

CASE STUDY | Asphalt Reinforcement Geogrid Road Application



Spartan Road Grid™ 10C
(Fiberglass composite grid with thicker nonwoven geotextile)

Spartan Road Grid™ 10
(Fiberglass grid alone)

Spartan Road Grid™ 10
(Fiberglass composite grid with very thin nonwoven geotextile)

WHAT:

Asphalt pavement road rehabilitation
Calgary, Alberta, Canada

APPLICATION:

This application involves three asphalt road rehabilitation projects using Spartan Road Grid™ polymer coated fiberglass grids and fiberglass grid–geotextile composites, to reinforce asphalt concrete pavement (ACP) overlays to enhance their resistance to reflection and fatigue cracking and rutting.

CHALLENGE:

One of the important challenges faced by any city is the effective maintenance of the roads in its jurisdiction. Asphalt pavements experience various modes of distress like wheel path rutting, fatigue cracks, longitudinal and transverse cracks, and edge cracking which compromises the structural strength and riding quality of the pavement.

The City of Calgary carries out maintenance and rehabilitation of the pavements periodically and in some cases, where the pavements have undergone extensive damage, reconstruction of the pavement also is carried out. A condition assessment showed that nearly one quarter of the city's road network, 3,300 lane kilometers or 2,050 lane miles had met trigger for rehabilitation. This backlog translated to more than 10 years of worth of budget, but allocated budget was only sufficient to treat about 275 lane kilometers or 170 lane miles. Faced with construction and monetary constraints, the City of Calgary started exploring innovative and cost-effective methods for pavement rehabilitation.

CONVENTIONAL SOLUTION:

As with most urban pavement, milling and overlay/inlay is extensively used for rehabilitation of distressed asphalt pavements, however this does nothing to enhance pavement performance or longevity.



TITAN SOLUTION:

Titan proposed that the City of Calgary explore the benefits of using Spartan Road Grid™ asphalt reinforcement geogrids with the objective of enhancing pavement performance, longevity and providing long-term cost efficiencies.

Developed through rigorous R&D and a series of technological advancements, these fiberglass geogrids are designed to improve the service life of roads. Their high tensile modulus reinforces the asphalt thus enhancing resistance to fatigue cracking and rutting. As a result, the asphalt pavement can be less thick yet have the same structural strength as unreinforced asphalt pavement of greater thickness. With the fiberglass composite geogrid, the grid is bonded to a nonwoven geotextile and provides the following additional benefits:

- *When saturated with tack coat the nonwoven geotextile becomes an impervious membrane which acts as a moisture barrier preventing the entry of surface water into the pavement.*
- *The geotextile is generally considered to help installation by providing better bond to the existing pavement. Under favorable conditions this facilitates installing the fiberglass composite geogrid directly on milled surfaces, thereby avoiding a leveling course.*

The City of Calgary, decided to carry out pilot studies in three locations to monitor performance— two roads with curb and gutter namely Sarcee Trail and 50 th Ave., and rural road 101 Street SW. Specifics on each follow:



Sarcee Trail Project

CONVENTIONAL SOLUTION

Mill 100 mm & inlay 100 mm (ACP)

Spartan Road Grid™ SOLUTION

Mill 70 mm, inlay 30mm ACP, install Spartan Road Grid™, inlay 40 mm ACP)

Pre-Rehabilitation Condition:

- Extensive medium and high severity transverse and longitudinal cracks on both lanes. Transverse cracks were closely spaced at 5m (16 ft) intervals.
- Semi continuous wheel path fatigue cracking of low to medium severity predominantly in the median lane.
- Negligible rutting.
- Negative slope (sloped towards the median) on the median lane was observed in certain areas.
- Extensive potholes where longitudinal and transverse crack intercept.



101 Street Project

CONVENTIONAL SOLUTION

Mill 80 mm and inlay with ACP 80 mm thick in two lifts (30 mm + 50 mm)

Spartan Road Grid™ SOLUTION

Mill 40-50 mm, lay Spartan Road Grid™ fiber-glass composite geogrid and place ACP 40-50 mm thick

Pre-Rehabilitation Condition:

- Extensive, moderate, and high severity centerline and longitudinal cracks in both lanes. Transverse cracks were spaced at 20 m (65 ft) intervals on average and about 20-25mm (0.7-0.9 inches) wide, most of them were sealed.
- Intermittent low severity rutting, average rutting was less than 9mm (10.4 inches).
- Semi continuous wheel path fatigue cracking of medium to extreme severity, extensive potholes.
- Several asphalt patches placed over localized failures observed in the wheel paths. However, the moisture trapped in the subgrade was pumping the water under truck loads, causing the disintegration of patches. New patches were not lasting more than a few weeks, requiring significant maintenance in spring and summer seasons.



50th Ave Project

CONVENTIONAL SOLUTION

Mill 110 mm inlay 110 ACP

Spartan Road Grid™ SOLUTION

Mill 90 mm, Inlay 40 mm ACP, install Spartan Road Grid™ fiberglass geogrid, 40-50 mm thick

Pre-Rehabilitation Condition:

- Severe rutting at intersections.
- Moderate rutting throughout the length.
- Slight fatigue cracking.





