Hampshire Highways
Guidance Document on Surfacing Options for Footways & Block Paving

2016 Edition

PLEASE NOTE THIS EDITION IS TO BE REVIEWED WITHIN THE NEXT 12 MONTHS

Hampshire County Council

CONTENTS **Page Number**

PLEASE NOTE THE PRESUMPTION IS AGAINST THE USE OF BLOCK PAVING DUE TO WHOLE LIFE MAINTENANCE COSTS AND LIABILITIES

1 BLOCK PAVING AND NATURAL STONE PAVING

1.1 General Guidance

Block paving is now an accepted surface treatment on the Highway and is the preferred solution for shared surface applications. Blocks can be made of concrete, fired clay or sawn from stone. This section addresses concrete and clay pavers. The use of natural stone blocks is dealt with in Section 1.6

Specifiers should be aware that clay pavers tend to polish more than concrete pavers, encourage the growth of moss/lichen and can become very slippery when wet. For this reason concrete pavers are the preferred option. Clay pavers are not to be used in the carriageway and may only be used in the footway subject to confirmation of Polished Pendulum Test Value (PPTV) criteria or satisfactory evidence of long term performance elsewhere

1.2 Block Paving for Vehicular Areas

The design and installation of block paving schemes shall be carried out in accordance with BS 7533 with special attention paid to the section giving guidance on sites requiring a modified design due to factors such as channelised traffic, etc.

All block paved roads shall be designed for traffic flows of greater than 0.5msa or any such higher value as may be appropriate. Designs for traffic levels of 'up to 0.5msa' shall not be permitted.

The riding quality of block paving is likely to be poor in relation to most other surfacing types and should therefore only be used on very low speed roads where this characteristic is not so important. Although water dispersal offered by blocks is generally good due to the chamfered edges and good paths for water to escape, the texture of the blocks themselves is usually smooth and the overall skidding resistance will be governed by the aggregate used within the blocks.

The resistance to polishing of concrete blocks, clay pavers and natural stone products is measured using the PPTV test - BS 7932: 2003. This is analogous to the Polished Stone Value (PSV) test used for aggregates and allows the skid resistance of block paving units to be specified using Table 1e on page 17 of the Hampshire Highways Surfacing Options & Guidance Document 201 (HHSOGD 16) substituting PPTV for PSV. Independent test results of less than nine months old for the particular product to be used should be obtained. Due to a number of factors, evaluation of PPTV test results is not as straight forward as it should be. Additionally, suppliers may provide test data on a similar product saying that as the same raw material is used this result is representative of the proposed product. This is only partly true as the PPTV of a product depends

upon both the raw materials used and the manufacturing process. All must be identical if a substitute PPTV result is to be considered representative.
The majority of blocks on the market have relatively low skid resistance and are not generally suitable for use within 50m of roundabouts, pedestrian crossings, traffic signals, railway level crossings or similar features. **However, care should be taken to ensure that blocks of an adequate skid resistance are always specified by using Table 1e (substituting PPTV for PSV).**

It is important to note that the PPTV required by Table 1e is not generally dependent upon traffic speeds and hence skid resistance standards in traffic calmed areas should be identical to those used normally. Although traffic calming reduces vehicle speeds it also increases the degree of potential conflict between pedestrians and vehicles. The reduced speed and the typical site features introduced as part of a traffic calming scheme tend to bring pedestrians and vehicles together in the same road space. **Consequently, until more research into accident rates and severities in traffic calmed areas has been undertaken, the standards required by Table 1e shall be used.**

Research has shown that the quality of bedding sand is critical to the performance of block paved roads. **Sands shall be specified to comply with the relevant category in BS 7533: Part 3**. **In residential highway situations a bedding sand of at least a Category 1B shall be specified with Category 1A sand specified on all classified roads.**

Experience has shown that the majority of sands do not comply with the carriageway grades of sand in that they have excessive fines. In addition, potential sources for the different sand grades can be found on the Internet – http://paving.org.uk/laying_and_jointing_material.php

Some companies now offer crushed recycled glass sand for laying course material. Providing this also complies with the requirements for laying course material it should perform well and it has been suggested that it may actually reduce weed growth.

