

Perceived Factors Influencing the Foundation of Secondary School Buildings in Andoni Local Government Area of Rivers State

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ABSTRACT

The study examined the perceived factors influencing the foundation of secondary school buildings in Andoni Local Government Area of Rivers State. Four purpose of the study and four research questions guided the study. The research design adopted for this study is the descriptive research survey. The population consisted of two hundred and ninety - seven (297) teachers and principals. A sample of 30 teachers and principals representing 10% of the target population was drawn using simple random sampling techniques. A well-structured questionnaire was used to collect data. The data collected were analyzed using the frequency table and percentages. However, the overall result indicates that both teachers and principals strongly agreed that different variable causes attack on foundation concrete by ground water in secondary schools building in Andoni Local Government Area in Rivers State. Based on the findings of the study, the recommendations made were: Ground water must be prevented from influencing the foundation concrete of school buildings in Andoni Local Government Area of Rivers State; gravels must be effectively used to allow water to runoff from the foundation concrete; higher grade of cement should be used and proper curing should be done; soil stability should be considered while construction concrete is done.

Key words: Ground water, Cement, Foundation, Concrete, School building

I. INTRODUCTION

Buildings have been seen as the fundamentals to man's living and existence. Over the years school building in Andoni were builds with tarches and mould building, the foundation of these tarches building are strictly on wood, mold and tarch building has been the life style of the

people. In general any building that incorporates missionary consists of several structural elements which are joined together to form a structural entity, a good example of structural elements which may be joined are many: The two wythes of cavity wall, two intersecting walls, a flock and its supporting walls, and a pilaster , a frame and its infill wall.

According to Krukru (2019) opined that mold and tarched building is the major building existing within the Andoni territories of which foundations are done through woods. However, in Okenkero (1984) asserted that the introduction of bricks building comes into existence. The 1472 Portuguese traders discover the existence of the Nigeria from the South Coast, the Portuguese whose man goal was trading, had contacted the people of Lagos, Benin, long before the exploration by the British (Osokoya, 1989). Through the European relationship of trading with the Andoni settlers, bricks building became building of the high class people within the Andoni region, it has to do with expertise who are to lay the bricks in other of the structural design of the building.

According to Giadom (2004). Assert that bricks building production and building strengthen the labour production and enhance the efficiency and effectiveness of the economic life style of the Andoni's people. The foundation of bricks buildings are mostly done with polline rock cements, water, sand etc. However, not as solid as the rock concrete foundations. The effects of ground water on bricks wall are mostly visible as of enforce crakes in the wall of the building easily because of the lights nature of its foundation. This gives room to collapse of building and building walls.

The system theory has been approved to be the approach to this work, basically it implied

what affect one part also affect other part. In the contents of foundation concrete by ground water for a concrete to be solid all variable such sands, cement, chippings, rod and other materials must work together in other to form a sustainable foundation. Therefore, if any section malfunction it virtually affect the entire system. Foundation concrete is the mixture of sand, cement, water and stone used to stabilizes the base or formation of a structure to receive the load to the structure, foundation is the part of the structure that has direct contact with the ground, and which transmits the load of the structure, foundation is the part of the structure that has direct contact with the ground, and which transmits the load of the structure to the material ground, this mean that formulation concrete should be reliable is strength and bonding force the ground. Foundation being the bases on which the whole structure rest is very importance to building and holler structure that has is root in the ground. Foundation is the critical link between the ground and the structure, therefore the substance concrete became part of the bases on which the strength of a building is determined.

However, the recent introduction of concrete foundation has great resistance to the effect of ground water on building. The study of geology has giving great consideration to soil analysis for the introduction of structures or buildings foundation concrete became the best ad reliable foundation for building of structures (Ovai, 2014). The use of water, chippings, and cements are the major components of concrete which provide bonding within itself, the adding cement and water shilled cement gives protection the foundational concrete against the effects of the ground water. Therefore, this study sought to investigate perceived factors influencing the foundation of secondary school buildings in Andoni Local Government Area of Rivers State.

Statement of the Problem

Over the years it has been observed that several secondary school structures have been collapsing. The recent collapse of secondary school structures calls for a very great concern which attract investigation towards the roots of the collapse structures. The Andoni environment is found at the coastal area of the Atlantic Ocean, the underground water of the Andoni environments is influence by the sea water (Oku, 2003). The researcher was bothered about the effect of the underground water on foundation concrete of the building in the Andoni tertiary. It was based on this that the researcher investigated into the perception of ground water influence on foundation concrete

on secondary school building in Andoni Local Government Area of Rivers State.

