

7.2 Axial Soil Spring

The maximum axial soil strength applied to a pipeline is derived from foundation engineering, specifically the ultimate frictional load capacity of steel piles. Figure 7.5 presents a schematic showing the factors that contribute to the capacity of friction steel piles. The primary components to the friction pile capacity are derived from adhesion between the soil and steel pile and/or the lateral earth pressure with depth that exerts a confining force on the pile wall. Relative to a pipeline, one can imagine the steel pile rotated from a vertical to a horizontal position, and the same load components being applied.

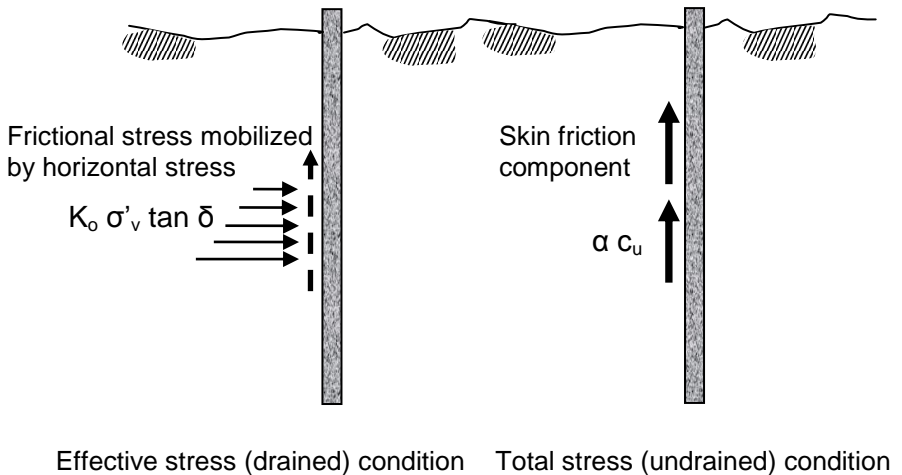


Figure 7.5 Schematic of pile foundation and components of frictional load capacity for drained and undrained conditions.

The equation for maximum pile capacity and maximum load per unit length on a horizontal pipe (T_{\max}) depends on the undrained or drained loading conditions.

For undrained loading:

$$T_{\max} = \pi D \alpha c_u \quad 7.3a$$

For drained loading: