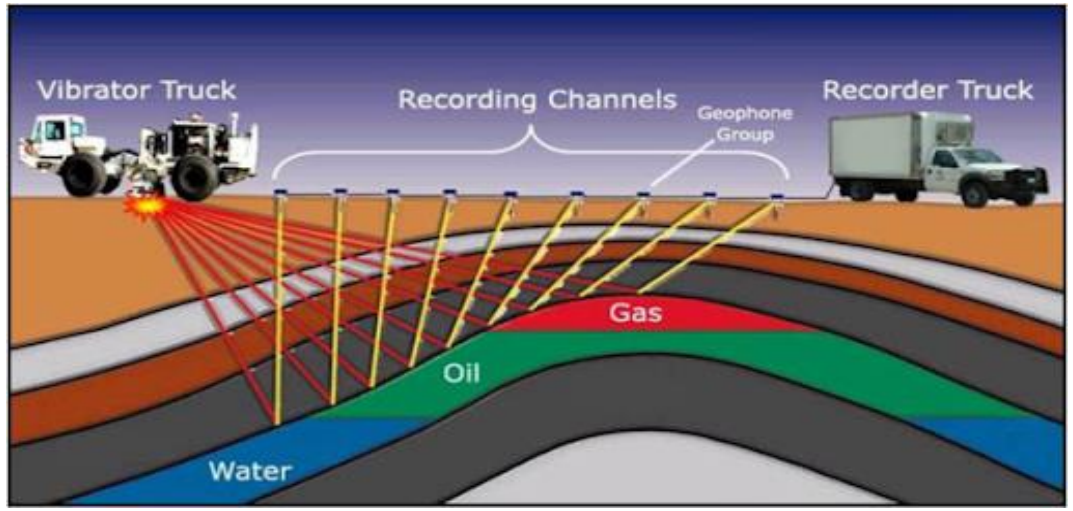
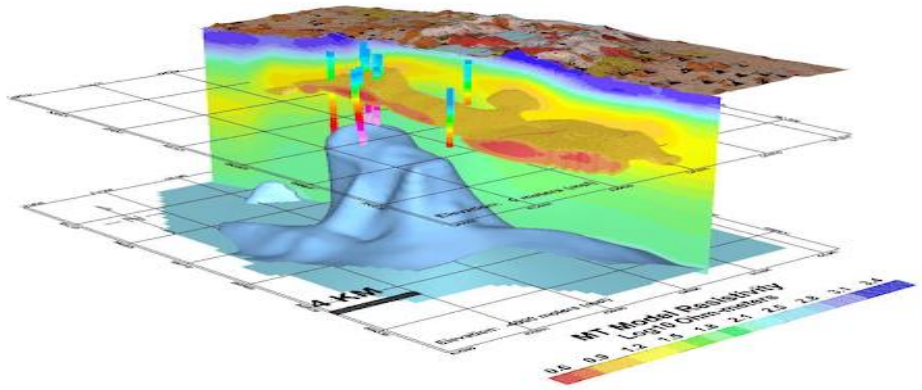
SITE INVESTIGATION: GEOPHYSICAL SURVEY

Nur Amalina binti Mat
Geotechnical Research Laboratory
Pusat Kecemerlangan Kejuruteraan dan Teknologi JKR (CREaTE)

WHAT IS GEOPHYSICAL SURVEY?

