

DISCUSSION

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I requested to be permitted to deliver a few words just before Mr. Guz, because his paper touches on an item that is very close to my heart.

This is the Standard Penetration Test SPT as a means of solving practical problems in foundation engineering.

I am sorry to be speaking on a subject on which I have done some work. If I don't mention myself, who else will?

So, one of the suggestions I would make is, I would request that Mr. Guz read my State of the Art Paper on Standard Penetration Test presented at the Puerto Rico Pan American Conference, in June 1971. Not because I claim that paper to have solved any great, important problems.

You know the standard statement that an expert is a man who has stopped thinking, he knows! Well, I don't want to be an expert. The important thing is that I raised some problems in that State of the Art paper, and it seems to me that Mr. Guz's paper also raises the same problems.

Let me summarize: To begin with, everybody knows the Standard Penetration Test has not been standardized.

When I see the high blow counts mentioned in Mr. Guz's paper I am automatically tempted to question them. I would suggest that we are in the same batting field, playing in the same game: one possibility is the very well-known Dutch cone penetrometer static point penetration resistance; another possibility is to check on what would be your Standard Penetration Test values in an earth dam, let's say, in a 98% Proctor compacted clay dam. If we are talking in the same terms, my SPT values, in this type of material, at depths of about 8 to 15 meters, usually are around 10 to 13, let's say.

Now 98% compacted materials giving 10 to 13 blows, definitely would appear incompatible with 50 blows in this case.

Therefore it seems to me that there must be some influence due to fairly big sized gravel or cobbles.

Incidentally, I would very much request if you could give the grain size distribution curve rather than merely saying that the soils have about 20% sizes bigger than 4.7 mm, because just one grain of considerably bigger size casually occurring in front of the SPT spoon could immediately alter this

standard penetration test result, whereas a large percentage of 4.7 mm sizes would not alter it in any way. Well, that's one problem.

The second problem that I have noticed comprises the rather interesting observation, that Mr. Guz has a smaller number of blows in subsequent SPT borings in comparison with the earlier one. Now I would ask him whether this has something to do with the depth effect. In other words, it has been very well proven, and I insist on this, that depth influences SPT results very much. It influences SPT results due to the unavoidable depth effect on the length of the rods in any materials - even in clay materials, in constant strength materials. But it influences it very much more in any materials that have a ϕ value. This was proved by USBR test results back in 1952, 53. We have done an awful lot of tests of this type where for instance, you make the borings first and then you excavate three basements, and sometimes the foundation engineer is suddenly afraid. The material doesn't look as good as he thought, so he'd make a new boring, after making these three basement excavations. The results are absolutely different along a significant stretch, *side by side*.

Let me mention another condition in which this has been observed, as I have published in the discussion of State of the Art paper: I suggest that whenever you read Proceedings, don't read merely the first two volumes - please read the discussions also. Sometimes there are very important reminders there.

Well, I have some data showing cases where the SPT results were run first from a certain elevation, then after a 25 meter excavation down below and then again from a platform at the same initial elevation because it was a viaduct that was built by placing the reinforced concrete girders first and then excavating under it. The results were entirely different. And this can be proven to be consistent.

This is the second question regarding the case history reported, assuming now that there is nothing questionable about the SPT values. The third question is as follows. I don't really believe that we can correlate satisfactorily SPT resistance, which is a resistance phenomenon, with deformations. One can explain that physically very easily. Let's suppose that we have a compression of the one meter or so settlement that Mr. Thomson mentioned. And, incidentally, we do have quite a number of buildings which have settled more than that, and have given more than 1:100 differential settlements, with no cracks.

But anyhow, let's suppose that we do have a settlement of 1 meter.

Thereby you have achieved a consolidation of the stratum, which, will subsequently cause but insignificant settlement within the precompressed stress range: if you unload, reload, etc. you have basically absorbed the settlement.

But the SPT doesn't change, because the corresponding changes in void ratio are

very small.

Very small iota changes of void ratio in individual soil elements along the depth of the stratum accumulate to give a significant overall compression that radically limits settlements in future recompression foundation behaviour; but the void ratio change over any individual soil element is too small to reflect any perceptible additional resistance, especially by the relatively crude index of the SPT. Of course, whenever a material is denser, it will simultaneously become more resistant and more incompressible. But to try to make a correlation between these two parameters is a little bit too much.

I would suggest that we do not try it without clearly distinguishing between virgin compression and recompression cases.

It reminds me of that statement by a famous British statistician, who said that you can find a very strong correlation between the number of births in London in the last decade of the last century and the tonnage of coal produced in Philadelphia in the same decade.

You can find a very close correlation, but does it have meaning?

So I would really request that some of these questions be answered in the written discussions.

THANK YOU.