



Landslide Mitigation by Using Soil Nailing Technique

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Abstract : Landslide constitute one of major natural catastrophes, which account for considerable loss of life and damage to human settlements, agriculture and forestland. Therefore, prevention measures must be taken to reduce the damage before happening landslide event. Soil nailing is a ground stabilization technique that can be used on either natural and excavated slopes. It involves drilling holes for steel bars to be inserted into a slope face which are then grouted in place. Mesh is attached to the bar ends to hold the slope face in position.

The chief intent of this study is to establish feasibility of constructing soil nail walls at Gaganbawda Ghat, 55 km from Kolhapur, Maharashtra, India; by evaluating the geological reviews and surveying the site, additionally, considering physical and chemical specifications of soil and geotechnical landslide characterization. This study has been analysis particularly at Gaganbawda Ghat landslide, such that, the same method may be utilised to arrest other similar landslide prone areas of Maharashtra and India.

Keywords – Gaganbawda Ghat, Landslide, Mitigation, Shortcreting, Soil nails.

I. INTRODUCTION

Soil nailing technique to stabilize slopes and excavations in soils has been drawn-out from New Austrian Tunnelling method (NATM), which is a system for underground excavations in rock supports. In NATM, passive metallic reinforcement, known as rock bolts, are inserted and grouted in conjunction with shotcrete facing. By the use of soil nailing technique we can stabilized the certain slope for prevention over landslide and can reduce the damage and human losses due to landslide.

Soil nails are basically rigid bars which driven into soil or pushed into boreholes which can be subsequently filled completely with grout. Together with the in-situ soil, they chart a coherent structural body supporting an excavation or holding the movement of an unstable slope. Soil nail walls are a widely used technology for retaining vertical cuts, nearly vertical cuts in soil and any slope which is at an angle steeper than the soil parameters would normally permitted.

This Project is based on the case study and analysis of soil nailing technique used at sorchen bypass in Bhutan and the feasibility of implantation of the same in Gaganbawda Ghat, Kolhapur with the pros and cons over retaining walls for prevention measures in landslides.

II. OBJECTIVE OF PROJECT

1. To prevent human losses and their settlements from landslide.
2. To find effectiveness of soil nailing technique over other techniques.
3. To find the suitable application of soil nailing in different ground and soil conditions.

4. To find percentage of damage takes place before and after applying soil nails and mesh by using empirical data.

III. METHODOLOGY

3.1 Methodology

3.1.1 Selection of Site :-

- Location: Gaganbawda Ghat, Kolhapur.
 - Geographical area: 28228 ha.
 - Co-ordinates of Location: 16° 54' 35.05" North (Latitude)
 73° 09' 45.50" East (Longitude)
- Gaganbawda Ghat is located at 55 km away from Kolhapur District and 19 Km far from Vaibhavwadi Taluka.



(Location map of Gaganbawda Tehsil)



(Landslide dated on 29/09/2021)

3.1.2 Design Considerations :

- The Design provided in this is in accordance with the Geotechnical Engineering Circular No. 7 – Soil Nail Walls reference manual (GEC 7) published by U.S Department of Transportation, Federal Highway Administration.

Sr No.	Parameters	Recommendation as per Soil Nail Walls reference manual (GEC 7)	Parameters adopted in the design considerations
1	Nail length	0.7H	11m
2	Nail inclination	10° to 20°	15°
3	Drill hole diameter	100mm to 200mm	150mm
4	Nail spacing	1.22m to 1.83m	1.52m
5	Grade of Reinforcement bars	Fe500	Fe500

IV. FIGURES AND TABLES

FIGURES	NAME
1	Location map of Gaganbawda Tehsil and Landslide dated of 29/09/2021
2	Tabular format of design considerations

V. CONCLUSION

- Soil nailing technique found to be effective for prevent landslide disaster in Gaganbawda Ghat.
- Soil Nailing is a pocket friendly method for land mitigation and as compared to the native techniques like construction of Retaining wall.
- It can prove to be more efficient, less materials consuming, easy to make and most importantly more economical.
- This technique can be executed only on some suited types of soils.

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