

SOIL CLASSIFICATION AND MAPPING OF GHAZIABAD CITY USING Q - GIS**Aman Sengar*1, Brijmohan Prajapati*2, Harshit Yadav*3,****Mehak Yaseen Bandey*4, Hemant Kumar Gupta*5**

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ABSTRACT

Soil formation in the northern plane of India is due to the alluvial action of the river Ganga and its tributaries. In my work, a map of the soil profile of the city is drawn at a depth of 1.0 m. In this project work, the newly invented software 'Q GIS' is used to generate an appropriate map of the city. The main purpose to choose Q GIS software is nothing but its level of accuracy over the other methods of map generation like depiction or photograph. Although Ghaziabad is situated in the north-central region of India. It is very important to know the soil structural behavior of the soil near the city to minimize the effect of future disasters like liquefaction and earthquake.

Keywords: Soil, Classification, Research, Ghaziabad, Q-GIS, Soil Types.

I. INTRODUCTION

This work is based on the mapping of the soil profile of the city Ghaziabad which is an important city of India, which is located between the Ganga and Yamuna, two main Rivers of the country, and Soil formation in the northern plane of India is due to alluvial action of river Ganga and its tributaries. In my work, a map of the soil profile of the city is drawn at a depth of 1.0 m. In this project work, the newly invented software 'Q GIS' is used to generate an appropriate map of the city. The main purpose of choosing Q GIS software is nothing but its level of accuracy over the other methods of map generation like depiction or photograph. Although Ghaziabad is situated in the north-central region of India. It is particularly important to know about the soil's structural behavior near the city to minimize the effect of future disasters like liquefaction and earthquakes Ghaziabad is in seismic Zone-VI, so it is vulnerable to earthquakes. This district is in danger for natural calamities like Floods, Droughts, Windstorms, Sunstroke, Cold waves, Fire, etc. and man-made calamities like Accidents, and Chemical and Biological threats etc. I have collected more than 8 boreholes data to precede my work. I have collected the data from various sources and governmental bodies like Uttar Pradesh Jal Nigam, Uttar Pradesh Public Work Department, and Ghaziabad Development Authority. My project work aims to provide the basic data that may be further used to know the soil structural behavior of the soil of the city Ghaziabad. This may be further used to minimize the losses due to earthquakes in Ghaziabad.

II. METHODOLOGY

In this work, first soil samples were collected from the boreholes in Ghaziabad from KIET Campus, Gangnahar, Kavi Nagar, Behta Hajipur, Dasna, Madhapur, Modinagar, Kumheda, samples were kept for 24 hrs. in oven at 100-degree Celsius to make the soil dry. Tests were done in Geotechnical Labb like moisture content for analysis of Natural water content, Sieve analysis, and Liquid limit and plastic limit test to get the type of soil and Proctor compaction test to get the Optimum moisture and maximum dry density of the soil. A digital Shapefile of Ghaziabad was created using Google Earth, that shapefile was used for map generation using "Q-GIS" software. Inverted distance weightage (IDW) method of Interpolation is used for map Generation.

III. GEOREFERENCING OF BOREHOLES

This is a process in which all the data collected during the work was digitized using the software "Q-GIS".



Figure 1: Georeferenced map of Ghaziabad

IV. RESULTS AND DISCUSSION

In this work, soil samples were collected from different places in ghaziabad i.e., KIET Campus, Gangnahar, Kavi Nagar, Behta Hajipur, Dasna, Madhapur, Modinagar, Kumheda. Some tests were performed to get the soil type and other parameters of the soil samples like moisture content determination, sieve analysis was done on 4.5mm, 2mm,1mm, 0.600mm, 0.450mm, 0.300mm, 0.150mm, and 0.075mm IS sieves. Liquid limit test using Casagrande apparatus and Plastic limit test was also conducted to get the soil type of the sample, additionally Proctor Compaction test was also performed to get optimum moisture content and maximum dry density of the soil. Various tests were performed on different soil samples collected from various sources in Ghaziabad. All the results are attached in the below table

