The Study of Basement Pattern of an Industrial Estate

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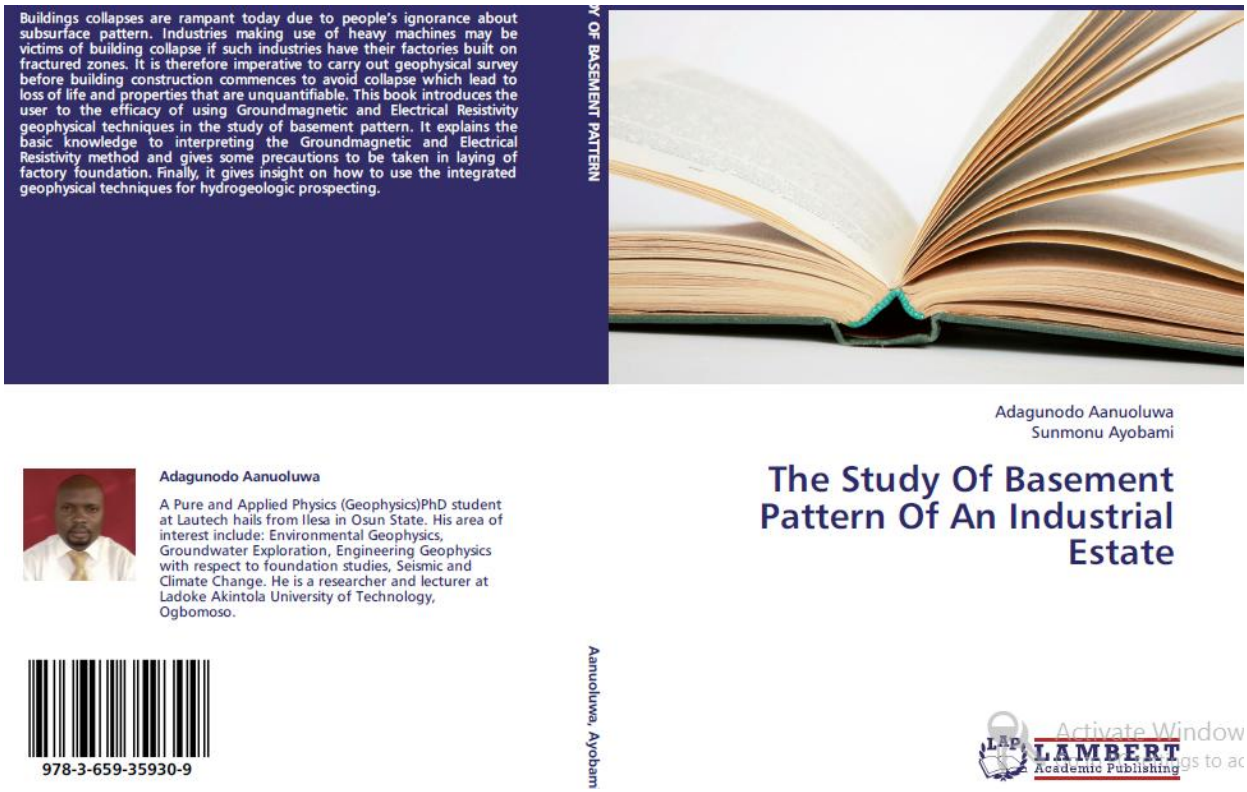

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INTRODUCTION
1.1 Preamble

The foundation of a building is that part of walls, piers and columns in direct contact with the ground and the one transmitting loads to the ground. The building's foundation is sometimes referred to as the artificial, and the ground on which buildings foundation is laid as the natural foundation. Ground is the general term for the earth's surface, which varies in composition within the two main groups, rocks and soils. Rocks include hard, strongly cemented deposits such as granite and soil the loose contains uncemented deposits such as clay. Rocks suffer negligible compression and soils measurable compression under the load of buildings. The size and depth of a foundation is determined by the structure and size of the building it supports and the nature and bearing capacity of the ground supporting it (Barry, 1999).

