PRS-NEOWEB®
Cellular Confinement System

Solutions Overview

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INTRODUCTION – THE TOUGH CELL

PRS-Neoweb® is the cellular confinement system (geocell) created, manufactured and distributed by PRS Mediterranean Ltd. Made from unique Neoloy® polymeric alloy strips, PRS-Neoweb is expanded on-site to form a honeycomb-like structure, which is filled with granular infill, topsoil or recycled materials. The complex interaction of cell wall, cell geometry and infill material on three planes creates a unique cellular confinement system. PRS-Neoweb is used for soil confinement, stabilization and reinforcement in a wide variety of load support and civil engineering applications, such as base reinforcement in paved and unpaved roads, and earth stabilization in slopes and retention walls.

PRS-Neoweb is manufactured from Neoloy, a novel polymeric alloy developed by PRS, based on polyester nano-fibers in a polyolefin matrix. The properties of this alloy enable a strong and stiff geocell with high durability, higher tensile strength, resistance to creep and high temperatures, and dimensional stability than commonly-used HDPE-based geocells.

OPTIMIZED GEOCELLS

Product models typically feature different levels of performance such as with rebars, pipes and geotextiles, as “one shoe doesn’t fit all”. Although geocells are traditionally available in different size cell openings (distance between weld seams) and wall heights (depth), PRS-Neoweb is manufactured in 4 category types (A-D) according to several project profile types.

This enables optimization of the PRS-Neoweb geocell with the specific performance requirements of the project, for example if the project is a slope, channel, wall or heavy-duty road. The PRS-Neoweb type is selected according to the project loading, hydraulic stresses, design lifespan and environmental durability requirements. This customization optimizes the performance and cost according to the project’s requirements.

Benefits:

Project Optimization & Costs

- Customized geocell – according to project requirements and design-life
- Optimize project costs – can be reduced by up to 50%
- High long-term performance – Neoloy® geocell technology inside each cell

Improved logistics and handling

- Available section sizes up to 50% larger
- Up to 50% more sections per pallet / container
- Sections easier to carry, handle, layout
- Faster Installation time
NEOLOY® ADVANCED POLYMERIC ALLOY

Neoloy® is an innovative high-strength polymeric alloy developed by PRS for the PRS-Neoweb® cellular confinement system. Based on nano-fibers in a polyolefin matrix, Neoloy combines the ductility of HDPE with the dimensional stability and creep resistance of polyester. This unique material provides PRS-Neoweb geocells with unrivaled long-term resistance to: creep, fatigue, stress-cracking, temperature extremes, oxidation and UV light. The result is a strong and stiff confinement system with unmatched durability.

Neoloy enables the use of PRS-Neoweb for long-term load support infrastructure projects such as paved roads, railways and multi-modal ports. PRS-Neoweb with Neoloy maintains its engineering characteristics and geometry for the project lifespan, even under dynamic loading, thermal cycling and high temperatures.

Confinement by PRS-Neoweb geocells upgrades the modulus of inferior materials. This enables replacement of high-quality aggregate with lower cost infill. No longer ‘confined’ to solving problems in weak subgrades, Tough PRS-Neoweb geocells can be deployed in the upper base layer of any structural pavements, and thereby lower infill and project costs.

HDPE vs. NEOLOY BASED GEOCELLS

Recent research has broadened our understanding of cellular confinement systems and the influencing factors of the reinforcement. The research demonstrates that not all geocells are equal. PRS-Neoweb geocells with a higher elastic modulus produced greater improvement in terms of stiffness, bearing capacity, stress distribution and reduced deformation, when compared with conventional HDPE geocells. (Pokharel, et al 2011 and 2009)

While HDPE geocells are typically used for soil erosion control for slope and channel protection, as well as low earth retention structures, their use in ground improvement applications is often limited to low volume roads and temporary pavement structures, due to concerns about stiffness and durability. Dr. Dov Leshchinsky in ground-breaking research of geocell reinforcement of retaining walls used HDPE geocells which were sufficient for short-term performance and testing:

