



Transportation and utilization of aggregates for road construction

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Road construction relies on non-renewable aggregate resources as the main construction material. Sources for high-quality aggregate resources are scattered, and requirements for aggregate quality can cause long transport distances between quarry and road construction site. In European countries, the average aggregate consumption per capita is 5 tonnes per year (European Aggregates Association, 2016), while the corresponding figure for Norway is 11 tonnes (Neeb, 2015). Half the Norwegian aggregate production (sand, gravel and crushed rock) is used for road construction.

In Norway, aggregate resources have been considered abundant. However, stricter requirement for aggregate quality, and increased concern for sustainability and environmental issues have spurred focus on reduction of transport lengths through better utilization of local aggregate materials.

In this research project, information about pavement design and aggregate quality requirements were gathered from a questionnaire sent to selected experts from the World Road Organization (PIARC), European Committee for Standardization (CEN), and Nordic Road Association (NVF). The gathered data was compared to identify differences and similarities for aggregate use in the participating countries. Further, the data was compared to known data from Norway regarding:

- amount of aggregates required for a road structure
- aggregate transport lengths and related costs

A total of 18 countries participated in the survey, represented by either road authorities, research institutions, or contractors. There are large variations in practice for aggregate use among the represented countries, and the selection of countries is sufficient to illustrate a variety in pavement designs, aggregate sizes, and quality requirements for road construction. There are considerable differences in both pavement thickness and aggregate sizes used in the studied countries. Total thicknesses for pavement structures varies from 220 mm to 2400 mm, and aggregate sizes for unbound materials varies from 19 mm to 600 mm. These results imply great differences in the amount of aggregate transport to road construction sites. Another important factor is the distances between the construction sites and the aggregate sources. For many projects, especially in countries in need of importing aggregates, aggregate transport will have considerable impact on sustainability assessment of the construction projects.

If pavement design can be altered with the goal of achieving better utilization of local aggregates through adaption to the quality of local aggregates, aggregate transportation can be reduced. Reduced transport will alter the economical balance of a project, allowing reallocation of costs from transport to e.g. improved aggregate production. The overall result can be more profitable construction projects and a more sustainable development of road structures.