Week-01-L-06

Value Engineering Agricultural Plan

Introduction to Value Engineering (VE)

Value Engineering Exercise Session

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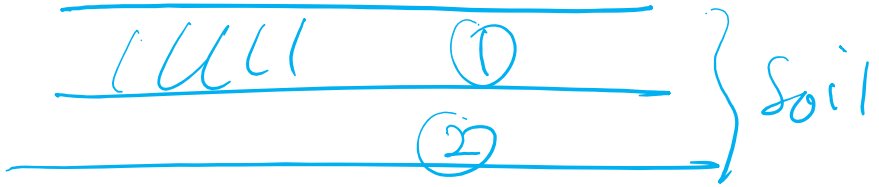
A case study



- In the case of construction in Dholera Smart City, the team encountered surprising soil behavior during road building. Initial assessments, based on color and local knowledge, suggested the soil was unsuitable for construction.
- However, a deeper investigation revealed that the problematic "black cotton" soil was hidden beneath the surface. To confirm the suitability of the soil, the team examined local roads and found that road issues were related to the asphalt surface, not the base or subgrade.
- Subsequent soil testing and analysis, considering the soil both as strata and material, indicated that the soil was weak due to fluctuating water levels and unsuitable water quality but could be used effectively in road embankments after compaction.
- This discovery led to significant cost savings by repurposing approximately 1.25 million cubic meters of excavated soil, which was initially considered waste. The savings were estimated at ₹250 million, highlighting the importance of thorough soil evaluation in construction projects.

A case study:
Don't judge the soil by its appearance

- Unexpected Soil Behavior: Surprising soil behavior was encountered during road construction in Dholera Smart City.
- Initial Assessment Misjudged Soil
- Deeper Investigation Revealed Hidden Soil
- Road Issues Linked to Asphalt, Not Soil
- Cost Savings of ₹250 million from Soil Repurposing

Source: dholera-smart-city.com

Site Assessment and Soil Evaluation

- The team encountered unexpected soil behavior during road construction in Dholera Smart City.
- Initial judgments about the soil quality were based on color, feel, and local knowledge.
- The team noted the flat ground, lack of vegetation, and fine-grained soil.

Source: agrivi.com

Surprising Soil Discovery

- Surprisingly, the so-called "black cotton" soil was not visible on the surface but found beneath a meter of soil.
- Initial assessment deemed this soil unsuitable for road construction, but the team was not convinced.

