## **Nonlinear Static SSI:**

The studies below allow us to consider the contribution of all the components in the foundation to achieve an efficient design.

- Evaluate the distribution of forces to the different components of the foundation under lateral loads: passive pressure, side friction, pile forces.
- Verification of computational models in Plaxis 3D, and comparison with closed form solutions, based on experimental data.
- Use of continuum 3D finite element models to calibrate equivalent springs to be used in other modeling software.



• Evaluate the effect of pile groups under lateral loads and compare it to closed form approximations.



## Nonlinear Dynamic SSI:

The effects of SSI vary on a case-by-case basis. Incorporating SSI into a computational model can affect the design of the foundation and structure above ground. We studied the effect of SSI in the design by gradually increasing the level of detail of the SSI components, and how this affected the distribution of forces in the foundation. (The study was based on using the UCSF computational model as a benchmark.)

Seismic motion is affected while traveling through the soil before reaching the foundation, which influences the demands used for the design. Models that do not include SSI apply the motion directly at the base of the structure, overlooking the effect of the site. To improve our understanding of the seismic demands, we have performed studies that compare the response of the free field versus a site with a foundation. The study included Finite Element models with deep foundations, over 100 piles and 1 million elements.