“However, without improvement, HDPE geocells are not suitable for long-term applications. Problems of durability related to leaching of additives, oxidation, and to UV exposed facing should be addressed. Large thermal contraction and expansion of outer cells due to daily and seasonal temperature changes combined with high intrinsic thermal coefficient of the geocell material could lead to progressive failure initiating at the outer cells. Stress cracking of exposed facing could occur in low temperature. Low stiffness and strength may lead to significant creep having poor long-term dimensional stability.” (Leshchinsky D., 2009, Research and innovation...)
LOAD SUPPORT – ROADS AND RAILWAYS

PRS-Neoweb cellular confinement was designed for any road pavement. The Neoloy strength of PRS-Neoweb increases the modulus of structural layers (Modulus Improvement Factor - MIF) even those with high CBR. This provides long term stiffness and dimensional stability required for structural pavements even under heavy dynamic loading.

The high reinforcement factor of PRS-Neoweb enables the replacement of high quality (expensive) aggregate infill in the base layer with locally available, inexpensive soils or recycled materials. PRS-Neoweb also enables a reduction in the thickness of the asphalt and structural layers and/or a significant increase in the road design life.

The end result is that PRS-Neoweb significantly reduces road repair, rehabilitation and maintenance, as well as the use of raw materials, making road construction more sustainable and more economic. Initial capital as well as operational costs are reduced. These parameters make PRS-Neoweb a suitable and sustainable solution for the reinforcement of motorways, railways and multi-modal ports.

BENEFITS OF PRS-NEOWEB

PRS-Neoweb meets the basic goals of civil engineering construction solutions – high performance, fast installation and lower costs, particularly in problematic soils, difficult locations and where aggregate resources are limited.

- **Improve layer modulus with low strength fill** – PRS-Neoweb enables use of local non-cohesive fill, granular soils and recycled material instead of expensive base layer aggregate. This lowers initial capital costs as well as the hauling and environmental impacts of importing aggregates; the long-term confinement prevents aggregate degradation and extends the road life.

- **Reduce layer thickness** – High-strength Neoloy-based PRS-Neoweb cell hoop strength, wall stiffness and passive resistance enable a reduction in the thickness of structural support elements – both in the substrata and the wearing course.


- **Easy and fast deployment** – Folded PRS-Neoweb sections ease logistics and delivery on-site, while installation, by locally-trained work crews, is easy, fast and in all-weather conditions.

- **Cost effective** – PRS-Neoweb installation, reduced infill requirements and extended life-span result in savings in time, equipment, manpower and costs during construction phases, while roads that last longer and require less operating and maintenance costs over the project life-span.
UNPAVED ROADS

PRS-Neoweb is stronger, greener, faster and more cost-effective than other ground reinforcement alternatives for unpaved roads. PRS-Neoweb geocells with Neoloy stabilize subgrade soil, reinforce the aggregate base infill and prevent fatigue of the surface layer. High-strength PRS-Neoweb 3D confinement also reduces the structural layer thickness, while enabling the use of inferior types of infill at the same level of performance. And PRS-Neoweb will extend the service life of the pavement in addition to reducing road dust and sedimentation, PRS-Neoweb stabilized roads also reduce wear on vehicles and tires (and drivers). Transport through challenging terrain is safer, more reliable and more sustainable.

RAILWAYS

PRS-Neoweb offers cost-effective ground reinforcement solution for subballast and ballast layers, rail embankments, turnouts and train yards. Typically placed at the ballast/subgrade interface area, PRS-Neoweb has been shown to decrease the rate of track surface geometry degradation (both surface and cross-level) under a range of traffic loadings. It is actually the cost of maintaining such infrastructure over time (Total Cost of Ownership) that determines the economic worthiness and success of track engineering solutions and not the initial construction or rehabilitation cost. The ability of PRS-Neoweb to reduce the rate of degradation, particularly in problematic locations is of great value for both in the construction of new lines and in the maintenance of existing lines.

PORTS & CONTAINER YARDS

PRS-Neoweb based on the high strength Neoloy® novel polymeric alloy provides heavy duty load support – even while using inferior granular material, such as dredged sand for structural infill. PRS-Neoweb creates a semi-rigid mattress (“beam-effect”) that increases bearing capacity, improves load distribution and reduces settlement. PRS-Neoweb is particularly suitable to port and container yard projects in which soil bearing capacity, aggregates, durability and costs are critical.

