HESPL

CONCEPT TO CREATION

HARSHRAJ ENGINEERING SOLUTIONS PRIVATE LIMITED

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Vaishali, Bihar, India

CONTENTS

About Us

We are a HighTech Engineering Agency With It's Innovative Solutions

- Our Company is a specialized company dedicated to providing comprehensive slope protection solutions. With a deep understanding of the challenges posed by erosion, landslides, and unstable slopes, we are committed to ensuring the safety and stability of infrastructure projects.

At Harshraj Engineering Solutions Private Limited

we are the vanguards of stability, safe-guarding infrastructure with precision and expertise. Specializing in comprehensive slope protection solutions, we stand at the forefront of combating erosion, landslides, and unstable slopes.

MEET OUR ESTEEMED MENTOR

Mr R.K SINGH

Mentor

A Visionary Leader and Mentor
With over two decades of unparalleled expertise in the realm of construction, our mentor stands as the cornerstone of our company's success. Boasting 23 years of hands-on experience, their journey in the construction industry has been marked by an illustrious track record and a profound commitment to excellence.

Pioneering Excellence Across Diverse Projects

Our mentor has successfully led numerous projects, demonstrating unparalleled expertise across various domains:

- Hydro Projects: 6 completed projects showcasing visionary guidance and sustainable development.
- Tunnel Projects: 5 executed ventures, highlighting proficiency in managing complex infrastructural undertakings with precision and safety.
- Building Projects: A rich portfolio of architectural marvels and functional structures, redefining modern construction through exceptional leadership.

INTRODUCING OUR DIRECTOR

Mr. Kamlesh KR Singh

Director

A Reputation Built on Excellence
At the helm of our company stands a visionary director with a decade of invaluable experience in the construction industry. Specializing in a niche that demands precision and expertise, our director has dedicated their career to the intricate field of slope protection, ensuring stability and resilience in challenging terrains.

Beyond Construction: Leadership and Innovation

Our director exemplifies leadership and innovation, elevating projects and inspiring our team to explore new frontiers. Their strategic vision fosters collaboration, creativity, and forward-thinking, driving our company's success.

Their dedication to excellence and deep understanding of slope protection have cemented our reputation as a leader in the construction industry, setting the standard for precision and reliability.

INTRODUCING OUR DYNAMIC DIRECTOR

Mr. Harshraj Singh

Director

Youthful Vision, Proven Expertise
At the forefront of our company stands a dynamic and forward-thinking director, wielding two years of vibrant experience in the construction industry. Despite their relatively brief tenure, their passion for innovation and their fresh perspective infuse our projects with a youthful energy and cutting-edge approach.

A Trailblazer in the Making

Our director, with a B.Tech in Civil Engineering, brings a modern outlook and strong academic foundation to the construction industry. In just two years, their drive to push boundaries and introduce innovative practices has significantly impacted our projects, seamlessly blending contemporary techniques with traditional principles.

Their youthful enthusiasm and embrace of technology inspire aspiring professionals to challenge norms and carve new paths in a rapidly evolving industry.

WHAT WE DO?

At Harshraj Engineering Solutions Private Limited, we are the vanguards of stability, safeguarding infrastructure with precision and expertise. Specializing in comprehensive slope protection solutions, we stand at the forefront of combating erosion, landslides, and unstable slopes.

01

SURVEY - Topographical survey using Total Station, Terrestrial Lidar & drone with in-house experts.

02

INVESTIGATION - All the geotechnical investigations & surveys are performed by our in - house team

TURNKEY - We offer turnkey solutions for special projects.

04

DESIGN - We offer designs for rockfall protection, slope stabilization, as a manufacture independent solution

03

SLOPE STABILIZATION

We offer slope stabilization services, assessing site conditions and soil properties to design and implement effective solutions.

SLOPE REINFORCEMENT

We use geosynthetic materials like geotextiles, geogrids, and geocells to reinforce slopes and prevent erosion.

GROUTING

Injection of grout materials into the ground to improve the soil' s strength and stability, reducing the riskof slope failure.

ROCKFALL PROTECTION

We specialize in rockfallprotection measures to mitigate the risks associated with falling rocks and boulders.

ROCKFALL BARRIERS

We install rockfall barriers with high-tensile steel cables or nets to contain falling rocks and protect infrastructure and public safety.

SHOTCRETE

We specialize in shotcrete services, offering efficient, high-quality solutions for mountains, tunnels, and other structures.

SOIL NAILING

Our soil nailing solutions use steel bars and advanced grouting to reinforce slopes and retaining walls, preventing erosion and landslides.

DRILLING

Tunnel drilling is crucial for creating tunnels through various geological formations like rock and soil.

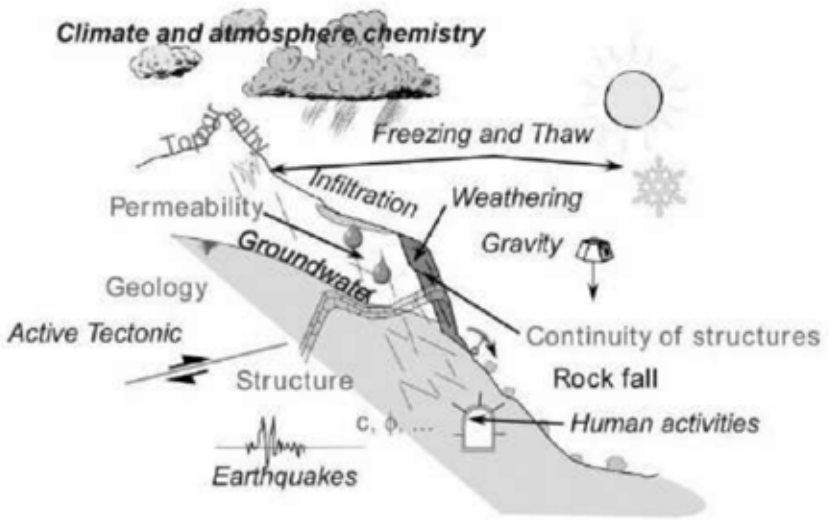
BLASTING

Blasting in tunnel construction uses explosives to excavate rock, requiring careful planning, expertise, and safety protocols.

DESIGNING AND DRAFTING OF SLOPE PROTECTION WORK

Our slope protection design services combine expertise, advanced technology, and precision to create tailored, high-quality solutions ensuring safety and resilience.

