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An Experimental Analysis Of Pile Foundation For Hospital Building

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ABSTRACT

• Pile foundation are used extensively for the support for the support of bridges and other structures to safely transfer structural loads to the ground and to avoid excess settlement or lateral movement. They are very effective in transferring structural loads through weak or compressible soil layers into the more competent soils and rocks below. Pile foundations are the part of structure. • In this research work the foundation of the hospital (G+6) was design by the pile foundation. We have used M25 grade of concrete for the preparation of design mix. The characteristic strength and load bearing of soil was tested by Plate load test and other materials tested by slump cone test , aggregate Impact Value test cement compressive strength test (cement fineness test construction water PH value . The expected result of SBC is 20000kg Approximate.

• Project reports contains introductions and problems definition. It also contains literature review of project. It includes location of study area and project site. It also includes brief details of equipment used on the site

• It also includes important activities such as marking the center line, boring, lowering of reinforcement, concreting, excavation, chipping of pile cap etc.

INTRODUCTION

1. In the present study the foundation is an important part of the structure. Pile foundation is one of the most important types of the DEEP FOUNDATION. The pile foundation is to be designed for the building because the load carrying capacity of the soil is very low. Site location of hospital is Odisha where the foundation is to be constructed.

2. Pile foundation are common foundation for bridge abutment piers and building resting on soft soil. The pile subjected to both vertical and horizontal forces.

3. The popularity of tall structure is increasing day by day withstand the load of these structure proper foundation is to be used such as pile foundation.

4. The foundation is a part of a sub structure which transfer to super structure load to the soil. The foundation into two main categories.

1.SHALLOW FOUNDATION: - It transfer the load to shallow depth. A shallow foundation is a type of building foundation that transfers structural load to the earth very near to the surface, rather than to a subsurface layer or a range of depths, as does a deep foundation. Customarily, a shallow foundation is considered as such when the width of the entire foundation is greater than its depth.[1] In comparison to deep foundations, shallow foundations are less technical, thus making them more economical and the most widely used for relatively light structures.

2.DEEP FOUNDATION: - • A deep foundation is a type of foundation which is placed at a greater depth below the ground surface and transfers structure loads to the earth at depth. The depth to width ratio of such a foundation is usually greater than 4 to 5. It transfer the load deep below the ground level.

• The construction process of a deep foundation is more complex and more expensive than shallow foundations. However, when dealing with poor soil conditions at shallow depth, large design loads, and site constraints, a deep foundation is likely to be the optimum solution. • Pile is defined as vertical structure element of deep foundation drilled deep foundation drilled deep into the ground of construction Sites. The pile is applicable for a very large load. Deep foundation are usually piles installed by driving, pushing or constructed in-situ, • Piles can be made of wood, concrete or steel or of composite member.

- The pile can be rounded, square, hexagonal, rectangular, even triangular or conical. They can be short and long.
- Since the stability of the structure is dependent upon the soil foundation system. All forces may act on the structure during its life time should be considered. Typically, foundation design always includes the effect of the that load plus the live load On the structure other miscellaneous forces that may have be considered result from the action of wind, water, heat, ice first, earthquake and explosive blasts.
- The construction process of a deep foundation is more complex and more expensive than shallow foundations. However, when dealing with poor soil conditions at shallow depth, large design loads, and site constraints, a deep foundation is likely to be the optimum solution. Whilst clean, renewable energy solutions are being developed there is a continued need for offshore oil and gas platforms to provide an important part of our energy mix. Jacket structures for oil and gas platforms are commonly founded on (predominantly axially loaded) open-ended steel tubular piles. The challenge to companies in this sector are to reduce costs and at same time increase safety. New exploitation opportunities are rare and are typically in deep water areas with challenging geology. Reassessment of and life-time extension of old platforms is also becoming more important. One major benefit for developers and operators are that the new CPT based design approaches for axially loaded piles now included in the offshore design standards typically allow for increased axial pile capacities to be adopted, particularly in dense sand deposits. The CPT based design approaches that account for friction fatigue, stress level, interface shearing characteristics and plugging have been shown to be more reliable than traditional design approaches in database assessments by Chow (1997) and Schneider (200) amongst others. However, topics such as the effect of pile ageing and cyclic loading on axial pile capacity remain uncertain. These issues are addressed in Section 2 of the paper. Many countries around Europe have developed ambitious targets for energy generation from renewable sources. Offshore wind farms are seen as key to achieving this aim. Siting turbines offshore provide several benefits including: (i) availability of high unrestricted wind speeds, (ii) the ability to use larger turbines and (iii) the ability to develop combined wind and wave/solar energy installations as alternative renewable energy solutions which become economically viable. The majority of turbines constructed to date have been founded on monopile foundations. Because of increased water depths and larger turbines, monopile diameters are increasing, with planned developments having piles of 10 m diameter. The cost of foundations can represent over 30% of the development cost for an offshore wind farm and advances in pile design that allow for cost savings are urgently required. In addition critical issues related to the impact of cyclic loading, soil-structure interaction for dynamic analyses and environmental concerns around the impact of installing large-diameter piles have led to the development of large industry-academia R&D projects. These issues are addressed in Section 3 of the paper. In the final section issues related to onshore piling such as the use of lowdisplacement piles in addressing environmental concerns and field tests investigating negative skin friction on piles are discussed.

