

JULY 21, 2004 - The Role of Suction in the Performance of Clay Fill

Speaker: Mr. Ronald R. Reed, P.E. (tel: 214-350-5600) of Reed Engineering Group, Inc., Dallas TX

PRESENTATION SUMMARY

To an audience of about 55, Mr. Ronald F. Reed, P.E., President of Reed Engineering Group, Inc. presented his paper, "The Role of Suction in the Performance of Clay Fill". Mr. Reed is a geotechnical engineer with a Bachelor of Science in Forest Engineering, another Bachelor of Science in Civil and Engineering and in 1980 he earned a Master of Science in Geotechnical Engineering from UT Arlington. He is a licensed professional engineer in Texas and five other states and has worked in the geotechnical field since 1976.

Mr. Reed gave a brief history of Proctor's and Terzaghi's development of moisture-density and moisture-penetration relationship in the 1930s. He said he has found cases where clay soils have settled because they were installed too dry of optimum. He said that because of this, when water gets to them, they can cause large voids to occur such as the ones in slide 13 of his presentation.

Mr. Reed said he had a case in Dallas where a 20-year-old home was originally built on fill that he believed was compacted too dry of optimum, such that when a termite injection was the done, the moisture caused settlement of the fill. He said this can happen in Dallas because they use a lot of fill and their water table is very low. He said this is not likely to occur in Houston since our water table is near the surface and the soils beneath our building pads quickly wet up due to suction from below.

Mr. Reed said he requires his field crew to use hand penetrometers to test the fill's shear strength during placement in conjunction with the usual moisture and density tests. He always requires that fill be placed between +1% and +5% of optimum. Then, if the field crew reports high shear strengths, it alerts him that the fill may have been placed too dry.

He noted that improperly placed clay can either settle or heave, dependent upon compactive effort and relative moisture used at the time of placement. Clods in clay fill have a high transient shear strength as a result of high matrix suction. Point to point contact between clods, coupled with low compaction energy, results in large voids within the fill. A decrease in matrix suction by addition of moisture results in loss of strength of the individual clods and subsequent collapse. Mr. Reed said he has run tens of thousands of suction tests. To run the suction tests, he currently uses the WP4 Dew Point Potentiometer from Decagon Devices, Inc. of Pullman, WA, which he says costs about \$2000.

To download a copy of the presentation presented by Mr. Reed, [click here](#).

To download a copy of the paper presented by Mr. Reed, [click here](#).

To view a summary of his March 2001 FPA presentation, [click here](#).

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