

## 10 FAQs about Streetscapes

### **Q1 What is the cost implication of choosing a natural stone surface rather than a bituminous surface?**

**A1.** Since the underlying structure and the ancillary works associated with both natural stone and bituminous surfaces are basically the same, cost differences are largely attributable to the time taken to lay the different materials and the price of the material used. Additional time (i.e. the period over which 'Prelims' are applied) and supervision is needed for natural stone and the purchase price of natural stone is greater than for bituminous materials. In broad terms, whatever initial cost estimate is used per square metre of bituminous material will probably have to be quadrupled if natural stone is the preferred finished surface. However, there are many whole life benefits to be gained from providing a high quality natural stone streetscape environment and, depending on the location, these benefits can often more than offset the initial high investment cost. Before deciding on the finished surface it is important to apply a whole life cost benefit model that consider the full range of benefits that accrue from natural stone paving schemes.

Further guidance on this topic is given in Section 1.3 of the 2<sup>nd</sup> Edition of the Natural Stone Surfacing - Good Practice Guide.

### **Q2 What are the essential considerations for ensuring the success of any streetscape project?**

**A2** Amongst the main essentials are (Section references are relevant to the 2<sup>nd</sup> Edition of the Natural Stone Surfacing – Good Practice Guide) :

- Choosing the correct category of site loading (Section 2.1)
- Ensuring that appropriate design parameters are used (Section 4)
- Using correct specifications. (Section 6).
- Consideration of future aftercare and maintenance requirements at design stage (section 8)
- Having good project and site management in place (Section 5)
- Having skilled and adequate site supervision (Section 7)
- Employing a skilled and trained quality workforce (Sections 5&7)
- Putting in place an aftercare and maintenance regime and strategy that will be effective for the whole of the streetscape's service life.(Section 8)

### **Q3 What is the difference between flexible and rigid construction?**

**A3** Flexible surfaces deform under load and revert to, or near to, their original profile once the load has passed. Rigid surfaces are not intended to deform under load but should remain rigid. Flexible surfaces typically fail under fatigue i.e. under the cumulative effect of a number of cycles of load while rigid constructions typically fail under a combination of very heavy single loads followed by fatigue failure. The SCOTS research has shown that flexible surfaces generally cannot sustain heavy traffic loading while rigid surfaces can. Bituminous materials may be used as a base layer for both flexible and rigid pavements however, in broad terms, Dense Bitumen Macadam (DBM) up to 150mm thick is only for use in flexible pavements while Heavy Duty Macadam (HDM) in excess of 150mm thick –giving a much stiffer layer –can be used in rigid pavements. Definitions of stiffness and guidance relating to 'flexibility' of various materials are given in Section 4 of the 2<sup>nd</sup> Edition of the Natural Stone Surfacing – Good Practice Guide.

**Q4 When would and wouldn't I use herringbone, stretcher, Bogen etc. patterns?**

**A4** It is known that arranging stone element surfacing in certain patterns enhances interlock between the stone units although the degree of enhancement has not yet been quantified. Patterns that preclude long straight lines in either direction are preferred. Surface patterns for stone elements surfacing need to take into account both the appearance of the surface and the contribution they can make to the flexural stiffness of the surface layer. Particularly in flexible construction certain patterns are essential to generate interlock and to ensure the elements and joints act homogeneously. Rigid surfaces are not so dependent on interlock for their load carrying capability, but it is thought likely that certain patterns assist rigid pavements to withstand localised horizontal forces. A stretcher bond pattern generates low to moderate interlock in the surface and should be laid at 90° to the direction of travel. A herringbone pattern generates moderate to high interlock, the orientation at 45° to the normal axis precludes long lengths of joints becoming parallel with the direction of travel. Herringbone is particularly suitable for use in corners and junctions. An Arc or Bogen pattern generates high interlock in the surface and is generally used with cube shaped units. This pattern also precludes long lengths of joints becoming parallel with the direction of travel and is also particularly suitable for use in corners and junctions. Section 7 of the 2<sup>nd</sup> Edition of the Natural Stone Surfacing – Good Practice Guide gives information and guidance on the selection and use of stone surface patterns.

**Q5 How critical are support structure profile tolerances?**

**A5** Level control of the surface of the roadbase is very important. If the roadbase is too high, it will be almost impossible to meet finished surface tolerances and if it is too low any increased laying course thickness will affect the pavements resistance to load. If the roadbase levels vary a non-uniform distribution of the bedding will ultimately lead to depressions in the paving surface and to ultimate failure. Another factor worth noting is that today public expectation is such that even minor variations in surface profile will inevitably lead to adverse comments and suggestions of failure. Section 7 of the 2<sup>nd</sup> Edition of the Natural Stone Surfacing – Good Practice Guide gives information and guidance on pavement layer tolerances.

**Q6 Why is consistency of joints so critical?**

**A6** Particularly for flexible construction consistency of joint widths is vital as it will ensure consistent and full compaction of the joint materials, which in turn is critical to structural performance of the whole pavement. Where units are laid in patterns which have curves and arcs then the joint widths will vary, but with skilled laying and pre-selection of units the required degree of consistency can be achieved. It is important that the units should not be touching. Sections 4 and 7 of the 2<sup>nd</sup> Edition of the Natural Stone Surfacing – Good Practice Guide gives information and guidance on joint widths and materials.

**Q7 Should I use the Guide or the British Standard?**

**A7** The Guide and BS7533 are based on the same basic research. The Guide design philosophy considers theoretical 'infinite' life of the stone surface construction, whereas the BS considers stated design lives. In theory therefore the BS may be a little more conservative than the Guide, but design life must be carefully considered. The BS and the Guide complement each other although the style may be different. The Guide considers the use of natural stone materials in a much wider sense from quarrying to aftercare whilst the BS is more limited in its advice.

**Q8 I am writing a contract specification, can I just 'cut and paste' information straight from the Guide?**

**A8** The information given in Section 6 (Specification Guidelines) of the 2<sup>nd</sup> Edition of the Natural Stone Surfacing – Good Practice Guide is generic and refers to all of the main issues required to write a robust specification that will help to minimise later contractual problems. Each project must be developed individually using relevant parts of the Guide only for reference and guidance.

**Q9 Why does an old street built over 100 years ago cope with modern-day trafficking without failing?**

**A9** Examples of this can be seen all over the country where stone surfaced streets look as good now as they did 100 years ago but no detailed examination of these streets has been carried out mainly because it is not practical to uplift them to try to examine why they perform so well. However, there are many more examples of such streets that have failed very soon after traffic loadings changed. One common link for the successful streets is a lack of utility intervention as well a lack of HGV vehicles and buses using them. Buses cause most damage, HGVs also damage street surfaces while cars cause minimal damage.

**Q10 Will I have to do post-construction maintenance and if so what are the basic initial steps to successful aftercare of streetscapes?**

**A10** Aftercare is essential to the success of any scheme. A reasonable stockpile of the stone used should be kept in a local depot for future repair work and a record of the source of the stone should also be kept. A maintenance manual should be produced to which all parties (private and public sector) have signed up. A regular inspection and maintenance regime should be adopted and budgeted for and should provide for things such as topping up of joints in the streetscape's early life and rapid intervention for those minor joint failures which can become major failures if not dealt with sooner rather than later. Section 8 of the 2<sup>nd</sup> Edition of the Natural Stone Surfacing – Good Practice Guide gives guidance and advice on successful maintenance and aftercare of streetscapes.