Durability of Light Weight Concrete Bridge Decks – Field Evaluation

Description

Meta Fields
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Abstract :

Lightweight aggregate is commonly manufactured by heating clay, shale, slate, or slag in a kiln, causing expansion of trapped gasses and subsequent formation of a porous void system within the aggregate particles. In lightweight concrete mixtures, normal weight aggregate is replaced with lightweight aggregate. Structural lightweight concrete mixtures typically include lightweight coarse aggregate with either normal weight or lightweight fine aggregate. Most lightweight concrete used for structural purposes has an equilibrium density between 105 and 120 pounds per cubic foot, which is up to 30% lighter than normal weight concrete. The North Carolina Department of Transportation (NCDOT) has constructed a number of concrete bridge decks using lightweight aggregate, with construction of the first lightweight concrete bridge deck completed approximately 40 years ago. Use of lightweight concrete in bridge decks can significantly reduce the deadload of the structure, allowing for longer spans and reduced sizes of other structural members. Some research has suggested that use of lightweight concrete in bridge decks can offer advantages in addition to those directly related to the reduced weight. These possible advantages include reduced cracking tendency and lower permeability. If this is true, enhanced durability performance could result in lightweight concrete bridge decks being a more economical choice than normal weight concrete bridge decks for some applications. As stated in the NCDOT Call for New Research Idea Number 1405, the purpose of this study will be "to evaluate the field performance of lightweight concrete bridge decks, comparing to normal weight concrete in the same structure or environment where possible." The results of this study will assist the Department in making decisions regarding the use of lightweight concrete for bridge decks in North Carolina. Additionally, this study will provide a more complete understanding of the durability performance of existing lightweight concrete bridge decks, which will assist the Department with maintenance and repair decisions.

Subject : LWC
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