Research

Full-Depth Reclamation Method for Rehabilitation of Streets Pavement in City of Sirjan: Mix Design and Bearing Capacity

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ABSTRACT

This paper aims to evaluate the full-depth reclamation (FDR) technique for the improvement of urban streets in the city of Sirjan from a technical standpoint. Also, experimental results of soil-reclaimed asphalt pavement (RAP) blend stabilized with Portland cement has been represented. The experimental program of this research includes two phases. The first phase includes geotechnical investigation of different pavement layers for assessment of the quality of existing materials and estimation of a structural number of existing pavements, and the second phase includes determination of optimum mix design for the recycled layer (stabilized soil-RAP blend). To this end, unconfined compressive strength and density tests were conducted on several soil/RAP ratios of 100/0, 80/20, 60/40, and 40/60. For each blend, different percentages of Portland cement were mixed to soil/RAP blends and cured for 7 and 28 days. Results showed that by adding RAP to virgin soil, unconfined compression strength and optimum moisture content of stabilized samples decrease. Furthermore, the addition of Portland cement to the mixture increases compressive strength and decreases optimum moisture content. The results of this study also show the significant ability of FDR to increase the structural number of distressed pavements.

Keywords: Full-Depth Reclamation (FDR), Portland cement, Reclaimed Asphalt Pavement (RAP), USC

1. INTRODUCTION

In asphalt, pavements require rehabilitation at the end of design life. Regarding the cost of reconstruction and the cost of transporting and storing removed pavement materials, paying attention to recycling techniques for asphalt pavements has been increasingly considered by transportation agencies .Pavement recycling techniques have well-recognized financial and environmental benefits. Full-depth reclamation (FDR) is a technology used for pavement rehabilitation. In this method, the existing asphalt layer and aggregate materials below it are pulverized and treatment with an additive [1]. In the past, hot mix asphalt (HMA) overlay was usually used to improve the condition of distressed pavements, without any respect to the pavement condition and the type of distresses .Over time, due to the limitations of traditional rehabilitation methods, other methods such as cold recycling, hot

recycling, and full-depth reclamation methods were proposed [2]. In the cold and hot recycling methods, only asphalt layer is reused and recycled, and then an HMA layer is placed on it as a surface layer. The method of full-depth reclamation is different from the two previous methods because in the FDR method, the whole of the HMA layer and a portion of the aggregates underneath it are recycled to form a stabilized base layer [1]. The goal of the full depth reclamation method is to create a stabilized base layer. At first, if the thickness of the asphalt is more than 10 cm, it should be grinded and removed by milling machines. Then, Wirtgen Recycler WR 2500 pulverizes asphalt pavement and the aggregate layer underneath it. After that, the suitable stabilizer is sprayed on the mixed materials (Portland cement in this study). With the second pass of the Wirtgen machine, the Portland cement is thoroughly mixed with the