TURBO POWER

TurboPower Limited

PRECAST PILES . BORED CAST-IN-SITU PILES. PILE TESTING


SR-40
TURBO POWER is one of the esteemed leaders in delivering unrivalled piling services

INDEX

Introduction

Pile foundations consist of structural members installed into the ground for transferring load from the superstructure to a deeper part of the ground that is competent to sustain the load. Commonly, piles are installed either by hammer-driven or bored cast-in place. Now we are first time going to introduce static Hydraulic Pile Driver in Bangladeshi Market.

For hummer-driven pile, the structural strength of each pile element has to be designed to withstand stresses arising from handling and particularly during installation.

For concrete hammer-driven piles, a substantial amount of reinforcement has to be included merely to cater for handling and installation phases. The reinforcements are not required under working conditions of the pile.

Bored cast-in-place piles usually require very much less reinforcement. In fact, a substantial portion of most bored piles are just in situ concrete without any reinforcement. However, the replacement of soil with concrete in bored piles can be messy and expensive affair and is not normally economical for piles of small sixes required to carry loads of less than 100 tones.

Treated timber piles are use quite extensively in Bangladesh. However, even properly treated timber has the tendency to deteriorate after ten (10) years in the ground. Moreover, they are susceptible to damage from wood boring insects.

Shal-Bolli piles have been used in groups with low load carrying capacity of about 1 tone or less working capacity per pile. Its use is limited to coastal region where high water tables prevail and considerable settlement can be tolerated by the structure supported on these piles. The piles have to be permanently submerged below the ground water level. Uneven cross section along its longitudinal axis and non-straightness in the naturally occurring Shal-Bolli tree trunk also make quality control at the site difficult ■

VISION AND MISSION

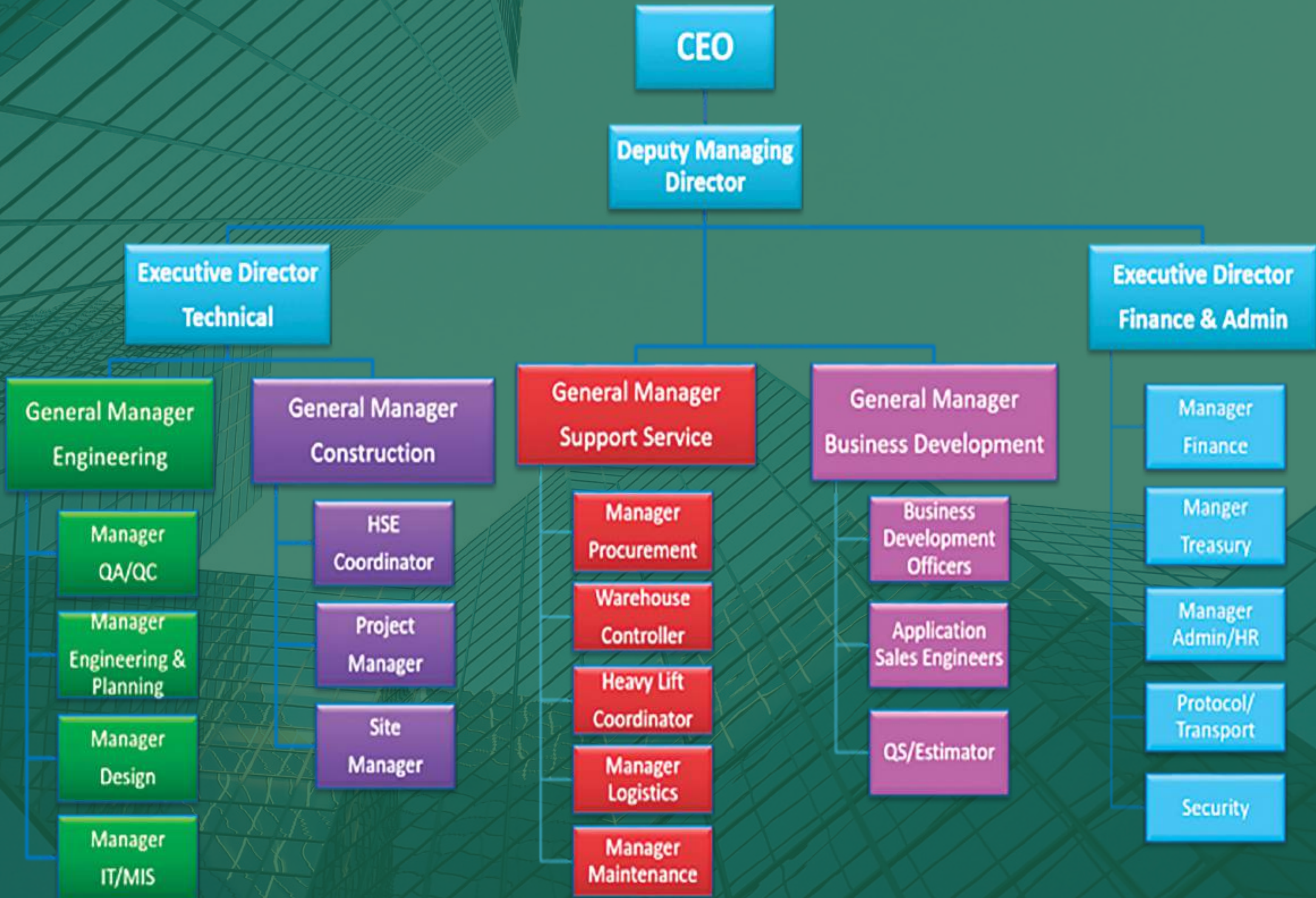
Our Vision

To be the preferred contractor of choice. A company that our customers want to work with and our employees are proud to work for.