LITERATURE REVIEW

Amey D. Katdare, Nandkumar K Patil, Seema S. Shiyekar "Design of
Pile Foundation for site in Sangli district of Maharashtra". They says the foundation is an important part of the structure. The pile foundation is one of the very important type of deep foundations. Shallow foundations and deep foundations are important types of foundation. In this paper, OPD building in Sangli District has been considered as a case study. The soil has been found to be clayey soil. Piles have been designed for this building as bearing capacity of the soil is very low.

Imran Khan Pathan, Amanana Venkatesh "A study of pile foundation to enhance soil bearing capacity for the structure". This paper presents a case study of piling foundation and testing of a Commercial Project in the south region of India. The overall pile driving works involved more than 1600RC piles of a total length over 25.000 m. Assumption that the bearing E capacity of a pile driven into cohesive soil may increase significantly in time (set-up effect), was the reason for the contractor to take the risk to accelerate the testing procedure.

K. Ishihara Chuo, University Kiso, Tokyo "Case studies of pile foundations undergoing lateral spreading in liquefied deposits". They says that Liquefaction of surrounding soils during earthquakes may affect the performance of pile foundations leading to damage and even collapse of piles. In fact, there are cases of liquefaction related damage to piles caused by an excessive lateral movement of the liquefied soils. IS: 2911[1] The load carrying capacity calculation formula for single pile for different soil conditions are taken from Code gives the useful information for the design consideration for the bored pile, driven pile and pile cap for the pile group. Spacing, behavior of the pile in the pile group and reinforcement specifications for the pile group are used as per recommended by the code. The lateral resistance of the single pile is calculated using the code method. Bearing capacity is taken from the code.

J.E Bowles[2] had a new concept based on the shifting rate of piles, and the settlement rate of the surrounding soils has been suggested for the study of negative skin friction. Negative skin friction occurs when the settlement rate of the surrounding soils is greater than that of the piles. Some relative equations have been established to define the negative friction zone of piles. Negative skin friction is dependent on the time factor and the degree of consolidation of the soil mass and can be negligible when the soil mass is nearly completely consolidated.

K. R. Arora[3] gives a good idea about the classification of the different types of piles. General theories for the analysis of the single pile and brief knowledge of the pile group are also taken from this reference.

MATERIAL

- Cement
- Fine aggregate: sand
- Coarse aggregate: 10 and 20 mm
- Water
- Steel :20 mm diameter 11 number bar ring 10 mm distance between ring is 150 mm and master ring diameter are 16 mm distance between ring is 2m.
- Admixture: Bentonite Slurry: - Support the excavation by exerting hydrostatic pressure on its walls i.e. to prevent the collapse or retain an area. Viscosity range should be 30 to 90 sec. PH value is 9.5 to

11.5, density is 1.05 to 1.2Kg / m^3. (By testing)

METHOD

- The construction sequence / procedure of the bored cast in-situ piles is as follows:
- Setting Out
- Excavations
- Placement of Reinforcement
- Concreting
- Stippling Pile Heads and Bonding

- **Setting Out**
- The first and foremost step and is no doubt the most important step for carrying out piling is setting out. Generally, a licensed Surveyor hired by the contractor will set up the positions of the piles which is shown in the pile layout plans of the detailed designs showing the Northing and Easting of the center of each pile along with diameters etc. The positions set out by the Surveyor are secured and preserved by pegs.

