CASE HISTORY

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ROCKFALL PROTECTION WORKS NEAR THE ROAD ADJACENT TO BIO-DIVERSITY PARK, HITECH CITY, HYDERABAD OF TSIIC CYBERABAD ZONE IN THE STATE OF TELANGANA

CYBERABAD, TELANGANA, INDIA

TECHFAB INDIA

At the Heart of GeoHazard Mitigation Activity

Rockfall Protection

Client:	Products used :
TELANGANA STATE INDUSTRIAL INFRASTRUCTURE CORPORATION LIMITED (TSIIC)	• DOUBLE TWISTED WIRE MESH • TECHRHOMBUS HRC • TECHFAB METAL GABION
Main contractor:	
SARATH CHANDRA CONSTRUCTION	
Manufacturer & Supplier:	Year of construction:
TECHFAB (INDIA) INDUSTRIES LTD.	2021 - 2022

Project brief:

Madhapur of Cyberabad Zone of TSIIC, a part of Hyderabad Knowledge City which falls under Industrial Area Local Authority has grown phenomenally in the last few years with many new offices / buildings coming up thereat. Many more buildings are under different stages of completion with noteworthy T-Hub's iconic building (T-Hub - a Government of Telangana's initiative for fostering innovation ecosystem) under advanced stage of completion. To meet the fast increasing demand of better connectivity for the increased traffic, Telangana State Industrial Infrastructure Corporation Limited (TSIIC) has recently constructed a new carriageway of around 850 meter connecting internal roads of Hyderabad Knowledge City with the Old Mumbai Highway joining the same adjacent to Bio-diversity Park.

This new road was constructed by drilling the hillock thereat to create a passage for the road. Now, to mitigate the hazard for the carriageway users from loose boulders on the hilltop and rock slope falling on to the carriageway, TSIIC has decided to take up slope stability and safety works.

Solution:

To reduce the risk of falling rocks on to the newly constructed Carriageway, TSIIC appointed IIT, Hyderabad to finalize a suitable scheme. TechFab India suggested a solution for Rockfall Protection & GeoHazard Mitigation based on the recommendation of IRC Highway Research Board Special Report 23 on 'State of the Art: Design and construction of rockfall mitigation systems' which was finally adopted.

The solution consisted of rock bolting, rockfall netting, and cable wire rope at edges, top, bottom, and diagonals . This solution was provided at all locations except the severe areas with overhangs. Only for the severe areas with overhangs, rock bolting, rockfall netting, and rhomboidal wire rope panels have been provided. A Rockfall Protection Embankment also provided at the toe of the slope. The rockfall protection embankment consists of a 3m high toe gabion wall with a vertical face towards the road and a trapezoidal section towards the cutting. This trench formed by the trapezoidal section towards the slope cutting also act as a rock trap ditch for any debris that may slide along the nettings.

Site before Construction

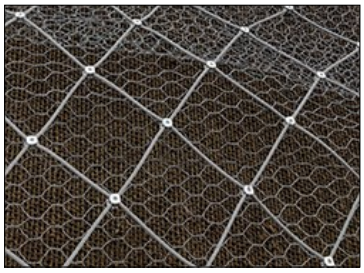
Product Description:

- **Double Twisted Wire Mesh**

TechFab India double twist (DT) mesh is available in a variety of strengths and corrosion protection coatings to suit project requirements.

