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CASE STUDY ON PILE FOUNDATION

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Abstract. Pile foundation are commonly adopted to transfer the loads from the superstructure through weak strata onto the stiffer soils or rocks. Therefore the reliability of pile-supported depends largely on the behavior of the piles.

Pile Foundation consist of piles that are dug into soil till a layer of stable soil is reached. Pile foundation transfer building load to the bearing ground with the greater bearing capacity. Pile foundation are useful in region with unstable upper soil that may erode, or for or for large structures. Pile foundations are often required to resist lateral loading. Lateral loads come from a variety of sources including wind, earthquakes, waves, and ship impacts.

I. INTRODUCTION

Pile foundation have been used for many years, for carrying and transferring the loads to soil considered to be weak in structure due to the soil conditions. In the early stages of development, villages and towns were located in the close vicinity of lakes and rivers due to the availability of water , and, also, to ensure proper protection of the area. Therefore, the weak bearing ground was reinforced by the use of timber piles that were manually forced into the ground, or fixed into the holes that were filled with stones and sand. The primitive methods of pile installation were modified after the industrial revolution, and the techniques of installation by steam or diesel driven machines were introduced. With the advancement in the technologies of soil mechanics and other related disciplines, superior piles and pile installation system have been developed.

II. AIM

To capable of supporting the load without detrimental displacement

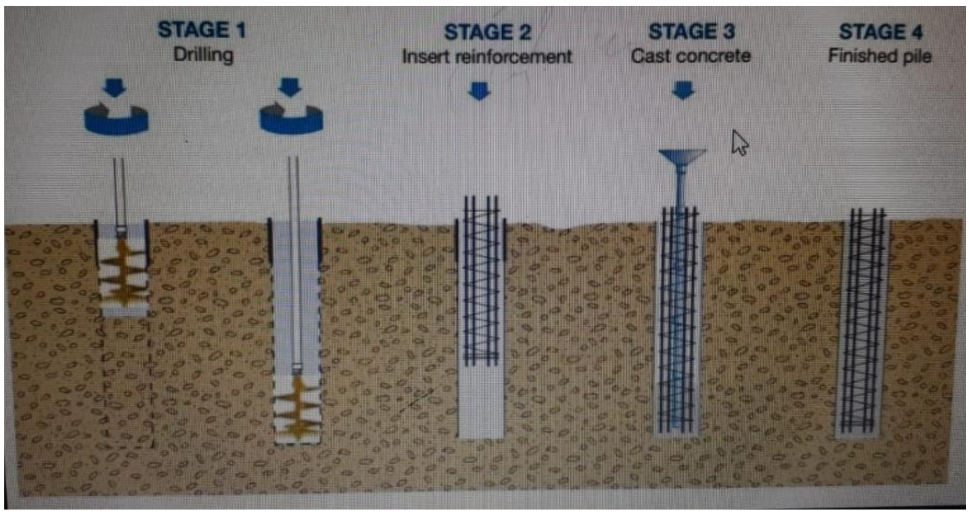
III. OBJECTIVE

1) To transfer the load from superstructure , through weak , compressible strata or water onto stronger
2) Pile Foundations are more compact and Less compressible and stiffer soil or rock at depth
3) Increasing the effective size of a foundation and resisting horizontal loads.

IV. METHODOLOGY

A. Site selection & Drilling
B. Inserted the basket in to the drill well
C. And inserted steel reinforcement
D. Concreting and then complete the pilling

V. Stages of pile foundation



VI. Advantages

- According to the specification we pre order the pile
- The pile can be pre-made its length breadth its size according to site use
- Precast is the process through which reducing the completion time
- Can be installed in a very large area
- Can be installed a very long lengths
- We can use piles in a place where drilling and holes are not done
- Work of pile is very neat and clean

VII. Disadvantages

A pile can be damaged quickly by driving through stones and boulders.

Piles are can be attacked by marine borers in a salt water

A pile cannot be above ground level.

It is very difficult to know the actual required length in advance

Vibration generate when piles are driving which affect the neighboringstructures.

VIII. GEOTECHNICAL INVESTIGATION REPORT:

For foundation analysis of the structure on the site, it is necessary.

1. To determine the soil profile of the site
2. To know the physical properties and strength characteristics of soil/rock at various depths.

For this geotechnical investigation was entrusted to us by M/s radhe Associates.

The following points were decided

- No.of borehole on one approach.
- Undisturbed samples at different interval.
- Standard penetration tests are conducted at different intervals.
- Collection of disturbed samples.
- To find physical properties of disturbed samples.
- To locate ground water table, if any.
- Interpretation of results, Analysis.
- Recommendation.