Table 1. Test Results of Various Samples

Location	Natural water content(%)	Soil Type	OMC	MDD
KIET Campus	15.82	SC	16.2	2.135
Gang Nahar	12.27	SC	16.4	2.134
Kavi Nagar	16.63	SC	15	2.13
Behta Hajipur	12.69	SC	16	2.09
Dasna	14.58	SC	17	2.07
Madhapur	13.15	SC	16.9	2.07
Modinagar	16.58	SC	15.9	2.065
Kumheda	13.25	SC	16.2	2.14

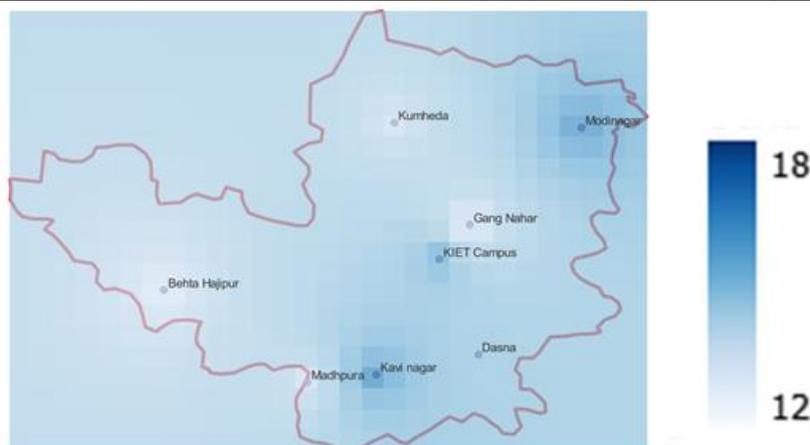


Figure 2: Natural Water Content



Figure 3: Soil Type – Silty Clay

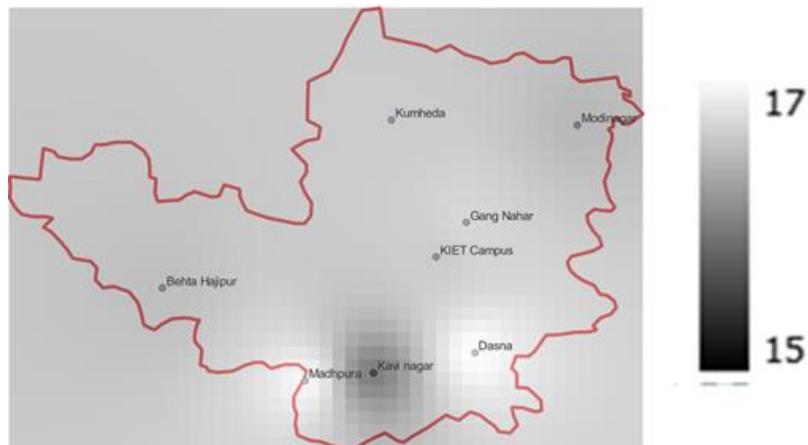


Figure 4: Optimum Moisture Content



Figure 5: Maximum Dry Density

V. CONCLUSION

The basic knowledge about the soils may be found with the help of this work. In the areas which are densely populated in Ghaziabad where preliminary soil surveys may not be possible the basic data may be taken from this work. This project work may provide basic information for shallow foundations constructed in Ghaziabad City. In a dense area where SPT is not possible, preliminary and basic data may be found from this work. The soil which is most widely spread over the city at shallow depths is Silty Clay. The maximum dry density of the various samples collected is ranging from 2g/cc to 2.2g/cc and the optimum moisture content is ranging between 15% to 17%. It may be easily found out which area is covered with which types of soils. This work

may be further used to know the soil structural behavior of the soil of the city Ghaziabad. This may be further used to minimize the losses due to earthquakes in Ghaziabad.

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