- **Excavation**
- The excavation of boring of the pile is carried out by auger method of boring or conventional percussion boring. In Auger cast piling procedure, a continuous flight auger drill is used to excavate a hole by screwing a hollow shaft auger into a depth of at least equal to the length of the pile.
- Auger piling method is the quietest from of piling and is a fast and very economical technique. It is a cast in-situ process, very suited to soft ground where deep casings or use of drilling support fluids might otherwise be needed.

- **Reinforcement lowering**
- Most of cast in-situ concrete piles are reinforced throughout its length with a cage of reinforcement fixed at ground and then lowered with the help of crane before concreting. The reinforcement usually used in pile foundation includes vertical main bars of #11 diameters with the spiral of lower dia reinforcement for providing shear and avoiding the buckling failure in the pile foundation.
- The reinforcement bending schedules are first properly prepared by the contractor which is submitted to the Engineer for approval. After approval the bar bending schedule is used for cutting and fixing of the rebar at site.

- **Concreting**
- The tremie method of concrete placement is used for the concrete pouring of the pile foundation. This method uses a vertical pipe, through which concrete is placed by gravity feed blow water level. The lower end of the tremie pipe is kept immersed in fresh concrete so that concrete rising from the bottom displaces the underground water. The dia of the tremie pipe varies from 20 to 30 cm.

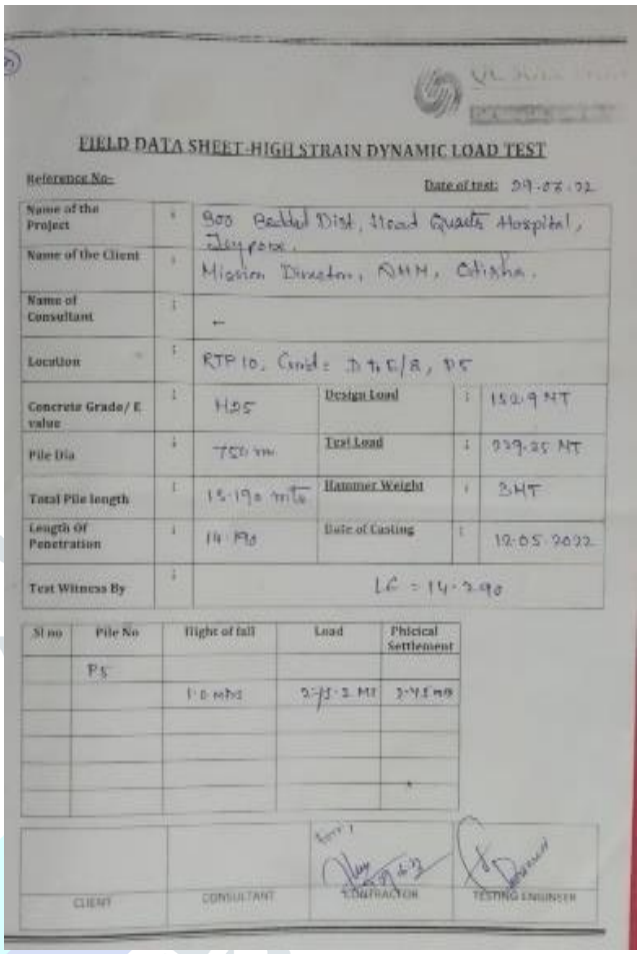
- **Stipping Pile Heads and Bonding**
- Pile Chipping is the extra pile that is above the cutoff level, which provided for good and sound concrete. The main purpose of chipping is to remove the surplus slushy concrete (a mixture of concrete, slurry, and mud) over the cutoff level.

