



PASSION  
TO  
INNOVATE



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**A&T Engineering Private Limited** is an Engineering, Construction and Technology providing company dedicated to infrastructure development, specialized in design & execution of reinforced soil structures, Gabion walls, Ground improvement, Slope protection and other Civil/Structural works. The organization is motivated with fully committed & experienced work groups, who have successfully executed a numbers of projects. With the objective of offering comprehensive solution for design & execution of Reinforced Soil Wall upto a world class quality and acceptability of the Reinforced Soil Wall technology to Infra projects. We also have expertise to support and installation of Gabions Retaining walls and other Geosynthetic products. Within the short span of business, we have been making our presence all over India for the execution of Reinforced Soil Wall & various geotechnical solutions.

## Our Strength

- ◆ A&T Engineering brings together unparalleled array of Construction and Engineering expertise.
- ◆ We provide technical excellence to boost the performance and durability of structures operating across India.
- ◆ We are operating with a work force of over 200 technical persons at various sites.
- ◆ Dedicated design specialized in team geotechnical and highway solutions.
- ◆ Committed work ethics.
- ◆ Diligent employees.
- ◆ Communicative and flexible.
- ◆ Bright outlook.
- ◆ Dynamic presence.

## Vision & Mission

### VISION

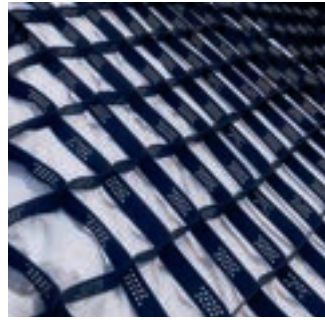
- ◆ We aspire to provide a complete range of innovative engineering solutions in the field of geosynthetics & civil / structural works.
- ◆ We continually create, design and supplying innovative technologies for various market segments.
- ◆ We work with goal of providing better and more sustainable solutions to our customers.
- ◆ We are committed to deliver a highly specific response to our customer requirements across the nation.

### MISSION

- ◆ To maintain the highest levels of professionalism, integrity, honesty and fairness in relationships with our clients, sub-contractors and customers.
- ◆ To achieve customer recognition and satisfaction by committing to the highest level of performance with creativity and passionate results.
- ◆ To provide customer service with safety.
- ◆ To intent on improving quaiaty at all stages of projects.
- ◆ To provide best construction practices by issuing technical recommendations and procedures.



