Study on utilization of dredged material in soil subgrade

Midhat Shabir¹, Aman Bathla², Dr. Amit Gupta³

¹M. Tech Scholar, ²Assistant Professor, ³Professor
Civil Engineering Department
Geeta Engineering College, Naultha, Panipat

Abstract: This study presents the results of experimental study carried out to investigate the Subgrade geotechnical properties of dredged material from Wular lake, one of the largest fresh water lakes in Asia and largest flood basin of Kashmir in the northern Bandipora district 34 km north of Srinagar. Every year thousands of tons of silt is deposited in the lake which is constantly decreasing its depth and water holding capacity. Dredging the heavily silted Wular lake is a key to save it from dying. Its dredging operations generate a large quantity of dredged material posing serious health and environmental problems. Concern over environmental effect of dredging, disposal of dredged material and the increasing unavailability of suitable disposal sites has put pressure for characterization of this material as a resource for various beneficial applications. Its mineralogy and geotechnical properties qualify it for various uses. Therefore, comprehensive laboratory and field investigations were conducted to determine the engineering properties of the dredged material. The results show that dredged material can be effectively used in bulk as a resource for various applications. Thus our study aims at to determine the properties of the material and is this material suitable for subgrade of roads.

Keywords: dredged material, subgrade soil testing, water content, CBR etc

INTRODUCTION

Wular lake is one the largest fresh water lakes in Asia. It is sited in the Bandipora district. Wular Lake is located 34 km northwest of Srinagar city at an altitude of 1,530 m AMSL between 34°20’ N latitude and 70°24’ E longitude. It is elliptical in shape with a maximum length of 16 km and breadth of 7.6 km. The lake is surrounded by high mountainous ranges on the northeastern and northwestern sides, which drain their runoff through various Nallahs, prominent being Erin and Madhumati. On the eastern and southern sides are the low lying areas of Sonawari which used to get inundated almost every year until numerous criss-crossing embankments were constructed along River Jhelum.

1.4 OBJECTIVES OF THE WORK:-

Our Project Objectives may be summarized as:-

• To study the various geotechnical parameters of the dredged material from Wular Lake to check whether it is suitable for road subgrade.
• To determine the suitability of the material dredged from Wular lake for different uses like filling and foundations.
• To determine the feasibility of the material dredged from Wular lake for use in road construction.

LITERATURE REVIEW

DREDGED MATERIAL AND ITS SOURCES:-

Dredging is simply the removal of sediments from a body of water that have accumulated due to upland erosion in order to maintain a desired depth, as in a reservoir, lake, dam, shipping berth, navigation channel. Dredged materials exhibit properties similar to those of undisturbed native soil and rock materials in a subaqueous environment, but when excavated, removed, remoulded, or redeposited, the properties change accordingly as the original material structure changes. High water contents, low dry densities, and low shear strengths typify remoulded and deposited fine-grained dredged materials. Dredged material is categorised into various sediment types such as- Rock, gravel and sand, consolidated clay, silt or soft clay and a mixture of rock, sand silt and soft clay. Rock may range from soft marl like sandstone and coral to hard rock like granite and basalt. Depending on its size and quantity rock can be a valuable construction material. Gravel and sand are perhaps the most valuable resource and are routinely used for beach nourishment, wetland restoration and many other purposes. Consolidated clay, if the water content is low, can be used for engineering purposes. Silt and soft clay usually come from maintenance dredging, are rich in nutrients and thus are good for agricultural purposes such as topsoil and for wildlife habitat development. Mixed materials are somewhat more restricted in use options but may still be used for filling, and improvement and topsoil. Using dredged material as a resource is important, one could almost say urgent, because use – rather than disposal has broad societal, environmental and financial benefits. It contributes to global sustainability. The potential uses for dredged material depend on the type of dredged material, where it is dredged, how it is dredged and its overall acceptability. Two broad categories of proposed uses are often distinguished: Engineering uses and environmental uses. Engineering uses of dredged material include: Construction including landfill and foundation materials; Isolation of contaminated sites; Flood and coastal protection, such as beach nourishment; Land improvement; and Placement on riverbanks. Environmental enhancement using dredged material includes: Habitat creation and improvement; Water quality improvement; Aquaculture; Agriculture; Recreation; Sustainable relocation; and pit filling. In both cases, criteria are to be established that ensure that extensive testing is done for suitability of materials, that the potential use site is in reasonable proximity to where the dredging is planned and...
that a thorough physical and chemical evaluation is done. Beneficial use of dredged material is an integral and necessary part of the dredge material management process. Dredged material can be beneficially used in upland, wetland, and aquatic environment.

RESULTS AND DISCUSSIONS

All the tests were carried out as per relevant Indian Standards. All necessary precautions were taken while performing the tests. Complete set of observations for each test are given in Appendix.

- Particle size analysis
- Liquid limit
- Dry Density Test
- Moisture content
- Specific gravity
- Unconfined Compaction test
- CBR Test

References

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