

7533-102 Revisions

Throughout – complete absence of any direct reference to non-cementitious jointing or bedding materials. While the use of non-cementitious bound bedding materials can be regarded as a specialism, this omission is particularly concerning given the growing use of jointing mortars bound using an epoxy or similar reliable resin which are acquiring increasingly significant market share for repair and remedial work, along with high quality installation of stain-vulnerable pavings.

3: Definitions:

A definition which uses the word being defined within the alleged definition is not fit for purpose. Consequently, using 'bedded' as part of the definition for 'bedding' creates a self-referring definition.

3.2 bedding layer

layer of material on which paving units are bedded

A course of material onto which the paving units are laid

3.3 bedding mortar

blend of fine aggregate and cementitious binder on which paving units are bedded

A mixture of fine aggregate with binder onto which paving units are laid

3.4 bound construction

paving units laid on and jointed with hydraulic mortar

Jointing is not exclusively undertaken using hydraulic mortar. Resinous or bituminous jointing materials are sometimes used.

Suggest:

paving units laid on hydraulic mortar and jointed with cementitious, resinous or bituminous material

3.5 bound surface construction

surface course where the paving units are laid on a laying course of bedding mortar and the joints are filled with a cementitious mortar or grout

Cementitious mortar or grout is not the only jointing option. Resinous or bituminous material may be used in some constructions

Suggest:

surface course where the paving units are laid on a laying course of bedding mortar and the joints are filled with a mortar or grout

3.7 cobble

natural stone element rounded by erosion

Lack of upper/lower limits on sizes. When is a cobble small enough to be a pebble or large enough to be a boulder?

Suggestion:

natural stone element rounded by erosion and generally measuring 65-254mm

3.9 complementary fitting

paving unit, of a different size to the main works, used at the end of alternate rows of paving units to break the bond

??? What's with the 'alternate rows'? Since when was paving laid in rows? And why alternate rows? Complementary fittings are often used to terminate every course of paving.

Suggest:

paving units, of a different size to those used to form the pavement body, which are used at the ends of courses to complete the course to an existing edge neatly and without cutting

3.11 conventional paving

paving designed to prevent water ingress through the surface layer

Conventional paving is not always designed to prevent water ingress but is more a case of NOT being intended to direct water through the surface layer. Consider sand-filled close-jointed paving where some water will penetrate the surface layer, although this has not been designed.

Suggest:

Paving designed to direct water into drainage fittings or onto adjacent areas rather than drain through the surface layer

3.13 flag

precast concrete unit used as a surfacing material that satisfies the following conditions:

A flag may be a concrete or natural stone unit. Ever heard of a Flagstone?

Suggest:

Natural stone or precast concrete unit used as a surfacing material that satisfies the following conditions:

3.14 flexible construction

pavement which is constructed with an unbound surface layer

It's more than just an unbound surface course: it needs an unbound base and/or sub-base.

Suggest:

pavement which is constructed with an unbound surface layer and unbound base and/or sub-base

3.19 inboard cutting

cutting a paving unit to allow the cut at the edge of the paving to be greater than one quarter of the paving unit

Incorrect definition. Inboard cutting is a technique which involves more than simply cutting. Units may be re-arranged or re-orientated to effect the best result.

A technique to arrange paving units at the edge of a pavement to eliminate, as far as practical, small cut pieces of less than one-quarter of a full unit and/or pieces with fewer than four edges.

3.20 interlock

effect of frictional forces between paving units in unbound construction which prevents them moving in relation to each other

interlock does not "prevent" movement; it restricts movement. If it prevented movement then we'd never see any settlement or creep.

Suggest:

effect of frictional forces between paving units in unbound construction which restricts movement in relation to each other

3.24 kerb race

foundation on which kerbs are laid

NOTE Also referred to as “kerb log” in some regions.

A race is generally understood to be a cast in-situ concrete foundation placed some time prior to placement of kerbs. Kerbs bedded on fresh plastic concrete are windrow bedded and the windrow is not regarded as a race.

A cast in-situ concrete foundation for kerbs which are typically mortar bedded atop the race some time later

3.28 mortar joint

joint between two units filled with a cementitious mixture

The mortar is not exclusively cementitious; it may be resinous or bituminous.

Suggest:

joint between two units filled with a cementitious or resinous mixture

3.36 sett

any unit of natural stone obtained by cutting or splitting used as a paving material, in which the working width does not exceed two times the thickness, and the length does not exceed two times the width

No mention of the fact that setts need to be rectangular in plan

Suggest:

any unit of natural stone, rectangular in plan, obtained by cutting or splitting.....