**Retaining Wall Solutions**



**Erosion Control & Slope Protection**



**Ground Improvement Solutions**



**Pavement Solutions**

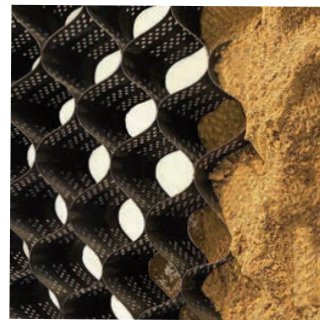
## Our Products



**ATSTRIP**



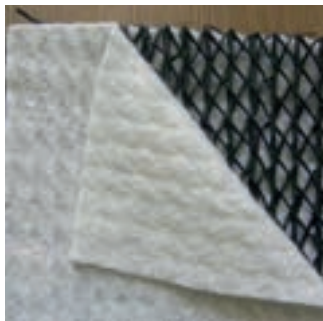
**ATGTX**



**ATWEB**



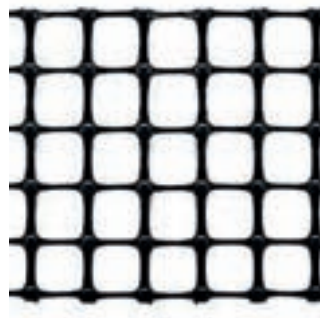
**ATDRAIN (2D)**



**ATDRAIN (3D)**



**ATBAG**



**ATGRID**



**ATMEMBRANE**



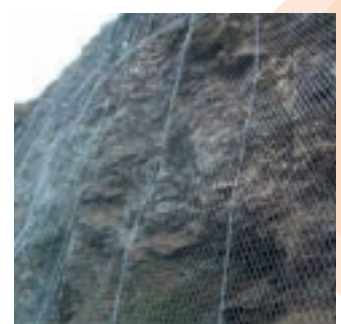
**ATTUBE**



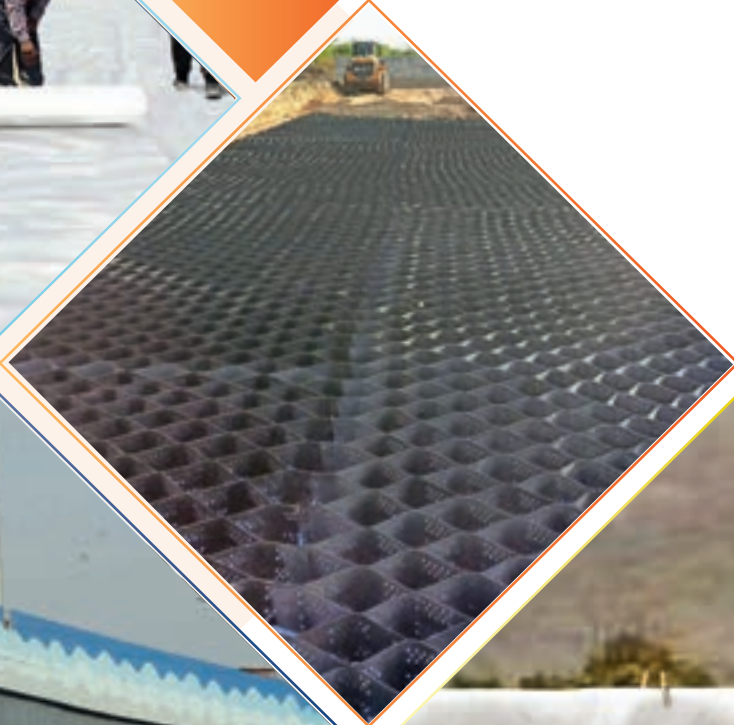
**ATGABIONS**



**ATMAT**



**ATNET**



These are engineered solutions that retains the earth/fill. Reinforced soil walls can be designed and constructed to fit a wide range of site conditions and project requirement. They can be built at different heights and length with the help of geosynthetic products such as geostrip/geogrid as reinforcing element and different fascia for upholding earth behind it or it can be customised based on the specific needs of the project. This is particularly important in areas with uneven terrain or slopes.



## ➤ *Benefits of Retaining Wall Solutions*

- Flexible structures.
- Long term structural stability.
- Can be used for seismic condition.
- Increased possibility of straight, curved and tiered walls.
- Accomodates greater settlements.
- Excellent appearance & effective performance.
- Provides resistance against corrosion.
- Faster construction.
- Economical solution in comparison to RCC wall.

## ➤ *Applications of Retaining Wall Solutions*

- Bridges & flyovers.
- Underpasses.
- Road over and rail under bridges
- Rail flyovers.
- Landfills.
- Noise barriers.
- Architecture & landscaping.
- Hilly terrain.

### **Reinforced Soil Wall (RSW)**

Where right of way is restricted, walls needs to be constructed vertical or with inward batter of 1°.

#### ➤ *Major components of RS wall*

- Concrete panel fascia / block fascia.
- Reinforcing element.
- Backfill material.
- Levelling pad.
- Drainage system.
- Coping beam.
- Crash barrier with friction slab.

### **Gabion Fascia Reinforced Soil Wall (GRSW)**

It is also an engineered retaining structure with gabion box acting as fascia and geogrid as reinforcing element to stabilize the soil. Gabion boxes are filled with stones to enhance the aesthetic appearance from fascia side.

#### ➤ *Benefits of Gabion Reinforced Soil Wall*

- These are preferable at water logged areas.
- Locally availed gabion fill can be utilized.
- Suitable for hilly areas also.

