

DESIGN, PRODUCTION AND PLACEMENT OF HOT MIX ASPHALT WITH ADDITION OF WASTE PLASTICS - BOLIVIA CASE STUDY

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ABSTRACT

The management of municipal solid waste materials is a major problem for municipal authorities in Bolivia because of the excessive amounts that are generated, and the environmental problems related to it. Although valuable reusable materials can be found among the municipal waste, in Bolivia only 4% of these materials are recycled [1]. The addition of waste plastics to asphalt mixes is an excellent opportunity to reuse large amounts of plastics and obtain a better pavement performance. Therefore, this study analyzes the performance of asphalt mixes with addition of waste plastics and the modifications needed in the production and placement process. The addition of a new material to the asphalt mix may cause important changes in the mixture properties. Thereby, laboratory tests were conducted to define the appropriate proportion of plastic to be added to the mix. In this study, mixes with addition of Polyethylene Terephthalate (PET) and High-Density Polyethylene (HDPE) were analyzed by Marshall and IDEAL-CT tests. Better performance to permanent deformations and cracking tolerance has been found when adding 1% of PET to the asphalt mix, and properties were within specifications using up to 3% of PET. However, according to the tests results, the addition of HDPE is detrimental to the quality of the asphalt mix. Conventional asphalt plants do not consider the addition of a new material to the asphalt mix; therefore, modifications are needed in the production process. If the plastics are exposed to high temperatures, they can melt or degrade causing changes to the mix, damaging the equipment of the asphalt plant, or causing environmental problems. Thereby, the plastics must be added after the dryer drum section. These modifications have been made to an asphalt plant to build a test road in the city of El Alto, Bolivia and to analyze the construction process when using waste plastics.

Keywords: Hot Mix Asphalt, Dry Process Modification, Construction Process, Plastics in Asphalt.

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