

NOVEMBER, 2001 - Settlement of Foundations on Expansive Clays Due to Moisture Demand of Trees

Speaker: Ken Tand, P.E., Kenneth E. Tand & Associates

Ken Tand P.E. a geotechnical engineer in Houston and member of the FPA gave a presentation of ten case histories of building foundation affected by tree roots in the Houston area. He noted that in the 70's, he usually found the water table in Houston at 10-15 ft depth, while today he normally records it at 15-25 ft depth. (This may explain why we see a lot more tree-related subsidence problems today since tree roots have to go deeper to pull water from the water table. It also may explain why we find footings today must be much deeper than in the past) Of the ten cases discussed, the deepest root he found was at 19 ft.

Since Ken was working with building foundations that had footings, he was usually able to record how much the footings had subsided relative to the soil. He did this by coring the slab and measuring the void below it and adding that to the amount of subsidence detected from his level distortion survey. For example, at a 40 year building with footings to 9 ft and roots found to 12 ft, he measured a 4.0" void and a 4.5" level distortion. Therefore he was able to conclude the total ground surface subsidence was $4.0 + 4.5 = 8.5$ " at that location.

Another interesting case was of a building that had footing depths at 13 ft, 11 ft and 7 ft. Subsidence values of the footings were found to be 1", 3" and 5", respectively. For this one, he found feeder roots at 10 ft which meant the hair-sized roots that desiccate the soil are likely several feet below that depth. At any rate, the value of using deep footings was obvious although 13 ft was insufficient for this site.

One final observation: Ken monitored a slab that had to have a large tree removed in 1988. Although the subsidence stopped when the tree was felled, today the soil has still not rebounded.

For a copy of Mr. Tand's presentation, [click here](#).

[PAST PRESENTATIONS \(click here\)](#)