1 – ROCKFALL



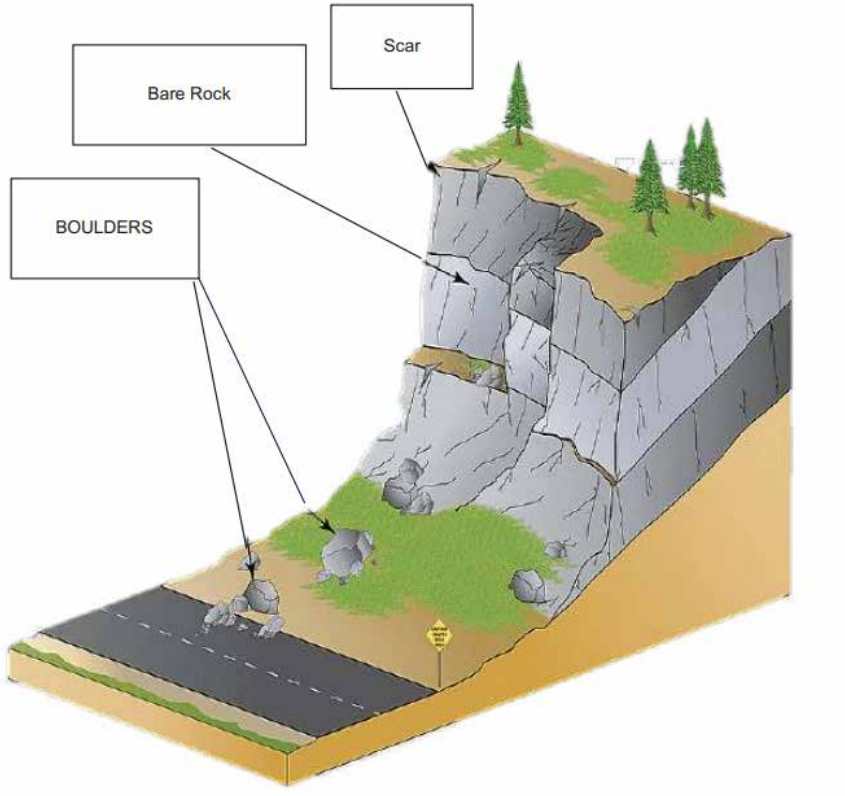
CHALLENGES:

Rockfall Hazards in Mountainous Terrain

Rockfalls are a major hazard during slope excavation for highways and railways in mountainous areas. They occur when rocks detach from cliffs and roll down slopes, triggered by factors like sliding, toppling, toe erosion, animal movement, or climatic events. Unlike rock avalanches, rockfalls involve minimal interaction between individual rocks.

Key triggers include increased pore pressure from rain, weathering, chemical degradation, earthquakes, erosion, freeze-thaw cycles, vegetation growth, and animal movement. Rockfalls pose significant threats to life, property, and infrastructure.

1 – ROCKFALL



Rockfall prevention mechanism - Identification through assessment & careful extraction

It is impossible to detect all possible sources of rockfall, but through careful site investigation, the likelihood of rockfall incidents can be accurately assessed. Fragmented boulders at the top of the slope are easy to identify as sources of rockfall. However, the most dangerous types of rock failure occur when a block is suddenly released from an apparently sound face due to relatively small deformations in the surrounding rock mass. This can happen when the forces acting across discontinuity planes, which isolate a block from its neighbors, change due to water pressures in the discontinuities or a reduction in the shear strength of these planes because of long-term deterioration from weathering. The release of these 'keyblocks' can sometimes precipitate significant rockfalls or, in extreme cases, large-scale slope failures.

1 – ROCKFALL

The safest way to assess is to use a LIDAR (Light Detection and Ranging) instrument which can maps rock faces/cliffs from a distance as long as 1000 meters, this can also help in determining the size of the boulders which are prone to failure.

Once critical boulders are identified, the same can be removed through control rockfall mechanism. However, there are chances of triggering a rock avalanche due to the changes in equilibrium. Rock removal can be done through manual or mechanical means.

1 – ROCKFALL

THE SOLUTIONS

SOLUTION 1 – FLEXIBLE ROCKFALL BARRIER

Flexible rockfall barriers are a common form of protection against falling blocks of rock and rock fragments (rockfall). These barriers consist of a system of cables, posts, and a mesh, and their capacity is typically quantified in terms of the threshold of impact (kinetic) energy at which the barrier fails. A rockfall barrier is a steel structure whose purpose is to intercept a moving rock volume and stop it dissipating its kinetic energy.

1 – ROCKFALL

The rockfall barriers are designed to address typical installation issues, offering quick and easy assembly with a lightweight design. The post sections and components are optimized, and key parts, like the energy dissipation devices, are made of durable aluminum.

Full-scale crash tests on barrier samples were conducted according to ETAG 027 and EAD 340059-00-0106 guidelines. Based on the results, European Technical Assessments were issued, leading to the Certificate of Constancy of Performance for the kits in compliance with European regulations.

ROCKFALL PROTECTION KITS RANGING from 500 kJ to 11180 kJ								
Height (mtr)	3 – 3.5m	3 – 3.5m	3.5 – 4m	4 – 5m	5 – 6m	6 – 7m	7 – 8m	7 – 8m
Energy Level (kJ)	500 kJ	750 kJ	1000 kJ	2000 kJ	3000 kJ	5000 kJ	8600 kJ	11178 kJ

1 – ROCKFALL

COMPONENTS OF ROCKFALL BARRIER

- Ring Net: The ring net is made of high tensile steel wire with 4 to 6 connections, the diameter of the ring is 350mm and strand diameter of the wire is 10.5mm having Galfan Coating (95%Zn/5%Al). The ring nets are made up without having any loose ends which is safer for installation.
- HEA posts: The HEA 200 profile posts contribute to low installation and transport weights. The post head is fitted with holes for guiding the support rope and the retaining rope, as well as for a shackle, allowing transport by helicopter or crane together with the pre-assembled mesh or net.
- Rope anchorage: Rope anchorages are made using our proven RRA spiral rope anchors, reinforced with double spiraled rope according to the EN 12385-10 standard. The rope is bent in a U-bolt shape into a stainless-steel tube, providing protection against mechanical and chemical agents.
- Base plate: Whether installing into loose rock, a concrete foundation, or solid rock, the baseplates can be easily and quickly installed using two, or at most, three conventional anchors. The posts are hinged on the plate, and the bolts between the baseplate and the post are designed with a predetermined breaking point.
- Brake Element: Brake elements are essentially energy dissipators that absorb impact energy. The brake element for the main rope absorbs 450 KJ of impact energy, while those for uphill restraining cables absorb 300 KJ, and braking ropes absorb 150 KJ.

