BY INDUSTRIAL FABRICS, INC.

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GEOGRID BASE REINFORCEMENT



BASELOK[®] BASE REINFORCEMENT

Biaxial (BX) GeoGrids have been used successfully in the civil construction industry for over 40 years.

BaseLok[®] GeoGrids are manufactured from an extruded polypropylene sheet that is punched and drawn. The result is an open aperture polypropylene grid structure that resists high, short term dynamic loads such as vehicular wheel loads.

Unconfined aggregate has the tendency to move under load and when force is applied. When a BaseLok® GeoGrid is installed beneath an aggregate layer, the aggregate interlocks with the GeoGrid, increasing the stiffness of the section. This increased stiffness means less required aggregate, reduced rutting, improved performance, and ultimately cost savings to the contractor and owner.



2> BASELOK" GEOGRID

BASELOK® BASE REINFORCEMENT

The environmentally friendly polypropylene design of BaseLok[®] GeoGrid is an optimal solution for a variety of base stabilization projects. By enhancing the structural stiffness of the subgrade beneath your paved or unpaved project zone with BaseLok[®] GeoGrid, you minimize opportunities for washouts, subgrade failures, potholes, and reflective cracking in base stabilization applications, such as:

Paved

- Roadways
- Runways
- Parking lots
- Airports
- Intermodal facilities

<u>Unpaved</u>

- Haul roads
- Storage yards
- Staging areas
- Working surfaces
- Wind & Solar Farms

Base Reduction - Reducing the amount of material and labor required to construct the appropriate subgrade, cutting both cost and time. Save on aggregate thickness for your next project.

THE PROOF IS IN THE TESTING

When designing with GeoGrids, strength is key. As there are many varieties and types of grids on the market, it has been proven that adding in a GeoGrid layer will add performance to a section. The stiffer and stronger the grid, the more performance and value added; specifically in weak and soft soils. As a load is applied, Baselok® GeoGrids must perform under the heavy load and spread the tension across the weak subgrade. This is why Baselok® has designed grids that ensure to be stiff enough to bridge over the weak soils without failure. Other manufacturers pride themselves on reducing the plastic for a higher cost product, yet lose the ability to be stiff enough under the toughest conditions.

Biaxial GeoGrids have stood the test of time and design. A recent FAA report, "Using geosynthetics in flexible airport pavements" confirms that reducing the plastic in products does not encourage performance. **BX 1200 performed 5-6x better than the competing triaxial geogrid at half the cost.** Additional tests show that the aperture stability modulus, based on the Giroud Han Method, may not be the key material property to geogrid benefits. Junction

stiffness and tensile strength prove to be major factors in resisting the lateral loads under certain conditions as proven by the "Montana State Study: Geosynthetic subgrade stabilization – Field testing and design method calibration, Cuehlo and Perkins."

Geogrid Design can be analyzed using the following methods:

- Giroud Han Design
- Bearing Capacity Method
- AASHTO 93 Design Method
- PCase Method





GEOGRID

Base Reinforcement

APPLICATIONS

- > Roads & Highways (DOT)
- > Petrochemical
- > Oil & Gas
- > Rail
- > Airports
- > Port & Intermodal Facilities
- > Wind & Solar Farms
- > Waste Management
- > Electrical Distribution
- > Government Infrastructure
- > Mining
- > Federal EPA Hazmat Sites
- > Coastal / Waterways







BASELOK® RAILWAY SOLUTIONS

Maintenance and Heavy Duty Railways

Biaxial GeoGrids have been successfully deployed in railway reinforcement projects since the 1980s. With enhanced aggregate confinement and optimized stabilizing qualities, BaseLok[®] GeoGrid is a proven solution for your next railway project.

