

DEVELOPMENT OF SOIL PROPERTY MAP FOR KOLHAPUR CITY

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Abstract - Soil plays a vital role in civil engineering as the stability and safety of any structure depend upon the properties of the soil on which it is constructed. This study focuses on the development of a soil property map for Kolhapur city based on experimental Examination and laboratory analysis. A preliminary survey was conducted to select representative sampling locations across different regions of the city. Soil samples were collected from these locations and tested for various engineering properties such as grain size distribution, Atterberg limits, moisture content, specific gravity, and compaction characteristics. The results obtained from these laboratory tests were carefully analyzed to determine soil classification and behavior patterns. Significant Diversity in soil properties were observed across different zones, indicating differences in strength and plasticity characteristics. Based on the analyzed data, a soil property map was prepared to identify strong, moderate, and weak soil zones. This map serves as a useful reference for engineers, planners, and construction professionals in selecting Appropriate Substructure types and ensuring safe and economical development within Kolhapur city.

Key Words: Soil Mapping, Geotechnical Examination, Soil Classification, Kolhapur, Foundation Design, Soil Testing

1. INTRODUCTION

Soil is one of the most critical components in civil engineering because the safety and stability of any structure depend on the characteristics of the soil on which it is built. Proper knowledge of soil properties is essential for safe foundation design, site selection, and infrastructure planning. Rapid urban development has increased the demand for reliable geotechnical information to support economical and sustainable construction. Kolhapur city has experienced continuous growth in residential and infrastructure development. However, the region shows significant Diversity in soil types due to geological and environmental conditions. These variations influence bearing capacity, settlement behavior, and overall structural performance. Lack of preliminary soil information often leads to increased construction costs and potential structural issues. To address this need, the present study focuses on the development of a soil property map for Kolhapur city. Soil samples were collected from selected locations and tested to determine their engineering properties. The analyzed data was used to classify soil behavior and prepare a map showing soil suitability for construction. This study aims to provide a

preliminary reference for engineers and planners for safer and more informed development.

2. LITERATURE REVIEW

Previous studies have highlighted the importance of soil Analysis and mapping for safe and economical construction. Researchers have used Geographic Information System (GIS) techniques to analyze spatial Diversity in soil properties and present the results in map form. Laboratory tests such as grain size distribution, Atterberg limits, and compaction tests have commonly been used to classify soil behavior and identify weak zones in urban areas. These studies show that soil property maps help engineers in site selection, foundation design, and urban planning.

Several researchers have also emphasized the role of geotechnical Examination in reducing construction risks. Variations in plasticity, moisture content, and density significantly influence settlement and structural stability. Lack of proper soil Analysis often leads to increased construction costs and Substructure problems. Previous work concludes that preliminary soil testing and soil classification are essential before any construction activity, especially in rapidly developing cities.

3. METHODOLOGY

The study followed a systematic approach. A preliminary survey was conducted to select sampling locations across the city. Soil samples were collected and tested for grain size distribution, Atterberg limits, moisture content, specific gravity, and compaction characteristics. The analyzed results were used to classify soil behavior and prepare the soil property map using GIS.