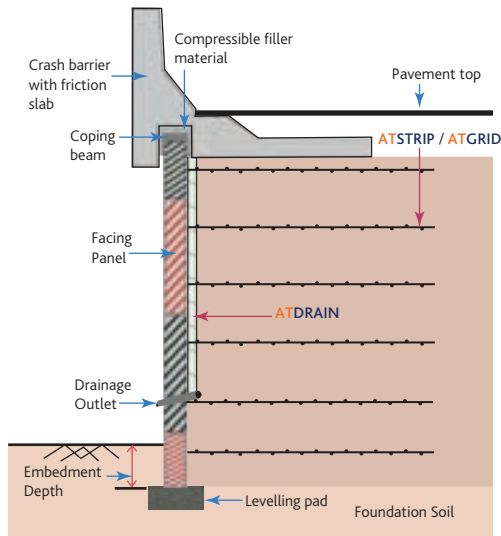


Fig:1A RS Wall with Panel Fascia

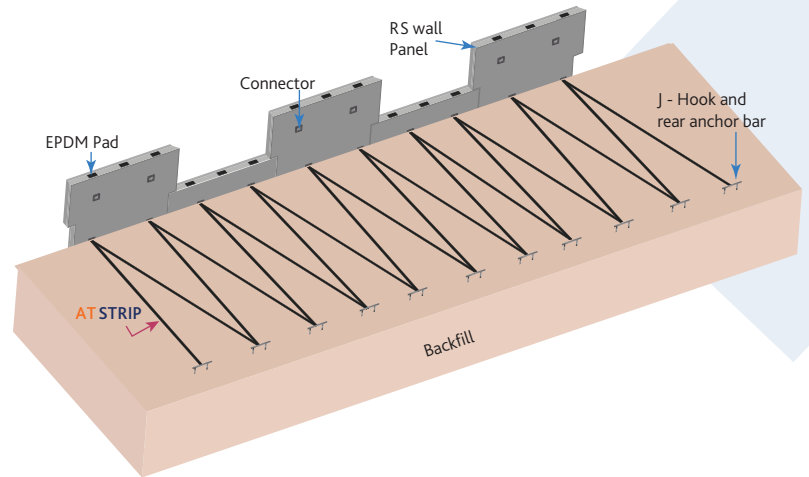


Fig:1B. Isometric view of RS Wall with panel fascia & ATSTRIP

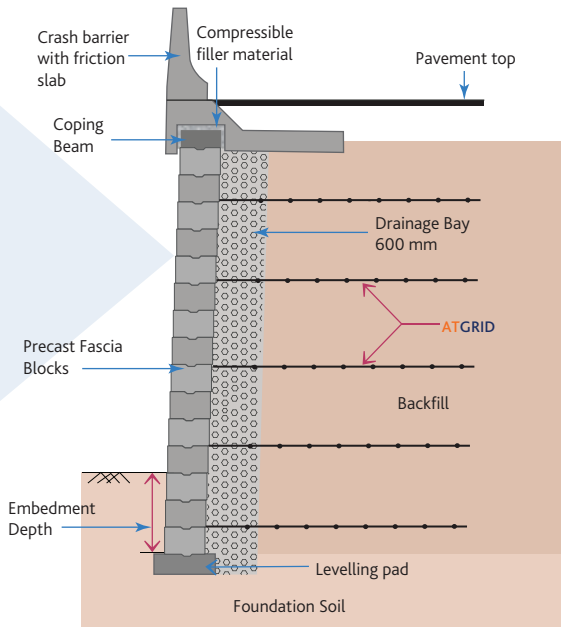


Fig:2A RS Wall with block Fascia

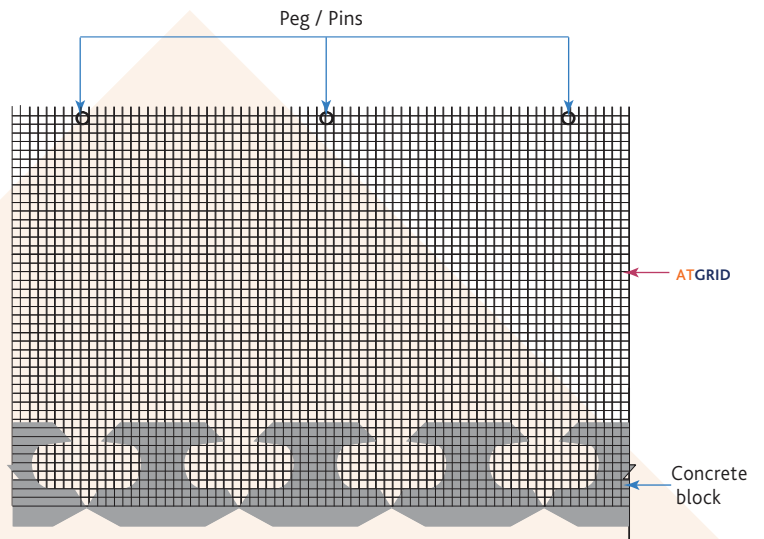


Fig:2B Plan view of RS Wall with block fascia & ATGRID

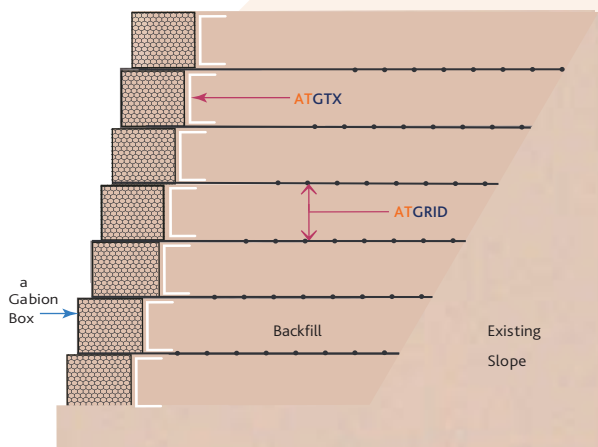


Fig:3 RS Wall with Gabion Fascia

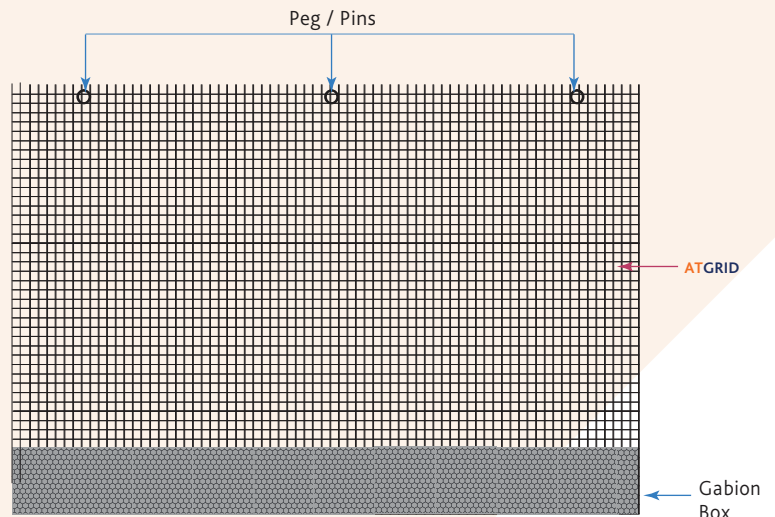


Fig:3A Plan view of RS Wall with Gabion fascia & ATGRID

## Gravity Gabion Wall

It is the mass gravity wall which uses gabion cages filled with stones to retain soil behind it. These are delivered flat packed and then assembled & filled with stones at site according to project requirements.



### ➤ Features of Gravity Gabion Wall

- Permeable and monolithic structures.
- Resist the loads through mass of gabions.
- Cage type fascia enhances the aesthetic appearance of slope.