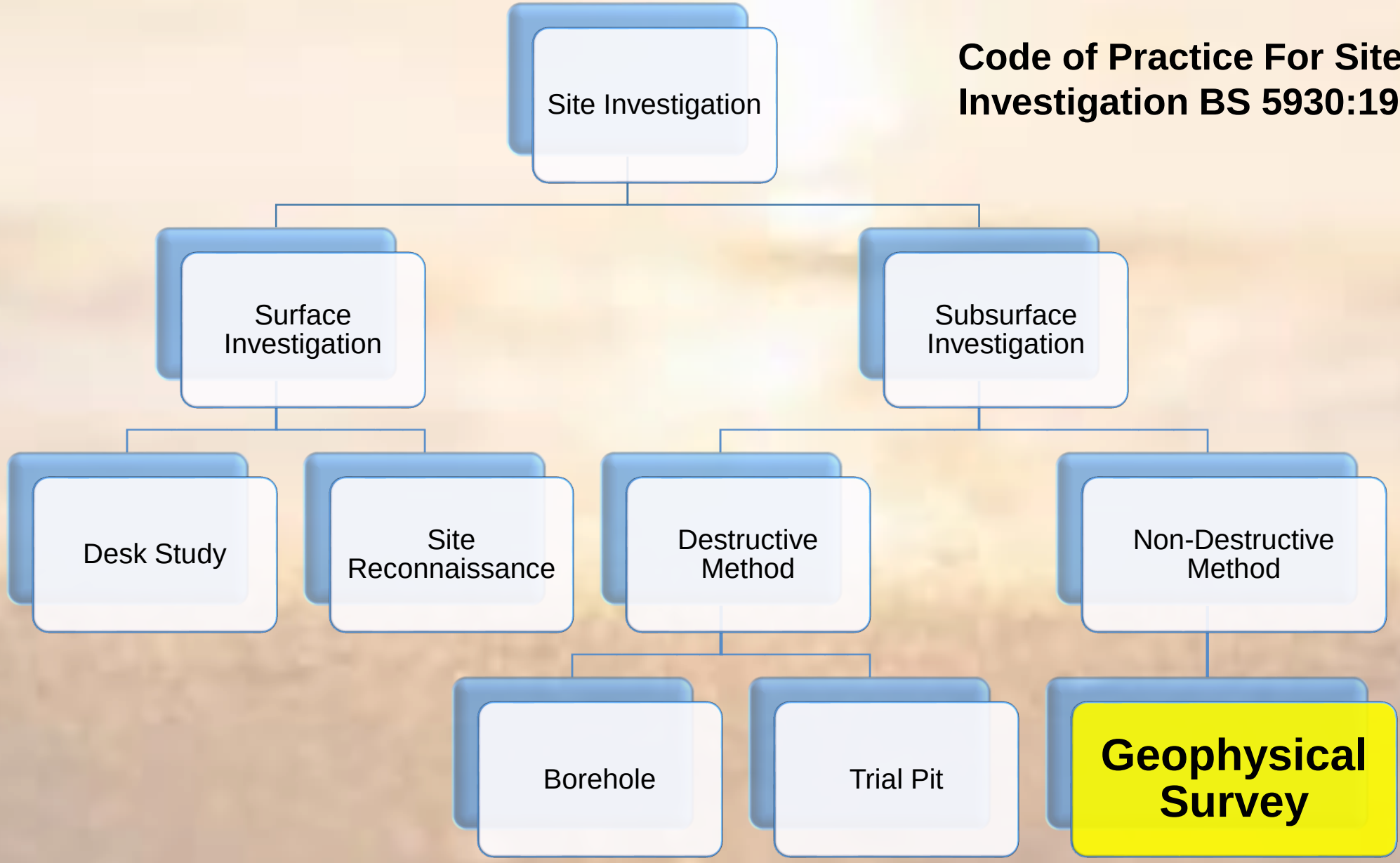
Non-destructive method to determine the subsurface characteristics by measuring physical properties of earth material and interpreting the results in terms of geological features





WHAT IS GEOPHYSICAL SURVEY?

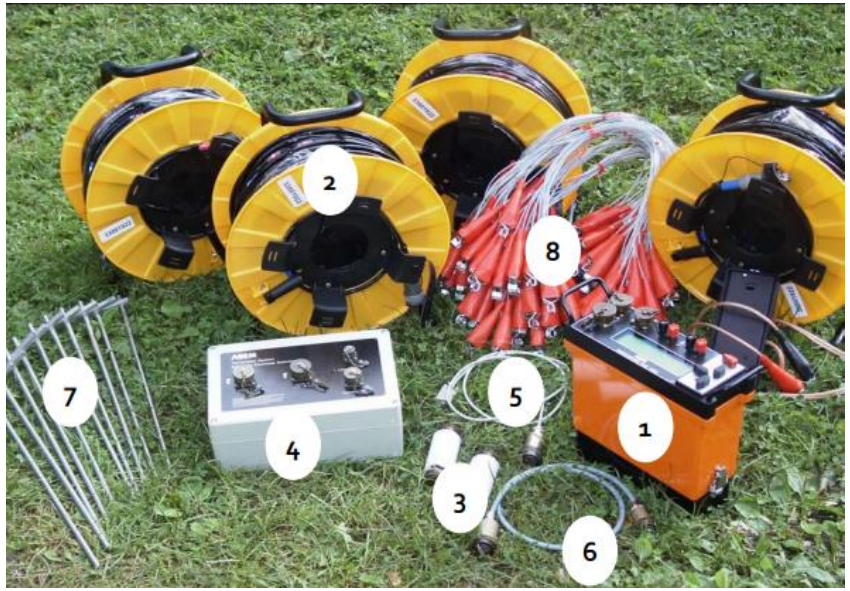
Code of Practice For Site Investigation BS 5930:1999