Purpose of the Study

The overall aim of this study is to investigate the perceived factors influencing the foundation of secondary school buildings in Andoni Local Government Area of Rivers State. Specifically, the study sought to:

1. Find out if ground water influence the foundation concrete of secondary school buildings in Andoni Local Government Area in Rivers State.
2. Investigate if the types of gravel influence the foundation concrete of secondary school buildings in Andoni Local Government Area in Rivers State.
3. Find out if the types of cement influence the foundation concrete of secondary school building in Andoni Local Government Area in Rivers State.
4. Determine the influence of types of soil affect foundation concrete on secondary school buildings in Andoni Local Government Area in Rivers State.

Research Questions

The following research question guided the study:

1. How does ground water influences the foundation concrete of secondary school buildings in Andoni Local Government Area in Rivers State?
2. How does the types of gravel influence the foundation concrete of secondary school buildings in Andoni Local Government Area in Rivers State?
3. How does the types of cement influence the foundation concrete of secondary school building in Andoni Local Government Area in Rivers State?
4. To what extent do of types of soil influence foundation concrete on secondary school buildings in Andoni Local Government Area in Rivers State?

II. LITERATURE REVIEW

Ground water rainfall that infiltrates the soil and penetrates in to the underlay strata is called groundwater, the quantity of water that can be accommodated under the surface depends on the porosity of the sub-surface strata. The water bearing strata, called aquifers, can consist of unconsolidated material like the sand, gravels, and glacial and drift or consolidated material like sandstones and limestone's is relatively imperious, but is soluble in water and so frequently has wide

joins and solution passages that make the rock enemas, similar to a porous rock in its capacity to hold water and act as an aquifer. The water in the pores of an aquifer is subject to gravitational force and so tends to flow, down ward, through the pores of the material, the resistance to this unground flow varies because of the effect of the weather of the soil, and its close material nature to the sea. The resistance varies and the permeability of the material is a measure this resistance. Aquifers with large pores such as coarse gravel are said to have a high permeability and those with very small pores such as clay, where the pores are microscopic, have a low permeability.

Cement

Cement are substance, which bind together the particles of aggregates (usually sand and gravel) to form a mass of high compressive strength (concrete). The most commonly used cement is Portland cement, which may be of the ordinary variety or rapid hardening. There are several other cements that will produces concretes with more specialized properties. Giadom (2004) states that Portland cement are mixture of substance containing calcium carbonate such as chalk or limestone, with substance containing silica and alumna, such as clay or shales, heating them to a clinker and grinding them to a powder. The basic requirement for Portland cement according to BS 12, cover composition sampling procedures and tests for fineness chemical composition, strength setting time and soundness the cement combines with water to form hydraulic calcium silicate and hydrated calcium aluminate, the initial set takes place in about 45 minutes and the final set within ten hours, and develop strength sufficiently rapidly for most concrete to form.

Low –Heat Portland Cements: This type of cement is manufactured to comply with the requirements of BS 1370, and its sets, hardens and evolves heat more slowly than ordinary Portland cement, it is used primarily in large stricture such as dams and massive bridge abutment and retaining walls, which use large volumes of concrete and where the generated that cannot easily be dissipated and high early strength is not usually required.

White and Coloured Portland Cements: White cement is produced by reducing the amount of iron oxide in the cement through careful selection of the raw material and using special manufacturing processes, coloured cement are obtained by adding suitable pigment to white cement this cement is mainly used for decorative purposes, and have been introduce to good effect in floors and paving.

Sulphate-Resisting Cement: This cement should comply with BS 4027, it is more resistant's than ordinary Portland cement to the effect of sulphates.

Extra Rapid Hardening Portland Cements: The cement is made by adding an accelerators, such as calcium chloride, to rapid-hardening Portland cement, it is used when high strengths are required as early as possible, or for concreting in cold weather (but not under freezing conditions) both the rate of hardening of the head evaluation is accelerated as well as the setting process. **Water Proof and Water – Repellant Portland Cements:** Concrete made with these cements is less permeable to water than concrete made with ordinary Portland cement, careful control is required during the mixing process as some types tend to entrain air, and how permeability is also dependent on a dense concrete.

Hydrophobic Portland Cements: This cement has been developed to relevant partial hydration of cement during storage in humid conditions, resulting in reduction in strength and formation of air-set lumps, substances added during the grinding process, form a water-repellent film around each grain of cement and so prevents deterioration during mixing the protective film is lost by abrasion and hydration takes place.