## Gravity Geocell Wall

It is also the mass gravity wall made with geocell fascia and its expanded form is filled with granular soil. It is further ensured that hydrostatic pressure are dissipated through perforations provided in geocell. After laying onto the slope the exposed surfaces of geocell can be vegetated for aesthetic appearance.



### ➤ Features of Gravity Geocell Wall

- Less wastage and damage of material.
- Easily movable as flat strips welded and reduces the carbon footprint by minimizing logistics.
- This is the one and only geosynthetic product that comes with third dimension that is having its significant properties.
- No skilled labour is required and can be laid in any weather condition.
- Infill used in it can be non-cohesive or recycled locally available material.

## Reinforced Soil Slopes (RSS)

These are steepened embankments constructed generally at slopes  $< 70^\circ$ . To construct steepened slopes reinforcing element are placed horizontally to increase slope stability. On fascia side, geosynthetic wrap around or welded wire mesh can be placed to prevent soil erosion. Vegetation can also be grown to increase the aesthetic appearance.

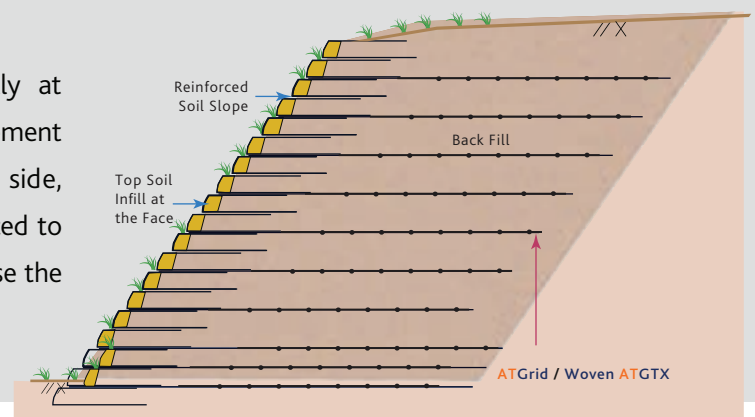
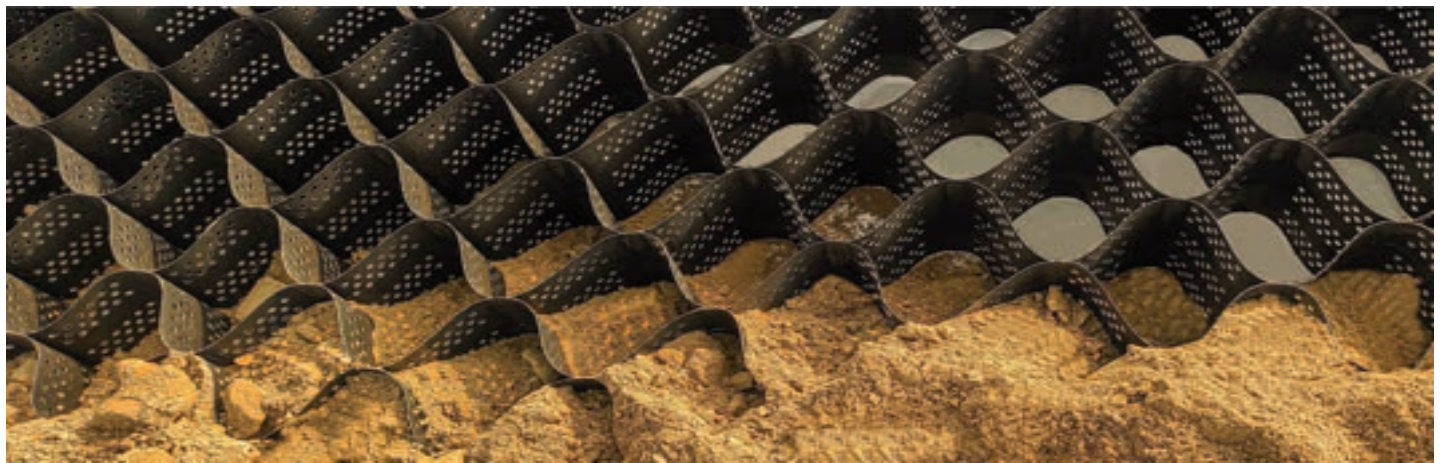


Fig:4 Reinforced Soil Slopes



Slopes if left untreated leads to soil erosion and ultimately hinders its stability and loss of human life. For retaining the soil mass in the stable position over slopes protection is needed. There are erosion control measures such as application of geocells and coir mat that holds the soil granules at that fixed position. These are laid along with vegetated seeds to increase the aesthetic appearance and slope stability.



## ➤ *Benefits of Slope Protection*

- Reduction of soil erosion over slopes.
- Protection of steep slopes upto 70°.
- Increase the soil resistance.
- Promotes sustainable vegetation.
- Acts as noise barrier in transportation applications.
- Consistent quality and performance.
- Less expensive solution in comparison to stone pitching.
- Easy installation and no skilled labour is required to lay at site.

