

# APPLICATIONS FOR THE **OIL AND GAS** INDUSTRY



**Tensar**<sup>®</sup>



➤ Tensor® TriAx® Geogrids greatly enhance constructability to significantly improve site access while reducing up-front costs and future maintenance.

## Reducing construction costs and long-term maintenance needs

As energy needs continue to grow globally, oil and gas developers are answering the call. However, new sites are often opening in more and more remote areas – inside and outside of the traditional oil and gas states, in protected areas or in the midst of prime farmland. Gaining access to a site can be a challenging part of any oil or gas project. These areas where access roads, laydown yards and drilling pads are often constructed contain poor soils, weak subgrades and are frequently subjected to poor weather conditions. Considering the extremely heavy loads that these areas are expected to carry, traditional solutions can be costly and time consuming.

Left untreated, a weak subgrade subjected to continuous heavy traffic loads will quickly degrade, causing the surface to rut, pothole, “washboard” and ultimately deteriorate beyond use. Fortunately, tried and true technology exists for building more reliable and economical access roads and mud-free drilling sites. Tensor TriAx Geogrids provide a simple solution for stabilizing construction platforms and reducing subgrade stress. TriAx Geogrids greatly enhance constructability to significantly improve site access while reducing up-front costs and future maintenance.





*Tensor TriAx Geogrids provide a cost-effective solution for stabilizing access roads for oil and gas sites.*

## Tensor TriAx Geogrid answers a variety of oil and gas site challenges

### 1. SITE ACCESS ROADS

Site access and haul road construction can be easy when a drill site is on firm, dry ground and is located near a well-constructed road. More often, however, sites are in remote locations where substandard soils must be trafficked to get to the well site. Additionally, oil and gas reserves are often located significant distances from local quarries or other aggregate sources, affecting stone costs and increasing the time to haul the stone, which affects drilling schedules. Finally, when well sites are hit with rain, or are coming out of the winter thaw, bearing capacities of the subgrade soils can decrease dramatically. What might have been a firm access road becomes a wet, rutted mess, compromising the construction schedule and worse, production rates. Fortunately, one cost-effective, proven solution has successfully stabilized thousands of miles of access roads, keeping them operational 24 hours a day regardless of weather conditions: Tensor TriAx Geogrids.

### IN PROJECT AFTER PROJECT, TRIAX GEOGRIDS HAVE:

- ▶ Improved road surface quality, thus increasing safety
- ▶ Reduced the frequency of costly and disruptive road surface maintenance
- ▶ Reduced aggregate requirements up to 60%
- ▶ Withstood highly corrosive chemicals due to their polypropylene construction
- ▶ Increased operating speeds of construction equipment
- ▶ Reduced labor and equipment needs
- ▶ Eliminated the need for costly overexcavation and disposal of poor quality soil
- ▶ Avoided issues associated with chemical stabilization including weather and climatic restrictions, curing, uniformity, chemical solubility and environmental and personnel safety

- ▶ Reduced tire rolling resistance resulting in reduced maintenance cost for earthwork equipment
- ▶ Reduced construction truck traffic, minimizing disturbance to the local environment
- ▶ Reduced construction disruptions from inclement weather and spring thaw

TriAx Geogrids have saved oil and gas developers hundreds of thousands of dollars in stone cost alone for a single well site. For example, the roadway section shown below (Figure 1) was installed on access roads heading into a well site in the Eastern U.S. where the total cost savings to the owner was close to \$1.3 million.

### AGGREGATE REDUCTION: UNSTABILIZED ROAD VS. ROADS STABILIZED WITH TRIAX GEOGRID



FIGURE 1

› One drilling site superintendent summed up his experience after a TriAx Geogrid installation like this: “Last year, our sites were mud bogs... this year, they’re like superhighways.”



## 2. SAFETY

Poor access roads are not only costly in terms of productivity but can also cost lives. Unfortunately, fatalities could occur at night in poorly lit areas, when trucks or other equipment have encountered roadway problems, such as potholes or washouts that caused the driver to lose control of the vehicle. Typically, these problems are caused by repeated, heavy trafficking (especially over weak soils) that creates rapid deterioration of the surface. However, hazardous roadway conditions can be minimized when Tensar TriAx Geogrids are used on your site.

When using Tensar TriAx Geogrids to stabilize access roads, the aggregate interlocks with and is confined by the geogrid resulting in a more stable and uniform working surface. This stabilized access road enhances load distribution, and reduces the stress applied to the subgrade. With enhanced load distribution, subgrade failures can be prevented. This minimizes the potential for surprise potholes or washouts to form, thus creating safer, more reliable roadways.