TYPES OF GEOPHYSICAL SURVEY

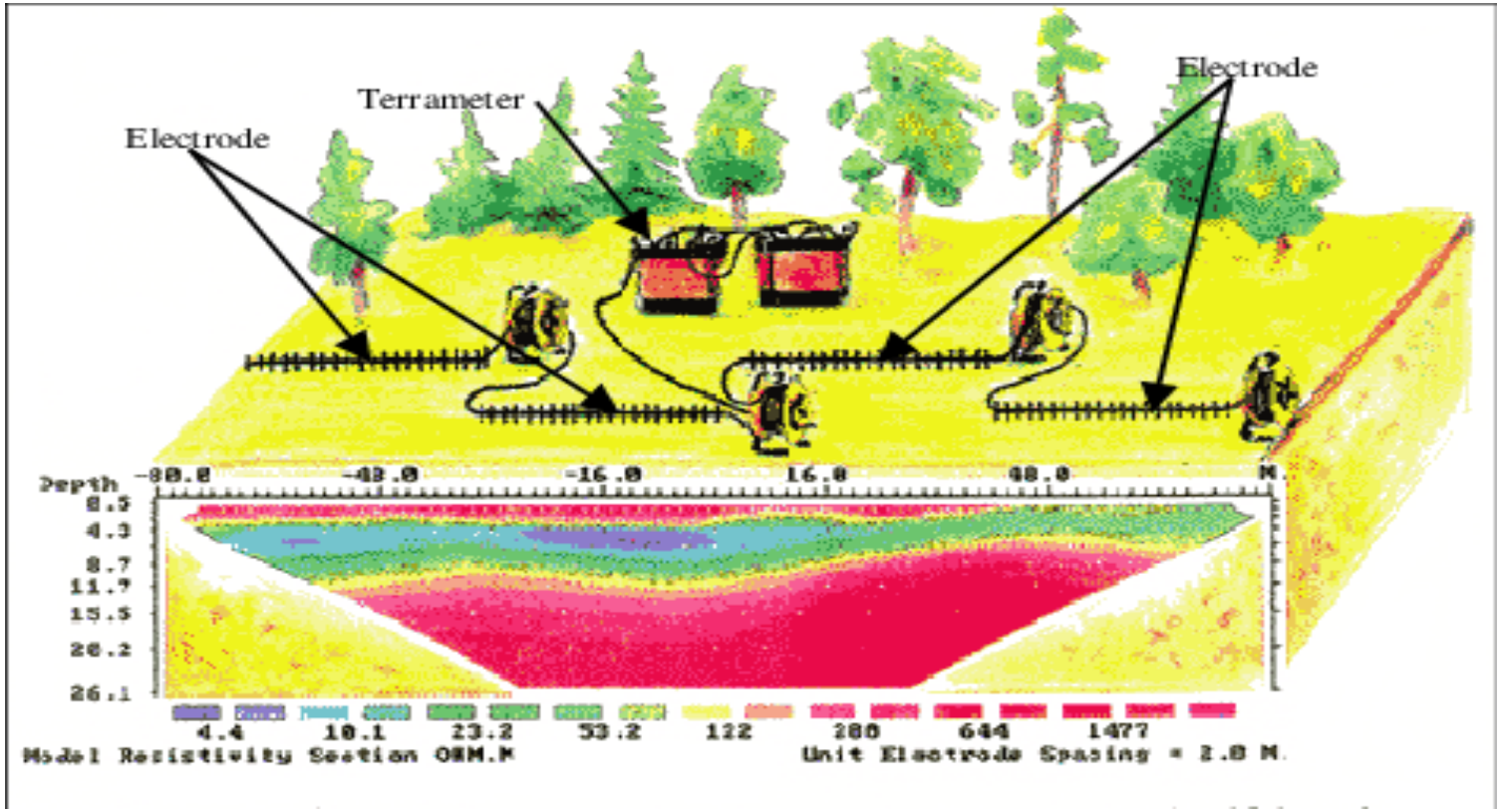
ELECTRICAL RESISTIVITY	SEISMIC	GROUND PENETRATING RADAR	GRAVITY
Electrical Resistance	Wave Velocity	Radio Wave	Density of Rock
APPLICATION			
Determination of the subsurface profiling related to the detection of groundwater, overburden materials, boulder, bedrock, cavities, fault zone, slope failure and groundwater quality	Determination of the depth of soil-bedrock and excavation classification	Determination of the boundaries of trenches and ditches, buried drums and pipes	Determination of fault zone area and the extent of large buried channels and cavities

ELECTRICAL RESISTIVITY METHOD



Equipment:

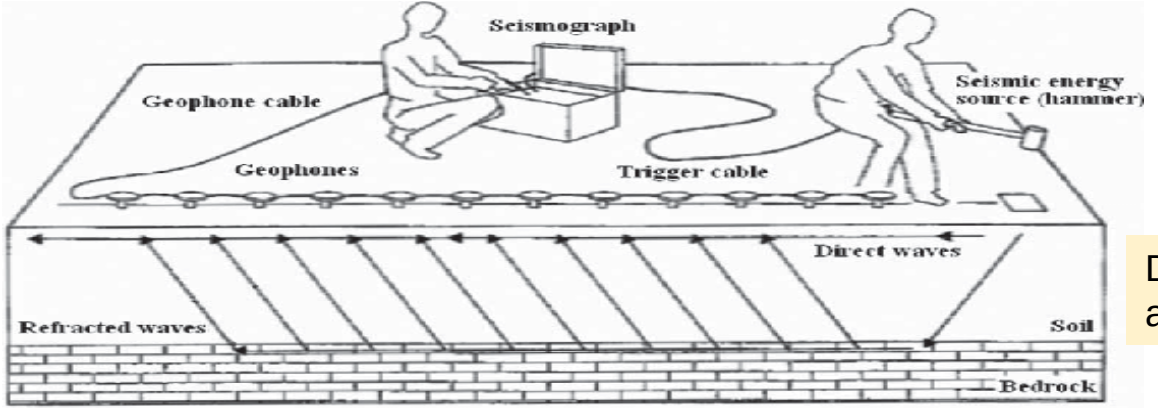
1) Terrameter SAS4000
2) Resistivity multi core cable
3) Cable connector
4) Electrode selector/switch box
5) Data transfer cable
6) Terrameter to switch box cable
7) Steel electrode
8) Jumper cable