COMPARISON WITH OTHER REINFORCEMENT SOLUTIONS

PRS-Neoweb creates a reinforced mattress with a beam effect with unbounded base material. Compared to 2D geosynthetic products, such as geogrids and geotextiles, geocell confinement in three dimensions better minimizes the lateral movement of soil particles. This results in a higher locked-in confining stress and thus a higher modulus of the base. Conventional ground stabilization solutions (soil replacement, additives, or thicker base layers) either do not provide sufficient long-term stability and strength for transportation engineering and/or entail higher costs and environmental impacts.
## SUSTAINABLE ROADS

As a green construction method PRS-Neoweb minimizes environmental impacts and extends project life-spans. The ability to use inferior quality soil – including recycled asphalt, fly ash and recycled concrete – for infill saves aggregate resources and reduces the number of haul vehicles and use of virgin aggregate resources. This in turn, lowers fuel usage, the carbon footprint and reduces project costs. In addition PRS-Neoweb also results in a reduction and savings in construction vehicles, manpower and project costs. The enhanced service life of PRS-Neoweb roads meets another goal of sustainability, reducing long term road operations and maintenance.
SLOPE & CHANNEL PROTECTION

PRS-Neoweb confinement along with anchoring techniques ensures the long-term stability of slopes and channels using vegetated topsoil, granular infill or concrete surfacing. The enhanced drainage, frictional forces and cell-soil-plant interaction of PRS-Neoweb prevents downslope movement from hydrodynamic and gravitational forces. PRS-Neoweb slope protection is provided by:

- Frictional resistance which reduces sliding
- Cell walls that mechanically protect against run-off, rill development and erosive forces
- Soil confinement, which enhances soil particle structure and soil integrity, minimizing the impact of raindrops
- Cell perforations facilitating plant and root interlock, thereby stabilizing the soil mass

The PRS-Neoweb system tolerates high sheet-flow conditions and prevents channeling by limiting flow and increasing hydraulic shear stresses.

SUSTAINABLE SOLUTION

PRS-Neoweb is the best-available sustainable solution for long-term soil protection and earth stabilization. PRS-Neoweb improves site ecology by enhancing water drainage and soil quality, and when integrated with revegetation schemes, improves the site, soil food web and visual landscape.

The perforations in the PRS-Neoweb cells promote infiltration and limit the impact of hydrostatic forces by improving drainage. This plays a crucial role in soil protection by:

- Preventing run-off and soil erosion
- Preserving the soil structure
- Enabling flow of water, nutrients and soil organisms

Healthy soil encourages the growth of vital soil organisms and processes that improve nutrient cycling, porosity and soil aggregation. The perforations are also critical in promoting revegetation by providing an excellent growth environment for roots and plants. This further stabilizes the soil and slope, while facilitating the restoration of the vegetation and landscape.

CHANNEL PROTECTION

PRS-Neoweb slope protection is also applicable to cost effective, long-term slope protection for channels and drainage trenches. PRS-Neoweb confinement of vegetated soil, hard armor or poured concrete fill optimizes erosion protection for natural or man-made channels and hydraulic structures, typically incorporated into open-channel systems.
The PRS-Neoweb composite structure dissipates energy from flood, current and wave action. Vegetative and/or gravel infill is used when there is periodic high water or flooding (depending on geometry and hydraulic stresses), while concrete infill is used for non-erodible channels.

The self-draining, permeability of PRS-Neoweb prevents the buildup of hydrostatic pressure, which can cause cracking in concrete structures. The flexibility of the PRS-Neoweb structure enables it to yield to earth movement without degradation in performance or structural integrity. PRS-Neoweb is also an excellent solution for bioswales and other stormwater management practices.

PRS-Neoweb is a more attractive, cost-effective and durable solution than concrete, rip-rap or gabion solutions. PRS-Neoweb systems with Neoloy feature high strength and long term performance, with high resistance to water, weathering and temperature extremes.