1 – ROCKFALL

SOLUTION II - ROCKFALL PROTECTION USING HIGH TENSILE STEEL WIRE ROPE NET / ROCKFALL DRAPERY

Rockfall protection using high-strength wire mesh, or rockfall drapery, is a passive protection measure. The high-strength wire mesh is anchored at the top, covering the slope like a curtain in what is known as a drapery system. In most cases, a catchment area is required at the bottom of the slope to contain falling debris. Alternatively, the system can also be anchored at the bottom if the slope is not too fractured.

Characteristics of Rockfall Drapery:

- Drapery systems are meant for controlled rockfall events, acts as a curtain, requires catchment area at the bottom.
- Nailed only at the top of the slope.
- Nailed systems are applied for fractured rock slopes for containing large boulders.
- The system is a combination of a Primary Mesh & a Secondary Mesh.

1 – ROCKFALL

Benefits of using High tensile steel wire rope net

- The double twist mesh is flexible and can conform to the rock slope if needed.
- With its superior strength compared to other systems, it significantly reduces the installation cost by reducing the number of rock bolts.
- It is easy to install as we have to just unroll on the rock-face, unlike chain link style meshes, which can get caught up in themselves during installation.
- It has isotropic flexibility and will not unravel even in the event of some wires accidentally breaking. Single twist mesh cannot provide the same level of safety in the event of wire breakage, irrespective of the strength and type of wire used.
- The drapery mesh is available with tensile strengths up to 280kN/m for applications where high slopes, or large amounts of debris are expected

The high tensile rope net system is available in two types of junctions:

HIGH RESISTANCE CLIP

STEEL WIRE KNOT

1 – ROCKFALL

Benefits of using High tensile steel wire rope net

Primary Mesh or Wire rope panel:
This is used to hold unstable boulders

Secondary Mesh:
This is used to hold the fine materials

2 – UNSTABLE SLOPES

CHALLENGES:

Slope failure can be triggered by weathering, earthquakes, heavy rain, and flash floods. Weathering weakens the upper rock layers, causing parallel surface fracturing and jointing over time, making failure prediction challenging. Rainfall increases pore and joint water pressure, reducing cohesion and friction between sound and weathered rock, often triggering slope failures or debris flows. The extent of this risk depends on rock permeability and the annual precipitation distribution, with higher potential for slope failure correlating directly with increased rainfall.

Earthquakes can trigger slope failure by causing boulders and rock sections in precarious balance to shift due to ground acceleration. Embedded boulders in talus layers may also dislodge and roll downhill as earthquake-induced forces reduce cohesion and friction angles. 'Fly rock' occurs when boulders split into smaller fragments due to external forces during downslope movement, influenced by shear, compressive, and tensile forces. Fragment size varies widely based on joint spacing and force intensity.

2 – UNSTABLE SLOPES

Slope failures and debris flows can mutually trigger each other due to ground acceleration or stress changes. Large rockfall events can initiate debris flows by dislodging vegetation and mobilizing substantial debris down scree slopes. Conversely, debris flows can erode rock faces, potentially triggering rockfalls in the short to mid-term. Slope stability measures, such as reinforced or double retaining ropes, are crucial to minimize the risk of unstable slopes, considering these interconnected hazards.

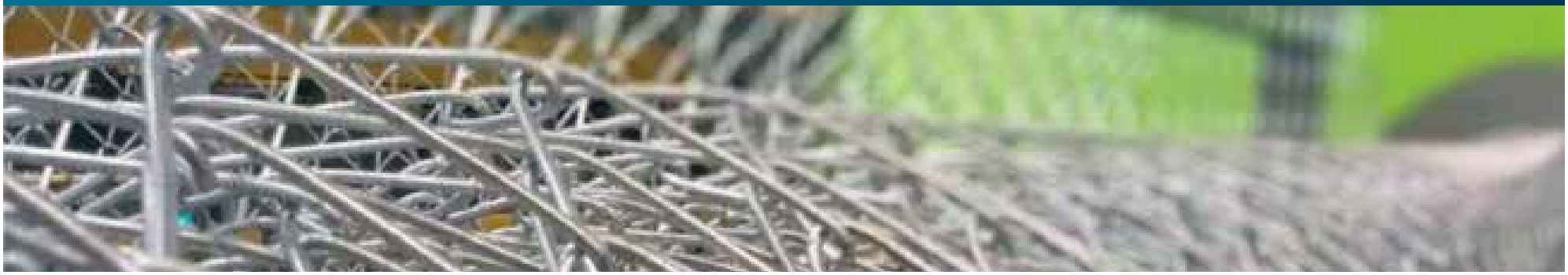
2 – UNSTABLE SLOPES

THE SOLUTIONS

SOLUTION 1 - SLOPE STABILIZATION SYSTEM using HIGH STRENGTH WIRE MESH, SOIL NAILING, COIR MAT & HYDROSEEDING

High Strength Wire Mesh: This system stabilizes slopes by anchoring wire mesh with nails at short intervals, applying pressure to the soil for active protection. It combines ground anchors and a flexible membrane, braced around its perimeter and internally connected to anchors. P&G, with expertise in laser scanning and stability analysis, offers comprehensive slope stabilization solutions. Steeper slopes (≥ 50°) use high strength steel wire mesh and soil nails. P&G, in collaboration with 3SGEOTECHÒ, installs the 3S TUTOR System, offering up to 170kN tensile strength for flexible facings that reduce carbon footprint compared to shotcrete. The system's Zn95/Al5 coating extends its lifetime fourfold compared to galvanized coatings, providing robust slope stabilization and protection.

3S TUTOR Reinforced system



2 – UNSTABLE SLOPES

The 3STUTOR system components are customizable based on slope geometry and geological-geotechnical parameters. All products are ETA (European Technical Approval) and CE certified.

