Improvements to the Design of Bridges for Resilience During Atmospheric Events in Puerto Rico

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Several public roads and bridges across the world provide travel between locations. In Puerto Rico they are mainly impacted by atmospheric events that impact the region in certain season. During Hurricane Fiona and Maria in 2017, rivers currents overflowed their banks and washed away several public roads and bridges in Puerto Rico, leaving a great number of citizens without communication for several days. The goal of this study is to find a solution for Puerto Rico's access to public roads and bridges, that have been impacted by atmospheric phenomena and river expansion. The investigation methodology implemented is NASA'S BEST Engineering Design Process. With this methodology it was establish a series of design requirements that include criteria as structural integrity, use of renewable energy, among others. Through the implementation of this methodology, it was proposed different design and it was selected the best possible solution through a criteria valuation matrix. Upon construction and evaluation of the execution of the prototype, base in the criteria establish, it was concluded that the prototype accomplishes a 92% of the criteria's. Further investigation is needed to establish optimization to the design base on use of renewable energy available in Puerto Rico after an atmospheric catastrophe event.

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