Geotechnical Applications of Structural Soil Using Lightweight Aggregate

Our recommendations call for compaction in 12 inch lifts or less, this saves time during the installation under normal operations. If the material is placed in larger lifts because of equipment restrictions, additional passes at the final grade may be necessary to settle the aggregate. The goal is simply to vibrate the material enough to make the particles lock into place. Once the particles have created a set configuration they can no longer move vertically. There will always be air space between the aggregate particles. The reason for this is:

Because it is not a soil, the objective in compacting structural grade lightweight aggregate fill is not to aim for maximum in place density, but to strive for an optimum density that provides high stability without unduly increasing compacted density. Two to four passes of vibratory compaction equipment commonly achieve optimum field density. Structural grade lightweight aggregates provide an essentially non-cohesive, granular fill that develops stability from inter-particle friction.**1** The ¾" gradation produces a specific weight that remains constant regardless of compactive effort. These properties are generally not understood by paving contractors. What this means is the aggregate particles are like a box of marbles. Test results indicate that specific weight of the aggregate is solely controlled by Mother Nature's geometry and cannot be influenced by additional compaction until crushed. Once the aggregates are settled in place they can no longer move vertically. The addition of water or additional compaction won't change it. The factors of horizontal displacement that was the concern of the paver contractor does not affect the compaction of the aggregate. They simply can rake the material back in place, then place the concrete or paving application. This hexagonal closed pack system is the densest possible geometric configuration.

Once contained horizontally, a simple proof roll will resolve any questions about the need for any additional compaction. Results of compacted lightweight aggregate density tests conducted in accordance with laboratory procedures (Proctor tests) should be interpreted differently from those for natural soils. For field density test, using the balloon method or sand cone may be helpful.

1. Holm, T. A., and A. J. Valsangkar. Lightweight Aggregate Soil Mechanics: Properties and Applications, *Transportation Research Record 1422*, National Research Council, Washington, D.C., 1993

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