**SLOPE PROTECTION SOLUTIONS**

- **Erosion Control**
  - Reconstructed slopes
  - Revegetation slopes
- **Transportation and Construction**
  - Cut and fill slopes
  - Roadside slopes
  - Abutment protection
- **Embankments**
  - Highways and railways
- **Energy**
  - Storage facility berms
  - Pipeline stabilization
- **Environmental**
  - Green roofs
  - Mine and quarry site rehabilitation
- **Geomembrane Protection**
  - Ponds, reservoirs, liquid containment
- **Landfills**
  - Waste containment facilities
  - Waste rehabilitation sites

**CHANNEL PROTECTION SOLUTIONS**

- **Water treatment**
  - Water transport systems
  - Sewage treatment conduits
  - Storm drainage channels
- **Stormwater management**
  - Bioswales
  - Flood water containment
- **Stream protection**
  - Stream quality and ecology
  - Bank (slope) erosion
- **Reservoirs**
  - Leveses
  - Dam and pond spillways
  - Protection of hydraulic structures
- **Environmental protection**
  - Silt and sediment control /diversions during construction activities
  - Pipeline and utility channel crossings
- **Marine**
  - Port facilities and protection
  - Channel and shoreline structures
GEOMEMBRANE PROTECTION

The mission critical objective in landfills and reservoirs is to provide **100% protection of the containment membranes** while creating stable soil, berms and slopes.

PRS-Neoweb cellular confinement combined with geomembranes creates protected, impermeable, non-slip and durable impoundment of solid waste, leachate and liquids. Liners are shielded by PRS-Neoweb from natural, accidental or intentional damage.

Used in applications which require containment, treatment or control of water, leachate and waste, PRS-Neoweb geocells are impervious to salinity, corrosion, acidity, sewage and extreme temperatures. Neoloy-based PRS-Neoweb confinement systems have considerably higher environmental resistance and durability than HDPE-based geocells.

In addition the use of PRS-Neoweb with concrete has many advantages:

- Geocells function as ready-made forms
- Concrete casting is fast, efficient, and controlled
- Hard-armor finish is of uniform thickness
- Resulting flexible slab accommodates subgrade movement and prevents cracking

RESERVOIRS

PRS-Neoweb geocells are spread on top of a geomembrane on the reservoir’s slopes. The cells are quickly and easily filled with concrete using only basic anchors and fastening for pouring. The use of Neoloy-based PRS-Neoweb offers:

- Fast and easy installation suited to existing ground contours
- Enhanced flexibility enabling infilled concrete to withstand seismic activity
- Effective containment of stored water
- Cost-effective solution that reduces shipping, materials and labor

LANDFILLS AND WASTE PONDS

PRS-Neoweb slope protection is used to maximize the capacity of municipal solid waste landfills, by allowing significantly steeper and higher covers. Integrated with geomembranes PRS-Neoweb geocells create impermeable, durable impoundment berms for waste containment and treatment, and filled with concrete is an environmentally safe and non-corrosive solution for chemicals, slurry and sludge.

PRS-Neoweb creates a system that holds the infill material in place and prevents mass movements by providing tensile reinforcement. PRS-Neoweb also improves the structural and functional behavior of soil infill materials.
EARTH RETENTION WALLS

Retention structures made from PRS-Neoweb offer strong, durable and attractive green solutions for steep and unstable slopes, and are particularly suited to development of sites with sharp grade changes, irregular topography, or lack of land.

**PRS-Neoweb is the ideal solution for earth retention because of the Neoloy composite material.** Neoloy has the long-term strength, dimensional stability under thermal cycling and environmental durability for retaining walls, which guarantees reliable performance over the project lifespan.

PRS-Neoweb retaining walls provide steep vertical earth retention (up to 81°) structurally stable under self-weight and externally imposed loads. Gravity and reinforced walls erected with PRS-Neoweb system layers maintain structural stability, even in compressible and unstable foundation subgrades.

PRS-Neoweb is more adaptable to low quality backfill, easier to construct, and more economical than conventional earth retention solutions, such as poured concrete, segmental retaining walls (SRW) and gabion walls. PRS-Neoweb retaining walls can be erected quickly – with each layer structurally stable as construction progresses – and is especially well suited to construction in areas in which access for heavy equipment is limited.

