Multiaxial Geogrids on CSAH and MSAS Routes

General Specifications, Granular Equivalent (G.E.) and Design Guidelines

Implementation

The guidelines contained herein are effective immediately for all Federal Aid and State Aid projects specifying multiaxial geogrid. This guideline **does not** apply to uniaxial geogrids.

Introduction

A general specification for multiaxial geogrid will provide designers a framework from which to specify the geogrid engineering properties required for a project.

With limited aggregate sources on some projects, there is an economic need to assign a granular equivalent (G.E.) to a geogrid.

This guideline will provide roadway designers with both general information and contact persons regarding the application of geogrids in roadway aggregate base course construction.

Purpose

There are three main purposes of this guideline. First, is to provide a general specification for the uses of geogrids. Second, is to provide a granular equivalent (G.E.) for geogrid. Third, is to provide design guidelines for the application of geogrids in the aggregate base course in both MSAS and CSAH routes.

Guidelines

SPECIFICATION

In the plans and proposals, geogrid should be referenced under specification number 2105. Minimum numeric strength values will differ depending on the application and strength of geogrid required.

GRANULAR EQUIVALENT

For aggregate base course design purposes, multiaxial geogrid shall have a maximum granular equivalent (G.E.) value of **2 inches.** Multiple layers of multiaxial geogrid within a pavement design shall not be additive. Maximum G.E. from geogrid = 2 inches.

DESIGN GUIDELINES

Geogrids are a regular network of tensile elements with apertures of sufficient size to interlock with surrounding fill material.

Multiaxial geogrids are typically used in aggregate base courses and have strength in two or more directions. Particles in the aggregate base course may move due to traffic loading causing surface rutting. Multiaxial geogrids are beneficial to use where traffic stresses exceed the aggregate base course lateral restraint capacity causing rutting and alligator cracking.

The geogrid shall not have any distortions or waves in the lay down. For maximum benefit, the geogrid should be installed a minimum of 4 inches and not more than 12 inches beneath the top of the aggregate base. Geogrid should be installed in the aggregate base and not in the granular

subbase material. The aggregate base material gradation is extremely important because the aggregate particles need to interlock in the aperture openings of the specified multiaxial geogrid. An aperture dimension range from 0.5 to 1.5 times the largest sieve requirement tends to interlock well.

Construction experience has shown that placing 4 to 8 inches of aggregate base on the geogrid should allow for an adequate construction platform. However, each design should be checked to ensure a stable platform for construction equipment. Aggregate material should initially be placed in the center of the geogrid and then spread outward radially in a uniform depth to the geogrid edges. Tracked construction equipment should not be allowed to drive directly on the geogrid itself.

Consult with your District Materials Engineer, District State Aid Engineer and the manufacturer's recommendations for further guidance.

Questions

For information on the technical contents of this guide, please contact either Blake Nelson, MnDOT Geotechnologies Engineer at **(651)366-5599,** Tim Andersen, MnDOT Pavement Design Engineer at **(651)366-5455.**

Attachment: General specification (2105) GEOGRID for multiaxial applications only (2 pages). For uniaxial applications the designer must write a project specific specification.2105

GEOGRID

2105.1 Description

This work consists of placing multiaxial geogrid(s) for construction in accordance with the details shown in the plan, the applicable MnDOT Standard Specifications, and the following:

2105.2 Materials

The multiaxial geogrid must meet the following strength values in accordance with ASTM D 6637.

Geogrid Type		**Type A**	**Type B**
Minimum Tensile strength at 2% strain	Longitudinal*	See note 1 below	410 lb/ft (6.0 kN/m) minimum
	Transverse**	See note 1 below	615 lb/ft (9.0 kN/m) minimum
Minimum Ultimate Tensile Strength	Longitudinal*	See note 1 below	1310 lb/ft (19.2 kN/m) minimum
	Transverse**	See note 1 below	1970 lb/ft (28.8 kN/m) minimum

Type A – Note 1: values as agreed upon by MnDOT Geotechnologies Engineer

Type B – Use only for aggregate base reinforcement

Junction Strength – 25 lb. (111 N) maximum

Minimum Aperture Dimensions: 0.5 x largest sieve requirement

Maximum Aperture Dimensions: 1.5 x largest sieve requirement

*machine direction

** cross machine direction or specified direction

2105.3 Construction Requirements

1. The installation operation must not cause damage, distortion to, or compromise the performance of the geogrid in any manner.
2. Geogrid, Type B, will be placed parallel to the centerline of the roadway.
3. The minimum overlap of geogrid is 1.0 ft. (0.3m) and must be tied with mechanical connectors, spaced at a maximum interval of 4 ft. (1.3m). Use mechanical connectors as approved by the manufacturer.

2105.4 Method of Measurement

Measurement will be made by the area of geogrid placed (no compensation for overlaps) as specified.

2105.5 Basis of Payment

The contract bid price per square yard (square meter) is full compensation for the cost of furnishing and installing the required materials, including mechanical connectors.

Payment will be made under:

Item No.	Item	Unit
2105.604	Geogrid	Square yard (square meter)

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