Blocks may be used decoratively, to delineate pinch points in estate roads, or even to construct rumble strips. If blocks are to be installed as part of a resurfacing scheme, consideration should be given to the difference in thickness involved. **Blocks for use in any trafficked area shall be a minimum of 80mm thick.** A course of blocks would be a minimum of 110mm thick (including sand bedding) and this must be considered at an early stage.

In traffic situations block paving shall only be laid in a 45º herring bone pattern. Experience has shown that if laid in running/stretcher bond the blocks are not confined enough to resist movement caused by traffic and increased noise is generated. Any other pattern will require specialist restraint measures.

Inappropriate street furniture can cause problems with block paving sites and should be avoided. The use of ironwork that can have blocks inset seems an elegant solution but needs very careful consideration. Such covers are generally much heavier than conventional cast covers and invariably require mechanical

aids for lifting which is not always possible due to physical restrictions or TM requirements. Also many Utility Companies refuse to accept such covers.. Careful detailing of blocks around street furniture and ironwork needs to be provided as the appearance of schemes can be ruined by poor attention to these items. Surrounding blocks should be mortared in place. Sanding of blocks around covers must be undertaken with care, especially where inset covers are to be used. Instances where sand has become lodged between cover and frame have occurred which has led to difficulties in lifting the covers. In some cases the whole frame has lifted out, disturbing the block paving, when this has been attempted.

Where block paving will be suction swept an appropriate sealant (e.g. 'Keybond' from Marshalls) **shall be specified to prevent loss of sand in the early life of block paving. If possible reduction of the vacuum on the sweeper is also desirable.** The sealant may initially reduce the skid resistance of the blocks but needs to wear off relatively quickly. Where skidding is likely to be a problem signs should be erected. Advice should be sought from the sealant manufacturer some materials do not affect the skid resistance.

Attention is drawn to the possible need to top-up jointing sand on a number of occasions until full penetration/stability is achieved - this may also require the delay in application of the sealant or an additional application after stability has been achieved.

There is also a wealth of informative literature available from the manufacturers of these products. A list of suppliers can be obtained from Interpave, the Concrete Block Paving Association.

1.3 Block Paving for Pedestrian Areas

Increasing numbers of claims are being received from members of the public who slip over on footways or other pedestrian areas. Research has shown that the incidence of pedestrians slipping increases markedly when the coefficient of friction drops below 0.4. Whilst there are no national standards for footway slip resistance the Highways Technical Group (formerly Departmental Standards Committee), based on the research currently available, have decided that until further research is carried out, **an absolute minimum PPTV of 45 shall be specified for new works**. **For heavily pedestrianised areas (e.g. city centres) or where there are expected to be concentrations of vulnerable people or where gradients of steeper than 5% exist, a minimum PPTV of 55 shall be specified** for blocks/pavers/slabs whether manufactured from clay, concrete or natural stone.

Further investigations have highlighted the need for a degree of surface texture in footway materials. High PPTVs on their own do not necessarily provide sufficient protection from slipping. Paving materials should have some texture to provide sufficient contact area with footwear so that there is enhanced slip resistance in wet conditions. Polished and semi-polished products should be avoided.

Failure to specify sufficient PPTV levels for products runs the risk of resulting in claims against the Highway Authority and expensive remedial treatments. Section 11.5 gives some guidance on improving the skid/slip resistance but such measures do not offer long term solutions. If a paving product is used which has inadequate resistance to polishing the only long term solution is likely to be to replace it with a more suitable product.
Again the **design and installation of block paving schemes shall be carried out in accordance with BS 7533**

1.4 Block Paving for Shared Areas

Where blocks/pavers/slabs are to be used by both pedestrians and vehicles then such areas shall be designed, specified and constructed as in '11.2 Vehicular Areas'. Although, using slabs carries additional problems as by the nature of their size they are more vulnerable to breaking when trafficked. It is recommended that slabs to be over-run incorporate fibre reinforcement and a maximum size of 450 x 450 mm be used to reduce the possibility of failure.