**TYPES OF EARTH RETENTION WALLS**

There are three main types of earth walls:

- **Gravity** – steep retaining walls for erosion control, structurally stable under self-weight and external loads
- **Reinforced wall** - mechanically stabilized earth with horizontal geogrid reinforcement for high and strong segmental retaining walls
- **Integrated erosion control and earth stabilization** – cost-effective combination of PRS-Neoweb gravity retaining wall and back slope protection

**KEY BENEFITS**

The key benefits of Neoloy-based PRS-Neoweb for retention walls are based on:

- High strength and durability, due to the proprietary Neoloy composition
- Very fast installation and construction
- Green wall / green solution
- Use of local granular material for infill
- Meets strictest earthquake building codes with high-seismic reduction factor (0.3-0.4)

**PRS-Neoweb is the ideal solution for earth retention because of the Neoloy composite material.** Neoloy has the long-term strength, dimensional stability under thermal cycling and environmental durability for retaining walls, which guarantees reliable performance over the project lifespan.
Structural Strength

Neoloy-based PRS-Neoweb offers very long-term stiffness and strength. PRS-Neoweb retaining walls provide steep vertical earth retention that is structurally stable under its own weight and externally imposed loads. Gravity and reinforced walls erected with stacked PRS-Neoweb system layers are stable even in compressible and unstable foundation soils. PRS-Neoweb retention walls have proven to retain their structural stability in seismic testing.

Green Wall

While retention walls maximize tight spaces by going vertical, PRS-Neoweb offers environmentally and aesthetically attractive retention walls with a green vegetated fascia on the outer horizontal terraces/rows. The reinforcement retains unstable slopes and the outer row (strip) of fascia cells can be used for planting and landscaping. Each PRS-Neoweb cell acts as an individual planter, protecting young plants while ensuring that the soil substrate is retained. Drip irrigation pipes can be easily laid along each wall layer. Climbing or cascading plants provide compelling aesthetics while maximizing vertical coverage.

Neoloy Durability

PRS-Neoweb offers long-term dimensionally stable due to the low creep of the Neoloy alloy (even under high temperatures) and very high resistance to thermal cycling. PRS-Neoweb durability also features high resistance to photochemical degradation – leaching of additives, oxidation and UV light to preserve confinement for the lifespan of the project. Its low dimensional stability minimizes thermal contraction and expansion of outer cells due to daily and seasonal temperature changes to prevent cracking and failure. Neoloy high creep resistance preserves PRS-Neoweb stiffness and strength for project design life.

EARTH RETENTION WALL SOLUTIONS

- Transportation and construction
  - Multi-grade transportation arteries
  - Green road and rail embankments
  - Safety barriers
- Rehabilitation
  - Mine site and quarry restoration
  - Failed slopes
- Environmental
  - Energy and noise absorbers
  - Green walls
- Channels and Coastlines
  - Storm water structures
  - Coastal cliff preservation
- Site grading
  - Expanding fields and yards
  - Grading site to boundaries
PRS – LEADER IN GEOCELL TECHNOLOGY

PRS – Professional Reinforcement Solutions (est. 1996) – is an international geotechnical engineering and technology company with worldwide offices and distributors. PRS offers cost-effective soil stabilization and reinforcement solutions based on the PRS-Neoweb cellular confinement system (geocells) for a wide range of road, slope, channel and retaining wall applications.

PRS is leading the industry with customizable geocells for efficient engineering to provide economic, sustainable and civil engineering value for every project. PRS’ leadership is evidenced by its extensive development and testing program with leaders in the world of geosynthetics, and its patents for geocells and geocell technology, polymeric alloys, and high-performance geosynthetics solutions.

GLOBAL EXPERIENCE

PRS earned its geotechnical expertise from actual field projects worldwide. Its Neoloy®-based PRS-Neoweb® cellular confinement system was chosen by leading international energy, logging, and mining companies, as well as consultants and contractors, making PRS their “partner of choice”.

PRS provides a full range of end-to-end services, from consulting design to on-site installation training. Product development has been directly influenced by our 15 years of customer relationships and being on-site in over 45 countries, working shoulder to shoulder with civil engineers, road designers, landscape architects and contractors. PRS-Neoweb performance has been proven in thousands of projects in every type of challenging environment around the globe – from scorching deserts to saturated peat bogs to frozen arctic tundra.
SUMMARY

High Reinforcement Factor

Vertical loading on the PRS-Neoweb confined cells creates a semi-rigid slab or “beam effect” over soft soils. This distributes the load evenly and effectively over a wider area, while increasing bearing capacity by a factor of 5 and decreasing settlement by up to 80% (Meyer, 2005).