3.37 Slab

Slab is a term used in Southern England for a flag but is best avoided as it risks confusion with the term used to describe a concrete base.

Flags are NOT exclusively concrete and Slabs are very definitely NOT exclusively natural stone.

4: Figs 2 and 3

Despite the requirement of 7.5.5.2 for a bucket handle joint and support for arrisses, both diagrams show rebated jointing and unsupported arrisses.

Suggest:

Show jointing to be flush with surface of pavement or profiled to show a bucket-handle finish

5.4.1 – Conventional pavements

e) use of term 'backing' rather than 'haunching'. Haunching is the more usual term whereas backing tends to be more informal.

g) *“the surface of the sub-base or base (if present) is tight and dense enough....”* - poor English and no definition of what could be reasonably regarded as “tight”. A better construction might be, “should be sufficiently tight and close knit with no excess of voids (ie: not open textured) and adequately dense to prevent....”

i) *“the extent of the site preparation includes enough room to provide adequate foundations and backing for any edge restraint.”* - use of the informal term “backing” and poor English. There should be 'sufficient space' to provide 'suitable' foundations and haunching.....

“Where an existing road or footway surface is to be overlaid, it should be checked for structural adequacy” - would read better and be less ambiguous as “structural competence”

Table 7–Recommended compaction equipment for sub-base and unbound base compaction

Definition of “Mass” in column 2 is required. This is intended to refer to the force generated by the kit rather than the dead-weight mass. This should be made clear to avoid confusion.

“...light weight falling weight deflectometer (LWD)....” - lightweight is one word

5.5.1 - Edge Restraints

“Edge restraints should be sufficiently robust to withstand override by the anticipated amount of pedestrian and vehicular traffic, creep and construction activity, and to prevent loss of the bedding layer material from beneath the surface course.”

Doesn't read clearly. Would be phrased as... 'to withstand override by the anticipated amount of pedestrian and vehicular traffic, to resist creep, to tolerate construction activity, and to prevent loss....'

“Where there is a need for water to escape from the bedding layer through edge restraints, they should contain weep holes or gaps to ensure that water entering the bedding layer can escape.”

Was this really written by a native English speaker?

Where there is a need for water within the bedding layer to escape through any edge or intermediate restraints, such restraints should incorporate weep holes, gaps or other means whereby the water can drain out freely.

“The edge restraint should present a vertical face down to the level of the underside of the bedding layer”

To avoid any confusion arising from the belief that an edge or intermediate restraint comprises only the paving, drainage of kerb unit observed at surface level, this sentence should be clarified....

“The edge restraint structure should present a vertical face down to at least the level of the bottom of the bedding layer”

5.5.2 Temporary restraints in unbound surface construction

Temporary restraints are not always required and this should be reflected in the first sentence of this clause....

*“During full compaction of the pavement, temporary restraints should be installed **when necessary** to resist lateral movement of the pavement.”*

The inclusion of Note 1 and Note 2 seems a long-winded way to make this very simple point. The explanation for the occasional need to use temporary restraints is welcome, but the simple addition of two words to the original sentence emphasises the key point.

5.6.1 General

“Where there is a movement joint in the base, it should be carried through accurately to the surface.”

Accurately? Isn't 'consistently' a clearer term for what is intended?

6.1 - Materials – General

“NOTE 1

For establishing the visual acceptability of materials and workmanship maintained during paving construction work, compare the texture, colour and finish with the manufacturer’s sample or trial panel, using an observer standing in turn at a distance of 2 m from each edge of the square in natural daylight conditions”

Garbled English – 'To establish visual acceptability of the materials and to maintain a consistent standard of workmanship during pavement construction works, the texture, colour and finish should be compared to a manufacturer's sample or a trial panel when viewed by an observer from each side of the sample or trial panel from a distance of 2m under natural daylight'

6.3.2.2.1-

Third sentence.....

“Where, because of narrower widths than permitted with use of the bedding aggregate as joint filling, it is necessary to use a finer jointing material, crushed igneous rock should be used.”

Terribly garbled English!

This crude agglomeration of words may have been intended to state.....

“Where bedding aggregate is used as a joint filling on pavements where those joints are narrower than recommended, a crushed igneous rock should be used for both bedding and jointing.”

....but it's so garbled it's impossible to be sure what was intended!

6.3.2.2.2 – Fine topping material

The sentence should make clear that this material is not always required, something along the lines of....

“When required by the manufacturer's recommendations or the design specification, Fine Topping Materials should be a crushed igneous rock or carboniferous limestone.....”