Technical Specifications of 3S TUTOR Plus 90/4.5

Geometry of the Mesh:	Rhomboid
Size of each rhombus (d x D) (± 0,3%), (mm):	100 x 146
Angle of the loop at the vertex, β:	58°
Nominal diameter of the wire (φA):	3.4mm
Nominal tensile strength of the wire, (N/mm2):	900
Diameter of the inscribed circle (φin):	75mm
Tensile strength of the mesh in the main direction (Ty):	100(kN/m)
Punching strength over the mesh according to ISO 17746:2016:	230 (kN)
Coating:	95%Zn/5%Al
Coating thickness:	265 gm/m2

2 – UNSTABLE SLOPES

Soil nailing reinforces and strengthens existing ground, whether natural or excavated slopes. It involves drilling holes for steel bars grouted into place, enhancing shear strength across different soil types and is cost-effective for seismic zones.

Soil nailing requires grouting with a mixture of cement, water, and an approved fluidifier specified by ASTM C937. The water-cement ratio is 0.40 to 0.45, with minimum strengths of 20 MPa at 7 days and 30 MPa at 28 days. Grouting uses fresh ordinary Portland Cement (OPC) without lumps, less than three months old, pumped at 12 bar pressure.

GROUT PUMP

GROUTING BEING DONE

2 – UNSTABLE SLOPES

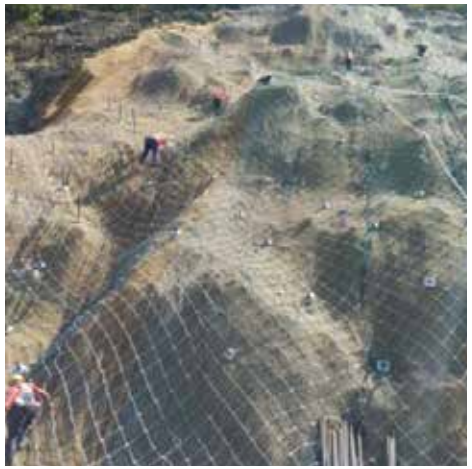
COIR MAT & HYDROSEEDING:

Coir mesh with pocket seeding creates pockets every 0.5m filled with soil, compost, seeds, and conditioner for vegetation growth on vertical slopes. High-strength wire mesh is then laid over the coir mesh to tension the slope. Hydroseeding involves spraying a slurry of fertilizers, bio stimulants, lime, seeds, water, and mulch onto prepared ground to establish vegetation and control erosion using a high-pressure spraying system.

2 – UNSTABLE SLOPES

APPLICATION OF SLOPE STABILISATION USING HIGH STRENGTH WIRE

INITIAL STAGES DURING SITE HANDOVER BY CLIENT



AFTER INSTALLATION OF HIGH STRENGTH WIRE MESH, COIR MAT, HYDROSEEDING & SOIL NAILING

COMPLETION OF SITE ALONG WITH VEGETATION GROWING

2 – UNSTABLE SLOPES

SOLUTION 2 - SLOPE CONSOLIDATOR SYSTEM

The Slope Consolidation System is a single-anchoring structure with a pyramid or umbrella shape and automatic opening mechanism. It arrives pre-assembled on site and unfolds like an umbrella. This modular solution for slope instability includes a frontal mesh face, steel posts, and a central joint for anchorage, allowing rapid reprofiling of collapsed slopes, reduced excavation, and potential reuse of collapsed material. It's adaptable for various loads and performance-tested after full-scale trials, ready for connection to deep or superficial foundations and filling according to project specifications

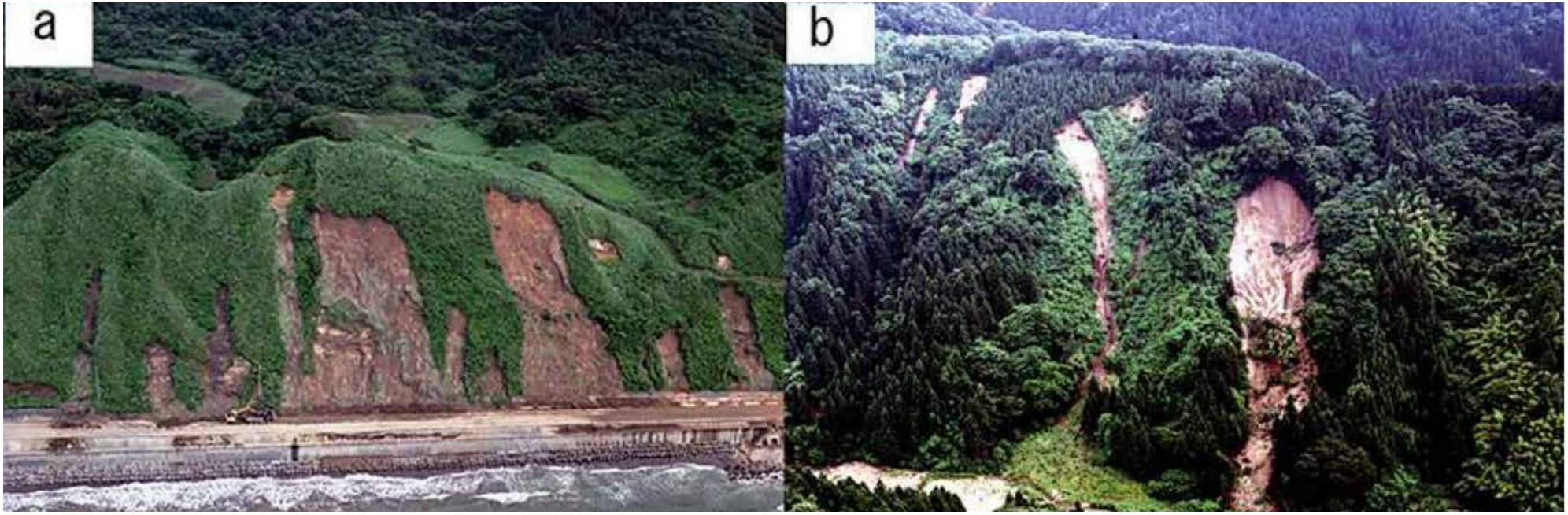


3 – SHALLOW LANDSLIDES

CHALLENGES:

A shallow landslide occurs within the soil mantle or weathered bedrock, typically within a few decimeters to several meters deep. It's often triggered by high water pressures due to permeable soil over low permeable layers, causing instability and downhill movement.

