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# “PLANNING AND INVESTIGATION OF ENGINEERING PROPERTIES OF SOIL IN PARTICIPATORY WATERSHED PROJECT AT VILLAGE SONDI (Tah.Seloo, Dist. Wardha)”

Mr.Yogesh Kamdi<sup>1</sup>, Mr.Sanket Jadhav<sup>2</sup>,Mr.Sandesh Puri<sup>3</sup>, Ms.Samiksha Ghude<sup>4</sup>, Mr.Sumit Gomase<sup>5</sup>, Ms.Shweta Chafle<sup>6</sup>, Prof. M.M. Lohe<sup>\*</sup>, Prof. A.P. Bobade<sup>\*</sup>

<sup>1</sup>UG student,CivilEngineering, BDCOE Sewagram, Wardha,Maharastra,India,kamdi.yogesh9@gmail.com

<sup>2</sup>UG student,CivilEngineering,BDCOE Sewagram, Wardha,Maharastra,India,sanketvjadhav88@gmail.com

<sup>3</sup>UG student,CivilEngineering,BDCOE Sewagram, Wardha,Maharastra,India,sandeshpuri2016@gmail.com

<sup>4,5,6</sup>UG student,CivilEngineering,BDCOE Sewagram, Wardha,Maharastra,India

<sup>\*</sup>Asst. Professor,Civil Engineering, BDCOE Sevagram, Wardha, India

### Abstract

*A soil is composed primarily of minerals which are produced from parent material that is weathered or broken into small pieces. Plants and animals have important roles to play in soil. Both plants and animals change the composition and structure of soil in many different ways. Plants with roots obtain nutrients and moisture from soil through their roots. Soils are characterised by their physical, chemical and biological properties. In addition, soils are good materials used in engineering projects. soil foundation, use of soil in constructions and industrial applications is another dimension of soils. The objective of studying this module is to know about the engineering properties of soils and their significance.*

*Forewords: Geotechnical Properties, Civil Engineering Structures, soil particle, shear strength, Bearing capacity of soil, PVD's.*

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## 1. INTRODUCTION

A watershed is an area of land that feeds all the water running under it and draining off of it into a body of water. It combines with other watersheds to form a network of rivers and streams that progressively drain into larger water areas.Sondi village geographically hilly region the land of this village has a large slope. Therefore water flow out of the field area in an accelerated rate along with the water the fertile soil is also drained. This flowing water flow from top to bottom Therefore it is necessary to reduce the speed of water and twist the water into the soil.

We are conducting soil investigations to determine the suitability of land for watershed are beyond the ability of one individual and require the cooperative effort of a team of specialists and students. This work examines the purpose and nature of the soil and considers certain general aspects to soil surveys.Knowledge of the soils within a potential watershed project area is essential for economic and technical reasons.

## 2. METHODOLOGY



### 2.1 Site Selection

1. Topographical survey of village.
2. Undeveloped rural area.
3. Increase in migration rate.
4. Geological survey of village Area.
5. Not covered under any irrigation project.
6. Less government schemes are implemented.
7. Good hydrological conditions (rainfall).
8. Firm and dense soil strata is available.
9. Local Material required for watershed structures are available (economical).
10. Site of watershed project is near to village which gives maximum benefit to village for recharging ground water table.

### 2.2 Survey On Site

- 1.Reconnaissance survey
2. Detailed reconnaissance survey
- 3.Topographical survey
- 4.Detailed engineering survey
5. Detailed soil survey ( geotechnical survey)
6. Map survey
7. Geological survey (data collection)
8. Hydrological survey (data collection)
9. Questionnaire survey (data collection)
10. Detailed agricultural survey