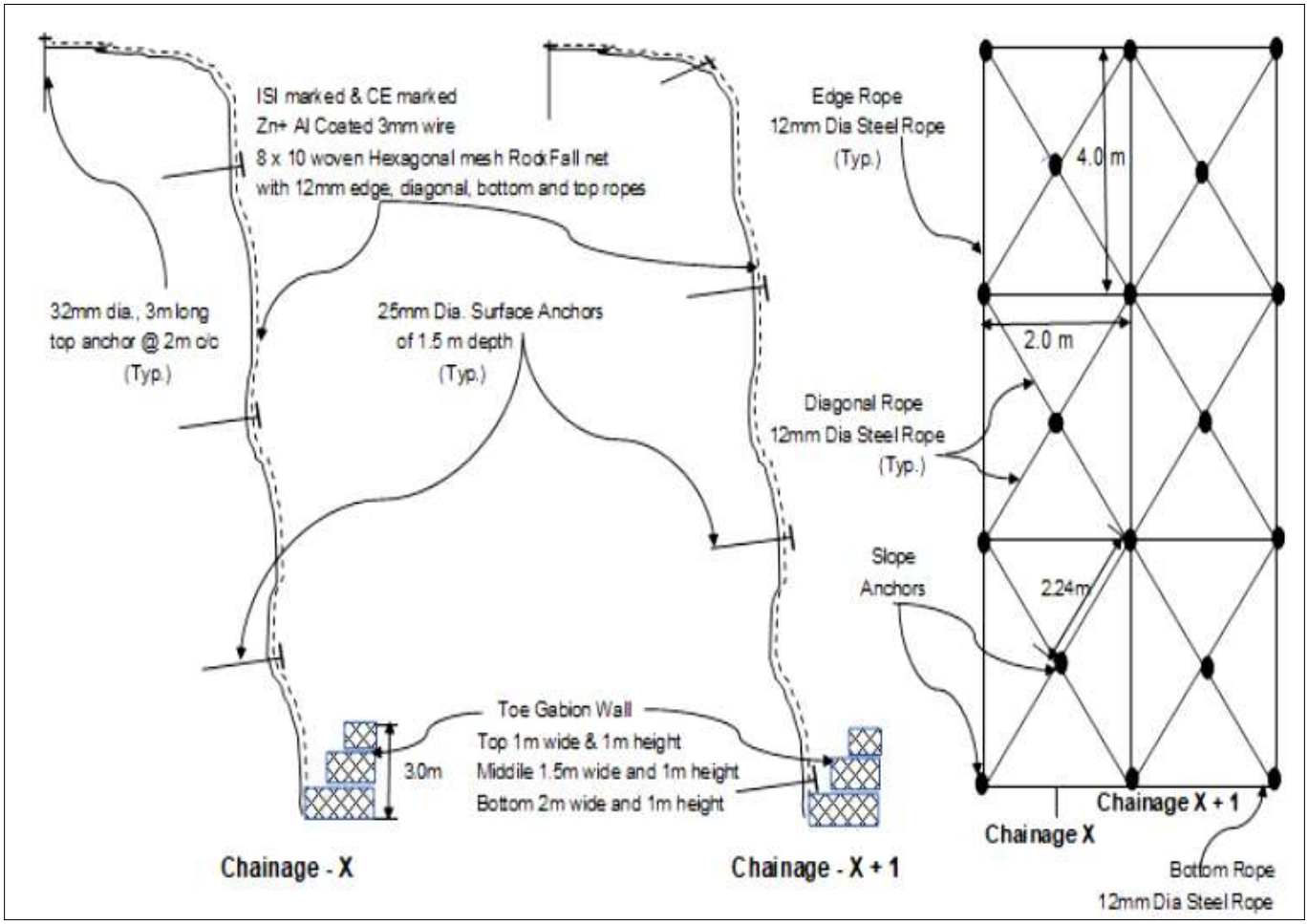
For this project we have used Double Twisted Hexagonal Wire Mesh, 3mm wire dia, Mesh type 8x10, Zinc+Aluminium (Galfan) + PVC coated, with 12mm edge, diagonal, bottom and top ropes. This type of netting has high mechanical resistance required to prevent the danger of sudden rock shock loads and dissipate rock fall energy created from loose fractured rock. Since the double-twist, hexagonal-woven mesh does not unravel when some wires break.

- **TechRhombus Flexible Rope Net System**



TechRhombus high tensile rope net system is made out of high tensile steel wire ropes with tensile strength of more than 1960 N/mm^2. High Tensile rope net system works in combination with or without bearing plates and other elements like top & bottom support ropes, wire rope anchors and soil nails.

