

A Case Study on Feasibility of Land Fill Soil for the Construction Road Embankment

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Abstract: *The Municipal Solid Waste (MSW) is a heterogeneous material which cannot be used in road embankments as such. It has large size plastics, clothes and even boulder size C&D waste. The material is much different than soil and use of MSW in embankments may result in long term settlements and ultimately lead to failure of road built over it. MSW needs to be segregated/separated for use in embankment construction. Physical and chemical characteristics of municipal solid waste are very important to know the presence of different toxic metals and their possibility of polluting the underground water resources. Geotechnical characteristics such as grain size analysis, specific gravity, compaction, permeability and swell index studied.*

Keywords: MSW soil (municipal solid waste soil), geotechnical, chemical characteristic

I. INTRODUCTION

Rapid growth of population, industrialization and urbanization during the last few decades has resulted in generation of huge quantity of municipal solid wastes (MSW) in different cities. Different constituents of this waste dump includes; food and vegetable remains, packing materials, paper, remains of used fuels, wood, metals, plastics, glass, ceramics, cloth etc. Construction and demolition (C&D) waste is dumped directly onto grounds without any segregation. Large open grounds and open excavations are often used as unregulated dumps for disposal of a variety of wastes. Landfills are mainly used as unlined open dumps for municipal and industrial wastes. The huge dumps lying at these landfills are affecting the health, hygiene, sanitation and aesthetics of the surrounding areas. These places have become habitat for bacteria, rats, flies and mosquitoes, all posing threat to human health and causing numerous human diseases. If these wastes are not properly treated, they can prove to be dangerous and environmentally hazardous. Large scale infrastructural development is being carried out in the country considering the huge surge in industrial and consumer good production. Several thousand kilometers of roads are built in the form of National Highway Development Program (NHDP) and Pradhan Mantri Gram Sadak Yojana (PMGSY) program. Environmental factors affect all biological activities and thus greatly influence the nature, rate and extent of biological decomposition. The nature of decomposition product is determined by the nature of biological decomposition. Principal factors to influence biological decomposition are microbial nutrient content, temperature, moisture, and degree of resistance of the waste to microbial attacks. Moisture is a limiting factor at moisture content levels of 55% to 60% or lower, because then the microbial activity is inhibited. The activity of most microbes increases with increase in temperature until a level of 40°C is reached.

II. LITERATURE REVIEW

As our topic is related to solid waste management, so refer the journal paper which works in solid waste management field & utilization of waste so we have an idea how we utilize & disposal the solid waste effectively. We have to do detail study about the geotechnical and chemical nature of waste as well as impact of solid waste on environment

German Co-operation (2017). "Solid Waste Management for Nagpur":-

Due to the high moisture and organic content of the MSW and taking into consideration that the MSW collection takes place as mixed waste, mass incineration is not recommended for Nagpur. We recommend an enhanced process which operates without waste segregation at the source therefore providing easy transformation to energy. According to our assessment, the mechanical biological treatment of the MSW is the most suitable technology under the existing scenario



Bhandewadi Municipal Solid Waste Treatment Plant, Nagpur

Neeraj Khatri(2016). “A Study of Reclamation of Landfill Site, Gurgaon Haryana”

In a study of reclamation of landfill site, Gurgaon Haryana. Stated that recovered soil fraction indicated that the fraction can be suitable for landfill cover material.

Nadhir Ansari(2017).) “Soil Characteristic in Selected Landfill Sites Iraq”

The results of the chemical tests for the soil and water samples, at all sites, showed that the maximum contents of sulphate, chloride and organic materials were 22.5%, 0.57% and 4.71%, respectively

Sharholly et al., (2008). “Effect of Municipal Solid Waste on Geotechnical Properties of Soils.”

-Municipal solid waste management (MSWM) is one of the major environmental problems of Indian cities. Improper management comprehensive review of the characteristics, generation, collection and transportation, disposal and treatment technologies of MSW practiced in India.[3]

Shekdar (2009).” Municipal Solid Waste Management in Indian Cities – A Review.”

Asian countries Solid waste management has been an integral part of every human society. In keeping with global trends, the systems are being oriented to concentrate on sustainability issues; mainly through the incorporation of 3R (reduce, reuse and recycle) technologies. High- income countries like Japan and South Korea can afford to spend more to incorporate 3R technologies. Most of the latest efforts focus on “Zero Waste” and/or “Zero Landfilling” which is certainly expensive for weaker economies such as those of India or Indonesia.[4]

Aakriti Chauhan(2017). “Use of Soil from Gazipur Landfill for Road Embankment Construction”

MSW soil from Gazipur landfill can be called a feasible fill material for road embankments. For further investigation, a test track may be prepared and investigated upon for better clarity on the feasibility of this material. Proper safety precautions must be taken into account.

Hanjir (2020) “Municipal Corporation of the City of Jalgaon”

The civic services in the city of Jalgaon are managed by Municipal Corporation of the City of Jalgaon. Managing Solid Waste generated

Yadav et al., (2009). “Geotechnical Properties of Fresh Municipal Solid Waste at Orchard Hills Landfill, USA.”

The problem of municipal solid waste management (MSWM) is also prevailing in the urban environment of Mysore. Therefore the present study was taken to find out the problems and prospects of Municipal solid waste in Mysore city. A detailed investigation was made regarding the methods of practices associated with sources, quantity generated, collection, transportation, storage, treatment and disposal of Municipal solid waste in Mysore city. The data concerning

to SWM in Mysore was obtained through questionnaire, individual field visit, interacting with people and authentic record of municipal corporation.[6]

III. METHODOLOGY

General

1. Landfill
2. Landfill Processes
3. Problem Statement

Test and Analysis

Waste procurement and segregation

1. Collection of landfill soil
2. Segregation

Geotechnical Characterization

1. Partical size Distribution
2. Specific Gravity
3. Compaction
4. Permeability 5.Free swell index

IV. SCOPE

1. The landfill soil can be mixed with the local available soil in the proportion to understand the.
2. For failure mechanism slope stability and settlement analysis of the embankment should be perform by using commercial software like PLAXIS, GEOSLOPE.
3. A study on application of admixture and geosynthetic material to modify soil properties should be perform.

4.1 Objectives

- Use of landfill soil as a replacement to the natural soil in road embakment construction which will help to reduce the impact of oversaturated landfill.
- Study of the physical and chemical properties of landfill soil.
- The feasibility of landfill soil from msw can act as a alternative and sustainable method for the disposal of non plastic waste.
- The volume of waste in bhandewadi dump yard can be reduced significantly

V. CONCLUSION

1. About 65% of segregation municipal solid wastes can be used for the embankment construction.
2. The soil had more than 50% particles larger than 0.075mm and had a good representation of particles of all sizes ranging from 0.075mm to 4.75mm. The soil is coarse grained sand.
3. Leachate studies indicate the MSW is non hazardous material as concentration of heavy metals is within the permissible limit

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