Deep-seated landslides, on the other hand, involve sliding surfaces located deeply, often below tree root depths, and include large failures with translational, rotational, or complex movements. They shape landscapes over geological timescales and significantly influence river courses by producing sediment.



3 – SHALLOW LANDSLIDES

THE SOLUTION

SOLUTION – FLEXIBLE LANDSLIDE BARRIER

Our shallow landslide and open hill debris flow protection barriers are designed for easy installation and optimized for lightweight durability. The RDC 200 barrier features aluminum components for quick assembly and minimal excavation, reducing job site operations and construction time. Its lightweight design facilitates handling in challenging terrain and lowers transportation costs, including helicopter transport. The barriers meet European standards (EAD 340020-00-0106) with full-scale crash tests, securing European Technical Assessments and Certification of Constancy of Performance under Regulation (EU) No. 305/2011.

System characteristics:

- The main interception layer is a ring net placed along the downslope side of the barrier, distributing forces and reducing stresses on the foundations.
- An additional interception layer (hexagonal wire mesh) is installed upslope of the ring panels to capture small debris along with larger blocks during shallow landslide or open hill debris flow events.
- Each post has two upslope bracing cables to provide redundancy in case one breaks during debris impact.
- The energy dissipation devices absorb the applied energy by deformation and not by friction. They guarantee high performance with high energy absorption: this allows lower forces on anchors and limited structure deformations.

4 – DEBRIS FLOW

THE CHALLENGES

A debris flow is a mass of loose mud, sand, soil, rock, water, and air that moves down a slope due to gravity. It must consist of at least 50% sand-size particles or larger to be classified as such. Some debris flows move very quickly, reaching speeds over 100 miles per hour on steep slopes. Others move slowly, creeping down at just one or two feet per year. Their speed and volume make debris flows highly dangerous, causing fatalities worldwide annually. Mitigation strategies include identifying hazard areas, educating residents and officials, limiting development in vulnerable zones, and implementing mitigation plans.

4 – DEBRIS FLOW

What Causes Debris Flows?

Debris flows can be triggered by various situations. Here are a few examples:

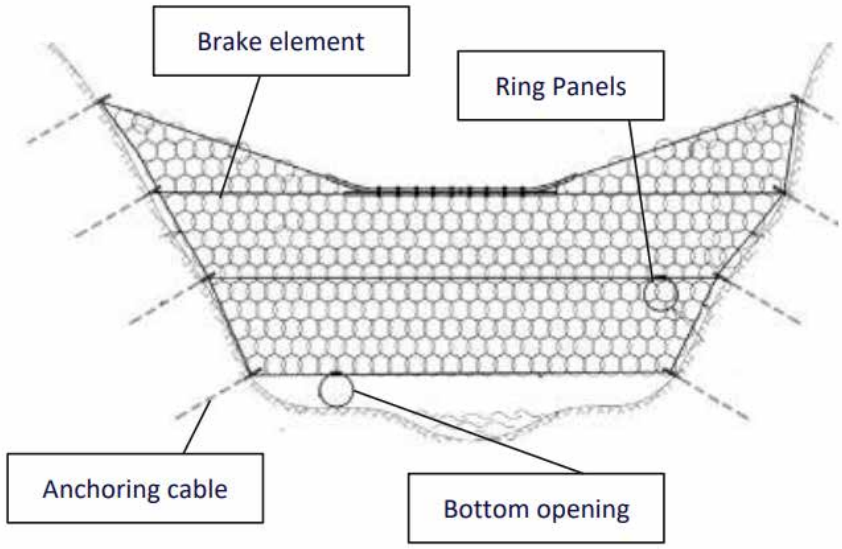
- Moisture Addition: Sudden water flow from heavy rain or rapid snowmelt can channel over steep valleys filled with loose debris, soaking and lubricating the material, adding weight, and triggering a flow.
- Ancient Landslide Failure: Debris flows can originate from unstable masses of older landslides perched on steep slopes. Water flow over these landslides can lubricate the material, or erosion at the base can remove support, triggering a flow.
- Support Removal: Stream erosion along banks can undermine saturated materials high on valley walls, removing support and triggering sudden debris flows.
- Wildfires or Logging: Debris flows can occur after wildfires burn vegetation from steep slopes or after logging removes vegetation. Before these events, vegetation roots anchored the soil and reduced soil moisture. The loss of root support and increased moisture can lead to catastrophic failures.