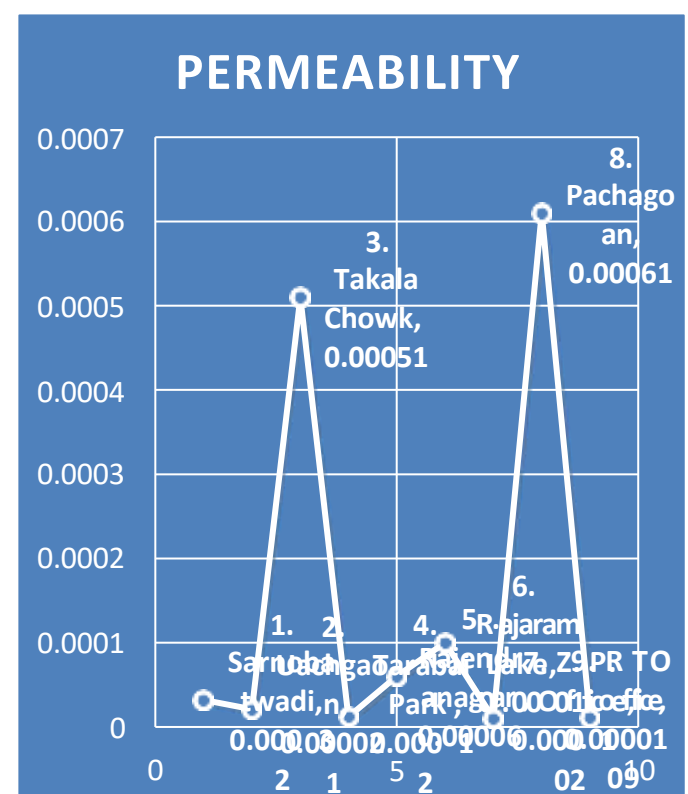
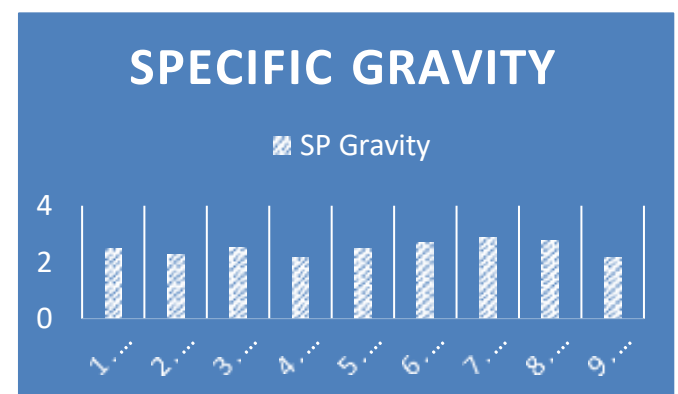
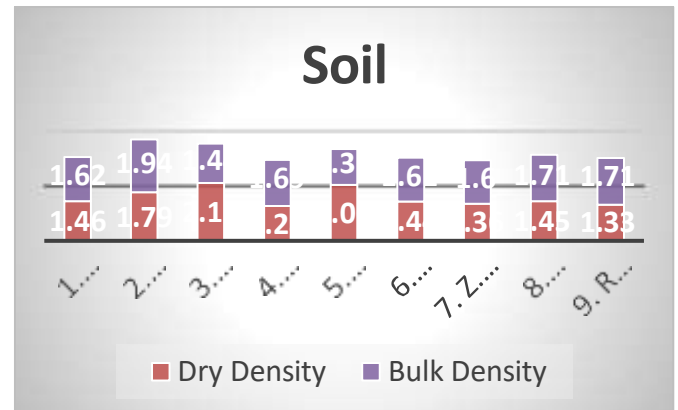
4. STUDY AREA

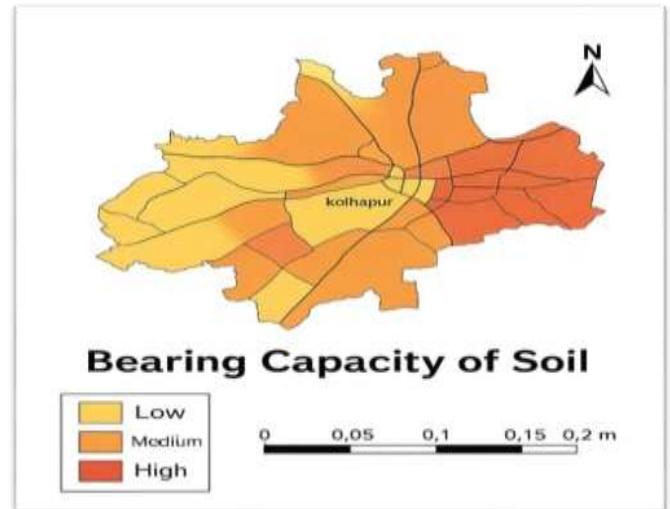
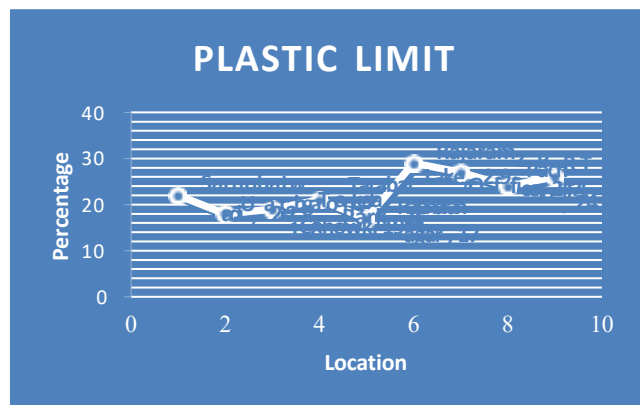
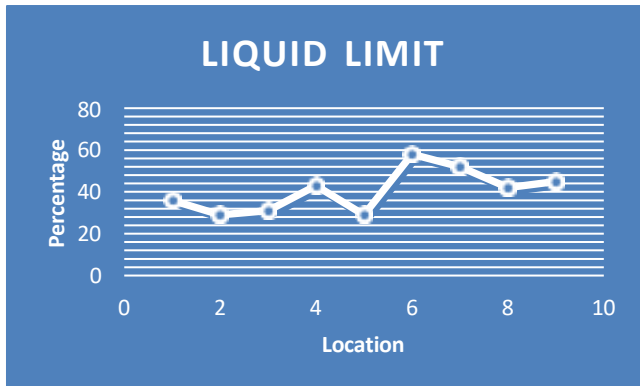
Kolhapur is a rapidly developing city in Maharashtra, India. The region shows Diversity in soil types due to geological and environmental conditions. Multiple locations were selected to represent different zones of the city for soil sampling and analysis.

5. RESULTS

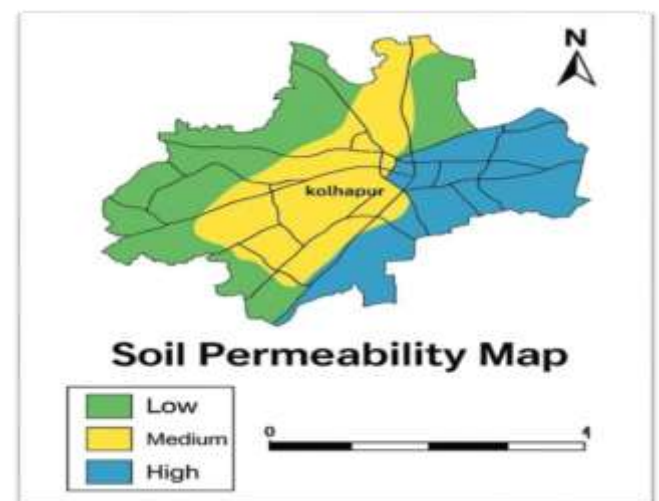
Sr. No	Location	Specific Gravity	Permeability
1.	Sarnobatwadi	2.47	0.000032
2.	Uachgaon	2.26	0.000021
3.	Takala Chowk	2.52	0.00051
4.	Tarabai Park	2.15	0.000012
5.	Rajendranagar	2.48	0.00006
6.	Rajaram Lake	2.68	0.0001
7.	Z. P. Office	2.86	0.0000102
8.	Pachagoan	2.76	0.00061

Sr No.	Dry Density (g/cc)	Bulk Density (g/cc)	Liquid Limit (%)	Plastic Limit
1.	1.46	1.62	36	22
2.	1.79	1.94	29	18
3.	2.13	1.44	31	19
4.	1.28	1.69	43	21
5.	2.06	1.31	29	17
6.	1.44	1.61	58	29
7.	1.36	1.6	52	27
8.	1.45	1.71	42	24
9.	1.33	1.71	45	26





BEARTING CAPACITY MAP FOR KOLHAPUR CITY



PERMEABILITY MAP FOR KOLHAPUR CITY

Soil Bearing Capacity	Range (KN/m ²)	Suitable Foundation Type
Low Soil Bearing Capacity	100	Deep Foundation (Pile Foundation / Well Foundation)
Medium Soil Bearing Capacity	150	Shallow Foundation (Isolated Footing / Combined Footing)
High Soil Bearing Capacity	200	Shallow Foundation (Raft Foundation / Spread Footing)

6. CONCLUSIONS

This study presented the development of a soil property map for Kolhapur city based on field sampling and laboratory Analysis of soil samples collected from selected locations. Various geotechnical tests such as grain size distribution, Atterberg limits, moisture content, specific gravity, and compaction tests were conducted to evaluate the engineering behavior of soil. The results showed significant Diversity in soil properties across different parts of the study area.

Based on the analyzed test results, the soil in Kolhapur was classified into different zones representing strong, moderate, and weak soil conditions. The developed soil property map provides a clear visual representation of these variations and

highlights the importance of understanding soil behavior before construction activities.

The findings of this study emphasize that preliminary geotechnical Examination plays a vital role in safe and economical foundation design. The prepared soil map can serve as a useful reference for engineers, planners, and construction professionals in site selection, Substructure planning, and future urban development in Kolhapur city.

7. ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to the laboratory staff and faculty members for their valuable support and guidance during soil sample collection, laboratory testing, and data analysis. The encouragement and technical assistance provided throughout the study greatly contributed to the successful completion of this research. The authors also acknowledge the support and resources provided for conducting the experimental work.

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BIOGRAPHIES

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