SEISMIC EARTH PRESSURES ON RETAINING WALLS

The following provides clarification on the County's policy regarding the calculation of seismic earth pressures on retaining walls.

The total seismic load is the sum of the static and dynamic load increments:

$$P_{ae} = P_{static} + \Delta P_{ae} = F_1 + F_2$$

P_{static} is determined based on active or at-rest conditions. The dynamic load increment, ΔP_{ae}(F_2), shall be determined using the following equations for different wall type and backfill conditions (after Agusti and Sitar, 2013):

Basement (restrained) walls with level backfill: $\Delta P_{ae} = \frac{1}{2}\gamma H^2(0.68\ PGA/g)$

Cantilever (unrestrained) wall with level backfill: $\Delta P_{ae} = \frac{1}{2}\gamma H^2(0.42\ PGA/g)$

Cantilever (unrestrained) wall with sloping backfill*: $\Delta P_{ae} = \frac{1}{2}\gamma H^2(0.70\ PGA/g)$

*Applicable for sloping backfill that is no steeper than 2:1 (horizontal:vertical).

PGA shall be defined as S_{DS}/2.5. The following resource from the Structural Engineers Association of California (SEAOC) and California Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps is available at the following link: https://seismicmaps.org/.

For retaining walls with sloping backfill conditions, seismic slope displacements must also be evaluated to determine acceptable performance (computed displacement of 5 cm or less). The seismic displacement may be computed as the average of the methods of Bray and Travasarou (2007), Rathje and Antonakos (2011), and Song and Rodriguez-Marek (2015).

For cohesionless soils, the point of application of the dynamic load increment is at 1/3H, where H is the retained height. For soils with cohesion, the point of application may vary between 0.37H to 0.40H; for additional information, see Agusti and Sitar (2013) listed in the references.

REFERENCES

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