

Construction Method

Mark out the site. It is assumed that the surfacing is to be flush i.e. level, with the existing ground. It is a good idea to excavate wider than the planned width, allowing an extra 300-450mm at the edges makes handling much easier, especially if [kerbs](#) or edgings are to be used.

In most cases, a well-laid tarmacadam surface is impermeable to water, and should be constructed in such a manner that surface water will be directed to adjacent open ground, a gully or similar [drainage](#) point.

Neco paving offer [pervious or permeable bitmacs](#) available from the batch plants.

Excavation

The surface needs to be dug off to a depth of at least 175mm. The depth of dig can be roughly calculated as....

(surface course + binder course + sub-base)

	Footpath (mm)	Light use Driveway (mm)	Access Road Small Car Park (mm)
Surface	20	25	30
Binder	40	50	70
Sub-base	100	150	225
Dig-depth	160	225	325

Specification Table

So, for the three projects under consideration, the dig depth is given in the table opposite. All figures are in mm and are typical values we have used for bitmac work in which neco paving work to. Conditions in other parts of the country vary and a other contractor may suggest differently, based on their experience.

All weeds and other unwanted organic matter, along with topsoil must be removed and any soft spots excavated and filled with compacted sub-base material. If the area is troubled with weeds, it should be treated the excavated sub-grade with a general weedkiller such as Sodium Chlorate, but it is unlikely any weed will be able to penetrate the upper layers. A [Geo-membrane](#) can be used if deep-rooted, pernicious weeds are a problem, of if there is any concern regarding the competence of the [sub-grade](#).

[Edgings](#) or [kerbs](#) MUST be used on free edges, i.e. those parts of the perimeter of the surfaced area not bounded by walls or other solid structures that will act as a retainer for the bitmac. This is to prevent the bitmac crumbling at the edges, as shown in the photograph opposite. Brick edgings, plain or decorative edging kerbs, or setts laid lengthways are all suitable, and should be constructed at this stage.



No edging/kerb = crumbling edges

Sub-base

This is essential if the pavement is to last longer than a couple of years. Do not employ any contractor who tells you that a sub-base is not required, unless there is a suitable existing sub-base or base layer. The sub-base should be a minimum 100mm thick. Refer to the [sub-base](#) page for full details on installation of a sub-base.

Binder course

This is a load-bearing, strengthening layer of the pavement and should be at least 40mm, preferably 50mm thick. The material used as a binder course is 'chunkier' than a wearing course, usually comprising 20mm or 28mm aggregate in a bitumen binder, known as Dense Bitumen Macadam (DBM). On public highways and other heavier-use projects, the binder course may be underlain by a base layer.

For binder course 50-80mm thick, use 20mm material (DBM)

For binder course 70-150mm thick, use 28mm material (DBM)

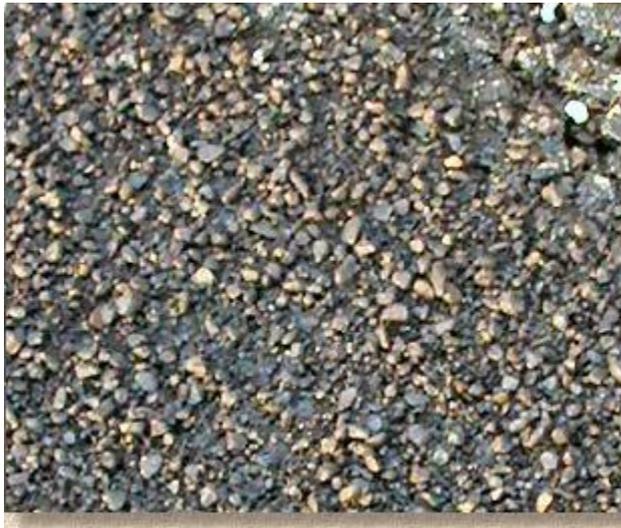


20mm Binder Course



Dense Bitumen Macadam

The binder course material should be laid and levelled out reasonably level ($\pm 10\text{mm}$) and thoroughly rolled and compacted before preceding with the wearing course. Larger areas may be laid by a paver machine specifically designed to lay bitmac.



Prior to final surfacing with the wearing course, the base course needs to be painted with a [*bonding emulsion*](#) to ensure proper adhesion.



Surface course

This is the top layer of the bitmac pavement, the layer that is seen and trafficked. It needs to be fairly regular to provide a smooth ride for wheeled vehicles, although this is much more important on higher speed pavements than on residential driveways. A macadam surface course should consist of a small, hard aggregate, usually 6mm or 10mm, in a bitumen or asphalt binder. Alternatively, an asphalt may be used; this material is also known as a sand carpet or asphalt carpet, and is prepared in a [batch plant](#) to a specified recipe, consisting of selected sands and grits mixed into an asphalt matrix, with coated chippings sprinkled over the surface and rolled into the asphalt as part of the compaction process. Again, it may be machine or hand laid, depending on area and access.



Hardstone 6mm Dense Surface Course

The wearing course should be at least 20-25mm thick when rolled, and should not deviate from the correct level by more than ± 6 mm. There should be no roller marks in the finished surface. Neco paving recommend a minimum fall of 1:80 for tarmac areas, although a fall in the range 1:40-1:60 is preferred.



