**Non-Traditional Stabilizers for Road Base Materials**

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**Abstract**

Cement has traditionally been used to stabilize road base materials, but its production is environmentally costly—about 1 ton of carbon dioxide and various nitrogen oxides are produced for 1 ton of cement [1]. A desire to find more sustainable alternatives to cement in civil engineering materials has arisen as state and federal departments of transportation become more environmentally conscious. Biopolymers may offer an alternative to cement for stabilizing road base materials. Many biopolymers are a “waste” byproduct of an existing manufacturing process or consume greenhouse gasses, such as carbon dioxide, in their production. This research has focused on using Xanthan Gum (XG) to stabilize soil. XG has been shown to be stable under a wide temperature and pH range, and under high-salt environments. XG is also FDA approved for human consumption and is biodegradable. Standard proctor specimens were prepared using a representative soil gradation and various concentrations of XG by total dry soil mass: 0.5, 1.0, 2.0, 3.0, and 4.0%. The strengthening mechanism of XG was also investigated by observing the XG-particle matrix using a scanning electron microscope. The findings suggest that XG coats individual particles and forms structural connections between particles. Strength gain and increase in stiffness in unconfined compression tests was observed and appears to be dependent on curing duration. Future research investigating the effect of moisture and freeze / thaw conditions on strength of XG stabilized soil is needed.

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**References**

[1] BP statistical review of world energy June 2007. London: British Petroleum; 2007. p. 48.

[2] Chang, Ilhan, et al. Effects of Xanthan Gum Biopolymer on Soil Strengthening. Construction and Building Materials, 2015.