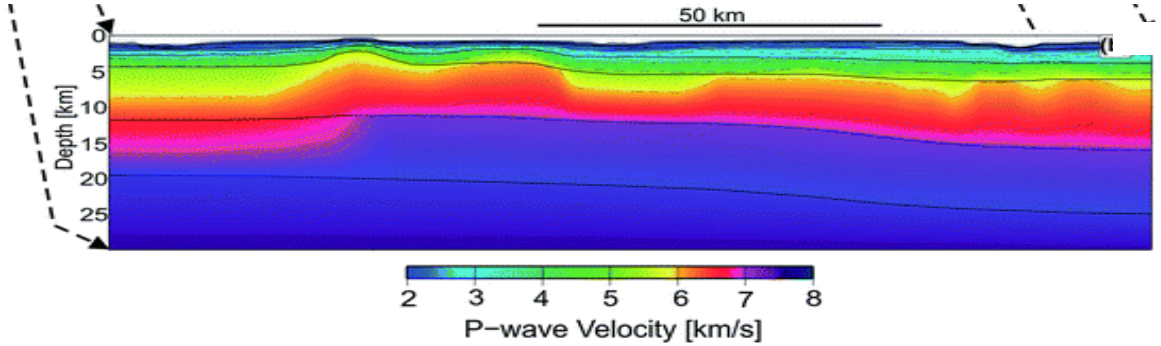
The picture above shows the general setup of equipment and the result of the image processed by 2D electrical resistivity method.

Results give subsurface profiling such as groundwater, bedrock, cavities etc.

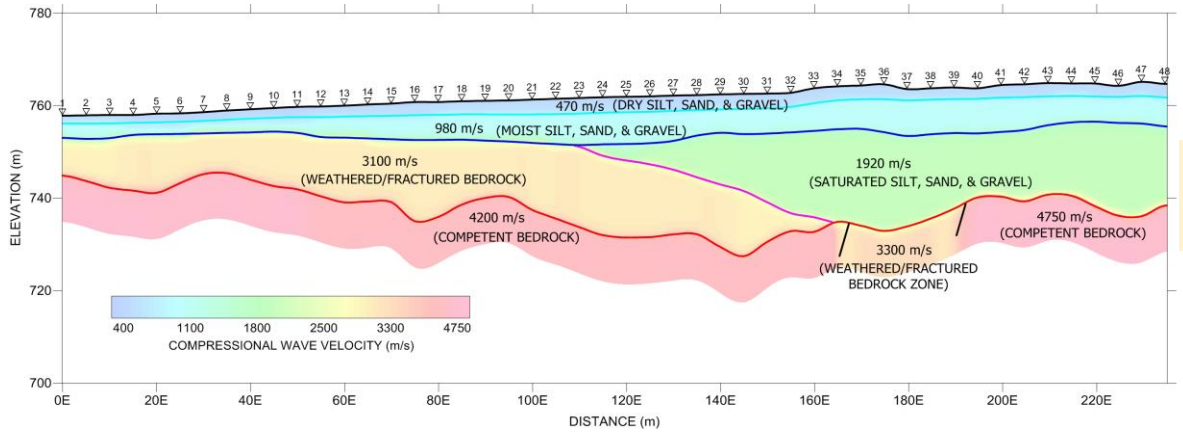
SEISMIC METHOD



Data acquisition



Data processing

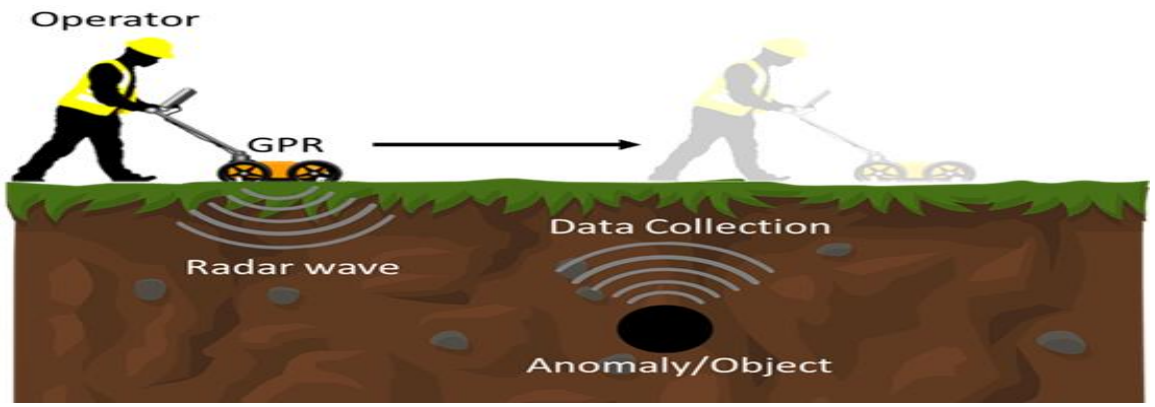


Data analysis

The picture above shows the equipment set up by using the seismic method

Results give soil-bedrock interface, thickness of alluvium, depth to the water table, relative frequency and orientation in rock and thickness of landfills.

GROUND PENETRATING RADAR (GPR)



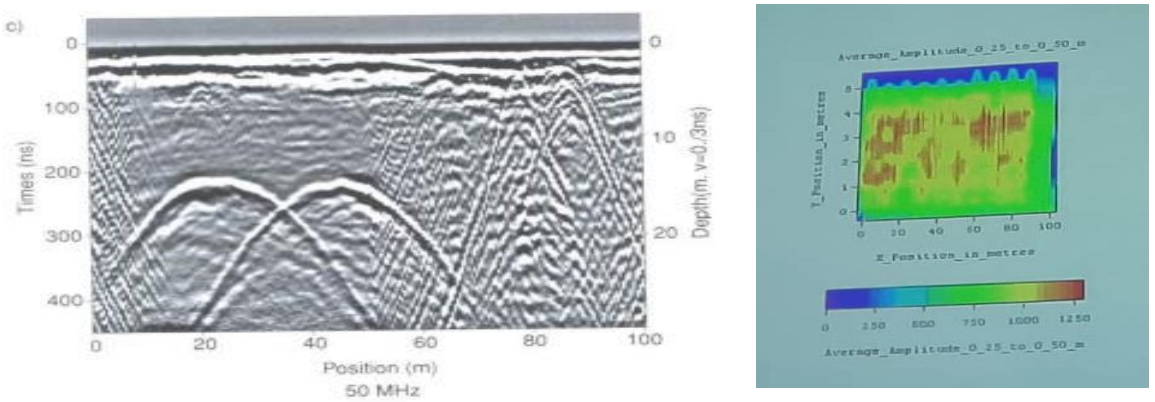
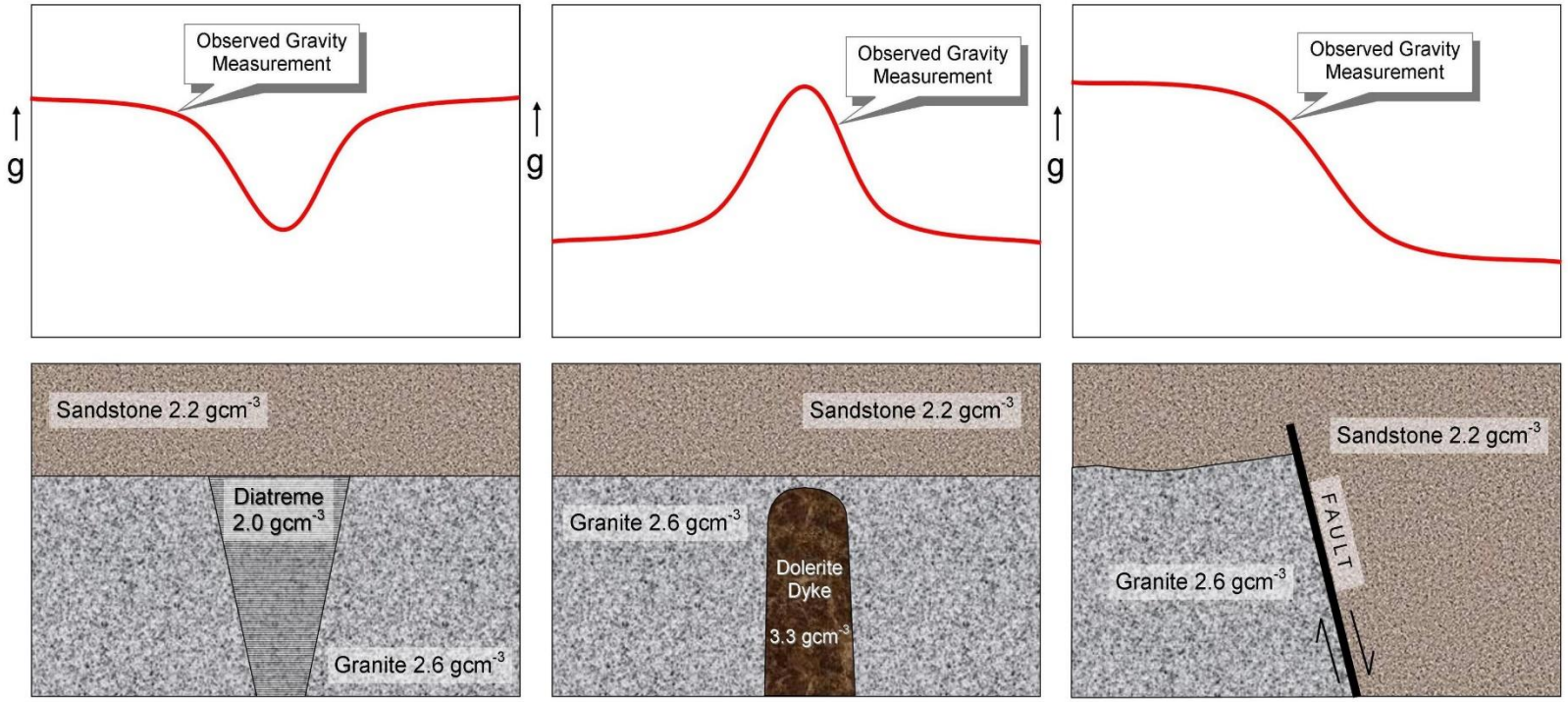