Limestone Surface Course

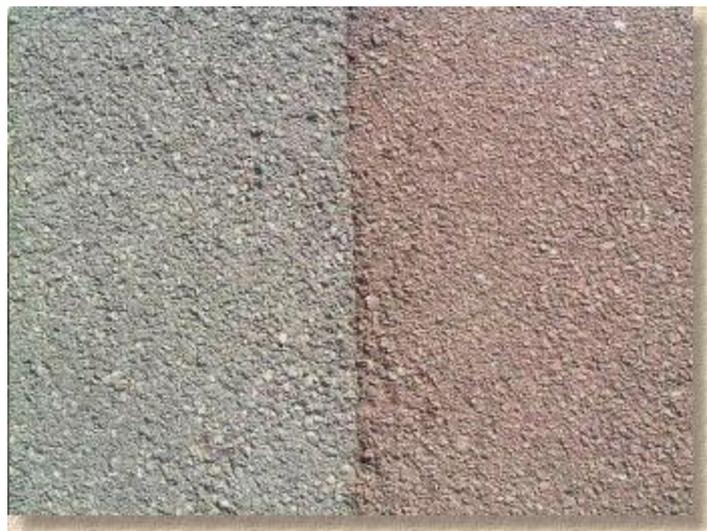
Cornish Granite Surface Course

Surface courses that use limestone or other light coloured aggregates will wear over time to give a greyish appearance to the surface, as the tar binder is gradually eroded by traffic and exposure to the elements, to reveal the grey-white aggregate.

Hardstone based macadams, such as that shown above, are generally much darker, relying on a basalt or other hard, dark aggregate, and so when they wear and weather, they tend to remain dark in appearance.

A Touch of Colour

Coloured macadam surface courses are available in two basic types. In the cheaper type, the binder (tar/bitumen) is coloured (e.g. red), but the aggregate is the same as for a normal black wearing course, e.g. a limestone or hardstone. This type of wearing course may well lose its colour over time when the aggregate becomes more and more exposed as the binder is gradually worn away.



Weathered red surfacing next to plain limestone surfacing - not very red, is it?

The best quality coloured wearing course material will use a coloured aggregate that matches the colour of the binder. For example, a good red wearing course will comprise a red binder with a red aggregate, such as quartzite. Then, as the binder weathers, the



Red quartzite wc



Red binder wc

aggregate will ensure the surface doesn't lose the colour.

The latest developments in binder technology have now made available highly coloured wearing course materials, such as the stunning red, gold and green surfacing supplied and installed to the highest standards by neco paving.

Although this ability to create custom colours for individual jobs has not yet filtered down to the 'average' residential driveway market, it is predicted that these new colours could reclaim some of the civic paving market that the bitmac manufacturers have lost to block paving over recent years.



Very red surfacing at the NEC in Birmingham

Red surfacing - half damp and half dry

HRA

Hot rolled asphalt (HRA) may occasionally be used as a surface course on footpaths or driveways. This is a very fine-grained material, more commonly used on public highways, and relies on the presence of embedding chippings of a hard stone to improve durability and to add traction.



Asphalt with Criggon Green chippings

Once the asphalt has been spread out and levelled, usually by machine and to a thickness of 40mm, the pre-coated chippings are scattered over the surface at a specified rate (Kg per m²) and rolled into the asphalt to improve skid resistance.

The chippings must have both a high Polished Stone Value (PSV) and a low Aggregate Abrasion Value (AAV). The high PSV ensures the chippings don't become 'slippy' when worn, and the low AAV ensures a good resistance to abrasion (wear). Consequently, over a period of use, the chippings tend to stand slightly proud of the worn (abraded) asphalt matrix, which is much softer, comparatively.

The chippings may be artificially coloured by coating them with a pigmented binder, or they may rely on the natural rock colour, eg a red granite, to introduce colour to the surface. In all cases, the chippings are pre-coated to ensure proper adhesion to the surface layer. Uncoated chippings are NOT suitable.



HRA with red-coated chippings



White limestone chippings in asphalt sand carpet

Chippings in the Surface Course

On the subject of chippings, these are sometimes added to residential driveways for decorative purposes. However, there are a couple of drawbacks with this practice. Un-coated chippings will not adhere properly to the wearing course, and, with macadam (rather than HRA) surface courses, there is a problem ensuring the chippings are properly rolled into the surfacing material and thereby held firmly in place. For this reason, neco paving prefer not to use chippings on this type of work, but, if required to do so, a 3-6mm fine-grained dense macadam wearing course would be used and lightly sprinkled with the chosen chipping which will generally be 6-10mm in size. The practice of scattering 18-20mm unwashed limestone chippings over a 6mm or 10mm macadam wearing course is not recommended and is often a trademark of the cowboy element.

Finishing-off

All bitmac and asphalts are consolidated by rolling. In most cases, a mechanical roller suitable to the size of the job will be used. This may be a single-drum walk-behind roller, a ride-on twin-drum roller or, on the larger jobs, a full-sized, triple-drum road roller (still fondly referred to as a "Steam Roller" by some members of the public). All modern rollers offer a vibratory option, which can be useful to ensure thorough consolidation but needs to be used with care on wearing courses as it can result in causing the drums to skid which may mark the surface.



Which ever option you prefer rest assured you wont go far wrong with the workmanship and price neco paving ltd provide.

Construction Diagram

