Pulse Velocity of Clay Shale and Limestone

Swapnil Kaulgud and C. Vipulanandan

Center for Innovative Grouting Materials and Technology (CIGMAT)
Department of Civil and Environmental Engineering
University of Houston, Houston, TX 77204-4003

ABSTRACT

The pulse velocity method was used to determine properties of clay shale and limestone obtained from Dallas, Texas. The average unit weight of clay shale and limestone was 144 pcf and the average pulse velocity was 7500 ft/sec.

INTRODUCTION

Recovering samples from soft rocks is a challenge and hence non-destructive testing methods must be evaluated to further characterize the core samples without damaging the samples. Pulse velocity measurement is one of the popular methods to characterize the non destructive properties of concrete and rocks.

OBJECTIVE

The overall objective was to characterize the properties of soft rocks such as clay shale and limestone from Dallas area (North-central Texas) using the Pulse velocity method.

ROCK SPECIMENS AND TESTING METHODS

Limestone (Austin Chalk) cores were obtained from Rowlett Creek and clay shale (Eagle ford) cores were obtained from Denton Tap and Hampton Tap (sites near Dallas, TX). These cores were carefully wrapped in silver foil and taped and transported to the University of Houston geotechnical laboratory for testing.

Clay shale and limestone samples were tested using commercially available pulse velocity equipment as per ASTM C 597 and D 2845, and the frequency of transducers was 150 kHz.

RESULTS AND CONCLUSIONS

In this study, total of 10 clay shale and 13 limestone samples were tested. The unit weight of clay shale was in the range of 126 to 152 pcf (20% difference) with an average of 144 pcf. The unconfined compression strength of clay shale was in the range of 1 to 4.6 MPa with an average strength of 1.9 MPa. The pulse velocity in clay shale varied from 6739 to 8562 ft/s.

The unit weight of limestone was in the range of 128 to 151 pcf with an average of

144 pcf. The unconfined compression strength of limestone was in the range of 6.3 to 16.6 MPa with an average of 10.9 MPa. The pulse velocity in limestone varied from 6260 to 8747 ft/s. A profile of unit weight and pulse velocity is shown in Fig. 1.

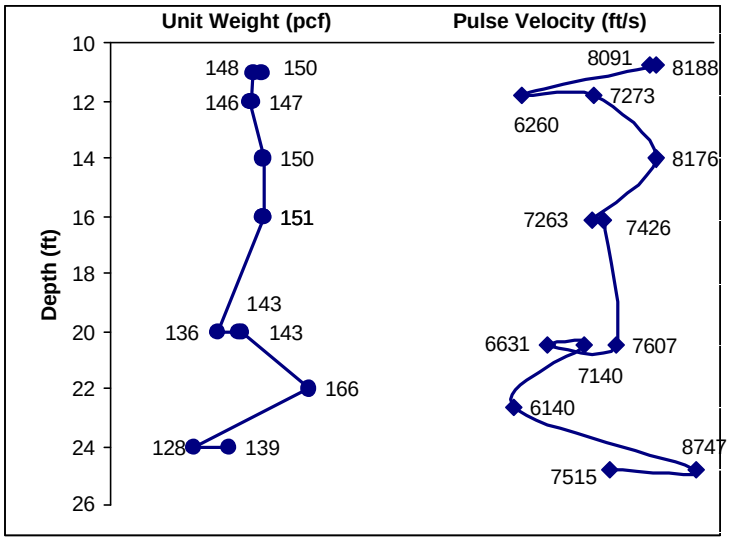

Fig.1. Unit Weight (pcf) and Pulse velocity (ft/s) properties of limestone at a site in Rowlett Creek.

CONCLUSIONS

The pulse velocity method using frequency of 150 kHz can be used to determine the pulse velocity of soft rocks such as clay shale.

REFERENCES

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