELINES FOR INSTALLING CONCRETE BLOCK PAVING

This is a basic guide for the construction of a flexible impermeable pavement. For greater detail the following document should be consulted: BS 7533-3:2005 Code of Practice for Laying Precast Concrete Paving Blocks and Clay Pavers for Flexible Pavements.

Health, Safety & Environmental Considerations

Safe working practices must be implemented to protect the workforce and those neighbouring the construction. Personal Protective Equipment must be used when required. All waste removed from site must be disposed of in accordance with local and national legislation, recycling materials where facilities exist.

Pavement Design

The construction of the pavement is based upon the local ground conditions, the type of traffic and the expected volume of traffic. Full details are available in BS 7533-2:2001 Guide for the Structural Design of Lightly Trafficked Pavements Constructed of Clay Pavers or Precast Concrete Paving Blocks.

Excavation

The depth of excavation is the depth of the sub-base plus the depth of laying coarse plus the thickness of the paver. Blocks can be laid over existing concrete or tarmac, provided that any voids are filled and any extensions to the original surface are of similar hardness to the original, otherwise differential settlement could occur.

In all cases, the final level of the paving must be 150mm below the level of any damp-proofing courses to reduce the risk of rising damp. If the pavement falls towards a building drainage must be incorporated to channel water away from to ensure water does not collect there and pass through the air bricks.

Edge Restraints

When a pavement is trafficked some of the downward loads are converted into lateral forces, edge restraints, therefore, must be capable of withstanding these loads. The edge restraint construction must also be of sufficient depth to contain the laying course and block layer otherwise material may migrate causing the pavement to sink.

Edge restraints are installed prior to the sub-base and may take the form of pre-existing walls or surfaces or they may be newly installed kerbs or blocks. If the latter, these must be both bedded and haunched with concrete to give them adequate strength.

The type of edge restraint and strength of haunching required will be determined by the type and intensity of the traffic that the pavement is expected to receive.

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If the pavement is particularly steep (ie greater than 1:20), intermediate restraints may be used to reduce the risk of bedding materials moving down the slope.

Falls

These are required to allow water to flow off of the pavement. A longitudinal fall of 1.25% (1 in 80) and a cross fall of 2.5% (1 in 40) is required and these should start to be incorporated into the construction from the sub-base installation. Where possible angle the falls towards areas of soft landscaping so any water run-off is absorbed locally.

SUB-BASE

Materials

An evenly graded granular Type 1 material is typically used (see Highways Agency “Specification for Highway Works”). Lower quality materials can be susceptible to the action of frost or moisture and may fail under load. Crushed concrete can be used provided that it is evenly graded and gives a close texture once compacted. Do not use materials containing organic matter.

The required depth of the sub-base will be dependant upon ground conditions, soil type and trafficking. Typically a depth a 100-150mm is required.

It should be noted that on particularly poor soils (ie heavy clay) a capping layer or a geotextile might be required between the sub-grade and the sub-base.

Installation

The sub-base should be installed in layers of approximately 75mm depth, each layer being compacted thoroughly with a plate vibrator prior to the next layer being placed. The final surface must be close textured so as not allow the migration of the bedding sand into the sub-base. The final level of the sub-base should be within the range +5, -10mm of the specified level.

LAYING (BEDDING) COURSE

Materials

This should be a well-graded sharp sand complying with the grading given in BS 7533-3: 2005. Do not use building sand as it is too fine. The sand should be moist, not saturated, and be of uniform moisture content. As a guide, the sand should bind together after being squeezed in the hand. If it does not, it is too dry and if water flows from the sand, it is too wet.

Do not use any cement in the laying course as not only will this make the laying course rigid, the fine particles can percolate up and stain the pavers.

Installation

The final compacted thickness of the laying course is 30mm +10, -5mm and should maintain the falls created

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in the sub-base layer. As a guide, a 30mm compacted layer is created from a layer of approximately 50mm of uncompacted sand, though this will vary depending on the sand source so on-site trials should be carried out to ascertain how local materials perform.

There are two methods of compaction, both carried out with a plate vibrator:

1. Pre-compaction. Here the laying course is completely compacted prior to installing the pavers and once the pavers are laid, the pavement is compacted again. This is not recommended if laying over a solid sub-base such as concrete or tarmac.
2. Post-compaction. The blocks are laid on loosely screeded sand (ie 50mm deep), and then the blocks and sand layer are compacted together in one go.

Only screed out as much laying course material that can be paved over during the current working period. At the end of a workday, no more than 1m of laying course should be left exposed, and this should be covered to protect against rain or frost. If the sand gets disturbed, re-screed it prior to commencement of laying the pavers.

Wearing Course

Utilise string lines to ensure the bond pattern and lines are maintained. Lay blocks with a joint gap of 2-5mm, adjusting the gap to maintain straight lines in the paved surface.

Install the whole paver units first. Cuts at the edges and around obstacles are left until the end of each working day. When cutting, do not use pieces of less than one quarter of the original size. If it appears that small cuts will be required use the “inboard” cutting technique, where two adjacent pavers are both trimmed to fill the space.

If laying on a slope always start at the bottom and work up, this ensure that the pavers do not “travel” down the slope whilst installation is in progress.

Cutting

This can be achieved by using an abrasive wheel or diamond bladed saw, a block splitting guillotine or by hammer and bolster. This last method is the least accurate, and most wasteful.

The most accurate method is probably mechanical saw, but experienced personnel should only use these due to the dangers involved. Care should also be taken to control the dust generated by this method of cutting as it constitutes a health hazard and it can get ingrained in the surface of the newly laid paving.

Compaction

This is carried out with a plate vibrator conforming to the requirements of BS 7533-3: 2005. Ensure that the plate is clean; otherwise any material stuck to the plate will be transferred to the paver faces. The use of a rubber or neoprene sole on the whacker will also reduce the risk of damage to the pavers.

Sweep kiln-dried joint filling sand (complying to the grading requirements of in Table D3 of BS 7533-3:2005)

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over the pavement and compact it, then repeat this operation. Finally, sweep some more of the jointing sand over the pavement to ensure joints are full, leaving some sand on the surface.

The jointing sand is an important part of the pavement structure. It creates a high friction joint between the pavers allowing loads to be spread laterally; and it assists in the blocking of the joint so stopping water penetration, and hence wash-out of the laying course. It is therefore important to check the level of sand in the joints and to top it up as required, this is particularly important in the early life of the pavement.

Blocks may be vibrated down without sand in the joints; however this can result in edge spalling especially on pavers without chamfers.

Levels

Once compact, the pavement should be level ie there should be less than 10mm of variance over a 3m straight edge and no more than 2mm variance between two adjacent pavers when measured at the joints.

When blocks are laid up against a drainage channel their surface should be 3-6mm above that of the channel; and if against a gully or drain fitting, 5-10mm above the gully grating.

Bond Pattern

Trafficked areas that have vehicles frequently turning and braking on them should be laid in herringbone. Stretcher bond can be used for very lightly trafficked areas if the direction of the traffic is perpendicular to the laying pattern, and basket weave should only be used for foot traffic.

Weather Conditions

The installation should be suspended if poor weather conditions (ie rain or snow) threaten the performance of the finished pavement. Any screeded laying course material should be covered as should any stockpiles to ensure that they do not get saturated.

Pavers should not be laid on a waterlogged laying course, so if the sand does get wet it should be removed and replaced prior to recommencing laying.

Joint filling can only take place when the both the jointing sand and the pavers are dry.