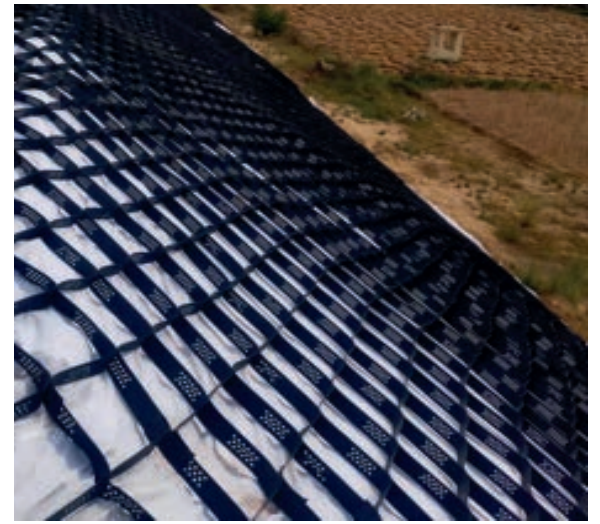
## ➤ *Applications of Slope Protection*

- Erosion control over natural and man-made slopes.
- Erosion control in canals and reservoirs.
- Protection of slope in highways.
- Site Re-vegetation.

### ATWEB

These are the cellular confinement systems used to stabilize the slope. The cells increase the resistance to erosive forces, protecting the root zone from loss of soil particles. Delivered as flat pallets and used in its expanded form filled with soil or concrete as per site requirement.

When filled with soil vegetation can be grown for aesthetic appearance on natural slopes and when filled with concrete it finds its application in protecting geomembrane lining in canal and reservoirs.



### ATMAT- Erosion control mats

ECM laid over the existing slope form a mechanically stabilized layer and functions as a barrier against detachment and transportation process of erosion until vegetation grows.

### 3D PP Fibre Mat

It is 3D structure consisting of UV stabilized non-degradable polypropylene fibres that are extruded at the contact points to provide a dimensionally stable matrix for soil erosion protection.



### Coir Polymer netting mat

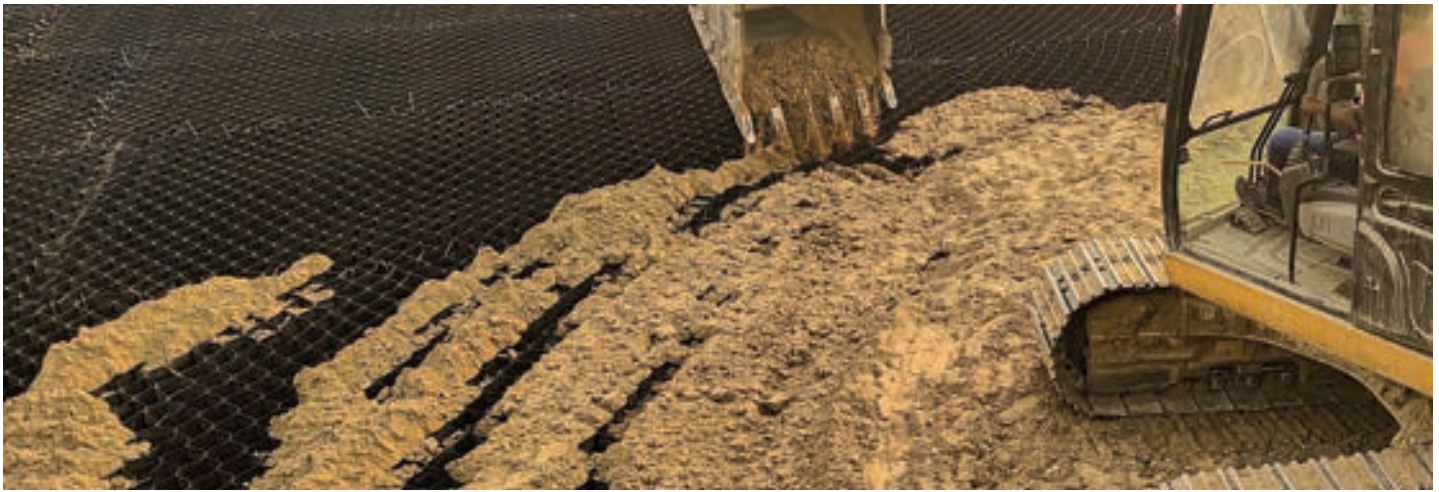
It is a composite product consisting of two layers of polymer netting and a one layer of biodegradable mulch material of coir in between.



## ➤ Applications of ATMAT

- Erosion control over natural slopes.
- Erosion control in canals and reservoirs.
- Protection of slopes over partial reinforced soil wall system.

Ground Improvement is enhancing the poor ground conditions by mechanical means & the inclusion of geosynthetic products . It enhances the soil properties of foundation soil thereby increasing its bearing capacity to support the structure. Various ground improvement techniques are discussed below.



## ➤ Benefits of Ground Improvement

- Higher embankments can be constructed.
- Enhance bearing capacity.
- Makes the bases stiff to dissipate pressure over wider area.
- Prevent deformation of the ground.
- No skilled labour is required and can be laid in any weather condition.
- Light weight and easy to install at site.
- Cost effective in comparison to higher soil replacement.

## ➤ Applications of Ground Improvement

- Roads and railways.
- Embankments over soft soil.
- Piled embankments.
- Embankments over cavities.
- Landfills and ponds.
- Working platforms.

### ATGRID-Biaxial (PET)

It is manufactured using high molecular weight (>25000 gm/mol) and high tenacity polyester yarn. The polyester yarn are knitted together to provide its design strength in both machine and cross machine direction and finished with polymeric coating into a grid like structure.