When using BaseLok® GeoGrid Solutions for your ballast or sub-ballast railway project, you can expect:

- Lower construction time
- Lower upfront costs
- Increase in railway service life
- Eliminate speed restrictions on historically less sections of railway
- Minimize later creep and ballast settlement
- Enhanced roadbed drainage

Tested and Proven

AREMA - The American Railway Engineering and Maintenance of Way Association is the nation's premier source for industry practices pertaining to railway systems, and they strongly advocate for the use of GeoGrid track bed stabilization applications. The optimization qualities of GeoGrid have proven to stabilize various subgrades in multiple lab and field tests.

Building Better Railways

BaseLok[®] solutions use a biaxial design to encourage mechanical interlocking on the subgrade surface. Unbound aggregate is prone to lateral movement and can lead to ballast and sub-ballast settlement and can present substantial hazards to a railway. BaseLok's[®] ability to confine aggregate within its apertures promotes longevity and stability for your railway structure.



BaseLok[®] GeoGrid

BaseLok[®] FabGrid[®]



BaseLok[®] GeoCell w/ FabGrid[®]





Engineering Assistance

Snowshoe Effect: A geogrid reinforced aggregate section spreads construction loads over soft soils

CBR Installation Guidelines Table Subgrade **Clear All** BX Direct Ties?² **Geotextile⁴** Strength **Vegetation? Overlap**¹ Traffic³ $CBR \le 1$ Ν 3 ft Recommended Ν **Check Piping Ratio** $1 \le CBR \le 2$ If possible 2 - 3 ft Ν **Check Piping Ratio** Ν $2 \ge CBR \le 3$ Υ 1-2ft Ν Ν **Check Piping Ratio** γ γ $3 \leq CBR$ 1ft Ν Ν

NOTES:

- 1. General Geogrid Overlap Rule: Overlap = 3 ft for CBR \leq 1; Overlap = 1 ft. for CBR \geq 3; interpolate between.
- 2. Ties are typically 8" cable ties. The ties help keep the geogrid from separating during aggregate placement and spreading.
- 3. Direct Traffic pertains only to conventional rubber-tired equipment.
- 4. Analysis Req'd = Geotextile required only if filtration criteria not met by aggregate fill.

Each project will vary in loads, soils and environmental conditions. The Baselok® engineering team is ready to assist and recommend the exact need for each project with our full line of geosynthetic products from GeoGrids to GeoCells.

Contact our team today to complete a site visit and field testing or to just discuss your project needs.

WWW.BASELOK.COM



Installation

> PRE-CONSTRUCTION LOGISTICS

Ordering

To place an order, contact your BaseLok[®] representative and provide any information pertinent to the project. BaseLok[®] has a knowledgeable sales team and professional engineers on staff who can assist with your order and also help anticipate any potential issues that could arise during installation. At this time, it is also advisable to schedule a pre-construction meeting or possible jobsite visit with your BaseLok[®] representative or engineer.

Delivery

Upon delivery, verify that the proper GeoGrid product has been delivered. Each GeoGrid roll shipped will be individually labeled or tagged with the manufacturer's name, product identification, and roll number. Inspect the delivered products to verify that they are free of flaws and that no damage occurred during delivery.

Storage

GeoGrid should be stored at temperatures above -20°F (-29°C). GeoGrid should only be handled/installed at temperatures above 14°F (-10°C). Contact BaseLok® if your project limitations require installation or storage of GeoGrid beyond these recommendations.

> SURFACE AND SITE PREPARATION

If possible, the site should be cleared of all debris, stumps, plant growth, topsoils, stones, and other deleterious materials.

In some instances where very low CBR subgrades (CBR < 0.5) are present, it may be beneficial to leave some vegetation, topsoils, and fine root mats in place. Where moderate CBR subgrades (CBR > 2) are present, a light proof roll is recommended to locate unstable areas. This is why GeoGrids are used.

The proper equipment should be used to smooth and compact the subgrade to the specified requirements. Check with the engineer for subgrade compaction requirements.

