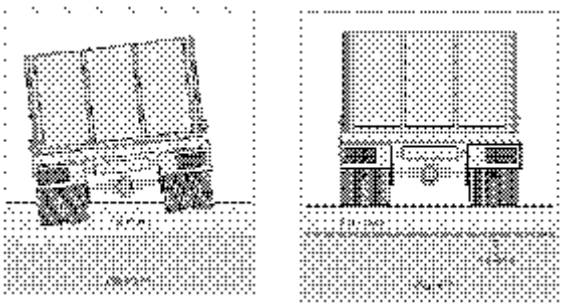
E'GRID REINFORCED ROADS

Maximum Benefit, Maximum Sub-base Thickness Reduction
with E'GRID Bi-axial Geogrid Reinforcement

Unpaved road design is generally associated with limiting the amount of wheel rutting that will occur on the surface of a road under a particular trafficking. Designs are based around an acceptable rut depth, typically 75mm and the strength of the existing subgrade. The softer the underlying subgrade, the greater the thickness of sub-base required to carry a set volume of traffic. Through the use of geosynthetic reinforcement, the Engineer may apply a sub-base thickness reduction factor to his unreinforced design and save on the quantity of granular fill required by the project. Clearly, different geosynthetic products generate different savings.

Question: What is the required sub-base thickness for an unpaved unreinforced design that has to carry a set traffic loading over a given CBR strength of subgrade?



Answer: A straightforward calculation allows us to identify the required sub-base thickness of an unpaved road when armed with the CBR subgrade and planned axle loadings. As we already know, the lower the strength of the underlying subgrade then the greater the thickness of granular sub-base required by construction to carry the nominated traffic loading. As subgrade strengths start to fall below a design CBR of 2% then an ever-increasing stone thickness is required.

Question: Does the inclusion of geosynthetic reinforcement in the design allow you to reduce the required sub-base thickness?

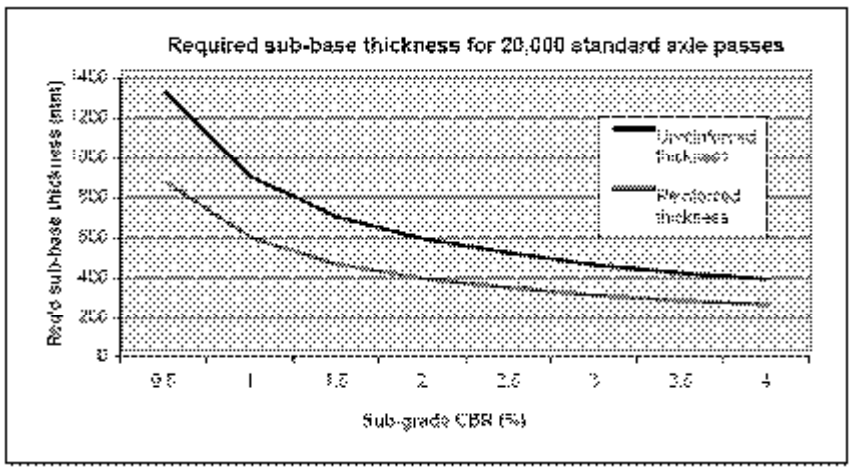
Answer: Yes, the inclusion of a quality reinforcing material in the sub-base can influence performance by:

(i) preventing lateral movement of the sub-base and reducing surface rutting

(ii) increasing sub-base stiffness and reducing vertical stresses in the sub-base

(iii) improving the flexural stiffness of the sub-base and reducing vertical stresses on the subgrade

(iv) reducing shear stresses transmitted from the sub-base to the subgrade



Graph showing the relationship between the required sub-base thickness and subgrade CBR, for a constant traffic loading, in un-reinforced & E'Grid reinforced unpaved roads