TEST RESULT

Dynamic Load Test Methodology & Result

Dynamic load testing (or dynamic loading) is a method to assess a pile's bearing capacity by applying a dynamic load to the pile head (a falling mass) while recording acceleration and strain on the pile head. Dynamic load testing is a high strain dynamic test which can be applied after pile installation for concrete piles.dynamic load testing can be done during installation or after installation.

The procedure is Standard Test Method for High Strain Dynamic Testing of Piles. It may be performed on all piles, regardless of their installation method. In addition to bearing capacity, Dynamic Load Testing gives information on resistance distribution (shaft resistance and end bearing) and evaluates the shape and integrity of the foundation element.



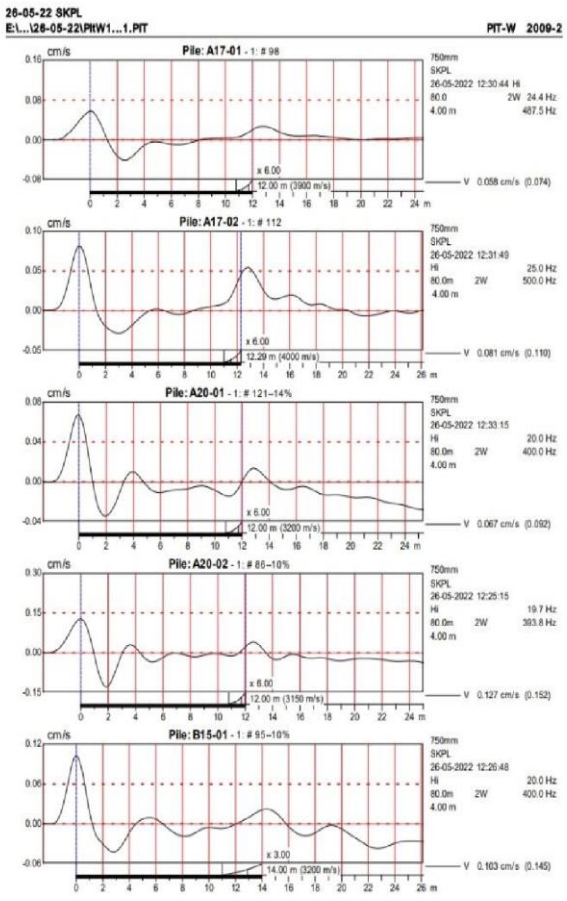
FIELD DATA SHEET-HIGH STRAIN DYNAMIC LOAD TEST

Reference No- Date of test: 29.05.22

Name of the Project	:	900 Bedded Dist. Head Quarter Hospital, Jeypore.		
Name of the Client	:	Mission Director, NHM, Odisha.		
Name of Consultant	:	-		
Location	:	RTP 10, Grid: D 7.5/8, D5		
Concrete Grade/ E value	:	M25	Design Load	: 152.9 MT
Pile Dia	:	750 mm	Test Load	: 229.35 MT
Total Pile length	:	15.190 mts	Hammer Weight	: 3MT
Length Of Penetration	:	14 Mts	Date of Casting	: 12.05.2022
Test Witness By	:	LC - 14.2.90		

Sl no	Pile No	Hight of fall	Load	Phicical Settlement
	P5			
		1.0 mts	2.11.2 MT	2.45 mm

CLIENT CONSULTANT CONTRACTOR TESTING ENGINEER



Pile Integrity Test Methodology & Result

Pile Integrity Test (PIT) is normally performed by striking the pile head with a light hand-held hammer and recording the response of the pile using a motion transducer (i.e. accelerometer) coupled to the pile head. The hammer strike (blows) generate compressive stress wave that will travel through the pile.

CONCLUSION

• In the analysis and design
• of pile foundation were carried out. The soil is tested and it has been observed that, the site is with Sandy soil with clay mix. The
  • bearing capacity of soil has been found to be very low and the load coming on the column which transfer to the ground is high, Hance pile foundation has been processed for the soil.
  • The length of the pile is 12 to 18 m. Diameter of rod is 20 mm and Diameter is 750 mm.
• In This project we use the pile foundation for increase the SBC. The value of SBC is 15 ton concerted to 20 to 22 ton by piling.

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