Less is More – Reduce Structural Pavement Thickness

The high performance of PRS-Neoweb confinement enables a reduction in the thickness of structural pavements – in both the strata and substrata layers – and even the elimination of support layers. Simulated road trials have demonstrated that the pavement thickness reduction factor for PRS-Neoweb exceeds 70% (Van Gurp, Westera, 2008).

Reduce Asphalt Thickness

PRS-Neoweb reinforced aggregate in the base course of new roads or rehabilitated roads increases the pavement modulus. This enables a reduction in the bituminous surfacing/wearing course to a minimum, typically reducing the amount (and costs) of bituminous/asphalt concrete/binder by 15-25%.

Use Inferior and Recycled Infill

PRS-Neoweb can readily use recycled asphalt and concrete for aggregate infill. PRS-Neoweb confinement prevents creep and strengthens RAP (Reclaimed Asphalt Pavement), recycled concrete and other non-cohesive, inferior granular fill, such as sand. This eliminates the need to mix RAP with virgin aggregates or stabilization additives. The result is savings in hauling, processing and aggregate resources and costs.

Extend Service Life and Maintenance Cycles

Neoloy based PRS-Neoweb exhibits very high creep resistant and dimensional stability. These result in the stiffness required for long-term reinforcement, even under heavy static or cyclical loadings and elevated temperatures. PRS-Neoweb confinement in the granular base or subbase layer also increases the subgrade modulus. This in turn reduces degradation of the pavement structure and foundation layers and extends maintenance cycles by a factor of 3 or more.

Advantage over HDPE Geocells

PRS-Neoweb geocells with Neoloy maintain their engineering properties over time and under elevated temperatures, unlike HDPE-based geocells. PRS-Neoweb geocells are:

- Significantly stiffer and stronger and resistant to stress-cracking
- Very high plastic deformation (creep) resistance
- Much more dimensionally stable, for reliable confinement in wide temperature range
- Far more resistant to oxidation and UV light degradation for very long periods

Sustainable Construction Technique

PRS-Neoweb is a sustainable solution because it saves time, transport, fuel, aggregate resources and carbon pollution. PRS-Neoweb uses~ 50% less aggregate for infill and enables the use of poorly-graded local soils or recycled waste for infill. The compacted sections can be easily transported to the site, unfolded and installed manually, while the reduced amount of soil replacement and haul vehicles means less environmental and on-site disruption.
APPENDIX 1 – CHOOSING PRS-NEOWEB CATEGORY

The following table explains how to select the PRS-Neoweb that matches the actual needs of the project categories, pre-calculated by typical stresses, loading, photochemical durability, elevated temperatures and design-life and not just the cell dimension. Different cell sizes and wall heights are available according to design objectives. This approach departs from commonly accepted practice of using standard (HDPE) geocells (of different sizes and heights) for all types of slopes, roads and retaining walls, without taking into account design requirements, which leads to over/under design performance.

**Tables of PRS-Neoweb Categories (A-D)**

<table>
<thead>
<tr>
<th>PRS-NEOWEB CATEGORIES – GENERAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>Suitable for moderate slopes, flow velocities and retaining walls; Road subgrades</td>
</tr>
</tbody>
</table>

