# 10.10 VERTICAL GROUND ANCHORS

## 10.10.1 GENERAL

This policy addresses design requirements for vertical ground anchors used in the foundations of bridges and reinforced concrete retaining walls. Vertical ground anchors shall meet the requirements of AASHTO-CA BDS and additional design requirements herein.

## 10.10.2 NOTATION

$P_{lock}$ = lock-off load per anchor (the prestressing force in the tendon immediately after transferring the load from the jack to the anchor head after seating loss)

$P_u$ = maximum factored tensile force effect per anchor due to external loads from the strength and extreme event limit states, without the effect of lock-off load

## 10.10.3 DESIGN REQUIREMENTS

In addition to geotechnical failure modes, the following structural failure modes shall be evaluated at the strength and extreme event limit states:

a) Tendon tensile rupture

b) Grout-tendon interface failure

c) Post-tensioned anchorage zone failure

Vertical ground anchors shall be prestressed. Stress limits for prestressing steel shall be evaluated at the service limit state.

Prestressing shall be locked off to a $P_{lock}$ not less than $0.25P_u$. The specified $P_{lock}$ shall exceed the prestress losses due to long-term settlement of the foundation.

The effects of $P_{lock}$, in addition to the effects of external loads, shall be considered in the design of the foundation system.

The anchor shall be designed to resist the resultant of $P_u$ and the internal force effects of prestressing. Prestress effects shall be determined through a soil-structure interaction analysis that includes the stiffnesses of the soil, the ground anchor, and the foundation.