For this project we have used TechRhombus HRC Type (High Resistance Clip) wire rope net with rope dia. 10mm and mesh size 300mm x 300mm.



Typical Cross Sectional View & Elevation View of the proposed solution

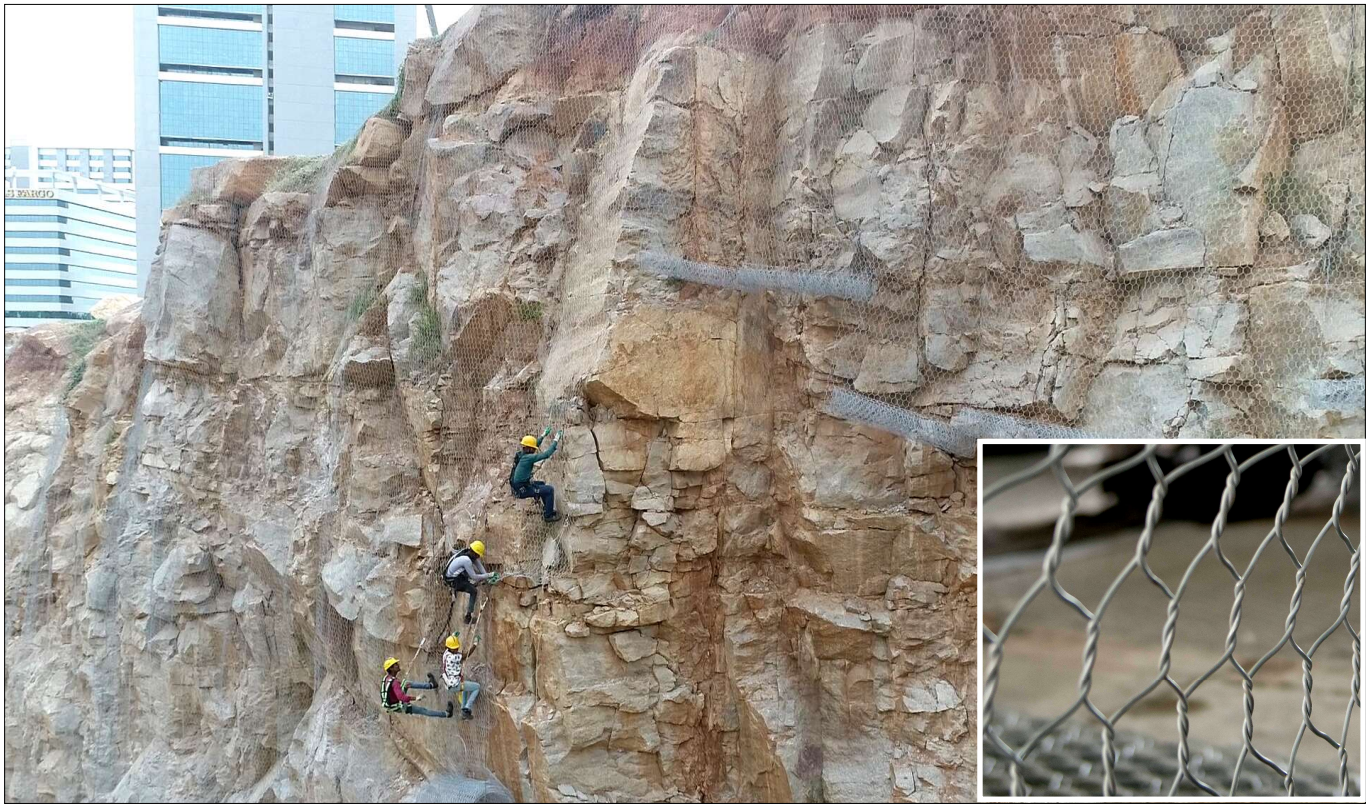
Drone survey was carried out at the site initially by IITH, Hyderabad and Geology Professors from Hyderabad Centra University visited the location and made observations on the geology of the area. The heights were in the range of 35m to 50 m. Surficial instabilities near the face of the slope were evident from the field observations for which treatment is required to be provided. Slope stability analysis was carried out by IITH, Hyderabad using 'Geostudio' software based on the survey and geology reports and no deep-seated global stability problems were seen in the subject area.

