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Analytical Research of Vertical Load Test on Bore Pile

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Abstract: The vertical load test is conducted on RCC bore pile this test is conducted as per the guidelines of IS 2911 part 4 respectively. This test is conducted on "Perstorp site which is located in dist. -Bharuch Gujrat. In this region the Strata of soil is soft aquifer hence to carry heavy structural load, pile foundation is best solution. The experimental study is carried out on 10 meter length of Bore pile of 500mm in diameter of loading area of 283.5 sq.cm. This paper is based on experimental study on bore pile due to vertical loading condition and expressing the behaviour of pile under the vertical incremental loading condition. And in this paper we follow the approach of analytical and experimental.

I. INTRODUCTION

This experimental test is carried out at Perstorp site project of chemical production which is located in dist.-Bharuch Gujrat come in seismic zone 3 and the geological condition of this region is soft rock aquifer having very high ground water table approximate of 5-10 m from ground level so, there is only pile foundation is option to Carry heavy structural load. In the paper perform experimental study on bore pile under the axial loading condition. This test is performed on 10 m depth of pile of 500 mm diameter. This test is performed commercial corporate geo Dynamics. In this experiment all the testing procedure and equipment are as per IS 2911 part 4. The loading is applied by

Precast concrete block of 2.5 MT each which is resting on flat MS plate supported by ISMB sections. The testing equipment is a hydraulic jack along with manual pump was used to applied load on pile. The reaction was obtained from adjacent reaction system the pile head deflection was measure by means of two dial gages having least count of 0.01 mm the dial gauge is attached to drum bar by mean of magnetic stand.

II. METHODOLOGY AND DETAILS

A. Pile Details

The pile was RCC bored pile with diameter of 500mm, details which are given below

Pile location	Group A
Pile length	10 m
Pile Diameter	500 mm
Working load	40.51tons
Test load	101.275 tons
Concrete grade	M30
Jack capacity	200 ton
Effective area of Jack	283.5 sq. cm
Test Type	Initial Vertical Load Test

B. Procedure for Vertical load test

The test should be carried out by applying series of downward incremental loads. Each increment being of 20 percent of safe load on percent of safe load on pile. For testing of pile its essential that loading is along axis. Four dial gauge will be fix for vertical load test at the pile head level .MS base plate of thickness 25 to 50 mm will be positioned on pile head. Hydraulic jack of required capacity will be placed on this base plate. The dial gauge will be positioned at equal distance around the piles on datum base. Care will be taken to ensure that the datum base supports are not disturbed. The load is applied on pile top by hydraulic jack. Each stage of loading shall be applied till the rate of displacement of each pile top is either 0.1mm in first one hour. The next increment in load shall be applied on achieving the aforesaid criteria. The applied test load shall be maintained for 24 hours. Releasing applied load is to be carried out gradually 20% in every 10-minute interval

TABLE I
Loading and Unloading Sequence

Loading		Unloading	
Pressure (kg/sq cm)	Load (Tons)	Pressure (kg/sq. cm)	Load (Tons)
0	0.00	340	96.39
30	8.51	320	90.72
60	17.01	290	82.22
80	22.68	260	73.71
120	34.02	230	65.21
140	39.69	200	56.70
170	48.20	170	48.20
200	56.70	140	39.69
230	65.21	120	34.02
260	73.71	80	22.68
290	82.22	60	17.01
320	90.72	30	8.51
340	96.39	0	0.00
360	102.06	-	-

Photograph while testing procedure is going on



III. OBSERVATION TABLE 1

Sr no	Time	Duration (min)	Pressure (Kg/ cm2)	Applide Load (Tones)	Dial Gauge Reading				Avg.Settlement (mm)	Differance (mm)	Remark
					0	1	2	3			
1	10:48	0	0	0	0	0	0	0	0	0	
2	10:50	1 min	30	8.51	0.21	0.27	0	0.2	0.17		
	11:05	15 min	30	8.51	0.21	0.27	0	0.21	0.1725	0.005	
	11:20	30 min	30	8.51	0.21	0.27	0	0.22	0.175		
3	11:21	1 min	60	17.01	0.27	0.33	0	0.25	0.2125		
	11:36	15 min	60	17.01	0.3	0.36	0.11	0.26	0.2575	0.053	
	11:51	30 min	60	17.01	0.32	0.36	0.11	0.27	0.265		
4	11:52	1 min	80	22.68	0.4	0.42	0.2	0.35	0.3425		
	12:07	15 min	80	22.68	0.41	0.43	0.22	0.36	0.355	0.048	
	12:22	30 min	80	22.68	0.46	0.45	0.25	0.4	0.39		

Observation Table of loading condition of Vertical Load Test

Name of Project										Project = Sewage Treatment Plant									
Pile No.		101		Pile Capacity (tons)		101.05		Test Load (tons)		101.05		Date of Test		09/11/2019					
Pile Diameter (mm)		500		Pile Area (cm ²)		1963.5		Type of Pile		Cast in situ		Client for GO		M.S. Enterprises					
Pile Length (mm)		10.00		LC Dist Gauge / LVDTs		0.01		Design Load (tons)		40.51		Concrete Grade		M25					
Sr. No.	Date	Time	Duration (Mins)	Pressure (kg/cm ²)	Applied Load (Tons)	LVDTs / Dial gauge Reading				Avg. Settlement (mm)	Dial (mm)	Remarks	Signatures						
						0	1	2	3				GO	Cont.	Client				
	10/11/19	10:40	0	0	0	0	0	0	0	0	0		P. Balan	GO	P. Balan				
(1)	10/11/19	10:45	5	0	9.57	0.31	0.32	0.0	0.0	0.170	0.170		P. Balan	GO	P. Balan				
	11:05	16 mins	50	0.51	0.81	0.82	0.0	0.0	0.172	0.172	0.172		P. Balan	GO	P. Balan				
	11:20	20 mins	50	0.81	0.91	0.92	0.0	0.0	0.175	0.175	0.175		P. Balan	GO	P. Balan				
(2)	11:30	1 min	60	1.01	0.23	0.33	0.0	0.0	0.173	0.173	0.173		P. Balan	GO	P. Balan				
	11:36	15 mins	60	1.01	0.30	0.36	0.11	0.0	0.182	0.182	0.182		P. Balan	GO	P. Balan				
	11:51	30 min	60	1.01	0.32	0.36	0.11	0.17	0.185	0.185	0.185		P. Balan	GO	P. Balan				
(3)	11:53	1 min	90	2.0	23.63	0.43	0.38	0.0	0.343	0.343	0.343		P. Balan	GO	P. Balan				
	11:57	15 mins	90	2.0	24.01	0.43	0.39	0.34	0.355	0.355	0.355	0.018	P. Balan	GO	P. Balan				
	12:10	30 min	90	2.0	24.38	0.46	0.38	0.40	0.383	0.383	0.383		P. Balan	GO	P. Balan				



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