## ➤ Features of ATGRID- Biaxial (PET)

- Stable aperture.
- Polymeric coating provides resistance from UV rays.
- High LTDS upto 100 kN/m with low creep.

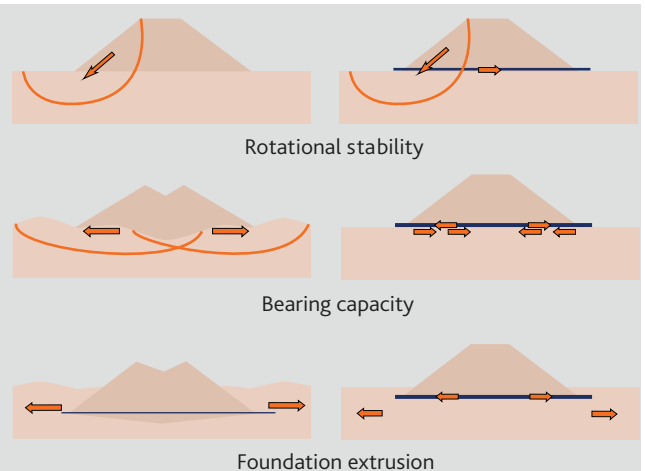


Fig:5 Basal Reinforcement with ATGrid-Biaxial (PET)

## ATWEB

These are cellular confinement system which forms a rigid base for the weak soil to improve the bearing capacity of the ground. It is made up of ultrasonically welded high density polyethylene strips and used in it's expanded form filled with soil. The cell depth and weld spacing can vary as per project requirements.

### ➤ Features of ATWEB

- Control settlements.
- It is easy to cut to any size without damage and provides reinforcement to weak ground.

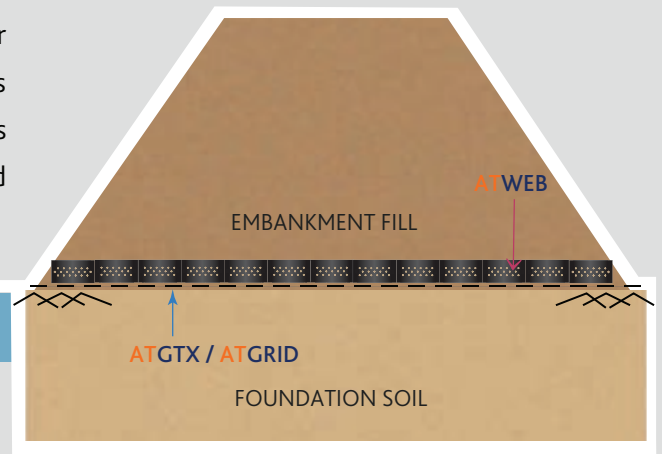


Fig:6 Basal Reinforcement with ATWEB

## Prefabricated Vertical Drains (PVDs)

PVD drains, also known as Prefabricated Vertical Drains or Wick Drains, are geotechnical solutions used in soil improvement projects to accelerate the consolidation of soft or loose soils. They consist of vertical strips made of synthetic material, typically polypropylene, that are installed into the ground.

### ➤ Features of PVDs

- Drainage core ensures proper removal of excess pore pressures from the ground.
- Reduction in consolidation time from many years to months.
- Low cost solution to long term settlements.
- Increase undrained shear strength of soil.
- Improves bearing capacity of ground.



## Stone Columns

These are vertical granular columns used to stabilize the weak ground by increasing its shear strength thereby enhancing bearing capacity and reducing settlements to support the structure.

### ➤ Benefits of Stone Columns

- Increased strength to improve stability.
- Reduced deformation due to distortion or compressibility of the soil mass.
- Reduced susceptibility to liquefaction.
- Reduced natural variability of soils, to make it more economical.
- Settlement reduction.

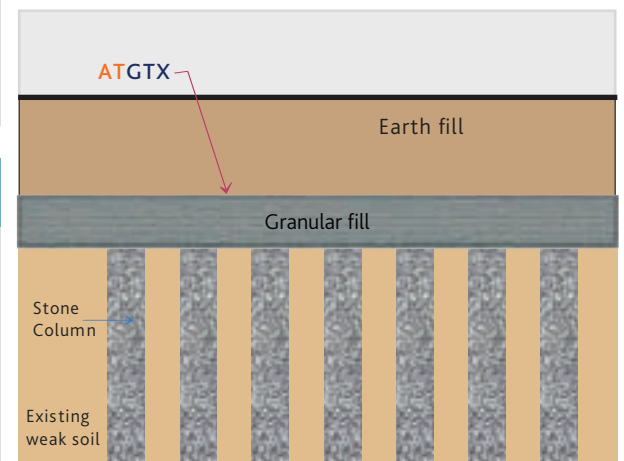


Fig:7 Stone Columns



Pavement reinforcement with geosynthetics are nowadays a vital part of road construction. Due to continuously increasing traffic and thermal fluctuations, roads become stressed which leads to its damage and hampers habitat losses. It increases the requirement of pavement maintenance adding to whole life costs and carbon footprint. There are many pavement reinforcement solutions (discussed below) which can be treated with geosynthetics and aids in enhancing pavement life.

## Benefits of Pavement Solutions

- Easy installation hence no skilled labour is required.
- Less carbon footprint.
- Can be laid in any weather condition.
- Enhanced performance of pavement.
- Light weight.