Image processed by GPR shows the position of electric cable and pipes (left) and concrete slabs (right).

Equipment of GPR

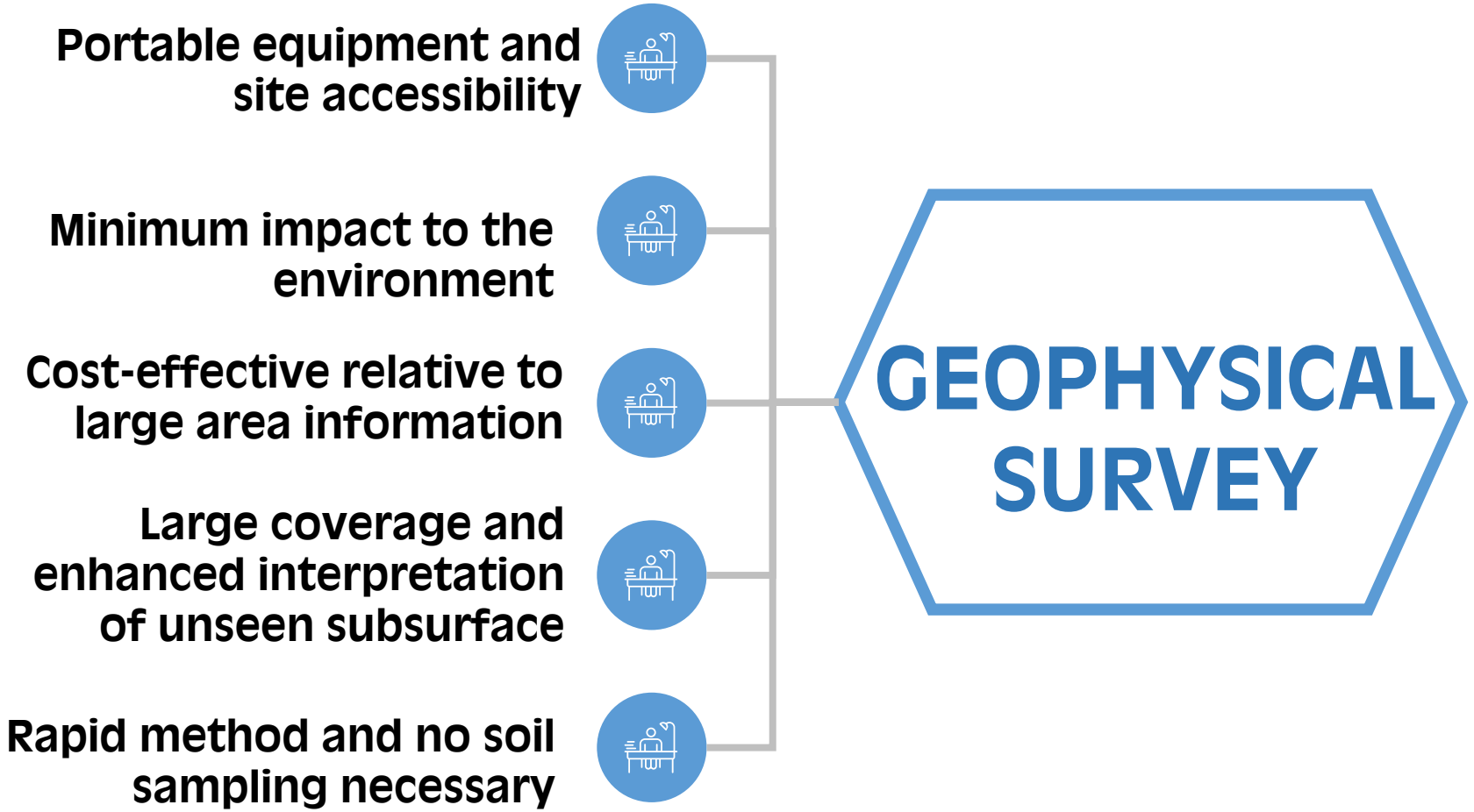
GRAVITY METHOD

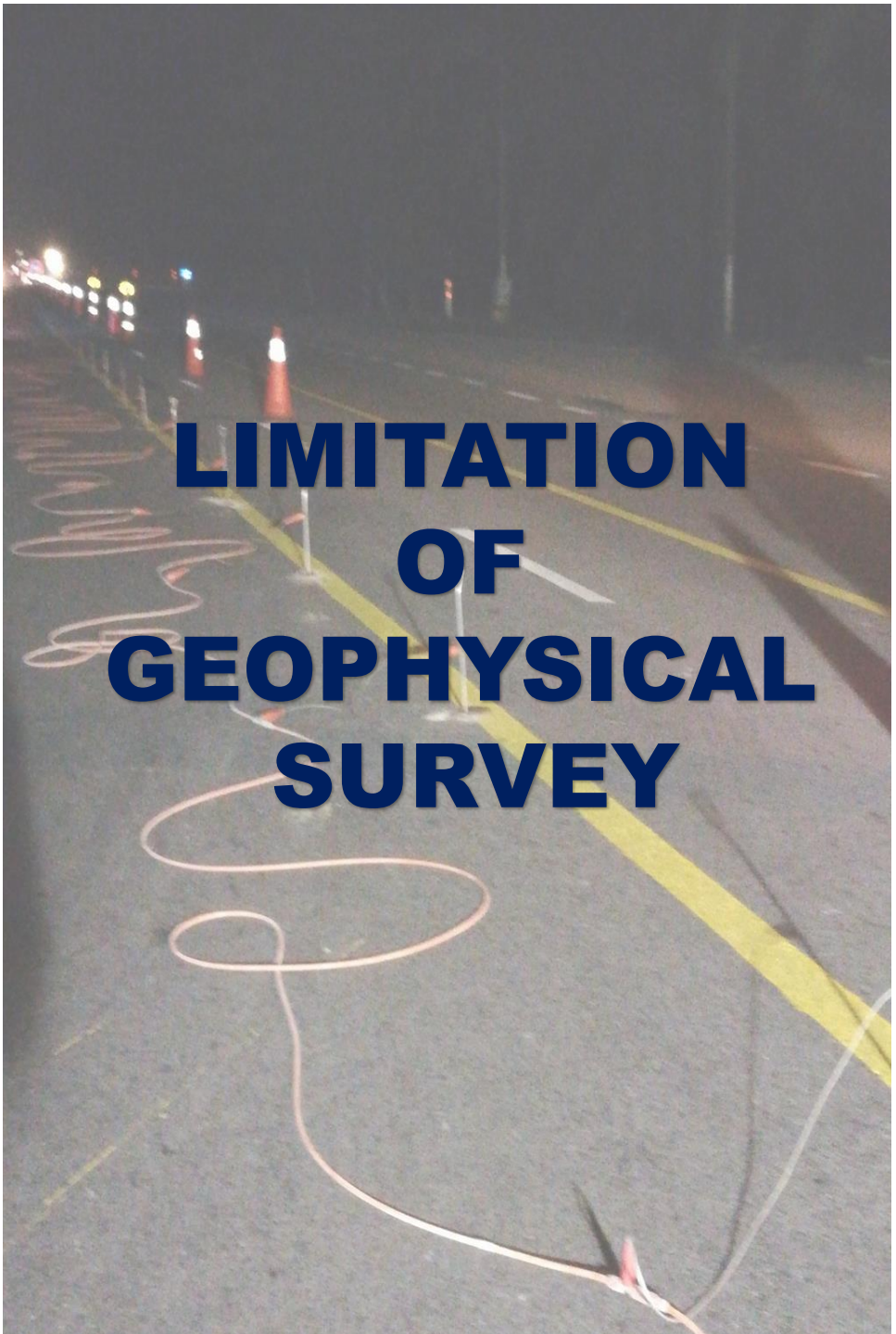
Equipment for gravity measurement known as gravity meter



The figures above show the image processed by using gravity meter

ADVANTAGES OF GEOPHYSICAL SURVEY





LIMITATION OF GEOPHYSICAL SURVEY

01 **Result: Misinterpretation between engineers, geologists and geophysicists.**

02 **Requires involvement of experienced person who is familiar with the particular testing method.**

