

Use of Plastic Waste in Road Construction in GomtiNagar Extension

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ABSTRACT – The plastic wastes could be used in road construction and the field tests withstood the stress and proved that plastic wastes used after proper processing as an additive would enhance the life of the roads and also solve environmental problems. Plastic use in road construction is not new. It is already in use as PVC or HDPE pipe mat crossings built by cabling together PVC (polyvinyl chloride) or HDPE (high-density poly-ethylene) pipes to form plastic mats. Waste plastic is ground and made into powder; 3 to 4 % plastic is mixed with the bitumen. The durability of the roads laid out with shredded plastic waste is much more compared with roads with asphalt with the ordinary mix. The use of the innovative technology not only strengthened the road construction but also increased the road life as well as will help to improve the environment and also creating a source of income.

INTRODUCTION

Highway engineering is an engineering discipline branch from civil engineering that involves the planning, design, construction, operation, and maintenance of road to ensure safe and effective transportation of people and goods.

- Road are like backbone for our country, from where road passed, the development of town, city, country rate goes high.
- Over 75 percent of population of the country living in the village , the development in urban center alone do not indicate overall development of country

- Improvement in road transportation facilities in rural area supports the development of rural area.
- By improving road facilities, we can provide education , healthcare and other social needs in villages in a much better & faster rate.

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OBJECTIVES

- To understand administrative processes involved in usage of plastic waste in road construction
- To evaluate implementation strategy of the state government, concerns faced by implementing agencies and resolution mechanism
- To assess key organizations involved and their specific roles and their coordination required with each other
- To formulate details of roll out orders for utilizing plastic waste
- To identify inter-linkages between implementing agencies and effectiveness
- To review details of Statutory and Non-statutory approvals in execution.

GUIDELINES OF INDIAN ROAD CONGRESS

The Indian Road Congress is the highest body of highway engineers in the country. The society was set-up by the recommendations of the government of India. The organisation over the years has been contributing to enhancement of the roads and bridges in India. IRC had in the H-2 committee meeting of members on the 15th of June 2012 had decided to formulate guidelines for utilising waste plastic with bitumen in road construction. The guidelines formulated by the committee were approved by the Council of IRC in August 2013.

FIELD WORK

A traffic count is a count of vehicular or pedestrian traffic, which is conducted along a particular road, path, or intersection. A traffic count is commonly undertaken either automatically (with the installation of a temporary or permanent electronic traffic recording device), or manually by observers who visually count and record traffic on a hand-held electronic device or tally sheet. Traffic counts can be used by local councils to identify which routes are used most, and to either improve that road or provide an alternative if there is an excessive amount of traffic.

Levelling : Levelling is the branch of survey by which we find the elevation of given point with respect to a assumed point.

Cost Estimation of Earthwork :

Earthwork to be estimated is for 30m lead for distance and 1.5m lift for height or depth. Formation width of road = 7m, Length of road = 1.3 km, Side slope for earth formation Banking = 2:1, Cutting = 1.5:1,

Gradient of Road :

0 to 600m = 1 in 200 Upward Gradient

600m to 1200m = 1 in 400 Downward Gradient

PROCESSING DETAILS OF PLASTIC WASTE

1. Collection of Waste Plastic
2. Cleaning and Shredding of Waste Plastic
3. Mixing of Shredded Waste Plastic, aggregate and bitumen in central mixing plant
4. Laying of Bituminous Mix

PLASTIC WASTE ANALYSIS

The Cost of Waste Plastics: **Rs.7 / Kg.**

The Cost of Processing: **Rs.5 / Kg.**

The Total cost of Waste Plastics: **Rs.12 / Kg.**^[5]

Optimum percentage of plastic in the blend as per the test results is around **8% (% Wt. of bitumen)**

Generally roads in India are constructed in basic width of **3.0 m, 3.75 m. and 4.0m.**

Consider 1 Km length road of width 7m. it uses bitumen approx. 16870Kg. **For new work** and 16870Kg.

For Up-gradation.

The Cost of Bitumen: **Rs.8400 / Drum (200 Kg.)**^[6]

The Cost of Bitumen: **Rs.42 / Kg.**

Cost of New Road / Km including BBM, Carpet, and Seal Coat: Rs.18,95,000/-10

→ Bitumen required for work (approx.): **16870Kg. / Km**

→ Cost of bitumen in new work: **Rs.7,10,000/ Km.**

→ Waste plastic, co-processed with bitumen for PMB (8% by Wt.): **Rs.1350 / Kg.**

→ Cost of waste plastic used: **Rs16200 / Kg.**

→ Cost of Bitumen saved (1350Kg. equivalent to plastic used): **Rs.56,700**

TEST CONDUCTED ON MATERIAL

1. Impact value test of Aggregate
2. Los Angeles Abrasion Test
3. Penetration Test of Bitumen
4. Marshall Stability Test

CONCLUSION

This project report involves estimation of earthwork quantity and cost required for a 1.0 km portion of the Gomtinagar, formation width 7m, located in Gomtinagar, Lucknow. The proposed road starts from Navodaya vidyalaya samiti, Gomtinagar and passes through Police Headquarter and ends at Police Headquarter GateB, Gomtinagar. The Abstract Cost was formulated by incorporating Bitumen with using Plastic waste, Bricks and Aggregates in addition with the other works and contingencies like labour, machinery and equipments charges. All the rates have been considered from the PWD Schedule of Rates for Lucknow Circle.