6.5.1 – Slurry grout jointing mortar

No consideration is given to the use of resin-bound jointing mortars.

There is a complete absence of any direct reference to non-cementitious jointing or bedding materials throughout the document. While the use of non-cementitious bound bedding materials can be regarded as a specialism, this cannot be said for non-cementitious jointing materials. Omission is particularly concerning given the growing use of jointing mortars bound using an epoxy or similar reliable resin which are acquiring increasingly significant market share for repair and remedial work, along with high quality installation of stain-vulnerable pavings.

Suggest:

The material used for jointing should be a cementitious slurry grout conforming to Table 14 for the appropriate jointing mortar type, or a suitable resin based jointing material, or a suitable bituminous material.

6.5.2 Site batched materials

Again, no consideration of resin-bound jointing mortars.

“Dry fine aggregate and cement mixtures should not be used.....”

Unclear and gives the impression that dry fine aggregate mixed with cement should not be used, when the intention is....

Dry mixtures comprising fine aggregate with cement should not be used.....

7.3 Laying Pattern

Fourth sentence – nonsense.

“For pedestrian-only areas, the laying pattern is not as important to serviceability.”

Should that be “as serviceability”, and what is serviceability? It should be defined.

7.3.1 – Rectangular paving units

“For cropped setts, where straight line bond patterns have been requested, the joint should display a straight line along its centre rather than trying to achieve a line along the edge of the paving unit.” (sic)

It's almost impossible NOT to achieve a straight line along the centre of a transverse joint if the paving units (plural) are laid in anything like a straight-ish alignment!

Use of a line to guide placement of paving units is essential and to suggest alignment priority is given to the jointing rather than the paving units is ludicrous. A transverse joint is not formed until two courses are laid: therefore, how can alignment of that first course be achieved? The second course is not yet present to give an alignment guide for the yet-to-be-formed joint!

40-odd years of laying setts tells me that installers will continue to lay to line. They cannot be expected to align to a hypothetical line that does not exist until the subsequent course is laid!

Suggested change:

Maintain the current methodology which is to lay the leading edge to line

7.4.2.2 - Cropped/cleft or textured side paving units

“The bedding layer for cropped/cleft or textured side paving units should be installed at the same time as the units.”

That would be good going! How do you lay bed and paver simultaneously? The bedding for such paving units should be placed “immediately prior” to installation of the pavers.

7.4.3.3 - Cropped/cleft or textured side paving units (e.g. granite)

“When laying the bedding layer material, the layer should achieve uniform density as far as possible.”

Is it possible to get any more layers into that sentence?

Suggest....

When placing the bedding layer material, the installer should endeavour to achieve uniform density of the bed as far as is possible.

“After the paving units have been hammered into position, additional bedding material should be added to loosely fill the joint.”

There's no indication of what qualifies as a 'loosely filled' joint. Would a joint loosely filled to the surface be suitable?

It should be made clear that to improve the immediate stability of the pavement additional bedding material may be used to partially fill the joints to a level of not more than half joint depth and that any excess should be raked out and the surface cleaned before moving on.

“Joints should not be allowed to remain unfilled at the end of a working shift.”

If this intended to indicate that final jointing must be completed at the end of each shift, this should be made clear. It won't actually happen on site, because it's impractical and/or uneconomic to complete final jointing at the end of each shift, but if that is the intent, then the ambiguity over whether this sentence refers to the temporary 'stabilising' joint filling or final jointing must be cleared up.

7.4.4.1.2 - Pre-cast concrete, clay and sawn sided stone paving units

“NOTE

The filling of joints with dry jointing material is not possible in damp conditions and can lead to an insufficiently filled joint.”

No mention is made of wash-in jointing, although this is mentioned in Note 2 of 7.4.5

7.4.4.1.3 - Cropped/cleft sided paving units

“NOTE 1

Where joint widths are not less than 10mm, it is normal practice to fill the joints using the same aggregate as for the bedding layer”

Bad English.....same aggregate as **used** for the bedding layer

“The fine topping aggregate, described in 6.3.2.2.2.....”

....which is not always used. As stated above, this should be qualified to relate only to those projects where it is required.

7.4.5 - Compaction of paving units into the bedding layer for unbound surface construction

Clarification is required about the eternal joint-then-compact or compact-then-joint debate. Referring back to the flowchart Fig 1 offers no help as it completely omits reference to this part of the construction process.