4 – DEBRIS FLOW

THE SOLUTION

SOLUTION – DEBRIS FLOW BARRIER

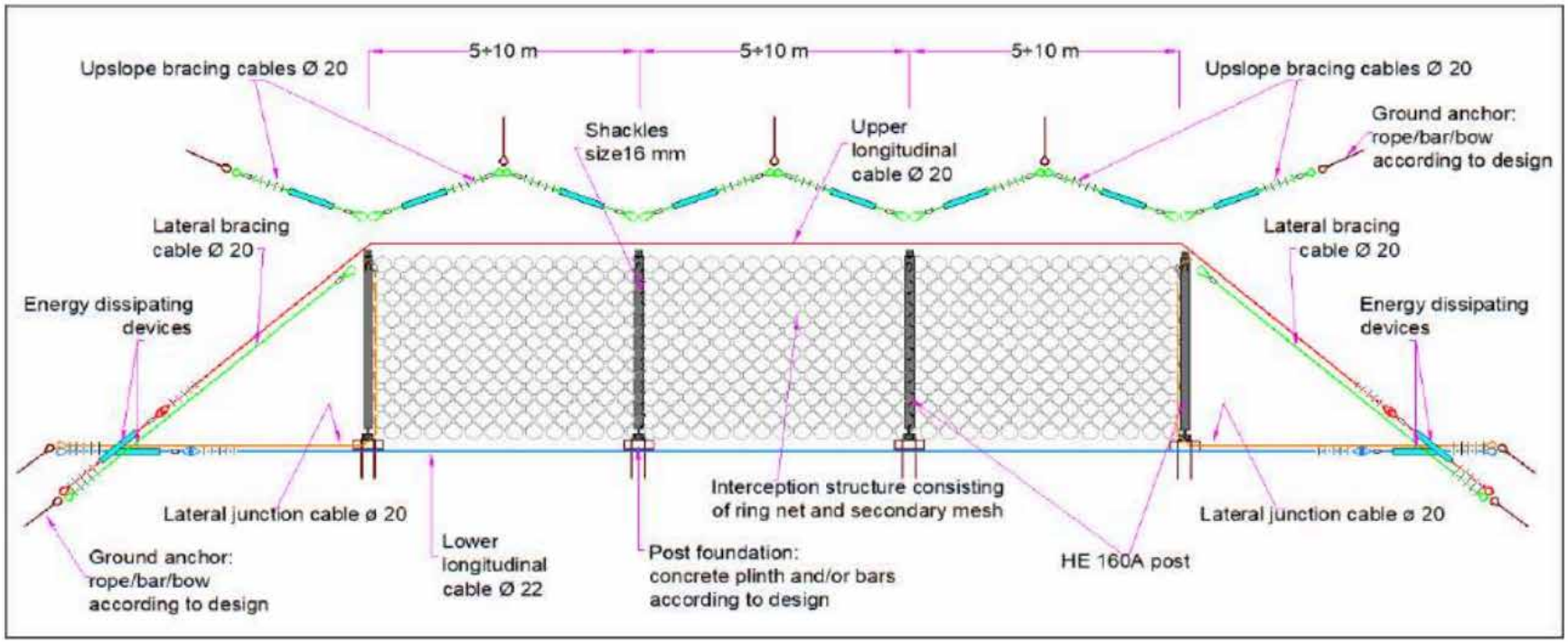
Debris flow barriers are constructed from high-tensile steel wire ring panels, serving as an alternative to check dams. They separate debris from flowing water, significantly reducing catastrophic impacts. Ideal for torrents and narrow gullies, they effectively prevent washouts of hill roads and culverts. Standard systems are available up to 25m wide and 7m high.



4 – DEBRIS FLOW

Benefits:

- Small material supplies > Less transportation cost
- No heavy machinery required for installation
- Only wire rope anchors for foundation. Only drilling is necessary and no large earth movements
- Fast installation procedure which leads to short construction period
- Cost effective compared to traditional methods



5 – BANK EROSION

THE CHALLENGES

Bank erosion is the wearing away of the banks of a stream or river, distinct from the erosion of the bed of the watercourse, which is known as scour. Trees growing along a stream have their roots undercut by this erosion. As these roots tightly bind the soil, they form abutments that extend over the water, significantly influencing the rate and progression of erosion.

5 – BANK EROSION

What causes Bank Erosion?

Rivers and streams are dynamic systems shaped by their catchments, constantly changing in response to factors like water and sediment supply, catchment geology, and vegetation. These factors influence erosion rates and the evolution of river systems over time.

- stream bed lowering or infill
- inundation of bank soils followed by rapid drops in flow after flooding
- saturation of banks from off-stream sources
- redirection and acceleration of flow around infrastructure, obstructions, debris
- removal or disturbance of protective vegetation from stream banks as a result of trees falling from banks or through poorly managed stock grazing, clearing or fire
- bank soil characteristics such as poor drainage or seams of readily erodible material within the bank profile
- wave action generated by wind or boat wash.
- excessive or inappropriate sand and gravel extraction
- intense rainfall events

5 – BANK EROSION

THE SOLUTIONS

SOLUTION 1 – GABION BOXES

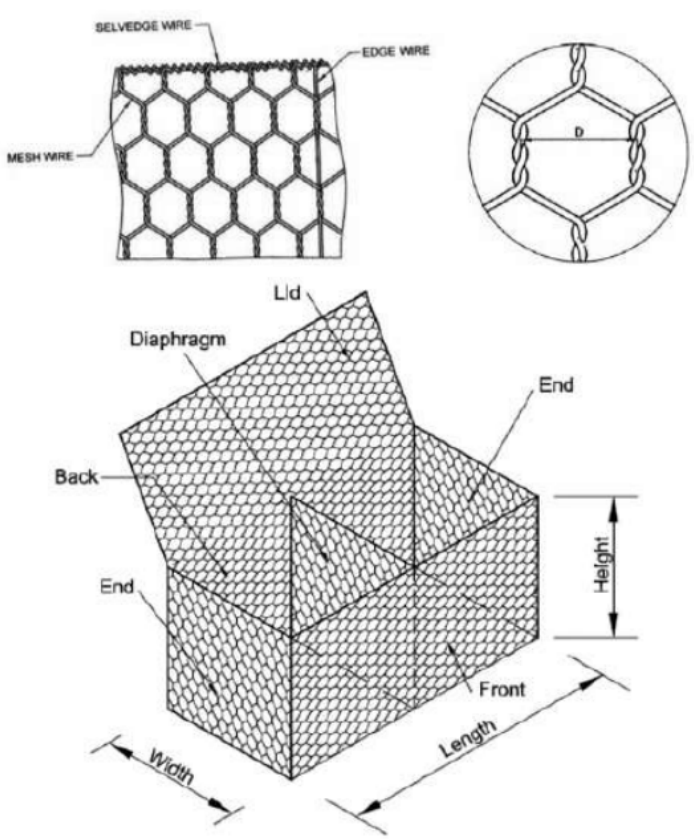
Gabion structures are rectangular cages made of double-twisted steel woven wire mesh filled with rocks or boulders. They act as gravity retaining structures, using their weight to retain soil. Their porosity prevents buildup of pore-water pressure, a major advantage. Gabions blend into surroundings and support vegetation growth, enhancing structure longevity. Compared to conventional solutions, they offer reduced carbon footprints.

Gabion boxes are used in the following areas

- Bank erosion protection
- Highway protection
- Landscaping
- Shore protection
- Canal linings
- Bridge abutment protection

5 – BANK EROSION

Gabion baskets are made of hexagonal double-twist wire mesh, delivered flat-pack in various sizes and openings. Widely used in mining for stabilizing overburden dumps, slopes, and mitigating landslides, they're zinc galvanized and PVC coated. Internal diaphragms create equal compartments filled with natural stone on-site, forming flexible, permeable, monolithic structures for earth retention, with minimal stone migration assured.