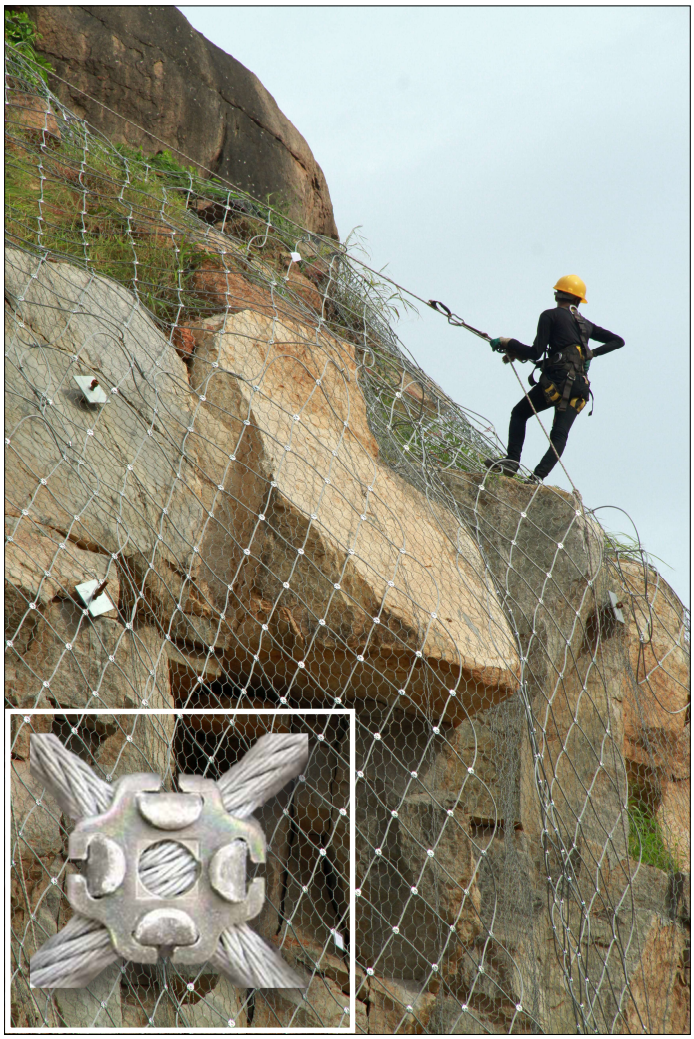
The work started with preparatory works of taking down the loose material from hill slope side and removing by suitable methods the large boulders, bushes, shrubs, roots, grass etc., on the top of the slope and at the edge of slope. A proper medium has been created for release of pore water pressure developed due to water trapped inside the slope so as to ensure all trapped water is released.

On the prepared surface, the rockfall netting was installed which shall provide stability against any local failures that may happen between the installed rock bolts. Rockfall netting shall comprise double-twisted wire mesh with top, bottom, edge, and diagonal rope. The double-twisted wire mesh with the rope cable at edges and diagonals work as a composite that shall effectively contain smaller and medium size particles on the slope surface. The rhomboidal wire rope panels effectively take up load coming from any big-sized boulders. The depth of the rock bolts for the overhang portions were fixed at 7m.

The rock bolt on the slope surface made of Fe 500 grade steel of 25mm diameter and up to a depth of 1.5metre along with the rockfall netting. The rock bolt have a tensile capacity of 220 kN. The spacing of the rock bolts required is 4.0m c/c in vertical direction and 1.0m c/c in horizontal direction. The location of the rock bolts at 1.0m in horizontal direction should be such that the diagonals connecting the rock bolts from every 2.0m horizontal interval pass through the rock bolts at 1.0m. The rock bolts stitch the surface rock to the stable rock mass behind.

Installation works in progress





Installation works in progress

During Construction Photographs (Installation of TechRhombus)

Completed Structure

Conclusion:

The project is completed successfully.

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