1.5 Improving Skid/Slip Resistance

Problems with poor skid/slip resistance (particularly on clay and stone products) have resulted in a number of trials into ways of improving these properties. Methods used have included shot blasting, bush-hammering and chemical etching.

Shot blasting has generally produced only short term improvement (see HHSOGD 16 page 43) – typically 2 to 3 months. Bush-hammering has been shown to give a longer improvement (approx 12-24 months) but does affect the appearance of the paving more than shot-blasting. It also carries the associated risks of breaking paving slabs and removing jointing material. The appearance of the paving 'mellows' with further pedestrian/vehicular trafficking but re-jointing can add significantly to treatment costs overall. Chemical etching (e.g. 'Slipstop' process) has only been trialled but results indicate it performs similarly to shot blasting – depending upon the strength of the acid used. This type of treatment also affects the appearance of the paving.

1.6 Natural Stone Paving

Guidance on the use of natural materials in highway situations is available in a document called 'Traditional materials – a guide to the use of natural materials in the Highway'. When specifying natural stone paving , in addition to defining criteria in respect of resistance to polishing, abrasion and weathering, consideration need also to be given to the edge profile and surface texture to be provided. Paving materials must have some texture to provide sufficient contact area with footwear so that there is enhanced slip resistance in wet conditions.

Polished and semi-polished products should be avoided and the preference shall be for a “coarse textured” finish in accordance with BS EN 1341 with an average peak to trough dimension of 2mm This equates to a surface texture, as determined by the sand patch method, of approximately 0.7mm.

2 FOOTWAYS

2.1 General Guidance

Footway surfacings can take the form of Asphalt, Concrete or Natural Stone flags, Block paving or Path gravel. 'TRL Application Guide 26 - Footways: Design and Maintenance (version 2)' provides comprehensive guidance on the design, construction and maintenance of footways. AG26 does not consider Path gravel but Hampshire’s Standard details and the associated Notes for Guidance include all of these materials.

The constructions included in the Standard details assume a sub grade equilibrium CBR of 3% or greater. If it is believed the sub grade is poorer than this the sub base thickness should be increased to account for this, 'TRL Application Guide 26’ provides guidance on this.

It is recommended that any flags used in areas of possible over running by vehicles should incorporate fibre reinforcement and should have a plan area no greater than 450 mm x 450 mm. Any larger will be liable to break when loaded. It has been noted that tactile paving at corners has often suffered in this way despite the fact the units are 400 mm square. Substituting 100 mm x 200 mm concrete block paviours, with surface blisters, in this situation has largely overcome this problem.

The following tables extracted from 'Application Guide 26' and amended with current terminology may be of use. See also section 3.10 on use of deferred set materials.

2.2 A note on Slurry Treatment of Footways

The use of basic slurry seals on footways has caused problems in the past (which has led to complaints by the public) and the process is no longer recommended for highway applications. However, micro-asphalts for footways have been developed as a true alternative to surface dressing and provision has been made to call these up under the Term Highway Contract.
For the time being however, the use of footway micro-asphalts should remain subject to approval by the appropriate Area Director.

Table 2/1 – RELATIVE PROPERTIES OF TYPICAL SURFACING MATERIALS FOR FOOTWAYS

MATERIAL		RELATIVE PROPERTIES						
		Slip Resistance	Durability	Surface Evenness		Structural Contribution	Appearance	Unit cost
				Initial	Long Term			
Block	Concrete	3	6		4	6	5	2
Paving	Clay	2	6		4	6	5	2
Slabs	Concrete	3	5	5	3	4	3	3
	Natural Stone	1-4	5	5	3	4	6	1
Asphalt Concrete		4	4	6	6	6	4	4
Surface Dressing		5	3	n/a	n/a	n/a	4	6
Micro Asphalt		4	3	4	5	n/a	4	6

