Quiz **Name**

1. The Tacoma Narrows Bridge was completely rebuilt in the years 1948 to 1950. The data for the new bridge is as follows. It has a total length of 5,000 feet and a center span of 2,800 feet. Its 2 main cables support a single deck that carries 4 lanes of automobile traffic. The dead load is 8,680 pounds per foot. Assume that it is designed for a live load capacity of 4,000 pounds per foot and that the sag in the cable over the center span is 280 feet.

i. Consider one of the main cables over the center span at a point where it meets one of the towers. Compute the tension T of the cable at that point and compute the angle α that the cable makes with the horizontal there.

ii. Compute the contribution of this one cable to the compression forces on the tower. (Round off your answers appropriately.)

2. The Williamsburg Bridge spans the East River in New York City. It has four main cables. Its center span has a length of 1600 feet, the total dead load for its two decks is 19,210 pounds per foot and the live load capacity is 7160 pounds. The sag in the cable is 177 feet.

i. Compute the tension T_d in one of the cables over the center span at the tower, and the angle α that the cable makes (at the tower) with the horizontal.

The Williamsburg Bridge is the only one of the East River suspension bridges for which the cables over the side span do not bear any of the load of the side span. The only purpose of each of these cables is to counterbalance T_d.

ii. Given that the cable over the side span makes an angle at the tower of 22.7° with the horizontal, compute the tension T in one of the cables of the side span.

iii. Compute the total compression C that all the cables (this is a total of 8 cables; four coming in from the center span and four more coming from the side span) generate in one tower.