OSSGA
Essential materials for building a strong Ontario

POSITION PAPER
AGGREGATE POP-OUTS

The presence of surface blemishes, such as aggregate pop-outs (either coarse aggregate or fine aggregate) is not necessarily an indication of a weak or low-durability pavement surface. Although this type of surface blemish may occur in any part of the province, the incidence of pop-outs may be higher in certain parts of Ontario due to the nature of the local aggregate used in either concrete or hot-mix asphalt production.

BACKGROUND:

Aggregate pop-outs are generally small, shallow pits or depressions in the surface of either concrete or hot-mix asphalt pavements that result mostly from the weathering of individual aggregate particles (in whole or in part). In some materials, pop-outs are the direct result of the expansion of absorbed moisture due to freezing; in others, this may be caused by chemical changes of an aggregate component. Pop-outs can range from 3 mm up to more than 50 mm in diameter. Typical materials that may result in aggregate pop-outs include chert, soft fine-grained limestone, shale, pyrite or coal.

Irrespective of the predominant material of a given sand and gravel pit or a bedrock quarry, all natural aggregate sources contain a highly varied mix of minerals and rock types that will ultimately influence the overall quality of the aggregate produced. The limitations on the quality of aggregates for a given application are reflected in the individual material specifications for aggregates.

In practical terms this means that all construction aggregate products, regardless of the type or application, may contain a certain amount of material prone to pop-outs and still meet the requirements of the specification.

Since natural aggregate sources have an inherent variability in their composition, the amount of material prone to pop-outs from any given source will vary depending on its location within the province. For example, gravel sources in southwestern Ontario may contain a small percentage of chert and still meet the overall material specification requirements. However, when exposed to the environment in a pavement surface, these particles may lead to aggregate pop-outs. On the other hand, gravel sources in eastern Ontario do not generally contain chert, resulting in a comparably lower proportion of aggregate pop-outs for this particular region.

CONCLUSION:

In short, the presence of aggregate pop-outs in a hot-mix asphalt pavement or concrete pavement surface does not necessarily indicate that a pavement is weak or has a low-durability surface. Regional experience and past performance should be taken into consideration when determining whether pop-outs on a particular pavement section require corrective action. Assessing whether the root cause of a surface blemish is aggregate-quality related, due to mechanical damage, or the result of inadequate placement techniques is important in determining what corrective action, if any, should be taken.

Eliminating pop-outs may be unnecessary for many projects and will involve significant costs to infrastructure construction, especially in areas where aggregate sources have a relatively high proportion of material types prone to pop-outs. In the few cases where aesthetics are of equal weight to performance, specifying aggregate products that do not contain materials known to cause pop-outs may produce the desired results. Restricting the use of aggregates from sources known to contain components prone to pop-outs can reduce supply from local sources, increase construction costs and produce a larger carbon footprint.

SOURCE:

OSSGA Specifications Committee

DATE APPROVED:

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