



Large Retail Store Developments

Using Tensar® Biaxial (BX) Geogrids to Create a Uniform Subgrade Elevation

The Challenge

Generally speaking, pavement sections around retail stores are designed for both heavy and light duty trafficking conditions. Consequently, the additional thickness of asphalt concrete or unbound aggregate in the heavy duty section, results in a situation whereby the subgrade-aggregate interface is at a deeper level.

results in “mechanical interlock”. This increases the stiffness of the base course layer and prevents lateral spreading of the aggregate during traffic loading.

BX Geogrids Create Uniform Subgrade Elevations

When applied to the pavements constructed to carry traffic in the areas around large retail stores, this technology can be used to create a scenario whereby the heavy and light duty sections are the same thickness. Consider the two sets of designs illustrated below:

Design Scenario 1 - Proposed Pavement Section

Standard Duty	Heavy Duty	Standard Duty
1.5 in. ACC Surface	1.5 in. ACC Surface	1.5 in. ACC Surface
3 in. ACC Base	4 in. ACC Base	3 in. ACC Base
9 in. Aggregate	9 in. Aggregate	9 in. Aggregate
Subgrade	Subgrade	Subgrade
142,000 ESAL's*	321,000 ESAL's*	142,000 ESAL's*

Design Scenario 2 - Mechanically Reinforced Pavement Section

Standard Duty	Heavy Duty	Standard Duty
1.5 in. ACC Surface	1.5 in. ACC Surface	1.5 in. ACC Surface
3 in. ACC Base	3 in. ACC Base	3 in. ACC Base
6 in. Aggregate	6 in. Aggregate	6 in. Aggregate
BX1100 Geogrid	BX1200 Geogrid	BX1100 Geogrid
Subgrade	Subgrade	Subgrade
165,000 ESAL's*	330,000 ESAL's*	165,000 ESAL's*



Retail store under construction.

This causes a number of problems, the most significant being that water entering the pavement tends to accumulate in the “bath tub” created by the heavy duty section. The subgrade strength decreases and the base becomes saturated resulting in a weaker pavement in the area where the greatest strength is required.

The Spectra® System Advantage

When used in base reinforcement applications (i.e. reasonably firm subgrade conditions), the Spectra® Roadway Improvement System provides one or both of the following benefits:

- Increased design life for a given pavement section.
- Reduced pavement thickness required for a given required traffic level.

The enhanced performance of pavements reinforced with Tensar® Biaxial (BX) Geogrids derives from the positive interaction between the geogrid and surrounding aggregate. Partial penetration of the coarser particles through the apertures of the geogrid

**The allowable traffic levels shown above are based on calculations undertaken using the current methods prescribed by The American Association of State Highway and Transportation Officials (AASHTO). Details can be found in the current (1993) Design Guide and Interim Standard PP 46-01.*

In Scenario 2, the reinforced heavy and light duty pavement sections each carry at least as much traffic as their unreinforced counterparts in Scenario 1. The big difference however, is that the reinforced heavy and light duty pavements, both have the same thickness and therefore the underlying subgrade will be at the same level.

Advantages of Uniform Subgrade Elevations

There are many advantages to creating a uniform subgrade elevation for both the heavy and light duty pavement sections:

- Drainage challenges due to migration of water into low lying areas are avoided, thus the pavement strength is maintained.
- Elimination of water trapped in the heavy duty section reduces its freeze-thaw susceptibility.
- Deviation from delivery paths by trucks onto light sections could normally cause premature degradation of the pavement – the use of geogrids results in a “built-in” safety factor whereby even the lighter section will hold up better.
- The use of a uniform subgrade elevation provides a much simpler method of construction—less stake out procedures.
- The site can be graded to one level, resulting in less excavation and disposal of existing soil.
- Cost savings can be maximized from the use of less material and a quicker construction time.
- Overall project schedule savings.

Case Study – Kroger, Arbor Square Deerfield Township, Ohio

The Kroger Company was planning to construct a grocery store in the new Arbor Square retail complex outside Cincinnati, Ohio. Ground conditions at the site consisted of loamy soils overlying glacial till.

The use of Tensar BX1200 Geogrid within the heavy-duty pavement section reduced the required thickness



Tensar BX Geogrids offered cost savings for this Cincinnati area Kroger.

of dense graded aggregate by four inches. This change in aggregate thickness meant that the heavy and standard duty pavements were of equal thickness and the subgrade was able to drain more uniformly.

Both the contractor and the owner realized significant savings in time and overall project costs due to the simplified construction method.

Following 18 months of continuous service, the performance of the geogrid reinforced sections has been outstanding.

Experience You Can Rely On

Tensar International Corporation, the leader in geosynthetic soil reinforcement, offers a variety of solutions for foundation and roadway projects. Our products and technologies, backed by the most thorough quality assurance practices, are at the forefront of the industry. Our support services include site evaluation, design consulting and site construction assistance. For innovative solutions to your engineering challenges, rely on the experience, resources and expertise that have set the industry standard for more than two decades.

For more information on the Spectra System or other Tensar Systems, call **800-TENSAR-1**, visit www.tensar-international.com or e-mail info@tensarcorp.com.

