



# Seismic Site Class Subject to Change Without Notice

## BEARING CAPACITY FROM SHEAR WAVE VELOCITY

### Introduction

When beginning design, it is useful to understand the general nature of the subsurface proposed for supporting new structures. Structural Engineers can use the subsurface strength and site class and strength estimates for preliminary design concept comments.

### Bearing

Since about 2000, shear wave velocity and SPT Blow count correlations have been documented. Further various authors such as Tezcan (S. Tezcan, Semih & Ozdemir, Zuhail & Keceli, Ali & Erkal, Aykut. (2007). Case Studies: A Rapid Technique to Determine Allowable Bearing Pressure. Geotechnical Special Publication. 10.1061/40940(307)66.). Various correlations have been established between bearing, blow counts and or shear wave velocity. Since shear wave velocity by the ReMi (Refraction Microtremor) method is relatively easy to measure, one can estimate bearing values using the correlations. While these bearing value estimates are not equivalent to actual load tests, they are a reasonable method at a much lower cost.

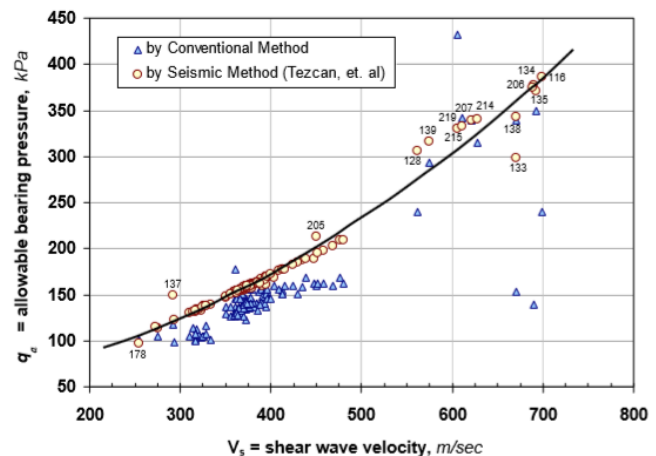


Figure-1. Comparison of Conventional and Seismic methods

(From a data base containing 123 case studies in and around the Kocaeli Province, 2004-06)

### Bearing Estimate Method

Measure Shear Wave Velocity by ReMi method using ambient noise.

Correlate known local conditions (where known) to velocity profile).

Select safety factor.

Apply one of various shear wave and bearing capacity formulations to findings to derive bearing value estimates.

From Tezcan for example: allowable bearing is estimated as  $q_a = 0.071 \gamma V_s$  hard rock,  $q_a = 0.1 \gamma V_s / n$  soft weak rock,  $q_a = 0.025 \gamma V_s$   $\alpha$  varies by soil type. It is shown in research that shear wave velocity and blow counts correlates to some extent based on an exponential relationship of blow counts and soil type of the nature  $V_s = AN^a$  where A is in the range of 30 to 100, N is the blow count and a is generally around 0.3. One could consider bounding the upper allowable bearing capacity pre design to a value estimated based above prior to detailed studies. At the same time one can estimate seismic site class. The values should be conservative in most cases.

### Timing

All the above methods can be used to provide early feedback on bearing and seismic site class. V.A.S.E. Pro use method the ReMi method and provide the following information on timing: Method 5, ReMi can often be carried out in less than a day on relatively short notice.



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