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Analysis of the resistance to freezing and thawing of secondary materials with a view to their utilization in road engineering

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Prerequisites/special skills (optional): /

Summary

Large amounts of secondary materials are produced every year in Belgium. They come from the demolition of roads, buildings and engineering structures – concrete waste, masonry waste, mixed waste ... - or may be “artificial” – metallurgical slag, incinerator ash ...

The utilization of these materials in road engineering – as trench backfilling materials, (sub)base materials, or aggregates for bituminous or cement concrete pavements – is meeting with some reservations, as their mechanical and durability characteristics are poorly known. Moreover, a widely debated question today is whether the criteria set for natural materials also apply to secondary materials.



One of the critical issues in using these materials is their behaviour under freezing and thawing. Standard NBN EN 13242 on aggregates for use in engineering work and road construction suggests two methods for determining the frost susceptibility or frost resistance of aggregates. These methods are based on water absorption and resistance to freeze-thaw cycles simulated in a climatic chamber. The object of the research is to evaluate the frost resistance of various kinds of aggregates with the suggested methods. Work will consist in investigating whether the various test procedures are adequate for secondary materials and comparing the resistance of secondary materials to that of natural materials.

References

NBN EN 13242. Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction. 2008

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Soil improvement with slag fines - laboratory study

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Prerequisites/special skills (optional): (please indicate here if you want to emphasize expected prerequisite or special skills like programming language, etc.)

Summary

Slag fines (“fines de scories”) have been included in standard tender specifications for road works (CCT Qualiroutes), as a binder for the improvement of earthworks and road formations. The other binders are lime, cement, and cementitious road binder.

This product comes from the steel process and contains lime. A study performed at the Belgian Road Research Centre has demonstrated the effectiveness this binder in treating silty soils. An increase in bearing capacity and compressive strength was observed. Swelling was investigated in the laboratory as well.

It will be useful to continue this study, using binders available on the market and representative Belgian soils. Work will include the characterization of the soil to be treated and the binder used (grading, lime content ...), as well as preliminary mix design studies in the laboratory to evaluate the mechanical performance characteristics of soil-binder mixtures with time for several binder dosages and water contents and the possible swelling of these mixtures. Limits to use will be defined.

This work fits in perfectly with the concern for sustainable development, by promoting maximum reuse of soils in place and the utilization of a secondary product such as slag fines.

References

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