> LAYOUT, OVERLAP, AND PLACEMENT

The layout of the GeoGrid rolls should be predetermined before you begin placement of the rolls. GeoGrid rolls are commonly rolled parallel with the roadway system. However, where conditions include very soft subgrades (CBR < 0.5), and/or where lateral spreading and separation of overlaps is a concern, it may be beneficial to lay out GeoGrid rolls perpendicular to the road. Consult with your engineer and GeoGrid representative to determine the best GeoGrid layout for your project.

For proper installation, the rolls should be overlapped side-to-side and end-to-end. The overlapping should be in the same direction as the aggregate placement. The recommended overlap varies from 1 feet to 3 feet based on subgrade strength. Recommendations for general overlaps can be found on top of page six. However, your engineer should be consulted to determine the proper overlap to be used.

BASELOK" **GEOGRID** <7



Installation

To accommodate curved sections in your layout plan, GeoGrid should be cut and overlapped. Cutting of GeoGrid may be done with sharp shears and other handheld cutting devices. It is mandatory that the proper safety equipment be used while cutting and installing GeoGrid. The GeoGrid may also be cut to accommodate other immovable protrusions such as manhole covers.

Once layout and overlap requirements have been determined, you can prepare to roll out your GeoGrid. The GeoGrid should begin to be rolled out from an area easily accessible to construction equipment while complying with the layout plan. For very soft subgrades, the layout should begin on firm soils on the perimeter of the project. This will act as an anchor point from which you can roll GeoGrid onto softer sections. Frequently check to make sure your alignment is being maintained throughout your GeoGrid installation process.

At the time of installation, GeoGrid shall be rejected if defects, rips, or flaws are present, or if deterioration or damage occurred during manufacturing, transportation, or storage.

> TENSIONING AND ANCHORING

While unrolling GeoGrid, maintain alignment and pull taut to remove slack and wrinkles. Do not roll out too much GeoGrid at once. Start with about 40 feet and continue unrolling as aggregrate is spread. Be sure to anchor the beginning of each roll at the center and corners before fully unrolling the material. To hold GeoGrid in place prior to aggregate placement, soil, rocks, or other weights may be used to hold the GeoGrid edges and overlaps in place. Small shovel piles of aggregate are commonly used along overlaps, edges, and corners. If allowed, anchor pins or sod staples may also be used.

> AGGREGATE PLACEMENT

The aggregate is placed and spread over GeoGrid using normal construction methods and equipment. The aggregate is normally back dumped. After the aggregate is back dumped, it is then spread out over the GeoGrid. Tracked bulldozers are commonly used for spreading of the aggregate. For soft subgrade conditions (CBR < 1.5), low ground pressure models are recommended.

Unless relatively competent subgrades (CBR > 4) exist, trucks and other construction vehicles should not be driven directly over GeoGrid. Where competent subgrades (CBR > 4) do exist, standard rubber-tired vehicles may drive over GeoGrid at very slow speeds of less than 5 mph. A test section should be evaluated to determine the possible damage from direct vehicle contact. If acceptable, aggregate may be dumped as the vehicle advances. Sudden starts, stops, and turns should be avoided when operating equipment directly over GeoGrid. Tracked construction equipment should not be operated directly on the GeoGrid. The turning or pivoting of tracked equipment over installed aggregate should be kept to a minimum to prevent tracks from displacing the aggregate and damaging the GeoGrid.

Installation



For softer subgrades (CBR < 4), aggregate should be dumped on previously placed material and then pushed onto the GeoGrid. For very soft subgrades (CBR < 0.5), consult with your engineer and GeoGrid representative to determine the best method of aggregate placement.

Lift thicknesses are generally not less than 6 inches. The initial lift may be as thick as necessary to prevent rutting or failure of the subgrade soils. During spreading, the bulldozer blade should raise gradually as each lift is spread over the GeoGrid. Take caution not to catch the bulldozer blade or any other equipment on the GeoGrid.

The shoving action from bulldozers or other aggregate spreading equipment may cause waves in the GeoGrid layout ahead of the fill. This can be minimized by unrolling the GeoGrid a little at a time. Once sufficient aggregate is in place on the GeoGrid, unroll the next section.

