Viable & Practical Stiffness Based In-Place QC Testing

Of Compacted Subgrade Material

Traditional subgrade compaction QC/QA methods do not evaluate in-place material strength or the structural uniformity of each lift as placed. Evaluating these two factors is essential if cost is to be held to a minimum while assuring the performance needed for the roadways intended function and projected life. This type of evaluation is essential if the industries trend towards modulus based mechanistic design and performance specifications for roadways is to be supported. Also, traditional methods do not provide contractors with sufficient real-time feedback so as to optimize the balance of quality and cost. A simple and precise stiffness or modulus based QC test method for subgrades is needed that will evaluate the required factors as compaction occurs at a rate greater than or equal to the rate of compaction.

Such an in-place QC test method has been developed that does not interfere with or delay the construction process. Without penetrating the ground, the method uses the stiffness of each lift to evaluate the quality of compacted subgrades. Using a control strip, lift stiffness at controlled moisture content is determined as a function of compactive effort. The resulting empirical relationship is used to establish QC stiffness targets for the subgrade. These stiffness target values are initially used to determine conventional percent compaction in real-time. Ultimately, the in-place stiffness values are used as indices of material strength, structural uniformity, projected life and design modulus. District2, Thief River Falls Construction Office, of the Minnesota Department of Transportation has specified and successfully used this QC test method on granular subgrades. Its success there has been sufficient to warrant continuing and broadening use on subgrades and bases.

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