Development of a Modern Design for Roads and Highways Made from GFRC (Glass Fiber Reinforced Concrete)

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Puerto Rico is facing a financial and design problem with its highways (Washington Post, 2017). The material that is being used does not fulfill transportation needs, making the roads hazardous for drivers. Fixing the problem requires a large investment from the government. Glass Fiber Reinforced Concrete (GFRC) is a special type of concrete composite that is known for its high compressive, flexural and tensile strength (Concrete Countertop Institute, 2019). This research aims to contribute to the development and improvement of highways and roads on the Island. The objective was to test the behavior of three concrete samples with glass fiber under compression conditions. One sample had no fiber, another had two layers of fiber, and a third sample had three layers of fiber. The sample with two layers of glass fiber held up the most resistance (2,131psi) and showed much stronger qualities than regular concrete and the concrete sample with three layers. Adding fiber contributes to a special element of strength and resistance to this type of construction material, while the high polymer content makes the concrete flexible, resistant to water and cracks, thus, requiring less maintenance. These structures provide a new way of fixing and improving roads and highways in Puerto Rico and present an opportunity to change the way roads are built in the Island by demonstrating to be useful because of its workability and strength. Since it is durable and it uses less cement than equivalent concrete and significant amounts of recycled materials, GFRC is considered sustainable.

Awards Won: