



The Liquefaction Battle in Variable Ground Conditions

San Francisco's South of Market (SOMA) district has very complex underground conditions consisting of sand dunes, bedrock hills, cliffs, mud flats and marshes—flattened and filled when the city was built and covered by rubble and debris after the 1906 earthquake and fire. When constructing a new building in the SOMA area, the combination of natural geology and historical interventions can produce challenging subsurface conditions that require not only addressing the structure's settlement concern, but also the mitigation of liquefaction and lateral spreading hazards.

Deep Soil Mixing (DSM) in combination with micropiles

creates an ideal ground improvement and foundation system, which is the most cost-effective solution for such variable ground conditions. The DSM panels act both as a liquefaction mitigation mechanism and a foundation support system, where the resistance to seismic overturning is provided by uplift-resisting micropiles. 270 Brannan Street, a multistory "Class A" office building, was the most recent example where such a high-level seismic performance system was implemented by a technically sophisticated owner through a process that included constructive collaborations between the various design engineers, the general contractor and the specialty contractor. ■