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# STUDY ON SOIL NAILING

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**Abstract:** Soil stabilization is a vast topic of study. It increases the shear strength of soil and also controls shrinkage which thereby enhances the bearding capacity of the soil helping it to support foundations and superstructure. It is done mostly by adding various elements like cement, lime, coal etc. in the soil. Another method is developed named soil nailing in which using steel bar as soil nail stabilizes the soil.

**Keywords:** Bitumen, Pavement, Plastic waste, Aggregate, Chicken grid, recycling.

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## INTRODUCTION

Soil nailing is a construction remedial measure to treat unbalanced ordinary soil slopes or as a assembly practice that allow secure over-steepening of fresh or presented soil slopes. Reinforcing or solid or hollow-system bars are inserted in the soil. Soild bars are inserted into the pre-drilled holes and with the help of separate grout line they are grouted. Hollow bars may or may not be pre-drilled and grouted simultaneously by using sacrificial drill bit and in drilling process pumping of grout down is done.


**Figure 1 Soil Nailing**[2]

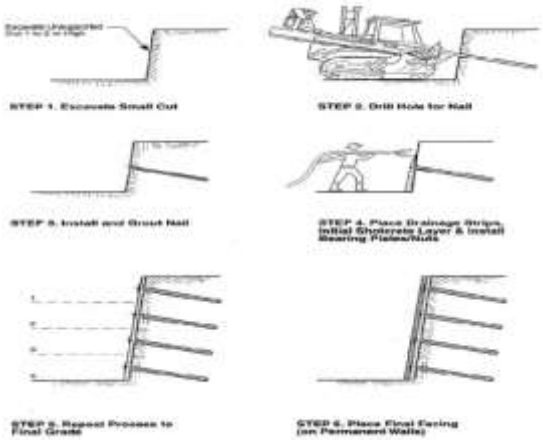
## OBJECTIVES

- Soil nail can prevent landslides by inserting steel reinforcement bars into the soil and anchoring them to the soil strata. It is called Soil Nail because it's like having a nail being hammered into the soil.
- Stabilization of slope
- Making of Tunnel portals
- Filling Roadway damages
- Preventing soil erosion from bridge embankments.
- Refurbish and restoration of already made retaining structures
- Steep cutting stabilizations
- Provide long term stability to existing concrete structures without demolition and rebuilding costs

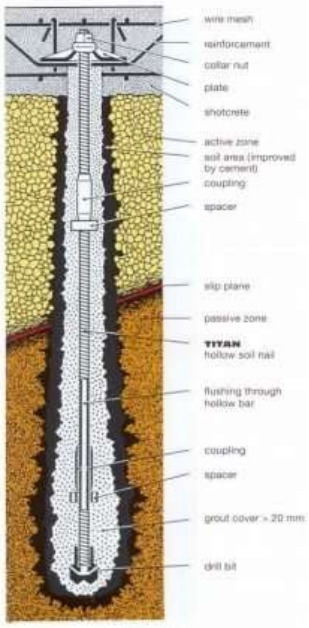
## MATERIALS AND METHODS

Wall with soil nailing gives a repelling load against the failure of slope. Its construction process is faster than other similar methods. The initial step to start the method is to drill into the soil in which the nail would be pushed. After the drilling the Engineer would provide the exact depth of nail to be dug in the drill hole. It must not be too short or too long. Just like a gravity wall. Grouting is done in the soil which then acts like retaining wall. After the placement of nail. A layer of shot-crete is placed for facing material. An optional aesthetic finish is given about the

layer giving a asthetic look to the site. Steel tendons typically used for drill-and-grout soil nails usually consist of 0.8 to 2.0-inch bars with a yield strength in the range of 60 to 72 KSI. Drainage is a significant attribute of soil nail wall structure. Face drainage is mostly used with eternal walls, and very usually used with momentary walls. Face drainage usually consists of synthetic drainage elements placed between the shot-Crete and the retained soil and may be typically 8 to 12 inches wide synthetic strips or perforated pipes.The grouted soil nail hole typically has a minimum diameter of 4 inches[4]. To maintain an even thickness of grout around the bar centralizers are placed..Nails with e-poxy coating or by providing any adhesive material are placed so that they last longer without corrosion in permanent structures.



Construction sequence of soil nailing (Byrne et al., 1998)




**Steel Bar Properties**

**BENEFITS & LIMITATIONS**

It is superlative for firm places. It can be used in uneven shapes. A smaller amount clatter and smaller amount of traffic obstruction. A reduced amount of impact on surrounding areas. Least amount of shoring is required. Requires less working area and better than traditional methods. Lower load requirements than tieback anchors systems. Eliminates the time and outflow of insertion steel piles. Wall height is not restricted. Reduced right-of-way requirements.
In some instances, the soil might be overexposed prior to the installation of the nail. Sand and gravels might not be compatible with soil nailing. Not recommended to use in areas of a high water table. Soil nailing in very low shear strength soil may require a very high soil nail density. Soil nailing in sensitive soils and expansive soils for permanent long-term applications is not recommended. Specialized contractors are needed to perform the work[5]

This technique can't be used where strict deformation control is required as it mobilizes its friction resistance with ground deformation.

a) A dewatered face is highly desirable for soil nailing otherwise it is impossible to establish a satisfactory shotcrete skin.
b) Soil nailing is not well suited for clean sands and gravels.
c) In soft clays, due to lesser friction generated, high reinforcement density of considerable length is required.
d) This technique is conventionally unsuitable for ground having high water table level due to difficulty in drilling and excavation.
e) Construction of soil nails require specialized work his technique can't be used where strict deformation control is required as it mobilizes its friction resistance with ground deformation.
f) A dewatered face is highly desirable for soil nailing otherwise it is impossible to establish a satisfactory shotcrete skin.
g) Soil nailing is not well suited for clean sands and gravels.
h) In soft clays, due to lesser friction generated, high reinforcement density of considerable length is required.
i) This technique is conventionally unsuitable for ground having high water table level due to difficulty in drilling and excavation.
j) Construction of soil nails require specialized worked

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ground having high water table level due to difficulty in drilling and excavation. f) Construction of soil nails require specialized worker.[6]

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