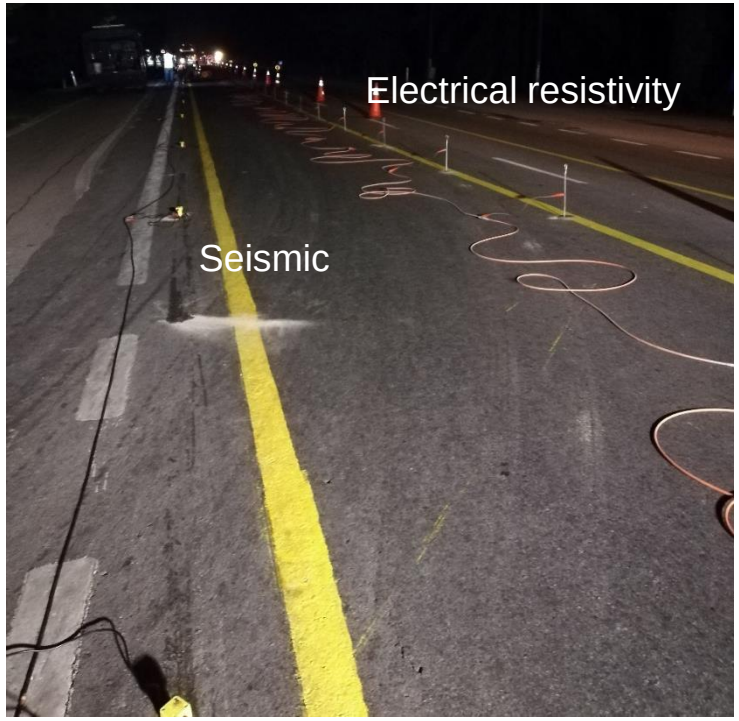
03 **Wrong selection of geophysical technique or method will produce incorrect profile or map.**

04 **Possibility of capturing interference or noise (error) during testing. Hence, there is a need to minimize the noise to produce a good quality of image analysis.**

05 **High capital cost to acquire equipment and software.**

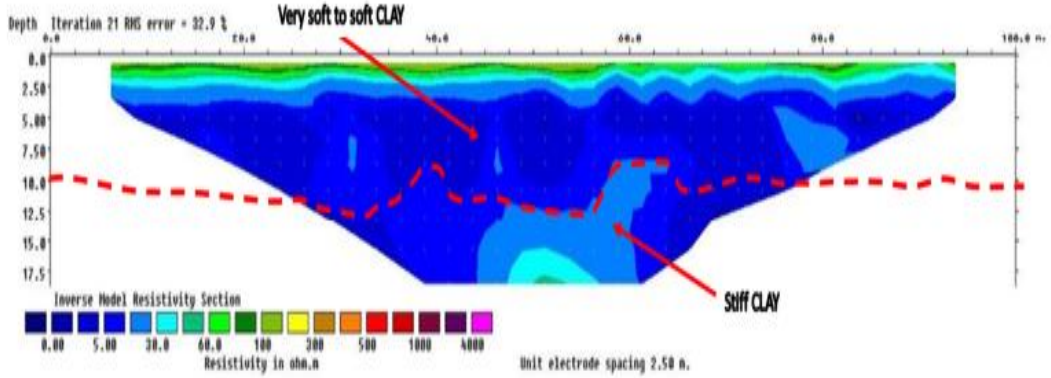
PREVIOUS STUDY BY GEOTECHNICAL RESEARCH LABORATORY

Integration of data obtained from geophysical method, borehole and trial pit to identify the problem of road settlement along Federal Road FT005, Pengkalan Raja, Pontian (2019)

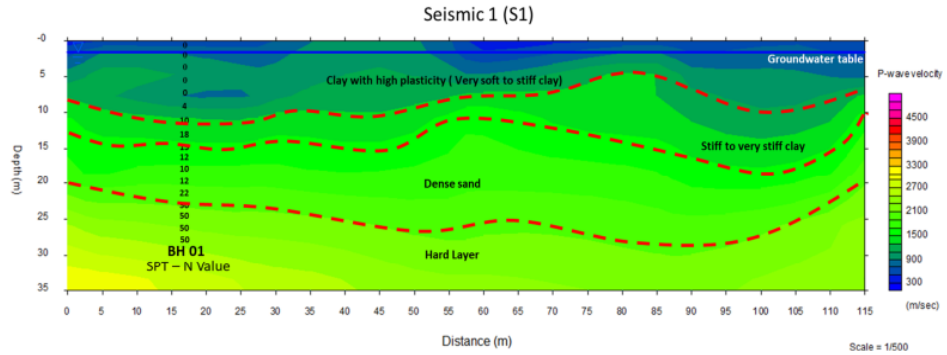


Setting of electrical resistivity and seismic at the site.

Ground Penetrating Radar (GPR).



2D image of electrical resistivity.



The correlation of SPT value (Borehole) and the data analysis by seismic.

CONCLUSIONS

The geophysical survey provides comprehensive data of subsurface characteristics

The right selection of geophysical survey method can produce the correct and best data interpretation

WAY FORWARD

Geotechnical Research Laboratory, CREaTE is in the process of equipping our laboratory with geophysical survey equipment.

Currently, Geotechnical Research Laboratory CREaTE is conducting research on identifying the cause of road settlement by using the geophysical survey.

REFERENCES:

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2. M Azrief Azahar, N Farhan Zakiran Mahadi, Qusanssori Noor Rusli, N Narendranathan and E C Lee (2019). *Use of geophysics for site investigations and earthworks assessments.*
3. Keary, P., M. Brooks, and I. Hill (2002). *An Introduction to Geophysical Exploration.*
4. *JKR (2019). Garis Panduan Perancangan Kerja Penyiasatan Tanah & Ujian Makmal*


thank
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