3D Signpost - Physics Setup

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Physics Setup

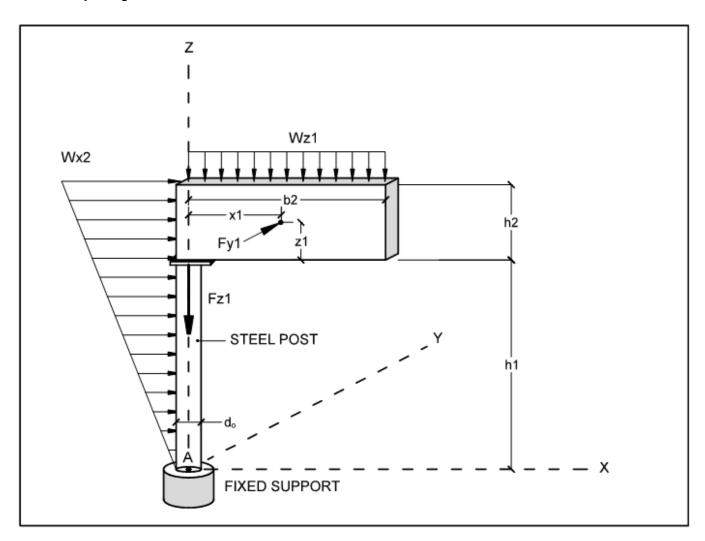### Free Body Diagram

How to calculate the spatially variable pressure WX2

The load created by the wind load intensity Wx2 is applied to both the post and sign as a spatially variable pressure. This pressure increases linearly as we move along the signpost in the positive z-direction. If the pressure was applied over half the post diameter, we would need to recalculate the spatially varying pressure each time the diameter of the post was changed because of a change in surface area. Instead we chose to apply the Wx2 load to an arbitrarily thin surface body, which traverses the left side of the signpost. This surface body has constant surface area regardless of the post diameter. The linear equation for the spatially varying pressure was calculated in the following manner.

Knowing the width of the application surface equals 1.68in and the length of the post equals 36ft, we solve for the linearly increasing slope value which defines the variable pressure when multiplied by a distance.

$$slope = \frac{load\ intensity}{area\ over\ which\ it\ is\ applied} = \frac{700\frac{lbs}{ft} * \frac{1ft}{12in}}{\left[36\ ft * \frac{12in}{1ft}\right] * [1.68in]} = .0803755\ \frac{lbs}{in^3}$$

The video below demonstrates how to configure the connections and apply a point force, uniformily distributed load, and a spatially variable pressure.

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