

Hydrosphere Engineering

Philip H. De Groot, Ph.D., P.E. and Michael C. Menoes, Ph.D., P.E.

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The use of O.D.O.T. Item 304 Aggregate base

Base material under pavements must be able to drain properly. Additionally, backfill material for subsurface drainage systems must help prevent the clogging of perforated conduits. O.D.O.T. Item 304 is typically specified for both applications, but is this a good idea?

Current O.D.O.T. specifications allow for 0% to 15% of the aggregate to pass the No. 200 Sieve (75 μ m openings). Materials passing the No. 200 Sieve are called fines and are typically composed of silts and clays.

According to Harry Cedergren (Seepage, Drainage and Flow Nets 1989):

“When blends of sand and gravel are thoroughly compacted with ample water, their permeabilities can be drastically reduced. Strohm et. al. (1967) discovered that when well-graded mixtures of sand and gravel contained as little as 5% of fines, high compactive efforts reduced the effective porosities nearly to zero and the permeabilities to less than 0.01% of those at moderate densities. These tests explain one of the reasons that blends of sand and gravel often used for drains are virtually useless as drainage aggregates if they contain more than insignificant amounts of fines.”

The passage from Cedergren makes it clear that O.D.O.T. Item 304 is not a suitable drainage material. Using O.D.O.T. Item 304 as a base material under pavement will trap runoff under the pavement, resulting in a continuous freeze-thaw cycle, ultimately causing pavement failure. Using O.D.O.T. Item 304 as a backfill material for subsurface drainage systems will result in fines clogging conduit perforations, and a pre-mature failure of the drainage system. Hydrosphere Engineering does not recommend using O.D.O.T. Item 304.