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**SUSPENSION BRIDGES** – High School Level

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**Problem Statement**

You plan to build a bridge across a tidal inlet on the Atlantic Coast. . The inlet is 50 ft deep. The tidal prism here ranges from  $3.6 * 10^7$  to  $5.3 * 10^7$ . The side slope of the inlet is  $\frac{1}{2}$ . There must be at least 30 ft of roadway on both sides of this span and the roadway must be at least 2 ft. from the ground or supporting base.

Sag in cable must be at least 10% of the span not exceeding 15%.

You are to design specifications for the bridge you will build calculating all necessary calculations such as: Theoretical Weight, sag in cable, Tension at minimum sag in cable, tension at ends of cable, cost analysis, free body diagrams of forces involved and any other calculations deemed necessary. This will be recorded along with any other ideas in your design notebook.

You will also build a 1:120 scale model of your bridge out of the materials you are given. This means that your model will be 1/120 of the length of the bridge you designed.  
( Scale: 1 in. = 10 ft.)

You will present you project and the bridges will be tested for the amount of weight they hold. Judging will be according to the judging criteria page.

Please record all calculations, sketches, drawings and ideas in your design notebook.