2.7 MIX DESIGN(pile cap,pier cap,girder,slab):

Ref Standard: IS 10262 & 456 & section 1700 of morth(REV 5)

Design Stipulations

1. Characterics comp strength of concrete: 35 Mpa
2. Max size aggregate: 20 mm
3. Degree of workability: 0.95 compacting Factor
4. Degree of quality control: Good
5. Type of exposure: Normal
6. Minimum quality of cement should be at least 400 kg per cumt & quality provided is 434.6 kg per cumt
7. Maximum w/c ratio is 0.45 & provided is 0.41

Test Data:

1. Cement used : opc(ultratech) 53 grade
2. Specific gravity of cement : 3.15
3. Specific Gravity of Fine aggregate: 2.63
4. Specific Gravity of coarse aggregate : 2.82
5. Water absorption of Fine aggregate: 0.35
6. Water absorption of coarse aggregate: 0.68
7. Free moisture in Fine aggregate: 0.2
8. Free Moisture coarse aggregate: 0

Target strength of concrete(clause no.1704.2.1,MORTH Rev 5)

Initial current margin of 12 Moa is considered (Table no 1700.5 of MORTH)

Target mean strength=47 Mpa

Selection of w/c ratio (Clause no 1703.2, Section 1700, MORTH & I.S. 10262)

Free w/c Ratio, For target mean strength of 7 Mpa=0.41

Max. w/c ratio=0.45

Taking W/C=0.41

Selection of water & sand content

Sugested water content per cubic meter of concrete for max size of aggregate=20 mm & grade f concrete M25 is 186 lit.

Taking water content=173 lit

2.8: MIX DESIGN(P.C.C WORK)

Ref standard: IS : 10262 & 456 & section 1700 of morth (REV 5)

Design Stipulations

1. Characteristics comp strength of concrete: 15 Mpa
2. Max size aggregate : 20 mm
3. Degree of workability : 0.9 compacting Factor
4. Degree of quality control:Good
5. Type of exposure :Normal
6. Minimum quality of cement should be at least 250 kg per cumt & quality provided is 278.1 kg per cumt
7. Maximum w/c ratio is 0.5 & provided is 0.5

Test Data :

1. Cement used : opc(ultratech) 53 grade
2. Specific gravity of cement : 3.15
3. Specific gravity of fine aggregate : 2.63
4. Specific gravity of coarse aggregate : 2.82
5. Water absorption of fine aggregate : 0.35
6. Water absorption of coarse aggregate : 0.68
7. Free moisture in fine aggregate : 0.2
8. Free moisture coarse aggregate : 0
9. Fine aggregate confirms to zone : 3

Target strength of concrete (clause no. 1704.2.1,MORTH Rev 5)
Initial current margin of Mpa is considered (Table no1700.5 of MORTH)
Target mean strength=25 Mpa

Selection of w/c Ratio (Clause no. 1700, MORTH I.S. 10262)

Free w/c ratio, For target of 25 Mpa=0.55 Max. w/c ratio=0.6
Taking W/C=0.5

Selection of water & sand content

Suggested water content per cubic meter of concrete for max size of aggregate=20 mm & grade of concrete M35 is 186 lit.
Taking water content=135 lit

TABLE : 1 Mix Design of P.C.C

Sr. No	Discription	Water content %	Sand in Total Aggregate in %
1	Each 0.05 decrease/ increase in w/c ratio	0.0.	-2.0
2	Each 0.0.5 decrease/ increase in compacting factor	3.0	0.0
3	For sand confirming to zone 3	0.0	-1.5
	Total Adjustment	3.0	-5.5

Required Sand content of soil of total aggregate by absolute violume will be 31.5%
Required water content is 39.1 lit

Cement content :

Cement content for w/c 0.5 is 278.1 kg per cum

Fine aggregate content:

V=(w+(c/sc)+(1/p*fa/Sfa)/100
V=Absolute volume of concrete=98%
W=mass of water=139.1 lit/cum
C=mass of cement=278.1 kg/cum
Sc=Sp.Gravity of coment=3.15
P=Ratio of fine aggregate to total aggregate br absolute volume=31.5%
Sfa=Sp.Gravity of fine aggragate in saturated dry condition=2.63

Total fine aggregate content=623.5 kg/cum

Coarse aggregate content:

Ca=((1-p)/p)*fa*Sca/Sfa

Total coarse aggregate of material per cement

Cement =50kg
Sand=112kg
Coarse aggregate(fraction 10-6 mm)=104.6 kg
(Fraction 20-10 mm)=159.9 kg

Water= 25lit

Table :2 Quality of material

Water	Cement	Fine aggregate	Coarse aggreagate
139.1 lit	278 kg	623.54 kg	1453.9 kg

Adjustment:

1. Extra quality of to be added for absorption in case coarse aggregate @ 0.68 % by mass is 1.8 lit.

2. Quality water to be added for absorption in case of fine aggregate @ 0.35 by mass is 0 lit.

3. Quality of water to be added for absorption in case of fine aggregate @ 0% by mass is 0 lit.

4. Quality of water to be added for deducted for free moisture fine aggregate @ 0.2 % by mass is 0.22 lit.

5. Actual quality of water is 26.5 lit.

6. Actual quality of sand required absorption/ free moisture % by mass will be 112.22 kg.

7. Actual quality of C.A required allowing for absorption/ free moisture% by mass is Fraction 10-6 mm=103.88 kg

8. Fraction 20-10 mm=155.82 kg

Sr no	Material	Quantity	Unit
1	Cement	50.00	KG
2	Fine aggregate	112.22	KG
3	Coarse Aggregate (20-10)	155.82	KG
4	Coarse Aggregate (10-6)	103.9	KG
5	Water	26.5	Litre

Remark:

Slump observed is 35 mm.

The theoretical density of fresh is 2494.6/cum