The draft suggests that compliance checks (flatness, levels, lips, etc..) should be undertaken before both jointing and compaction. It is not practical to assess some of these checks before compaction has taken place. For example, many minor lips between adjacent pavers will disappear during compaction.

There are some elementary compliance checks that can be carried out prior to jointing and compaction, but some are only possible afterwards.

Suggested changes:

Some reference to the two methodologies is required. Some pavers are better jointed then compacted while others need to be compacted then jointed.

7.4.6 Joint filling after compaction of paving units into the bedding layer

Fine topping material is not always required.

Suggested change:

In areas of cropped/cleft natural stone setts, a fine joint topping material conforming to 6.3.2.2.2 **MAY** be applied, in order to further stabilize the joint filling and to reduce or prevent water ingress.

7.5.1 – Laying paving on mortar - General

“Spot bedding should never be used”

What took so long to see the light? Thank you: thank you: thank you!

Final sentence.....

“Care should be taken to ensure the slurry does not choke or pollute drainage systems, e.g. excess material should be washed away after laying”

Unclear – the final phrase states that excess slurry should be washed away, but the point of the sentence is to remind operatives NOT to damage drainage systems. If excess is to be washed away, to where should it be washed? This needs clarification.

Suggest:

When washing away excess material, care should be taken to ensure the slurry does not choke or pollute drainage systems.

7.5.2 – Construction in adverse weather conditions

Final sentence....

“If weather conditions are such that the performances of the pavement might be jeopardized”

Performances? Unnecessary plural

7.5.4.1 – Moist bed with vibratory compaction

3rd paragraph

“Additional moist mortar should be spread over the surface and brushed to completely fill the joint, and final compaction should be completed by vibratory compaction using equipment conforming to Table 15. The area should then be soaked. The joint should finish at least 30mm below the top surface before re-grouting is carried out to fill the joint completely.”

The first sentence of this paragraph requires the joint to be completely filled. The final sentence requires the joint(ing) to finish at least 30mm below the top. Which is it to be?

If the intention is to initially fill the joints with moist mix, then compact with vibration to create a partially-filled joint that has at least 30mm depth from the surface of the pavement, then it needs to be made much clearer.

Final paragraph

....requires joints left unfilled to be covered, but this is contrary to previous requirement that no pavement should be left unjointed at the end of a shift.

7.5.4.2 – Moist bed with full depth slurry joint

“The mortar should rise up in the joint to no more than 10mm.”

Unclear – rise up the joint by 10mm maximum or to not less than 10mm from the surface?

7.5.5 – Joint construction using mortar

Again, no specific reference to the possible use of resin-based mortars, but this entire clause could be interpreted as being applicable to the use of resin materials.

Clarification on the use of non-cement jointing materials is required

7.5.5.2 – Joints using site batched mortars

“The joint should be well compacted, using an ironing tool to create a bucket handle profile, to give a dense top surface. The profile should be formed level with the top surface of paving units to provide support to arrisses of units.”

This paragraph needs some clarification. If a bucket handle profile is required by the first sentence, the second can't ask for a level (flat?) profile to support the arrisses of the paving units.

If the intention is to require a bucket handle profile where the mortar reaches and fully supports the arriss of each paving unit, then the paragraph needs re-drafting in clearer unambiguous English.

7.6.1 – Cutting and Trimming

First paragraph....

“No plan dimension should be less than 75mm unless this is unavoidable and is outwith a trafficked area.”

Trafficked by vehicles or pedestrians?

The two paragraphs starting *“Raw materials should be selected....”* and *“Concrete should be mixed....”* along with Note 4 are better placed within clause 7.6.2 as it is this clause to which they refer.

7.6.2 – Trimming and laying around obstructions

The fourth paragraph is a repeat of Note 2 above

8.1.2 and 8.1.3 – Kerb races and edge beams

There may be some confusion in terminology here. What the document refers to as an edge beam is commonly known as a kerb-race in Northern England, Wales, Scotland and Ireland. This is, for clarity's sake, a pre-placed bed of concrete that has been allowed to harden prior to placing the kerbs or channels.

When kerbs/channels are laid directly onto fresh, plastic concrete, this is usually known as Windrow Bedding.

8.1.3 – Edge beam bedding

3rd paragraph

“In areas subjected to heavy loading, either the backing concrete should be laid monolithic with the base.....”

If the kerbs are indeed being laid onto an edge beam, then it's simply not possible to have haunching that is monolithic with that base. There must, by definition, be a day joint between bed/base and the haunching.

Diagram G3 – they are complementary fittings, with an ‘e’. They are rarely flattering or free of charge!

../end