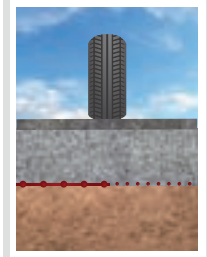
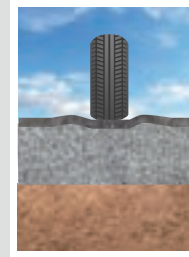
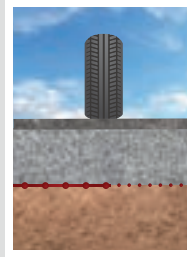
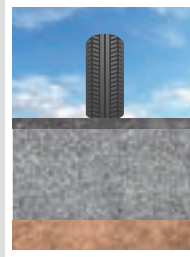


Fig:8 Thickness reduction

Fig:9 Increased durability

## Subgrade Stabilization

It can be achieved with the usage of **ATBiaxial (PP)** in base/sub-base layer to increase the design life of pavement or reducing the pavement thickness. The aperture allows interlocking with soil particles and binds it at its position which forms a rigid base thereby strengthening the pavement. Geotextiles (**ATGTX**) also play a important role in subgrade.

**ATBiaxial (PP)** is manufactured with high quality of polypropylene by punching and drawn method. It is designed for different grades providing higher tensile resistance at lower elongations.

## Features of ATBiaxial (PP)

- Comes in various tensile strengths.
- Stable aperture size.
- Increase bearing capacity.
- High modulus of elasticity.
- High junction efficiency and small deformation.

## Applications of ATBiaxial (PP)

- Roads & railways.
- Reinforcement of ballast/sub-ballast.
- Access roads and working platforms.
- Airport runways.
- Landfills.



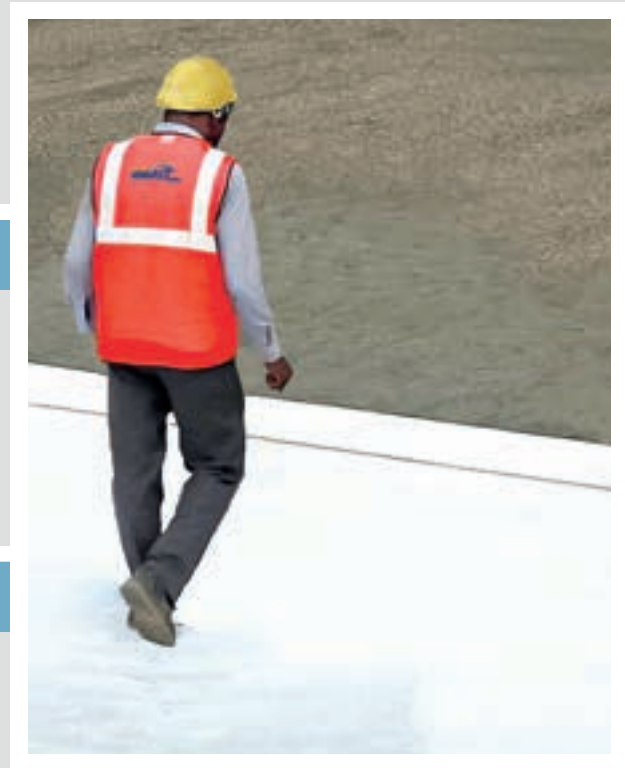
**ATGTX** is a permeable geotextile which when used in association with soil, have the ability for separation, filtration, protection and drainage. Raw material used for **ATGTX** is generally polypropylene or polyester.

### ➤ Features of ATGTX

- Highly durable in all soil conditions.
- Highly resistant to damage from construction equipment.
- Ensures separation, drainage and filtration when subjected to loads.
- Prevents intermixing of two different materials hence improving pavement life.

### ➤ Applications of ATGTX

- Roads & highways.
- Railways.
- Canals.
- Tunnels.



### Drainage System

Drainage of water from pavements has always been an important consideration in road design. Geocomposite drain acts as conduit for the movement of liquid or gases in its plane.

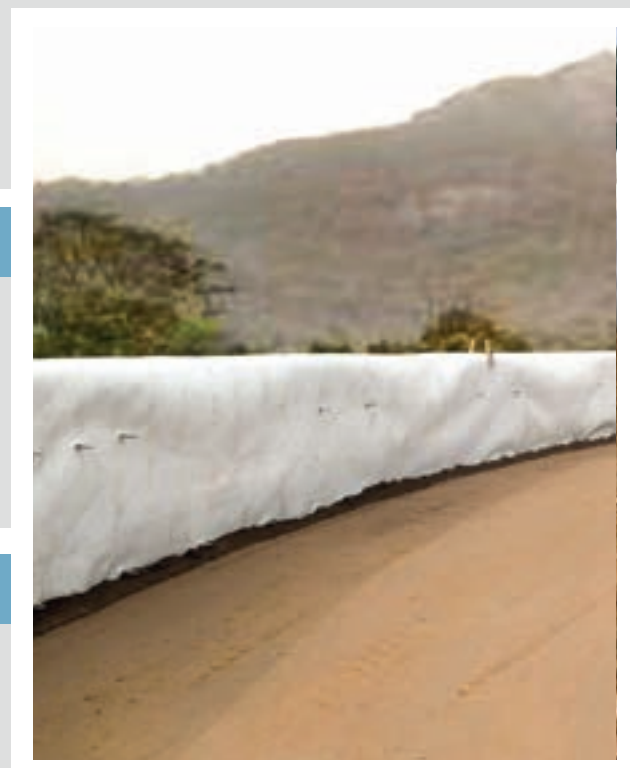
**ATDrain** is a geocomposite drain produced by sandwiching drainage layer (geonet) between two **ATGTX** layers. Because of two material **ATDrain** performs various functions such as drainage, filtration, separation, barrier and protection.