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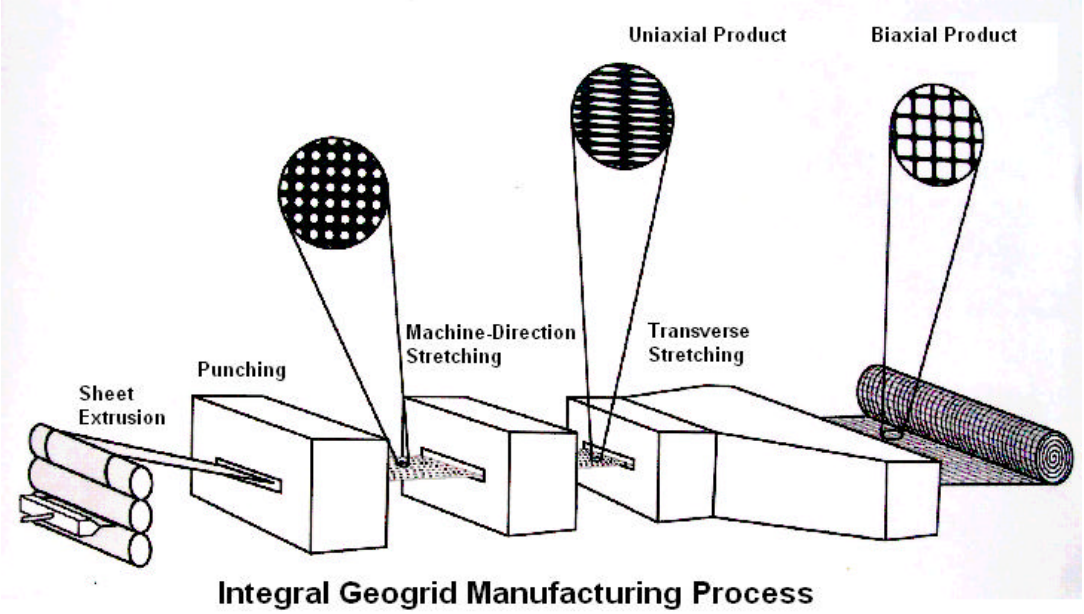
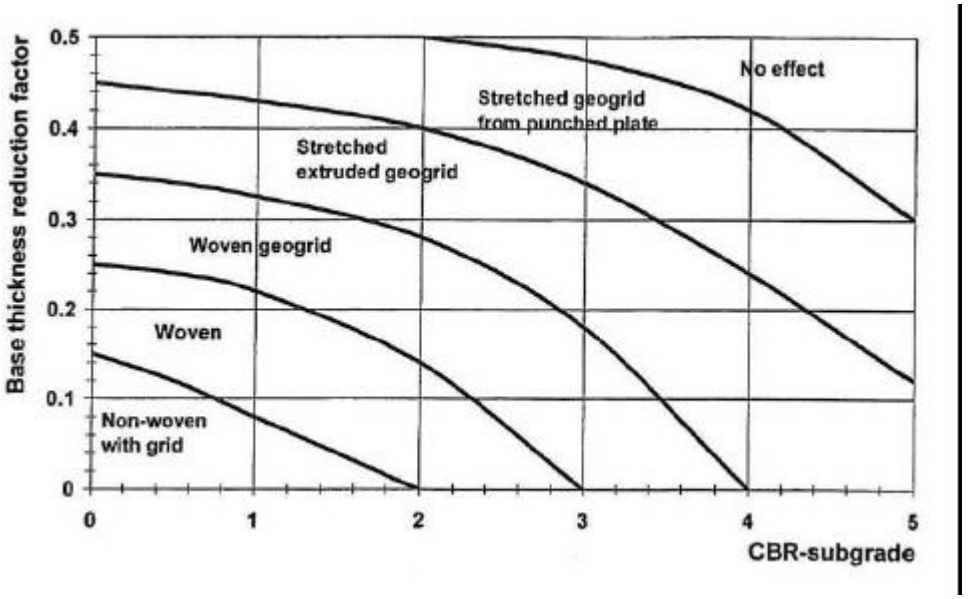
E'GRID® polypropylene biaxial geogrids have demonstrated that when used to reinforce an unpaved road they offer one of the largest possible reductions in the required sub-base thickness. This is due to E'GRID® bi-axial geogrids offering a combination of integral junctions and optimum rib cross-sections that have been developed to maximise interlock between the sub-base particles and grid apertures; a feature unique to punched & stretched geo-grids only.



Integral Geogrid Manufacturing Process

Different forms of geosynthetic reinforcement offer different savings in sub-base thicknesses. In an effort to quantify their reinforcing effect, a range of geosynthetic product types was analysed and reviewed by CROW, the Netherlands Information and Technology Centre for Transport and Infrastructure. CROW report 157 'Thin asphalt pavements – design and redesign' provides a range of curves applicable to a number of material types. This clearly shows that an E'Grid® type 'stretched geogrid from a punched plate' out performed all other material types in the test; including stretched & extruded geogrids, woven geogrids, woven geotextiles and nonwovens with grids.



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