Portland Blast furnace Cement: This is made by grinding a mixture of ordinary Portland cement clinker and granulated blast furnacesky. It issimilar to ordinary Portland cement but evolves less heat and is rather more resistant's to chemical attack by sulphates or seawater. Super Sulphated Cement, this consists of granulated blast furnace sky, calcium sulphate and a small percentage of Portland cement or lime, its prime advantage is the high resistance to chemical attack ground water carrying sulphate and week acids, it deteriorates rapidly if stored under dump conditions. Concrete produce by this cement requires a longer mixing period and the surface of the finished concrete needs to be kept moist during airing.

High Alumina Cement: This cement differs in method of manufacture, composition and properties from Portland cement, its main advantages stem from its very high early strength and resistance to chemical attacks, heat evolution is rapid, permitting the concrete to be placed at lower temperature than ordinary Portland cement concrete, when mixed milk a suitable aggregate such as crushed firebrick, it makes an excellent refracting concrete to withstand high temperature.

Pozzolanic Cements: These cements are mixtures of a Portland cement and a pozzolanic material (one combining with time to form a hard mass) they offer good resistance to chemical attack but

the rate of heat evolution and strength attainment is reduced.

Foundation Concrete

Foundation concrete is the mixture of sand, cement water and stone used to stabilizes the base or formation of a structure to receive the load to the structure, foundation is the part of the structure that has direct contact with the ground, and which transmits the load of the structure, foundation is the part of the structure that has direct contact with the ground, and which transmits the load of the structure to the material ground, this mean that formulation concrete should be reliable is strength and bonding force the ground. Foundation being the bases on which the whole structure rest is very importance to building and whole structure has its root in the ground. Foundation is the critical link between the ground and the structure, therefore the substance concrete became part of the bases on which the strength of a building is determined. Foundation distribute the vertical load of gray introduce material or members of the build so that settlement in either negligible or it is uniform under all part of the building; foundation is an anchors of supper structure building against weather and ground water attack. The most critical consideration in determining the foundation of a structure is the types of bearing capacity of the soil, to which the building load are

to be distributed. The bearing capacity of a soil is the maximum amount of presence, that the soil is capable to sustained without deforming, settlement result from other larger pressure bearing on weak soil is capable of causing crack and total failure, resulting from foundation concrete porosity, foundational concrete should be stabilizers in all respect and specification.

III. METHODOLOGY

This study adopted the descriptive survey research design. The population of the study will be 297 teachers and principals from 29 secondary schools in Andoni Local Government Area. Using simple random sampling technique, a sample size of 30 teachers and principals representing 10% of the target population was used. Although, twenty-seven respondents returned their questionnaires, the investigation employed the primary sources of data collection called the questionnaire which was subjected to subjected to face and content validity. The method used for analyzing the data was frequency table and percentage (%) which is considered useful for this kind of research work.

IV. RESULT PRESENTATION

Research Question 1: How does ground water influences the foundation concrete of secondary school buildings in Andoni Local Government Area in Rivers State?

Table 1: Percentage responses of how ground water influence foundation concrete on secondary school buildings N = 27

S/no	Items	Yes	No	Remark
1.	Ground water can cause the school building to collapse after a few years.	93%	7%	Accepted
2.	Ground water causes cracks on the wall of the building.	97%	3%	Accepted
3.	It weakens the foundational concrete thereby causing some parts to shake as load is applied.	55%	45%	Accepted
4.	It causes holes in foundation concrete so the age of the concrete is reducing.	90%	10%	Accepted
5.	Ground water permeates into the walls of the school buildings from the foundation concrete.	85%	15%	Accepted
	Grand total	84%		Accepted

Source: Researchers Field Survey(2022)

Table 1 showed that 84% of the respondents accepted that ground water influences foundation concrete on secondary school buildings in Andoni Local Government Area in Rivers State,

while 26% rejected the items. The implication of this analysis is that the teachers and principals agreed that ground water influence foundation

concrete on secondary school buildings in Andoni Local Government Area in Rivers State.

Research Question 2: How does the types of gravel influence the foundation concrete of secondary school buildings in Andoni Local Government Area in Rivers State?