### ➤ Features of ATDrain

- It distributes the pressure & transports water to collector drain.
- Removal of excess water from soil.
- Reduction in construction time with positive impact on economy & environment.
- Light & easy to handle.

### ➤ Applications of ATDrain

- Subsurface drainage of highways.
- Leachate collection & leak detection in landfills.
- Landscaping.



## Asphalt Reinforcement

With conventional method of asphalt road construction, high stress concentrations at the crack tip result in crack propagation that penetrates into the top asphalt surface layer. Asphalt reinforcement turns vertical crack stresses into horizontal direction for better dissipation. A&T provides solution for that with Glass grid and Paving Fabric.

**Glass grid** comprises of fiberglass strands coated with elastomeric polymer that imparts high tensile strength to the road if laid between levelling course and surface course in asphalt overlay.



### ➤ Features of Glass grid

- Imparts high tensile strength to road.
- High modulus of elasticity.
- Long term structural stability.
- Suitable for permanent projects.

### ➤ Applications of Glass grid

- For construction of new roads.
- For resurfacing of existing roads.
- Over road widening joints.

**Paving Fabric** is made by non-woven geotextile coated with bituminous layer which acts as a moisture barrier and stress relieving membrane between existing pavement and asphalt overlay and extends the service life of the overlay.



### ➤ Features of Paving Fabric

- Acts as a moisture barrier to the pavement.
- Acts as a stress relief interface that retards reflective cracking.
- Improvement in fatigue resistance.
- Suitable for different grades of tack coat, including polymer modified tack coats.
- Have different weights for varying degrees of maintenance needs.

### ➤ Applications of Paving Fabric

- Useful for bituminous pavements and overlays.

## Rock fall Protection

Structures designed to protect the areas around a slope from falling rocks include mesh or cable nets, barriers and fences, and catchment areas (ditches at the toe of a slope, designed to prevent rock fall from reaching the highway). Drapes made from double twisted high-tensile steel wire net (mostly in hexagonal mesh shape) represent an economical and safe solution, which is often used for protection of rock falls. The wire mesh is designed to be strong enough to withstand the force of the falling rocks. It allows the rock/debris to move freely inside the mesh when it's properly installed. The double twist on the mesh also ensures that the net won't fail if one wire is cut. Anchoring the mesh to the surface can be accomplished by different procedures and depends on the soil characteristics. This solution can also help to establish vegetation also.



### ➤ Features of Rock fall Protection

- Lightweight with high tensile strength and strong enough to withstand the force of the falling rocks.
- Allows flexibility.
- Does not stop the growth of natural vegetation.
- Cost effective solution.
- Long durability.
- Withstand multiple impacts without repair.
- Very low maintenance.

### ➤ Applications of Rock fall Protection

- Stabilization of rock faces and soil slopes.
- Landslide embankments.
- Debris flow protection.



## Soil Nailing

Soil nailing essentially involves reinforcing and strengthening of existing grounds by installing closely-spaced steel bars, called 'nails', into a slope as construction proceeds from 'top-down'. This process creates a reinforced section that is in itself stable and able to retain the ground behind it.



### ➤ Features of Soil Nailing

- Hold the earth in place.
- Cost-effective.
- Versatile.
- Reduce environmental impact.
- Faster construction.

### ➤ Application of Soil Nailing

- Erosion control.
- Landslide repair.
- Highway and railway cuttings.
- Tunnel portals.
- Retaining walls for both temporary and permanent support.

## Landfill

Slope stability of a landfill mainly depends on the geotechnical properties of waste, such as moisture content, unit weight, shear strength parameters and hydraulic conductivity of waste. A combination method is called the progressive slope or ramp method, where the depositing, covering, and compacting are performed on a slope. The covering soil is excavated in front of the daily cell. Where there is no cover material at the site, it is then brought in from outside sources.



### ➤ Features of Landfill

- Excellent energy source.
- Eco-friendly.
- Keep cities, towns and districts clean.
- Reduce cost.

### ➤ Applications of Landfill

- Community Parks.
- Landfill energy projects.
- Wildlife habitats.

## Canal Lining

Canal Linings are provided in canals to resist the flow of water through its bed and sides. The various geosynthetics for canal lining include geotextiles, geomembranes, geogrids, and geonets. They perform the functions of filtration, drainage, and impermeability, depending on the application. While geomembranes are impermeable sheets, geonets are made of HDPE and find use as drainage nets.



### ➤ Features of Canal lining

- Seepage Reduction.
- Prevention of Water Logging.
- Increase in Commanded Area.
- Increase in Channel Capacity.
- Less Maintenance.
- Safety Against Floods.

### ➤ Applications of Canal lining

- Irrigation system.
- Canal bank stabilization.
- Piping.



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