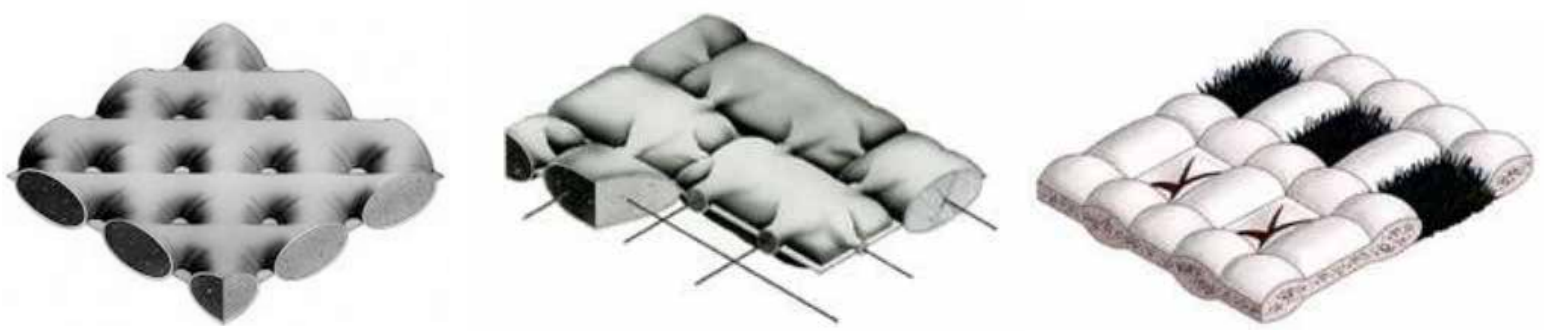
5 – BANK EROSION

SOLUTION 2 – GROUT FILLED MATTRESS

Grout-filled mattresses, made of strong synthetic fabric in pillow-shaped compartments connected by ducts, can be filled with 200 mm – 600 mm concrete. They prevent scour and erosion by river currents on abutments, ideal where sourcing and transporting boulders is challenging. Quick to install, even in running water, these mattresses are designed and simulated using software for optimal solutions. We offer site-specific design, supply, and execution services for Articulating Block Mattresses.

Application areas:

- Road embankments
- Ditches
- Channels
- Canals
- Rivers
- Reservoirs



5 – BANK EROSION

SOLUTION 3 – GEOCELLS

Geocell is a lightweight yet strong honeycomb-shaped confinement system used to reinforce foundations, increase load capacity of weak soils, and control erosion on low-angle slopes. Its cellular profile confines infill materials, preventing spreading. Geocells can be installed rapidly compared to traditional solutions like boulder or stone pitching, reducing project costs with locally available infill materials. Options for concrete filling are also available, approved by the Ministry of Road Transport and Highways under IRC 56 specifications.

Application areas of Geocell are:

- Roadways
- Railways
- Steep Soil reinforcement
- Channel protection
- Reservoirs
- Landfill area

Advantages of using Geocell:

- Greening possible
- Good anti-erosion characteristics
- Very economical to install
- Rapid installation

During installation

After installation

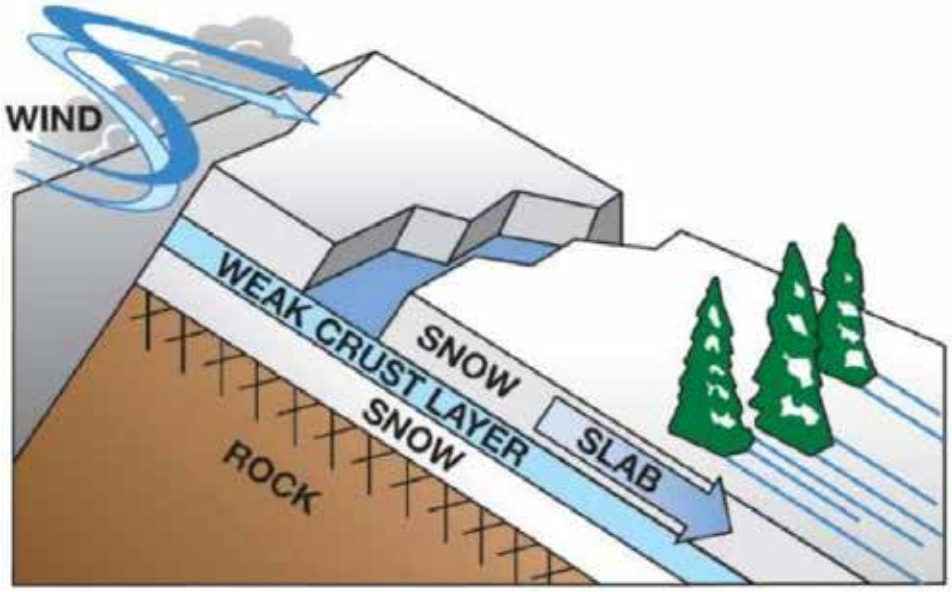
6 – AVALANCHES

THE CHALLENGE –

Avalanches are rapid flows of snow down slopes triggered by factors like precipitation, snowpack weakening, or human activities. They can include tightly packed slab avalanches or looser loose snow avalanches. Avalanches grow in mass and speed as they capture more snow and can mix with air to form powder snow avalanches. They occur globally in snowy mountain ranges and are serious hazards, prompting extensive avalanche control efforts. Classification systems describe avalanches based on size, destructive potential, initiation, composition, and dynamics.

Avalanches are caused by four main factors:

- a steep slope
- snow cover
- a weak layer in the snow cover
- a trigger



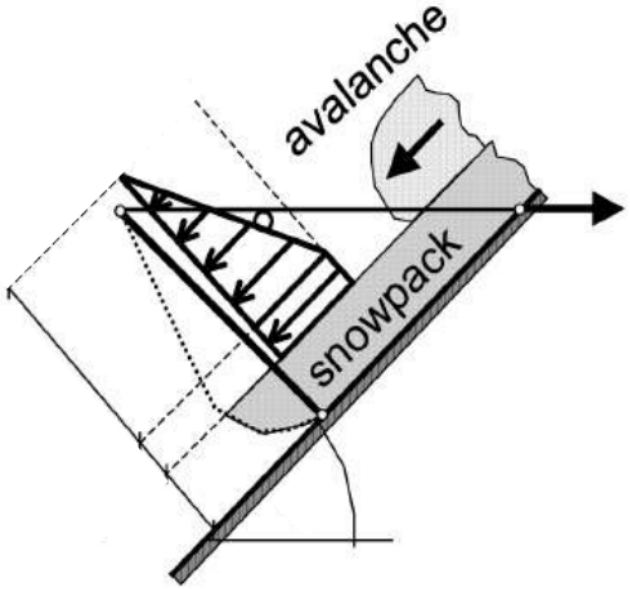
6 – AVALANCHES

THE SOLUTION –
SOLUTION – AVALANCHE PROTECTION BARRIER

Avalanche protection involves measures to contain and control hazardous snow masses, often using avalanche barriers. Similar to rockfall protection systems, these barriers span the runout zone to minimize hazard extent by stopping or redirecting avalanches. They're strategically placed at potential initiation points to absorb forces and reduce snow movement, sometimes requiring multiple lines for effective protection.