Source: housing.com

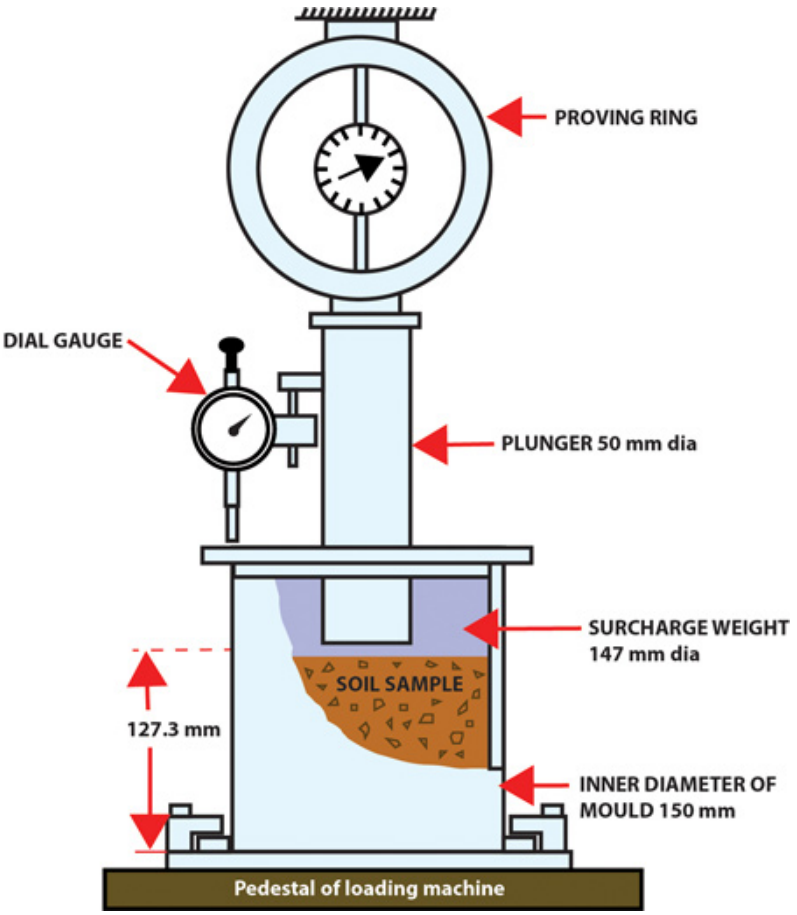
Road Condition Investigation

- To gain a better understanding, the team inspected local roads and found issues in the asphalt wearing course rather than the base or subgrade.
- This observation reinforced the belief that local soil could be suitable for road construction.

Source: resilientroadways.com

Initial Soil Testing and Hypotheses:

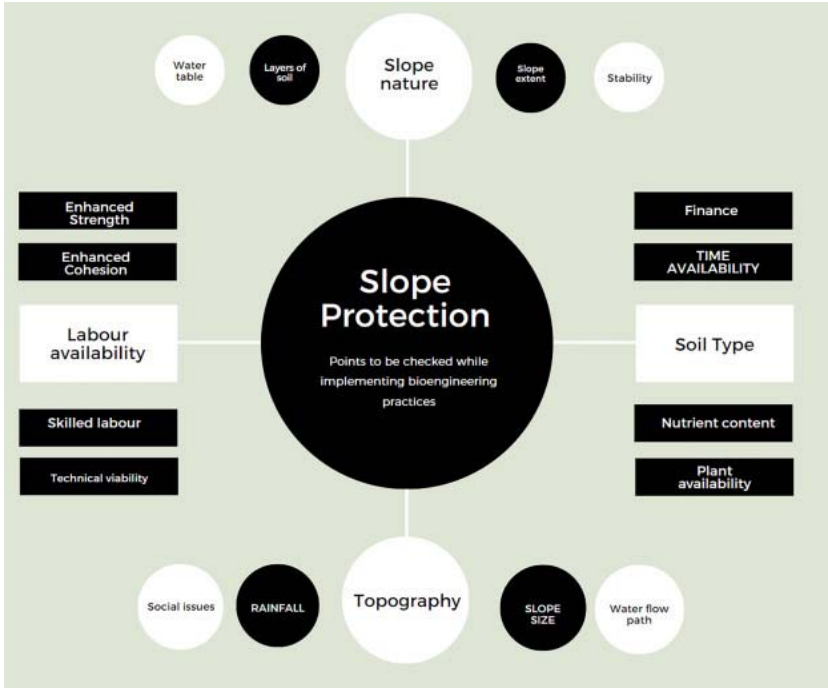
- After setting up a site laboratory, tests were conducted to check field density and observe the soil characteristics.
- Notable factors included the site's proximity to the sea, fluctuating water table, and high groundwater content with chlorides and sulfates.
- Soil properties such as density, color, classification, particle size distribution, and California Bearing Ratio (CBR) were determined.
- Both the surface and the soil at a depth shared similar properties.



Source: globalgilson.com

Soil Interpretation

- The soil was viewed from two perspectives: as strata and as material.
- As strata, it was considered weak due to fluctuating water levels, unsuitable water quality, uniform grading, and absence of natural consolidation agents.
- As material, the index properties made it suitable for road embankments, & soil's strength improved after compaction.
- The black color of deeper soil likely resulted from prolonged exposure to high groundwater.



Source: sciencedirect.com

Cost Savings and Environmental Impact

VE

The surprising discovery allowed for the use of approximately 1.25 million cubic meters of locally excavated soil in embankment filling.

This soil, previously considered waste, resulted in significant cost savings, estimated at ₹250 million, by avoiding disposal costs and the need to bring in soil from elsewhere.

These findings underscore the importance of thorough soil evaluation and the potential for significant cost savings in construction projects.

Thank You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