## 3. SITE FOOTPRINT IMPROVEMENT

Let’s face it: nobody likes to arrive at a job site every day, only to sink in mud. And productivity, as well as safety, are affected when muddy tires and tools become routine. In colder climates, this can be especially true coming out of the winter thaw, when trucks sink to the axles. But even firm sites can be compromised by rain or excessive moisture.

These struggles can be reduced greatly by incorporating TriAx Geogrids at your site. For a nominal cost to the site footprint budget, a site can be relatively mud-free, with improved productivity and safety throughout the drilling operation. Through careful analysis, a Tensar representative can propose a suitable mechanically stabilized layer incorporating TriAx Geogrid. By considering site specific variables like maximum axle loads, number of load cycles, and worst-case subgrade soil strength, a newly designed alternative section can offer a measure of insurance to help keep the site running smoothly. One drilling site superintendent summed up his experience after a TriAx Geogrid installation like this: “Last year, our sites were mud bogs...this year, they’re like superhighways.”



*Job sites stabilized with Tensar TriAx Geogrids provide increased productivity rates and safety.*



*The access road shown in the image above was stabilized with Tensar TriAx Geogrids, while the well pad was not. A dramatic difference in surfaces between the smooth, stable road and muddy, unstable well pad can be seen.*

› TriAx Geogrid can be readily installed over any subgrade or soil in near-arctic conditions.

#### 4. POST-DRILLING PRODUCTION SITE ACCESS

Site access after the drilling process ends is important to resource developers and regulatory agencies. Maintenance workers often go back to wells after the primary production stage. With the increased need to enhance oil recovery, workover rigs are being used more often to tap into production zones previously deemed to be not cost-effective. They are also used to service existing wells or cap wells in the event of an emergency. Access to these wells must be reliable. Fortunately, an access road stabilized with TriAx Geogrid outperforms an unstabilized road. Once in the ground, TriAx Geogrids, made of polypropylene, will not degrade, rot or lose radial stiffness and aggregate confinement capabilities. This provides developers and regulators with the confidence that access and site conditions will remain consistent and favorable on a properly constructed, stabilized access road.

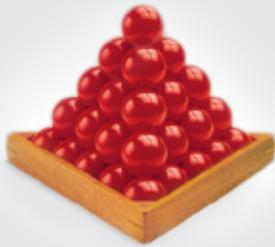
#### 5. COLD CLIMATE CONSTRUCTION

TriAx Geogrids perform well in a number of installation challenges: For example, over weak, wet or compressible subgrades, or under heavy loads near shallow utilities. Their performance in extreme cold weather conditions has been well proven. TriAx Geogrids can be readily installed over subgrades in near-arctic conditions. In addition, TriAx Geogrids are unaffected by freeze-thaw cycles, posing no challenges to long-term performance.

TriAx Geogrids' uniform polypropylene construction does more than withstand the cold. It provides reliable stabilization, presents no environmental hazards, and is always safe and easy to install. Thus, unlike other techniques, no specialized equipment, labor, health/environmental precautions or materials expertise is required. So why sacrifice performance and productivity over winter and early spring months? Tensar Geogrids have been successfully used in every climatic and surface condition for nearly three decades.



*This 2005 project in Siberia demonstrates that geogrids can be installed in near-arctic conditions.*



Just as the pool rack confines these billiard balls, Tensor TriAx Geogrid confines aggregate particles above, within and below the plane of the reinforcement.

FIGURE 2

## Mechanics of Tensor TriAx Geogrid

### KEY MECHANISMS

Now that you've seen what TriAx Geogrids are capable of, it's time to understand why they perform so well. The functionality of TriAx Geogrids is based on two key mechanisms:

#### ► Lateral Confinement

Considered to be the primary reinforcement mechanism, lateral confinement is defined by the USACE as "confinement of the aggregate material during loading, which restricts lateral flow of the material beneath the load." Lateral confinement can be illustrated using a billiard ball rack (Figure 2). The rack confines the balls within the triangle. As granular aggregates are considered to be stress-dependent materials, the confinement offered by properly designed, stiff geogrids increases the modulus of the confined aggregate (Figure 3). This stiffening effect occurs both above and below the geogrid when it is installed within a granular fill layer. This results in a modulus increase for the entire reinforced layer.



FIGURE 4 Rutting occurs from subgrade soil movement, causing premature deterioration of the roadway or construction platform.