Some features of an avalanche barrier:

- Possibility of installation on slopes with any gradient
- Modular design allows easily and simple installation
- Can be installed in any type of soil - different types of foundation
- Transportation costs: the structures are transported to the site fully assembled and closed, thus minimizing the costs of road transport
- Reduction of excavating works
- Preservation of landscape in its original form



7 – DISASTERS in MINING

THE CHALLENGE

Open cast mines involve excavating the earth's surface to access valuable minerals. Creating stable cut slopes from the original terrain is crucial for safe and efficient mining operations. Stability depends on local geological conditions and groundwater levels. Managing slope stability is challenging, aiming to enhance safety and productivity. Various types of slope failures, like planar, wedge, toppling, and circular, can occur. Monitoring ground motion with radar satellites enables precise localization and quantification of failures, leading to optimized slopes and significant safety and cost benefits.

OPEN PIT MINES

LANDSLIDE / INSTABLE SLOPES
IN AN OPEN PIT MINE

7 – DISASTERS in MINING

THE SOLUTION -

SOLUTION – Interferometric Synthetic Aperture Radar (InSAR)

Previously, monitoring critical mine areas for geotechnical stability relied on costly ground-based equipment, which limited coverage due to high expenses and complex data management. Interferometric synthetic aperture radar (InSAR) held promise but was hindered by low resolutions (10 to 20 m) and long repeat times (24 to 46 days). The advent of modern synthetic aperture radar (SAR) satellites with revisit times as short as 4 days and resolutions as fine as 3 m has revolutionized InSAR technology, making it a leading choice for comprehensive mine site deformation monitoring.

On Ground Solutions

Pros:
- High accuracy
- Targeted monitoring
- Monitoring of specific slope 24/7

Cons:
- Expensive
- Need trained manpower continuously
- Can focus on specific areas

In-SAR Technology

Pros:
- Detailed maps of ground deformation over all the Mine facilities: Pits, TSF, Waste dumps, Leach Pads, Access Roads, Processing Plants, etc.
- Detection of potential failure areas. Acceleration areas and details
- Update every 6 days -12 days
- Accurate results 3-5 mm

Cons:
- Interval of monitoring (6 days / 12 days)

OUR VALUABLE CLIENT

Our valuable clients inspire us to innovate and excel. We are committed to delivering exceptional service and solutions that exceed expectations and drive success.

GARWARE TECHNICAL

MAIN CLEINT: INDIAN RAILWAY
PROJECT COST: 20.09 LAC

ADIH INFRA PVT LTD

MAIN CLEINT: NHIDCL
PROJECT COST: 2.71CR

SHREE GIRRAJJEE INFRA PVT LTD

MAIN CLEINT: BRO
PROJECT COST: 8.50CR

APS HYDRO PVT LTD

MAIN CLEINT: NHIDCL
PROJECT COST: 5.10 CR

VICTOR AND COMPAN

MAIN CLEINT: ASSAM RIFLES
PROJECT COST: 2.10CR

RANI CONSTRUCTION

MAIN CLEINT: NHAI
PROJECT COST: 1.50CR

OUR ONGOING PROJECTS

APS HYDRO POWER (KISHTWAR)

OUR ONGOING PROJECTS

VICTOR AND COMPANY (SHILLONG)

OUR COMPLETED CLIENT WORK

CLIENT : ADIH INFRA STRUCTURE PVT LTD

LOCATION : SILLIGURI, WEST BENGAL

OUR COMPLETED CLIENT WORK

CLIENT : ADIH INFRA STRUCTURE PVT LTD

LOCATION : SILLIGURI, WEST BENGAL

OUR COMPLETED CLIENT WORK

CLIENT : RANI CONSTRUCTION PVT LTD

LOCATION : WEST BENGAL

OUR COMPLETED CLIENT WORK

CLIENT : RANI CONSTRUCTION PVT LTD

LOCATION : UTTRAKHAND

OUR COMPLETED CLIENT WORK

CLIENT : GHRIRAJ INFRA HIGHTS PVT LTD

LOCATION : RAJORI J&K

OUR COMPLETED CLIENT WORK

CLIENT : GHRIRAJ INFRA HIGHTS PVT LTD

LOCATION : KISHTWAR J&K

SOME PHOTOS OF OUR COMPLETED PROJECT

RINGNET INSTALLATION
DRILLING WITH SDA ANCHOR WIT

SOME PHOTOS OF OUR COMPLETED PROJECT

DRILLING WITH SDA ANCHOR WITH DRIFTER MACHINE

SOME PHOTOS OF OUR COMPLETED PROJECT

ROCKFALL BARRIER OF 3000 KJ

SOME PHOTOS OF OUR COMPLETED PROJECT

Cement Grouting

SOME PHOTOS OF OUR COMPLETED PROJECT

COIR MAT INSTALLATION

SOME PHOTOS OF OUR COMPLETED PROJECT

SHOTCRETE

LIST OF OUR MACHINERY

Drifter machine: 18 Nos

Jack hammer: 22 Nos

Compressor: 8 Nos

Winch machine: 4 Nos

Grout pump: 8 Nos

DTH machine: 5 Nos

Hydra machine: 1 Nos

LIST OF OUR STAFF

Project Manager 01

Senior Engineer 05

Engineer 08

Senior Supervisor 03

Supervisor 10

Accountant 01

HR 01

Mr R.K SINGH

Mentor

HARSHRAJ SINGH

Director

KAMLESH KR SINGH

Director

GET IN TOUCH

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