Table 2: Percentage response of the type of gravel influences foundation concrete on secondary school buildings
 N = 27

S/no	Items	Yes	No	Remarks
1.	The right quantity of gravel hinders pest and termites to infest the building.	100%	0	Accepted
2.	Gravel prevents weeds and mound growing on the foundation concrete.	90%	10%	Accepted
3.	Gravel easily allow water to runoff and evaporates from a damped surface.	100%	0	Accepted
4.	Gravel helps to heat up the house after the sun sets.	55%	45%	Accepted
5.	Using gravels not sea creatures' shells positively influence the strength of the school foundation concrete.	75%	25%	Accepted
Grand Total		84%		Accepted

Source: Researchers Field Survey(2022).

Table 2 shows that 84% opined that types of gravel influence the foundation concrete on secondary school buildings in Andoni Local Government Area in Rivers State, while 16% were of the opinion that types of gravel can never be an obstacle to foundation concrete on secondary school buildings in Andoni Local Government Area in Rivers State. The net result of this

interpretation is that types of gravel can affect foundational concrete on secondary school building in Andoni Local Government Area in Rivers State.

Research Question 3: How does the types of cement influence the foundation concrete of secondary school building in Andoni Local Government Area in Rivers State?

Table 3: Percentage response of the types of cement influence the foundation concrete in secondary school buildings.
 N = 27

S/no	Items	Yes	No	Remarks
1.	Using higher cement quantity affect the concrete strength.	75%	25%	Accepted
2.	The grade of cement can affect the foundation strength.	55%	45%	Accepted
3.	The cement-water ratio can adversely affect the foundation of the school building.	90%	10%	Accepted
4.	The foundation concrete standard curing days of 7-14days is usually adhered to by builders in the LGA	45%	55%	Rejected
5.	Lime cement easily bound than ordinary cement.	55%	45%	Accepted
Grand Total		64%		Accepted

Source: Researchers Field Survey(2022).

Table 3 showed that 64% of the respondents are of the belief that types of cement mixture affect foundation concrete in secondary school buildings in Andoni Local Government Area in Rivers State. On the other hand, 36%

rejected the items. The consequence of the analysis is that, it is obvious that types of cement affect foundational concrete in secondary school buildings in Andoni Local Government Area in Rivers State.

Research Question 4: To what extent do types of soil influence foundation concrete on secondary

school buildings in Andoni Local Government Area in Rivers State?

Table 4: Showing the types of soil affect foundational concrete on secondary school buildings
N = 27

S/no	Items	Yes	No	Remark
1.	The soil under the foundation concrete is stable during wet and dry season.	25%	75%	Rejected
2.	The soil has the ability to withstand construction process.	10%	90%	Rejected
3.	The soil has balanced chemistry to withstand any type of building.	45%	55%	Rejected
4.	The soil has a great ability to withstand erosion and runoff.	100%	---	Accepted
5.	The type of soil in the area is responsible to cause fixtures and unequal floors.	100%	---	Accepted
	Grand Total	56%		Accepted

Source: Researchers Field Survey (2022).

Table 4 shows that is respondents representing 56% are of the belief that types of soil affect foundational concrete on secondary school buildings in Andoni Local Government Area in Rivers State, on the after hard, 44% were in position. The consequence of the analysis is that, it is obvious that types of sand affect foundational concrete on secondary school buildings in Andoni Local Government Area in Rivers State.

V. CONCLUSION

The data marshaled in the investigation indicates that ground water, gravel, cement and soil influence foundation concrete of secondary schools' buildings in Andoni Local Government Area. The study equally exposed those factors responsible for the attack on foundational concrete on secondary school building in Andoni Local Government Area. Table 1, showed that 84% of the respondents believed that ground water influences foundation concrete on secondary school buildings. Table 2 reflect massive response of 84% of the respondents accepted that types of gravel influence the foundation concrete on secondary school buildings in Andoni Local Government Area in Rivers State. Furthermore, table 3 exhibits 64% majority of the respondent accept that types of cement influence the foundation concrete in secondary school buildings in Andoni Local Government Area in Rivers State. Table 4 indicated that 56% of the respondents accept that types of soil affect foundation concrete on secondary school buildings in Andoni Local

Government Area in Rivers State. However, the overall result indicates that both teachers and principals strongly agreed that different variable causes attack on foundation concrete by ground water in secondary schools building in Andoni Local Government Area in Rivers State.

Recommendations

In view of the findings of the study, the following recommendations were made:

1. Ground water must be prevented from influencing the foundation concrete of school buildings in Andoni Local Government Area of Rivers State.
2. Gravels must be effectively used to allow water to runoff from the foundation concrete.
3. Higher grade of cement should be used and proper curing should be done.
4. Soil stability should be considered while construction concrete is done.

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