Subsidence in Mexico City

It's not a pole, but instead is a hollow steel tube. It's actually a well casing, still in place but not in use. And it sticks out of the ground because the ground has subsided while the casing has remained static. This is the world's most extreme site of ground subsidence, and this most spectacular expression of the ground movement is in the Plaza de la Republica, the second most important square within Mexico City. Where most people pass by without knowing the story behind the black-painted, preserved 'pole'. Mexico City is built on an old lake bed that is largely floored by horribly weak, highly compressible, smectite-rich clays. These cause settlement of many of the city's old buildings under their own weight, with some sinking well over a metre, but modern structures have appropriate foundations that virtually eliminate ground movement that is due to loading. The big problem lies at depth, where sands inter-bedded with the clays have long been exploited for supplies of fresh water. Pumped abstraction of the groundwater has almost no impact on the sand aquifers themselves. But water pressures within the alternating sands and clays ultimately equalise, as water is squeezed out of the clays and into the partially drained sands. That loss of support by the pore water pressure causes the clays to compress under their own weight, independent of any imposed loads from buildings. The result is regional ground subsidence on a grand scale, and by as much as nine metres in Mexico City. A large part of the city centre has subsided by that amount within the last hundred years. The only structures not to have subsided are the well casings, which are effectively founded in the sands a hundred metres down and below most of the compacting clays. Controls on water abstraction have now reduced the rate of subsidence, but have not stopped it; unpainted well casing showed for more than a centimetre below the coat of black paint that was only a year old in 2010.