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## Use of Iowa Eggshell Waste as Bio-Cement Materials in Pavement and Gravel Road Geo-Material Stabilization

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### Abstract

While Iowa egg production is significantly important to the state economy and national market, large amounts of eggshells generated from Iowa egg industries remain unused as a value-added product. The primary objective of this study would be to explore and demonstrate the concept of using Iowa eggshells as bio-based, cementing materials to strengthen and stabilize frost-susceptible soils and improve the low quality of local aggregates presently used in Iowa pavement and gravel road applications. This will be achieved through the execution of the following primary tasks: (1) characterization of Iowa eggshells, (2) identification of treatment methods for producing high calcium oxide or quicklime (CaO) content eggshell powder (ESP), (3) evaluation of constructability and performance of geo-material stabilization techniques using high CaO content ESP through comprehensive laboratory assessment, (4) proof-of-concept demonstration of eggshell-based geo-material stabilization techniques for use in Iowa pavements and gravel roads, and (5) development of implementation recommendations for real-world applications. Such tasks are presented and discussed in detail in this presentation. The successful outcomes of this research will be new value-added products derived from Iowa eggshell waste, which could be used for improving the performance and sustainability of transportation infrastructure systems, eventually enhancing environmental quality as well as producing substantial economic benefits for the State of Iowa.

Note: This research project was approved and funded as one of IHRB Innovative Idea Projects and this presentation will be delivered as requested by the IHRB/Iowa DOT