



Introduction

To achieve sustainable developments, careful consideration needs to be given before automatically specifying the use of high quality, 'primary' or 'virgin' materials.

Cement and other binders have the ability to dramatically improve the mechanical properties of many host materials to which it is added. In the case of existing sub-grades, the modulus can be greatly enhanced, eliminating the requirement for the importation of 'primary' or 'virgin', high modulus aggregates to overlay and improve the foundation. Alternatively, secondary materials, perhaps bi-products of industrial process may be treated and improved with cement and used to overlay and improve the natural formation. It is also possible to employ secondary or recycled materials in road base applications when processed to specification requirements.

Background

Type 1 sub-base is a high quality crushed rock which is regularly specified to improve the foundation modulus. However, it is unlikely to provide a foundation modulus in excess of 60 to 80 MPa.

TRL Report 248 ⁽¹⁾ demonstrates that a CBM1 made with foundry sand, incinerator bottom ash, crushed concrete fines, or any of a wide variety of other materials will easily out perform a Type 1 sub-base.

Technical Guidance Sheet E4:- Secondary Materials in CBM

In roadbases, CBMs 3, 4 & 5, a BS882 ⁽²⁾ compliant aggregate is required. However, a number of secondary or recycled materials may be processed to meet the standards requirements either on their own or in combination with other materials such as sand or other aggregates. BS882 is however written for 'natural' aggregates and it may be necessary to consider additional testing in the case of alternatives.

Additional testing might include:

- leach testing for environmental approval;
- chemical stability, testing for long-term durability.

Benefits

The use of recycled or secondary materials provides a number of environmental benefits:

- reduced quarrying (often in environmentally sensitive areas).
- primary materials are reserved for high value bound or concrete applications.
- reduced transport of primary material.
- use of locally available secondary material.
- perhaps reduced land filling in the case of some industrial bi-products.



Special Considerations

Environmental

In order to protect flora and fauna and groundwater quality, it is important to discuss proposals with the Environment Agency. Suppliers of secondary materials will assist in this area and may already have the necessary approvals for the proposed usage.

Health & Safety

Alternative materials, especially residues from industrial processes may be viewed suspiciously by those who have to work with them. It is therefore essential to undertake a thorough COSHH assessment. Again, suppliers are in the best position to provide these and any additional support.

For many materials, routine precautions will be adequate.

- minimise / prevent dust.
- if dusty conditions are unavoidable, operatives should wear facemasks and goggles.
- wear gloves.
- wash hands before eating or smoking.

References

⁽¹⁾ 'Stabilised sub-base in road foundations: structural assessment and benefits'. B.C.J. Chaddock and V.M. Atkinson. TRL Report 248.

⁽²⁾ BS 882: 1992 Specification for aggregates from natural sources for concrete.

Acknowledgements

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