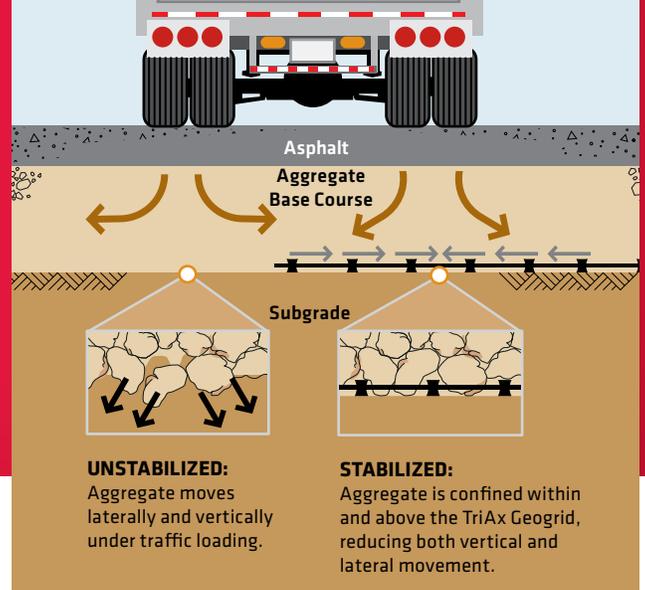


FIGURE 3

#### ► Bearing Capacity Improvement

Bearing capacity is the load limit of a soil layer. Rutting is almost always a result of subgrade soil movement while the roadway structure or construction platform is in service (Figure 4). As such, bearing capacity improvement, also known as the "snowshoe effect" (Figure 5), becomes an important mechanism when the subgrade support effectively controls the life span of the structure built on softer soils.

Together, the reinforcement mechanisms of lateral confinement and bearing capacity improvement allow TriAx Geogrid to deliver enhanced performance to the working surfaces in which they are integrated. By enhancing the performance of working surfaces, you can expect a longer service life and thus fewer expenditures on maintenance.



FIGURE 5 Just as a snowshoe distributes load over soft snow, utilizing Tensor TriAx Geogrids over soft subgrades distribute in-service loads more effectively for bearing capacity improvement.



## The Engineered Advantage™

Tensar TriAx Geogrid, combined with Tensar's comprehensive engineering design and technical support services, brings long-term value to your next oil or gas site.

By utilizing Tensar's approach to construction, you can experience the convenience of having a supplier, design services and site support all through a team of qualified sales consultants and engineers. With nearly three decades of success and proven performance, Tensar is the inventor and global leader for geosynthetic design, analysis and installation support. By working with Tensar you get:



### TENSAR TRIAX GEOGRIDS

Quickly and easily installed, TriAx Geogrid interacts with aggregate to create a mechanically stabilized layer (MSL) within the base course or subgrade. The result: stronger composite structures that significantly improve a paved or unpaved road's performance.



### SITE ASSESSMENT

We can partner with any member of your team at the beginning of your project to recommend a Tensar Solution that optimizes your budget, financing and construction scheduling.



### DESIGN ASSISTANCE/SERVICES

Experienced Tensar design engineers, regional sales managers and distributors will develop proposals, complete with budget estimates, to help you evaluate your best construction options and determine the most cost-effective approach.



### SPECIFICATION

Our value-engineered solutions feature stamped drawings with precise construction details. Changing site conditions can be quickly addressed in the field or in our Engineering Department.



### SITE SUPPORT

Tensar sales managers and distribution partners can advise your designers, contractors and road construction crews to ensure the proper installation of our products and prevent unnecessary scheduling delays.

With the Tensar Advantage, you not only get a product, but also confidence that your project is being supported from start to finish by leaders in geogrid technology. For nearly 30 years, industry professionals have been using Tensar Geogrids to build economical, long-lasting working surfaces. With clear advantages in performance, design and installation, Tensar offers a proven technology for addressing the most challenging conditions. Our entire worldwide distribution team is dedicated to providing the highest quality products, services and support.

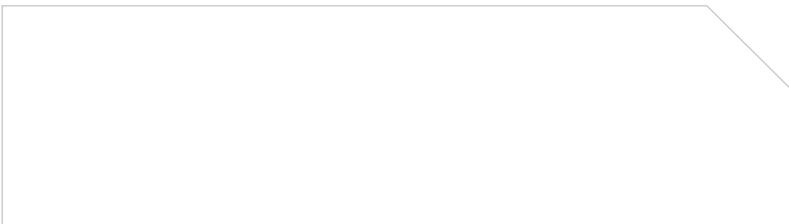
For more information on how the Tensar Advantage can bring value to your oil or gas site, please call **800-TENSAR-1**, or visit **[www.TensarCorp.com](http://www.TensarCorp.com)**.

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