World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:14, No:02, 2020

# Field Performance of Cement Treated Bases as a Reflective Crack Mitigation Technique for Flexible Pavements

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**Abstract :** Deterioration of flexible pavements due to crack reflection from its soil-cement base layer is a major concern around the globe. The service life of flexible pavement diminishes significantly because of the reflective cracks. Highway agencies are struggling for decades to prevent or mitigate these cracks in order to increase pavement service lives. The root cause of reflective cracks is the shrinkage crack which occurs in the soil-cement bases during the cement hydration process. The primary factor that causes the shrinkage is the cement content of the soil-cement mixture. With the increase of cement content, the soil-cement base gains strength and durability, which is necessary to withstand the traffic loads. But at the same time, higher cement content creates more shrinkage resulting in more reflective cracks in pavements. Historically, various states of USA have used the soil-cement bases for constructing flexile pavements. State of Louisiana (USA) had been using 8 to 10 percent of cement content to manufacture the soil-cement bases. Such traditional soil-cement bases yield 2.0 MPa (300 psi) 7-day compressive strength and are termed as cement stabilized design (CSD). As these CSD bases generate significant reflective cracks, another design of soil-cement base has been utilized by adding 4 to 6 percent of cement content called cement treated design (CTD), which yields 1.0 MPa (150 psi) 7-day compressive strength. The reduction of cement content in the CTD base is expected to minimize shrinkage cracks thus increasing pavement service lives. Hence, this research study evaluates the long-term field performance of CTD bases with respect to CSD bases used in flexible pavements. Pavement Management System of the state of Louisiana was utilized to select flexible pavement projects with CSD and CTD bases that had good historical record and time-series distress performance data. It should be noted that the state collects roughness and distress data for 1/10th mile section every 2-year period. In total, 120 CSD and CTD projects were analyzed in this research, where more than 145 miles (CTD) and 175 miles (CSD) of roadways data were accepted for performance evaluation and benefit-cost analyses. Here, the service life extension and area based on distress performance were considered as benefits. It was found that CTD bases increased 1 to 5 years of pavement service lives based on transverse cracking as compared to CSD bases. On the other hand, the service lives based on longitudinal and alligator cracking, rutting and roughness index remain the same. Hence, CTD bases provide some service life extension (2.6 years, on average) to the controlling distress; transverse cracking, but it was inexpensive due to its lesser cement content. Consequently, CTD bases become 20% more cost-effective than the traditional CSD bases, when both bases were compared by net benefit-cost ratio obtained from all distress types.

**Keywords :** cement treated base, cement stabilized base, reflective cracking , service life, flexible pavement
**Conference Title :** ICRAFTPE 2020 : International Conference on Recent Advances and Future Trends in Pavement Engineering
**Conference Location :** Lisbon, Portugal
**Conference Dates :** February 06-07, 2020

Open Science Index, Civil and Architectural Engineering Vol:14, No:02, 2020 publications.waset.org/abstracts/114017.pdf