Poor		Good		Excellent	
1	2	3	4	5	6

TABLE 2/2 – MAINTENANCE TREATMENTS COMMON TO ALL TYPES OF FOOTWAY/ CYCLEWAY SURFACING

Defect	Problem	Treatments	
		Temporary	Long-term
Depressions & bumps	Hazard for users	Fill or ramp. Contact Undertaker if cause is failed reinstatement	Reshape surfacing
Rutting	Hazard for users	Fill	Reshape surfacing. Prevent overrun or reconstruct if necessary.
Slippery surface	Hazard for users	Warn users or restore macro and/or micro texture	Clean, restore texture or renew surfacing
Surface contamination	Hazardous Unsightly	Clean or neutralise	Replace surfacing if necessary. Clean
Vegetation	Tree roots cause trips	Warn users or ramp trees	Reshape surfacing. Consider replacing with a more suitable variety
	Vegetation obstructs footway	Trim growth	Consider increasing frequency of maintenance
	Surface slippery	Warn users. Clean	
Water	Surface water	Salt if freezing	Reshape surfacing to correct gradients and cross-falls
	Blocked drainage	Clear blockage	Rectify any damage caused
	Burst mains	Inform Undertaker, make safe	

Reshape = relay modular paving, replace Asphalt Surface Course (and Binder Course) or overlay with new Surface Course, overlay with thick slurry or use re-tread.

Renew = relay modular paving using new units, remove and replace old asphalt material or concrete, or use re-tread.

TABLE 2/3 - MAINTENANCE TREATMENTS: ASPHALT SURFACING

Defect	Problem	Treatments	
		Temporary	Long-term
Mosaic cracking	Embrittled surfacing Structural failure	- -	Seal or replace surfacing. Replace surfacing, reconstruct if problem recurs.
Linear cracking	Water ingress, trips	-	Seal, replace surfacing or reconstruct if necessary
Loss of surface aggregate	Loose or uneven surface	-	Seal or replace surfacing
Potholes	Trips, water ingress	Fill holes	Patch or replace surfacing

TABLE 2/4 - MAINTENANCE TREATMENTS: MODULAR SURFACING

Defect	Problem	Treatments	
		Temporary	Long-term
Broken or damaged modules	Unsightly appearance, water ingress	-	Replace damaged modules, resurface or reconstruct if problem is due to overrun
Loss of jointing material	Water ingress, modules can move/rotate	-	Replace jointing material, seal joints
Missing modules	Holes, trips	Fill holes	Replace modules
Rocking modules	Hazard to users	Relay modules	Reconstruct if problem is due to overrun
Spalling of arrises or surfaces	Unsightly appearance	-	Replace damaged modules
Trips	Hazard to users	Relay modules	Reconstruct if problem is due to overrun
Widening of joints	Water ingress, modules can move/rotate	Fill wide gaps if a hazard	Relay surfacing and edge restraint if necessary

Note: When relaying modular surfacing it is preferable to relay the whole area between edge restraints.

TABLE 2/5 - MAINTENANCE TREATMENTS: CONCRETE SURFACING

Defect	Problem	Treatments	
		Temporary	Long-term
Damaged joints	Spalling, cracking, water ingress	-	Seal cracks. Overlay or replace joints and/or concrete
Cracking	Unsightly, water ingress	-	Seal cracks. Overlay or reconstruct
Weathering	Scaling, delamination, aggregate exposure	-	Overlay or reconstruct
Corrosion of steel	Cracking, rust	-	Seal cracks
Trips	Hazard for users	Ramp or feather	Overlay or reconstruct

TABLE 2/6 - MAINTENANCE TREATMENTS: KERBS AND EDGING

Defect	Problem	Treatments	
		Temporary	Long-term
Damaged or missing item	Loss of edge support	-	Replace kerb or edging
Horizontal or vertical steps	Hazard for road users and/or pedestrians	Relay item	Seal cracks. Overlay or reconstruct
Poor channel alignment, delamination, aggregate exposure	Drainage dysfunctional	-	Relay or replace kerb or edging
Vegetation	Water run-off prevented	Remove vegetation, apply weed killer	Increase vegetation control maintenance frequency
Trips	Hazard for users	Relay item	Replace kerb or edging