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To whom it may Concern,

Combined Use of Biaxial Geogrid with Nonwoven Geotextile for Optimum Subgrade and Base Course Stability

The use of biaxial geogrid for the purpose of stabilizing and reinforcing a prepared base course over an excavated subgrade is a well-established and proven process. The geogrid stabilizes and reinforces the roadway, and allows for decreases the aggregate thickness required and subsequent excavation by:

- Preventing lateral movement of the base course material, reducing surface rutting.
- Increase in base course stiffness, reducing vertical strains within the base course.
- Improvement of flexural stiffness of base course, distributing traffic load and reducing the maximum vertical stress on the subgrade.
- Reduction of shear stress transmitted to the subgrade (native) material, increasing its bearing capacityⁱ.

The effectiveness of a reinforced base course is jeopardized when the native soil subgrade exhibits a low CBR (the California Bearing Ratio, a measure of the soil's effective shear strength), a high concentration of organic matter and/or is in a location with a high water table. In these situations, migration of water, organic matter and fines from the subgrade can contaminate the base course:

- Reducing its ability to effectively drain water that is forced up and out of the subgrade by traffic loading.
- The loss of fines within the subgrade causes soil voids, reducing its compacted and stable state, causing instability underneath the geogrid-reinforced base course, and can result in loss of compaction and increased roadway degradation.ⁱⁱ

The use of a nonwoven geotextile beneath the biaxial geogrid adds the following features to the reinforced roadway:

- Separation- The dissimilar materials are separated so both the integrity and function of both materials can remain intact or improved.ⁱⁱⁱ
- Filtration- Allowance for adequate liquid flow with limited soil (fines) loss across the fabric plane (perpendicular to the geotextile surface).^{iv}
- Flow Rate and Permeability- A combination of opening size and textile thickness that allows large volume flow rates of liquid across the textile plane, whilst ensuring soil retention within the subgrade.^v

The presence of a nonwoven geotextile improves the geosynthetic-reinforced roadway base by preventing both the contamination of the base course with native fines from the subgrade and allowing the more effective removal of subgrade liquid through the geotextile, resulting in better drainage through the base course and a more stable, reliable subgrade.

Nonwoven Geotextile Recommendations for Use.

The condition of the subgrade will depend on the thickness of nonwoven geotextile to use:

- **Wet Clay, Sandy or Silt-laden Soils:** a thinner textile is recommended, one with less required puncture and tear resistance, but with high flow rates and permittivity (a measure of the fabric's ability to allow liquids to pass through it).
- **Soil with Stone, Rock or Hard Organics:** A thicker geotextile is recommended, one with high puncture and tear resistance, to prevent installation damage and ensure long term performance.
- **Recommended Overlap:** We recommend an overlap of at least 300mm. For low CBR soils, 450mm to 600mm is suggested.

Case Studies

The following pictures show a number of previous successful installations showing the use of a biaxial geogrid and a nonwoven geotextile to effectively separate and reinforce the various layers within a roadway (re)construction.

The Gore Road, Brampton ON



Road Construction over Peat Bog – Ontario





Construction Site – Sobeys'- St. Catherines



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Conclusion

The use of a nonwoven geotextile further support the reinforced base course that is reinforced with biaxial geogrid should be considered 'best – practice' when building on less-than-ideal native soil conditions.

Should there be any questions regarding this letter of recommended product use, please feel free to contact me at your convenience.



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ⁱ Giroud, Han: Design Method for Geogrid-Reinforced Unpaved Roads.1.Development of Design Method. Journal of Geotechnical and Geoenvironmental Engineering, 2004 pg. 776

ⁱⁱ Giroud, Han: Design Method for Geogrid-Reinforced Unpaved Roads.1.Development of Design Method. Journal of Geotechnical and Geoenvironmental Engineering, 2004 pg. 776

ⁱⁱⁱ Koerner, Robert M: Designing with Geosynthetics. 6th ed Vol 1. Xlibris Corporation, 2012, pg. 104

^{iv} Koerner, Robert M: Designing with Geosynthetics. 6th ed Vol 1. Xlibris Corporation, 2012, pg. 109

^v Koerner, Robert M: Designing with Geosynthetics. 6th ed Vol 1. Xlibris Corporation, 2012, pg. 109,110