### 2.3 Geological data collection

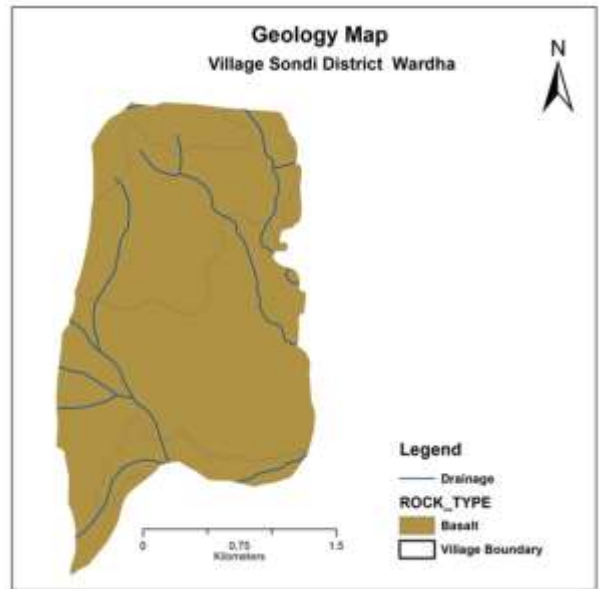


Fig-2: Geology Map

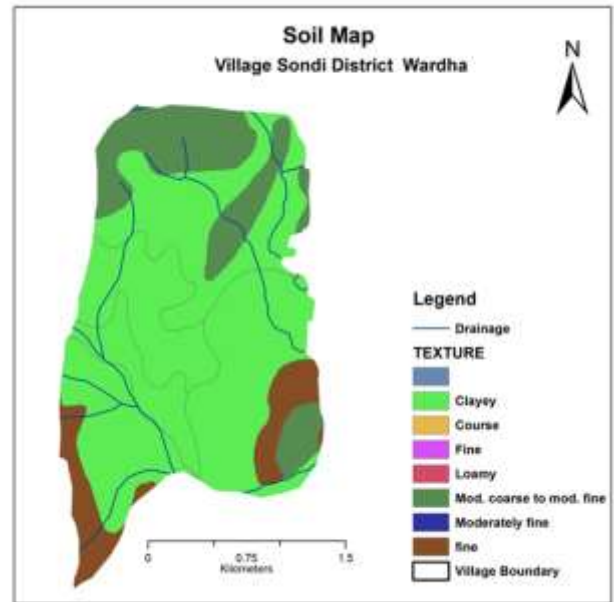


Fig-3: Soil Map

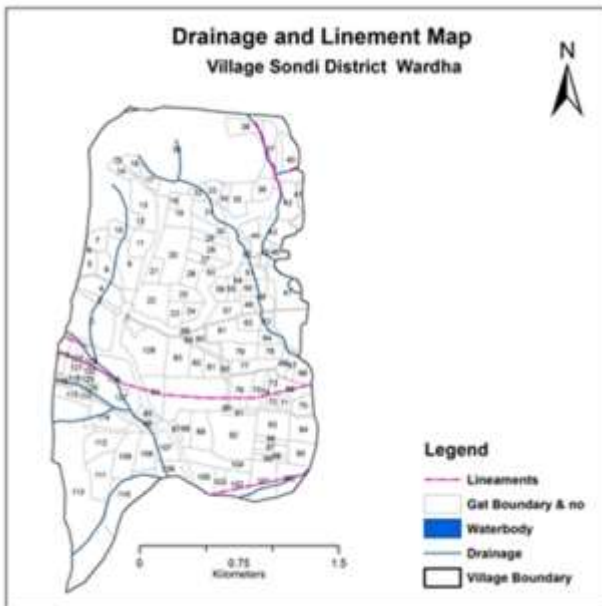


Fig-1: Drainage and Linement Map



Fig-4: Hydrograph of village Sondli

## 2.4 Collection of soil sample

For investigating the engineering properties of soil samples.

### Soil sampling:

A soil sample is the representative of the whole lot from which it is taken. It completely represents all the characteristics of the lot from which it is recovered. Following are some of the types of samples which are generally retrieved in geotechnical engineering:  
Disturbed soil samples (DS)  
Undisturbed soil samples (UDS)

#### a) Disturbed soil sample (DS):

When the natural conditions of a sample such as its structure, texture, density, natural water contents or the stress conditions are disturbed then the sample is called as disturbed soil sample. By using shovel from auger cutting these samples can be recovered.

#### b) Undisturbed soil samples:

Without disturbing the natural conditions of a soil sample such as its structure, texture, density, natural water contents or the stress condition the sample obtained is called undisturbed soil sample. This type of soil sample cannot be recovered and it retains the original properties of the soil mass as much as possible.

## 2.5 Soil testing

After collecting 20 soil samples following tests are performed:

### Disturbed soil sample

1. Determination of moisture content by oven drying method.
2. Performing sieve analysis and plotting particle size distribution curve.
3. Determination of liquid limit and plastic limit
4. Determination of shrinkage limit.
5. Determination of specific gravity of soil passing through 4.75mm IS sieve using Pycnometer.
6. Determination of optimum moisture content and dry density by standard proctor test.
7. Determination of coefficient of permeability by variable head method .
8. Determination of direct shear test.
9. Determination of Triaxial shear test.
10. Determination of bearing capacity by California Bearing Ratio test.
11. Determination of bearing capacity by Is code method.

### Undisturbed soil sample

12. Determination of bulk density and dry density by using core cutter method.

## 2.6 Observation And Result

Sr. No	Soil properties	Permissible limit	Calculated result
1	Moisture content	Less than 60%	10% to 35%
2	Grain analysis	-	All type of graded soil available
3	Liquid limit	Less than 60%	30% to 42%
4	Plastic limit	Less than 40%	15% to 22%
5	Shrinkage limit	Less than 20%	10% to 18%
6	Specific gravity	2.65 to 2.85	1.8 to 2.95
7	Bulk density	Greater than 1.6 gm/cm <sup>3</sup>	1.68 gm/cm <sup>3</sup> to 1.99 gm/cm <sup>3</sup>
8	Dry density	Varies for required specification	1.2 gm/cm <sup>3</sup> to 2.2 gm/cm <sup>3</sup>
9	Optimum moisture content	10% to 27%	13% to 24%

Table-1: Laboratory Test Result

## 3.CONCLUSION

The main focus of this paper is to study and analyze various soil samples in various regions at village Sondi. In this Village it has been observed that some critical soil samples have been identified with deficiency in parameter but that soil is suitable for ground water recharge and the hard rock is available below the depth of 3m at source of watershed catchment but if we go to the downstream side then the depth of rock bed increases and the soil is found with combination of 40 mm stones with clayey soil. and from the comparison of result it is indicated that the soil is suitable for various watershed structures.

## 4. ACKNOWLEDGEMENT

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geological data of village Sondi . We are also thankful to our project guides who guided and encourage us .and inspiration to continue efficiently working on our project and obtain promising results.

## 5. RESULT

Our project result occurred from Investigating Soil Properties of village Sondi and working as a student technical adviser in the participatory watershed project of village sondi under NDS Foundation. Practical processes are as follows:

- We investigating soil properties.
- Submission of geotechnical test report of soil to the design team .
- Execution of designed watershed structures.

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