> COMPACTION

Compaction requirements should be obtained from the project specifications. Unless very soft soils are present, standard compaction methods can be used. Vibratory compaction should be avoided or minimized over GeoGrid. Rutting or pumping of the subgrade experienced during compaction should be immediately addressed. Consult with the engineer to determine corrective actions required such as additional aggregate to strengthen the section.

In extremely wet conditions, it may be necessary to cease operations to allow pore pressures to dissipate from the subgrade and reduce moisture content. Weak areas found during final compaction commonly indicate inadequate aggregate thicknesses at those locations. Consult the engineer to determine a plan for these areas.

> REPAIRS

If GeoGrid is damaged during or after installation, it can be repaired by patching the area. To repair the damaged GeoGrid section, first excavate the fill from the damaged area extending 3 feet in all directions of the damage. Place a GeoGrid patch over the damage, extending at least 3 feet in all directions, and replace the excavated material and re-compact.

> SITE SUPPORT - BASELOK.COM

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Case Study

IFI/PCP Product: BaseLok[®] BL6 Large Industrial Complex / S Central Texas

Unpaved Roads and Laydown Yards Over Soft Soils

PROJECT TEAM OWNER:

NDA

ENGINEER: NDA

JOB NUMBER: EP00104276

CONTRACTOR: NDA

SUPPLIER: Industrial Fabrics, Inc. (IFI)

TECHNICAL DESCRIPTION:

BASELOK® BL6 GeoGrid Product: Square Yards: 178,500 SY Installation Date: February 2022 Completion Date: June 2022

PROJECT DESCRIPTION:

A large industrial site south of San Antonio, TX.

PROBLEM:

Soft soil has long been a problem in some parts of Texas. For this location, however, low CBR soils were not anticipated. When the contractor mobilized to the site, they were surprised by their inability to even move job trailers onsite without significant rutting. Knowing that Industrial Fabrics makes some of the strongest and stiffest geogrids on the market, they submitted an inquiry though the BaseLok.com website requesting assistance. Industrial Fabrics immediately mobilized one of their professional engineers to the site to conduct DCP testing and determine the actual subgrade CBR. DCP results showed a CBR of 1.8%.

SOLUTION:

Given the 1.8% subgrade CBR and the project's traffic loading, the Industrial Fabrics engineering team recommended a layer of BaseLok BL6 geogrid with 7 inches of crushed limestone. The contractor was anticipating needing 8 inches of aggregate anyway so the additional cost of the BaseLok BL6 geogrid didn't add much to the project budget, especially when aggregate reduction was included. With the BaseLok BL6 in stock at their manufacturing facility in Houston, Industrial Fabrics was able to ship and deliver the product the following day. The BaseLok BL6 was installed, and the project finished without delay.









Engineering Support



Design Support

Our engineering team at Industrial Fabrics, Inc. is well equipped to assist with your project needs. Whether you need to optimize your aggregate section, address soft subgrade issues or increase load support capabilities, IFI Engineers are ready to provide cost-saving solutions to help meet your needs. Start your project at engineering@ind-fab.com.

Support

- Dynamic Cone Penetrometer Testing
- Value Engineering
- Professional Submittals
- Installation / Jobsite Support
- PDH Virtual Presentations



Applications

- Aggregate & Ballast Optimization
- Base Stabilization
- Crane Pads
- Slope Erosion Protection
- Channel Lining
- Secondary Containment







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Customer should verify with the product manufacturer that customer has the most current BASELOK* GEOGRID specifications for the product ordered or purchased. The BASELOK* GEOGRID system can be used in the application described in our literature and on our website, provided proper installation and engineering principles are followed. Professional engineering should be consulted before installation of BASELOK® GEOGRID units to assure appropriate design and use. ALL EXPRESSED OR IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. BASELOK® is a trademark of Industrial Fabrics, Inc.