Geophysics involves the use of physical laws, mathematics and the physical properties of the earth to probe into the subsurface (Telford et al., 1976). Geological surveys are to locate subsurface geological structures or bodies and where possible to measure their dimension and relevant physical properties. Exploration geophysics can be used to directly detect the target style of mineralization, via measuring its physical properties directly. It can also be used to map the subsurface structure of a region, to elucidate the underlying structures, spatial distribution of rock units, and to detect structures such as faults, folds and intrusive rocks. This is an indirect method for assessing the likelihood of ore deposits or hydrocarbon accumulations. Methods devised for finding mineral or hydrocarbon deposits can also be used in other areas such as monitoring environmental

impact, imaging subsurface archaeological sites, groundwater investigations, subsurface salinity mapping, Civil engineering site investigation and interplanetary imaging.

The ever increasing in the demand for minerals of all kinds and the enormous demanding in the use of oil, water and natural gas has led to the development of many geophysical techniques of ever-increasing sensitivity for the detection and mapping of unseen or buried deposits and structures of various kinds. Methods based upon variations in the elastic properties of rocks have been intensified for determining structures associated with oil, water and gas such as faults, anticlines and synclines (Dobrin, 1976). The variation in electrical conductivity and natural currents in the earth, rates of decay of artificial differences introduced into the ground, local changes in gravity, magnetism and radio activity, all these provide information to the geophysicists about the nature of the structures below the surface (Adagunodo and Ehigbor, 2008).

The traditional way of erecting structures (that is, without a geophysical survey of where to build on) has made many structures to fail. Some situations occur where water comes out of the ground floor of the building which may result to weakening of the foundation. This has made some industries and residence to abandon their base and relocate to another area which has brought shortage to those that concern. This unfortunate disaster at times originates from lack of knowledge about the geologic structures or patterns of where buildings are erected.

Factories can be defined as buildings where goods are manufactured or assembled while industries can be defined as economic activities concern with the processing of the raw materials and manufacture of goods in factories. If the factories are located on the fracture zones, the vibration

of the heavy machines present in the factories will cause an appreciable increment in the lateral extent of the fractures over a long period of time. As the fracture zone increases, there might be deformation in the foundation of the factory due to the continuous vibration of the heavy machines. That is the reason why factories should not be built on the fractured zone. It is imperative to know that these fractures, faults and contact zones could serve as aquiferous zones, where groundwater could be developed for the use of industries. Therefore, this investigation will be on the study of the basement pattern of Oyo State industrial estate, Ogbomoso using groundmagnetic and vertical electrical resistivity techniques.
The geophysical techniques have been found very useful in geologic characterization, aquifer characterization, contaminant plume identification and location of buried wastes and other anthropogenic features (Boulding, 1993). In the recent past, integrated geophysical investigations have found useful and increasing applications in many geological studies ranging from shallow engineering studies, groundwater and mineral deposits explorations as well as in a variety of geo-environmental studies (Olorunfemi and Mesida, 1987; Frohlich and Parke, 1989; Sharma, 1997; Steeples, 2001; Alagbe, 2005; Adelusi et al., 2009; Adiat et al., 2009; Tijani et al., 2009). High urbanization rate and non-invasive character of the geophysical methods which can provide information over larger areas are said to expedite this trend (Frohlich et al., 1994; Dahlin, 1996; Aristodemu and Thomas-Betts, 2000; Draskovits and Vero, 2005). Meaningful evaluation of subsurface fracture distribution in urban or sub urban area using surface geophysics often requires an integrated approach. Alagbe (2005) also reported that it is often necessary to use several methods to obtain the desired results.

In the present study, groundmagnetic method has been combined with electrical resistivity method to study the Basement pattern of an industrial estate Ogbomoso, Southwestern Nigeria. Basement consists of weathered and unweathered zones. The unweathered basement with thin overburden will be useful for engineering purposes while aquifers present in the weathered overburden and fractured bedrock are useful for groundwater exploration. MacDonald and Davies (2000) reported that unweathered basement rocks contain negligible groundwater, significant aquifers are formed within the weathered overburden and fractured bedrock. Generally, to avoid catastrophic failure in the industrial setting, it is advisable to site the factories on unweathered basement with thin overburden thickness.

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