APPLICATION OF THE SINGLE MICROTREMOR METHOD TO THE ADELAIDE'S REGOLITH

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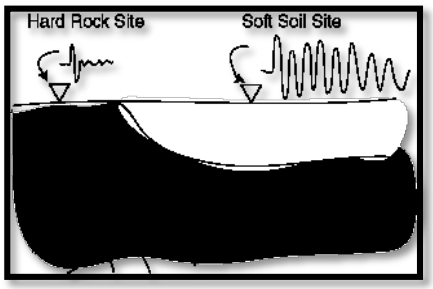
THE SINGLE MICROTREMOR METHOD HAS BEEN APPLIED TO ADELAIDE'S REGOLITH WHICH EXHIBITS LOW IMPEDANCE CONTRAST BETWEEN THE UPPER AND BEDROCK LAYERS. PRELIMINARY FINDINGS SHOW THAT THE PREDOMINANT FUNDAMENTAL PERIOD IS BETWEEN 0.8 AND 3.0 SECONDS. THIS SUGGESTS GREATLY AMPLIFIED GROUND MOTIONS FOR 3 TO 5 STOREY BUILDINGS IN THE ADELAIDE CITY DUE TO FUTURE SEISMIC EVENTS.

INTRODUCTION

Due to its simplicity, convenience and reliability in urban areas the single microtremor method has been widely used to study local site effects where local geological conditions modify seismic waves as illustrated below.



Many previous publications suggested further investigations in areas with low impedance contrast, such as regolith sites. Therefore, investigation of the application of the single microtremor method in regolith sites is a focus of the present study.

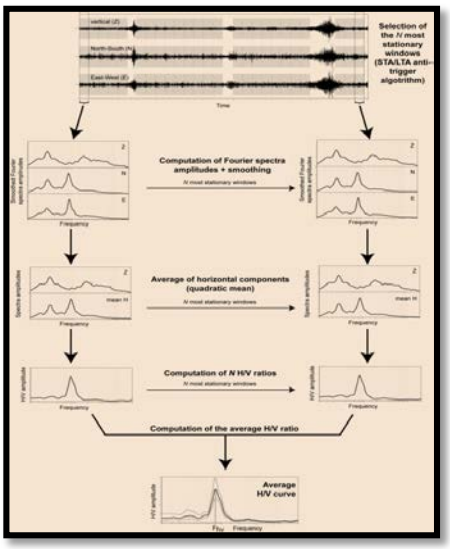
LOCATION & DATA ACQUISITION

- The single microtremor method is applied across the Adelaide city. Seven locations are examined – 4 to the north and 3 to the south of the city.
- Data were acquired continuously for two hours using an LE-3Dlite Lennartz seismometer and Kelunji digital data recorder. The recorded noise data were separated into 4 datasets using the Eqwave application. Each dataset includes 30 minutes of ambient noise recordings in 3 orthogonal directions (two horizontal and one vertical).

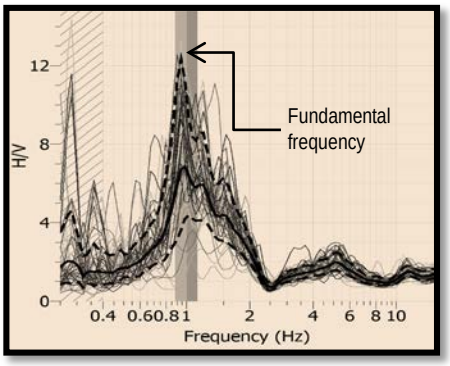
DATA PROCESSING & RESULTS

The data were subsequently processed to obtain the horizontal vertical spectral ratio (HVSR) which is important in local site effect assessment.

Data processing is summarised as follows:



A sample of an HVSR analysis result is shown below.



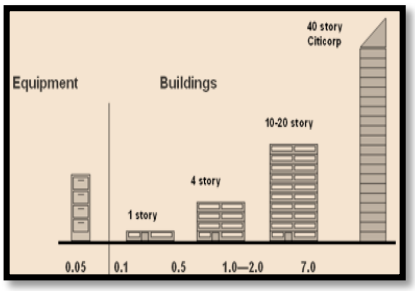
The results of the present study is as follows:

- Locations #1, #2, #3, and #6 show a clear peak, whereas #4 and #5 indicate otherwise. This suggests a complex sub-surface profile at #4 and #5. The HVSR results at Location #7 exhibits two peaks which suggests data derived from regions associated with industry. Additional investigation will be carried out to explore further this location.

The fundamental period of the site is obtained by taking the reciprocal of the fundamental frequency. The results are as follows:

Location	Fund. period (s)	Greatest affected building
#1 (Barton Tce W)	1.0	4 story bld.
#2 (Lefevre Tce)	0.8	3 story bld.
#3 (Finniss St)	1.0	4 story bld.
#4 (Frome Rd)	2.3	5 story bld.
#5 (West Tce)	2.1	5 story bld.
#6 (South Tce)	1.8	4 story bld.
#7 (Hutt Rd)	3.0 & 1.4	4-5 story bld.

These results suggest a significant seismic amplification for 3 to 5 storey buildings in the Adelaide city by using the general guide for building natural periods as follows:



FUTURE WORK

Further detail investigation is needed to obtain and refine the seismic parameters of Adelaide's regolith by undertaking additional surveys and enhancing the microtremor method.

REFERENCES

- WP12- Deliverable D23.12, (2004), Guidelines for the implementation of the H/V spectral ratio technique on ambient vibrations, SESAME European Research Project
- http://www.geopsy.org, (2015), Geopsy home: software applications for ambient vibration.