Vertical pressure \( q \) shall be based on a distribution width \( L_d \).

\( L_d \) is the length of tie plus \( H_e \).

\( H_e \) is the height from the bottom of tie to the top of shoring.

\( S \) is a distance perpendicular from centerline of track to the face of shoring.

\( D \) is from top of shoring to one foot below dredge line.

\( Z_p \) is the minimum embedment depth.

Length of tie is 9 feet.

\( q \) is the intensity of strip load due to E80 Railroad live load and shall be calculated as follows:

For \( H_e = 0 \) \( L_d = \) length of tie; therefore, \[ q = \frac{80,000 \text{ lb}}{(5 \text{ feet})(9 \text{ feet})} = 1,778 \text{ psf} \]

For \( H_e > 0 \) \( L_d = \) length of tie + \( H_e \); therefore, \[ q = \frac{80,000 \text{ lb}}{(5 \text{ feet})(L_d)} \]

**CASE 1:** Lateral live load pressure \( P_s \), due to E80 loading for track parallel to shoring system is calculated using the Boussinesq Strip Load Equation.

\[ P_s = \frac{q}{2} \left( \beta + \sin \beta \sin^2 \alpha - \cos \beta \cos \alpha \right) \]

The above equation can be simplified into the following equivalent form:

\[ P_s = \frac{q}{2} \left( \beta - \sin \beta \cos (2 \alpha) \right) \]

\( \alpha \) and \( \beta \) are angles measured in radians, \( \alpha = \theta + \frac{\beta}{2} \)

**CASE 2:** Live load pressure due to E80 loading for track at a right angle to the shoring system can be calculated using the following equation:

\[ P_s = K_s q \]

where \( K_s = \tan^2 \left( 45 - \frac{\beta}{2} \right) \)

\( \theta \) is the angle of internal friction in degrees.