**PRS-NEOWEB VS. PROJECT CATEGORIES – DETAILED SUITABILITY**

<table>
<thead>
<tr>
<th>PROJECT CATEGORIES</th>
<th>PRS-NEOWEB GEOCELL CATEGORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td><strong>SLOPES</strong> (1)</td>
<td>Max. Slope</td>
</tr>
<tr>
<td>34°</td>
<td>unlimited</td>
</tr>
<tr>
<td>45°</td>
<td>8</td>
</tr>
<tr>
<td>63°</td>
<td>3</td>
</tr>
<tr>
<td><strong>CHANNELS</strong> (2)</td>
<td>Max. Slope</td>
</tr>
<tr>
<td>34°</td>
<td>10</td>
</tr>
<tr>
<td>45°</td>
<td>7</td>
</tr>
<tr>
<td>63°</td>
<td>3</td>
</tr>
<tr>
<td><strong>WALLS</strong> (3)</td>
<td>Max. Slope</td>
</tr>
<tr>
<td>72°</td>
<td>unlimited</td>
</tr>
<tr>
<td>83°</td>
<td>10</td>
</tr>
<tr>
<td>≥84°</td>
<td>x</td>
</tr>
<tr>
<td><strong>LOAD SUPPORT</strong> (4)</td>
<td>Road Layer</td>
</tr>
<tr>
<td>Subgrade</td>
<td>✓</td>
</tr>
<tr>
<td>Subbase</td>
<td>x</td>
</tr>
<tr>
<td>Base</td>
<td>x</td>
</tr>
</tbody>
</table>

*The above table is a general guide for the selection of PRS-Neoweb category only; to be confirmed by PRS/consultant engineer.*
APPENDIX 2 – Selected Projects Over 50,000 Sq M

Mine Waste Site Rehabilitation, Poland

PRS-Neoweb was the “base” for converting a 4 km x 200m high mine site dry waste stack into an attractive multiple-use recreation site with forest trees.

Highway Slope Protection on Embankment, India

PRS-Neoweb on highway embankment slopes to prevent surface erosion and promote vegetative growth, which further protects the soil and slope stability.

Quick, Effective Erosion Control, Kazakhstan

PRS-Neoweb resolved slope stability and soil erosion problems of 45° slopes with a green aesthetic solution. Installation was fast and simple and practically maintenance free.

Roads & Pipeline Protection for Gazprom in Siberia

Durable service roads and pipeline protection were achieved with local infill in the harshest climate in the most remote region. NOTE – several million sq yd were installed

Military Road for UK Army, Afghanistan Steppes

PRS-Neoweb was chosen after testing various infill materials & road make-ups. Results were 75% savings in aggregate at 2/3 cost of conventional road constructed in half the time.

Protective Barrier for Firing Range, Singapore

Making a “bullet” proof barrier, PRS-Neoweb was overlaid on an earth berm and filled with local soil. Benefits include durability, noise reduction and a green solution

All Weather Access for Military Vehicles, Georgia

Troops easily installed PRS-Neoweb over unpaved road subject to severe loading in clay soil. This provided reinforcement for heavy vehicles and the perforations enabled drainage.

60+m High Retaining Wall Failed Slope, Russia

Slope failure was rectified by horizontal layers of PRS-Neoweb reinforcement for strength for the massive proportions, at a fraction of time & cost of alternative methods.

Pipeline Service Road in Desert, Kazakhstan

Using local soils for infill, PRS-Neoweb enables transport of personnel and equipment (wheeled vehicles) over weak sand along pipeline route in desert.
## APPENDIX 3 – PUBLISHED PAPERS ON PRS-NEOWEB

**PRS-Neoweb Contribution to Pavement Reinforcement** (Dr. K. Rajagopal, et al, Indian Institute of Technology, Madras, India and/or Dr. O. Kief, PRS-Israel)

- **Modulus Improvement Factor for PRS-Neoweb-Reinforced Bases**, *Geosynthetics India Chennai*, Kief and Rajagopal, (2011), India.
- **3D Cellular Confinement System Contribution to Structural Pavement Reinforcement**, *Geosynthetics India ’08, Hyderabad*, Kief and Rajagopal.

**Comprehensive Research Program - PRS-Neoweb Reinforced Bases**, (Dr. Jie Han, et al, U. of Kansas, USA)


**PRS-Neoweb for Earth Retention – Seismic Research** (Leshchinsky, D., et al, U. of Delaware, USA)


**Geogrid Trial Road Base with PRS-Neoweb** (Van Gurp, Westera, KOAC-NPC institute, Holland)


**PRS-Neoweb Bearing Capacity Improvement in Road Constructions** (Dr. N. Meyer, Dr. A. Emersleben, Clausthal University, Germany)

- **Bearing Capacity Improvement of Gravel Base Layers in Road Constructions using PRS-Neoweb**, *IACMAG*, (2009), Goa, India.