RESULTS:

- City evaluated 3 products – Spartan Road Grid™ fiberglass grid, fiberglass grid with thin nonwoven and fiberglass grid with thick nonwoven geotextile.
- Good installation and achieving strong interface bond are key to good performance.
- Where installed properly, early experience shows that products are performing very well.
- Spartan Road Grid™ fiberglass grid composite with thick nonwoven geotextile should be installed directly only over the fine milled surfaces. In case of rough milled surfaces, a thin ACP overlay underneath the fiberglass grid composite is recommended for achieving stronger bond.

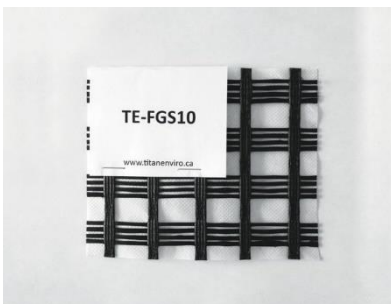


PRODUCT DESCRIPTION:



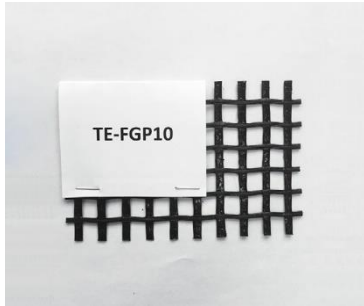
Spartan Road Grid™ 10C (Fiberglass composite grid with thicker nonwoven geotextile)

Spartan Road Grid™ 10C fiberglass composite geogrid is a biaxial geogrid bonded to a needle punched nonwoven geotextile. It is specifically designed for asphalt reinforcement with an additional moisture proofing benefit. Its composite characteristic provides a continuous non-deforming water-resistant barrier. The geogrid is polymer coated which ensures proper adhesion to the asphalt layers over the tack coat surface, and further optimizes the chemical compatibility between the geogrid and the pavement overlay to create a solid bond of the asphalt layers over the tack coat surface. This bond ensures that the reinforcing grid is in a position to effectively accept and distribute tensile stresses. This system offers excellent heat resistance, minimal shrinkage at high temperatures, high chemical, physical and biological durability along with optimal elastic modulus and aperture size. It is biologically unaffected by soil micro-organisms, inert to all chemicals normally found in the soil and formulated to resist ultraviolet degradation.



Spartan Road Grid™ 10 (Fiberglass composite grid with very thin nonwoven geotextile)

Spartan Road Grid™ 10 fiberglass geogrid is a bituminous coated composite geogrid made of biaxial fiberglass geogrid bonded to a thin 50gsm spunbonded nonwoven polyester geotextile. This product provides a moisture proofing benefit that ensures faster installation over milled surfaces. Its bituminous coating ensures a proper adhesion to the asphalt layers over the tack-coated surface and optimizes the chemical compatibility between the geogrid and the pavement overlay.



Spartan Road Grid™ 10 (Fiberglass grid alone)

Spartan Road Grid™ 10 fiberglass geogrid is specifically designed for asphalt reinforcement. Its optimal apertures allow asphalt particles to penetrate through the grid to achieve high interlock and effective bonding of the two asphalt lifts. This geogrid is also polymer coated which ensures proper adhesion to the asphalt layers over the tack coat surface, and further optimizes the chemical compatibility between the fiberglass reinforcement and the pavement overlay to create a solid bond of the asphalt layers over the tack coat surface. This bond ensures that the reinforcing grid is in position to effectively accept and distribute tensile stresses.

It is self-adhesive and offers excellent heat resistance; minimal shrinkage at high temperatures; high chemical, physical and biological durability along with optimal elastic modulus and aperture size. It is biologically unaffected by soil micro-organisms, inert to all chemicals normally found in the soil, and formulated to resist ultraviolet degradation.

PROJECT HIGHLIGHTS:

Project:

Asphalt Road Reinforcement

Client:

City of Calgary

Location:

Calgary, Alberta

Installation:

Sarcee Trail – Summer 2015

50 th Ave – Summer 2015

101 Street SW – Summer 2016

Product Solution/System:

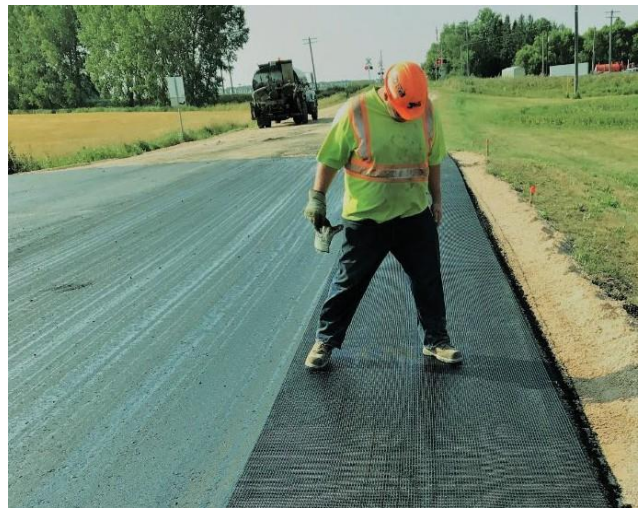
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BENEFITS:

- Minimizes or prolongs reflection cracking.
- Increases fatigue life.
- Decreases rutting.
- Reduces asphalt overlay thickness.
- Lowers maintenance costs.



Contact us for more information:



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