

## ADVANTAGES OF MULTI-LAYER GEOGRIDS VS. SINGLE-LAYER GEOGRIDS

### I. Tenax multi-layer geogrids have 'more tensile elements' per unit area.

This increased number of tensile elements allows for more effective interaction with the soil. The increased interaction with the soil greatly improves the pull out resistance of the geogrid in a wide range of soils. In fact, independent testing has shown that multi-layer geogrids consistently achieve superior pull out resistance in the widest range of soils.

Just as is the case with concrete reinforcement, the use of a larger number of tensile elements frequently distributed throughout the soil as opposed to a fewer number of tensile elements will provide better optimization of reinforcement.

<b>Multi-Layer Geogrids:</b>	MS-220 = 192 tensile elements/sq. ft.
	MS-330 = 288 tensile elements/sq. ft.
	MS-500 = 432 tensile elements/sq. ft.
<b>Single-Layer Geogrids:</b>	111 tensile elements/sq. ft.

### II. Tenax multi-layer geogrids have a 'variable aperture size'.

Multi-Layer Geogrids are comprised of multiple layers of high strength extruded, bi-oriented polypropylene grids. The multiple layers are rolled and stitched together without superimposing the meshes creating a geogrid with variable sized apertures. The variable sized apertures greatly improve the geogrid's interlocking capacity with the soil. This is especially true when deploying the typical aggregate fill used for road construction that has particle size distribution of  $\frac{3}{4}$ " inch stone down to fines.

The variable sized apertures are even more beneficial when the project calls for a fill material that is already on the project site with less than favorable soil characteristics. The different size of the openings allows for better filling of the void spaces in the cross section during placement of a soil with an extreme soil distribution curve, thus providing a better interlocking capacity.

### III. Tenax multi-layer geogrids add a 'separation effect'.

The multiple layers of a multi-layer geogrid provide an increased cross sectional thickness as compared to a single-layer geogrid. This increase in profile allows for increased separation between the subgrade soil and fill material. This separation effect is useful in preventing the intermittent migration of fill soil into the weak subgrade.

### IV. Tenax multi-layer geogrids 'perform as well or better' than a single-layer geogrid.

One of the most important characteristics of a geogrid is its ability to ensure a good interlocking of soil or aggregate fill material. The best way to determine that maximum interlocking of the soil or aggregate has taken place is by conducting a pullout test. Multi-layer geogrids have been independently tested to determine their corresponding pullout resistance. This independent testing supports the fact that multi-layer geogrids exhibit an excellent coefficient of interaction against pullout.

The purpose of deploying a geogrid is to prevent rutting of the reinforced area. Tenax has performed full scale in-ground tests for geosynthetic-reinforced flexible paved roads that include both multi-layer and single-layer geogrids. This testing indicated multi-layer geogrids provide equal or better structural contribution than a single-layer geogrid.