



Ministry of Housing, Utilities
& Urban Communities



Housing & Building National Research Center
International Conference

Future Vision & Challenges for Urban Development

Green Smart Sustainable Building between Present & Future

Cairo – Egypt, December 2024



Housing & Building National
Research Center

Template No. (1)

Workshop Title: Use of Plastic Waste in Road Construction

Abstract:

Within the framework of Egypt's interest in sustainability, green construction and cost reduction, and since plastic waste represent the largest share of solid waste in Egypt, their recycling and use in developing asphalt road construction technology played an important role in this direction. By referring to previous studies and discussing the determinants of specifications and guidelines in this field, it was found that the use of plastic waste in asphalt roads improves mechanical properties and reduces carbon dioxide emissions, as previous research confirmed that using 1 ton of plastic in asphalt road construction reduces carbon dioxide emissions by approximately 3 tons. With reference to the report issued by HBRC on the study and examination of the Indian guideline for the use of plastic waste in road construction No. RDSO/WKS/2019/1, which includes the classification and sorting of plastic waste into two types: thermoplastic, which can be reshaped by pressure and heat and molded and hardened by cooling, and thermostable, which cannot be softened or reshaped by heat, as well as clarifying the dry and liquid methods for using plastic waste additives in the production of asphalt mixtures, a laboratory plan has been developed to examine and evaluate the use of the most common types of plastic waste in Egypt, namely polyethylene terephthalate (PET), low-density polyethylene (LDPE), and high-density polyethylene (HDPE), using the dry method as it is the best from an economic point of view, by preparing (27) asphalt mixtures, where Three different contents of plastic waste (6%, 7% and 8%) were studied with three different contents of bitumen (3%, 3.5% and 4%) of the mixture weight for the three types of plastic waste. The performance of the mixtures mentioned was tested and compared by conducting performance evaluation tests and studying the economic considerations to reach the optimal mixture for each type of waste, to reach the optimal mixture and the optimal waste for use from the technical and economic point of view. It became clear from discussing, studying the results of the tests, and practical application in the sector from station 6+820 to 6+850 on the R24 axis in New Cairo City, that the use of plastic waste additives in the production of asphalt mixtures improves the performance of the asphalt mixture to withstand different traffic loads in addition to reducing bitumen consumption compared to regular asphalt mixtures by percentages ranging from 28 to 30%.



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Objectives:

1. Effectiveness of using plastic waste in asphalt mixtures for binder course.
2. Impact of using PET, LDPE, and HDPE waste on the performance of asphalt mixtures.
3. Make the economic and environmental benefits of consuming plastic waste in enhancing asphaltic binder courses.

Main outlines

- **Studies conducted by HBRC**
- **Practical applications in ongoing projects.**
- **Optimal use of plastic waste in improving asphalt mixtures for roads**

Suggested Speakers with related presentation:

1. **Prof. Ahmed Algabry**
2. **Prof. Esraa Emam**
3. **Dr. Elsayed Fahmy**

Expected Attendees:

- Specialists and those interested in the fields of road construction.
- Specialists and those interested in the fields of environmental sustainability and emission reduction.
- Specialists and those interested in the fields of recycling.