Our Mission

At TURBO POWER, our core mission is to make available a variety of piling services that are second to none. Our affiliates and association operate based on six values: Spirit, Determination, Pride, Commitment, Passion and Integrity, each of which inspires the way we serve our customers, who in turn contently count on as a catalyst to achieve their unique business goals.

ORGANIZATION STRUCTURE



POSTAL ADDRESS

Corporate Offiec

House No-436 (2nd Floor), Road#30
New DOHS,Mohakhali Dhaka- 1206

+88-02-9846443, 9846552

+88-02-9848941

info@turbopowerbd.com

www.turbopowerbd.com

Registered Office

48, Dilkusha C/A, (2nd Floor) Dhaka- 1000, Bangladesh.

+88-02-9551640, 9558934

+88-02-9558805

Chittagong Office

House # 21/21, Rode # 11 CDA, Agrabad, Chittagong, Bangladesh.

+88-01714-069813

marketing@turbopowerbd.com

PILING WORKS

Precast Piles

- Construction Sequence
- Fields of Application
- Environmental Impact
- Technical Specifications
- Pile Driver Specification
- Important Equations for Piles
- Sectional Detail
- Lateral Loads On Piles

Bored Cast in Situ Piles

Pile Load Testing

PILING

W O R K S

PRECAST
P I L E S

Precast Concrete Piles may be defined as a reinforced concrete pile which is moulded in circular, square, rectangular or octagonal form. The precast concrete piles are cast and cured in a casting yard and then transported to the site for driving. In case space is available, pile can also be cast and cured near the site of works. They are driven in a similar manner as timber piles with the help of pile drivers. The diameter of the pile normally varies 1mm 35 cm to 65 cm and their length varies from 45 in to 30 m.

The function of reinforcement in a precast concrete piles are to resist the stresses produced on account of its handling, driving and the loading which the pile is finally expected to receive. Longitudinal reinforcement usually consists of one bar 20 mm to 50 mm in diameter at each angle of the section of the pile. The vertical rods are tied horizontally by bars 6 mm to 10mm in diameter.

The horizontal bars may be provided in the form of stirrups wound around the verticals. For lengths of approximately 90 cm at head and toes, the spacing of the stirrups should be 8 cm c/c. Circular piles are seldom tapered but when tapering of the piles becomes necessary due to site conditions, their length is restricted to 12 m.

Good control of the driveability and execution in general thanks to integrity measurements.

Construction sequence

1. Positioning of the prefabricated concrete pile

2. The pile is driven into the soil with an impact pile driving hammer (diesel hammer or hydraulic drop hammer).
   Special timber packing or a synthetic cushion block lends adequate protection to the pile head during driving.

3. With control of driving achieved by measuring the set, the pile is driven into the resistive soil layer to a depth equal to one time the pile diameter.

Fields of application

- Ideal solution for cost-effective piling in homogeneous geotechnical conditions and for carrying low to medium loads.
- Extensive preliminary soil investigation is required in order to determine both the nature and the behaviour of the layers of soil.
- Wide range of applications.
- Given the prefabrication and the delivery time of the precast piles, the pile must be dimensioned depending on the definitive pile load and the soil conditions before execution.
- Adequate solution for soil profiles with very weak resistances in the upper strata, where excess use of concrete can be expected when installing cast-in-situ piles.

Environmental impact

- A pile driving permit is requested
- Causes noise pollution
- No soil removal (soil displacement pile)
- A stable, dry and flat work platform is required, also accessible for freight traffic (the piles manufactured in the factory are delivered on site)

Technical specifications

- The section sizes vary currently between 180 x 180 mm² and 450 x 450 mm².
- Coupling using mechanical interlocking joints is possible.
- The maximum length depends on the section and the transportation possibilities.
- High quality of concrete, usually prestressed.
- Soil displacement pile with a smooth shaft.
- Allowable bearing capacity between 325 and 2.050 kN.
- The rake depends on the equipment: Inclined piles with an inclination reaching 1/3 at most
- Quick installation.

Pile Driver Specification

Model	Max. Press force (kN)	Piling Speed (m/min)	Square pile (mm)	Circle pile (mm)	Side Piling space (mm)	Corner Piling space (mm)	Lifting weight (ton)
ZYJ	1200	3	250-300	250-300	450	1100	5

PRECAST PILES

Important equations for Piles

Subject	Static Hydraulic Pile Driving System	Cast in Situ Piles
End Bearing (Meyerhof)	Qp=400 N.Ag (kN) (in sand) =541N.Ag (kN) (in clay) Where, Qp= Ultimate End capacity of pile (kN) Ag= End area of pile(m2) N= SPT value	Qp = 140 N.Ag (kN) (in sand) =40 N.Ag (kN) (in clay)
Skin Friction (Meyerhof)	Qs=2 N.As (kN) (in sand) =10N.As (kN) (in clay) Where, Qs= Ultimate End capacity of pile (kN) As= End area of pile (m2) N=SPT value	fs = 1 N.As (kN) (in sand) =5 .N.Ag (kN) (in clay)
Structural Strength of Pile	Pa=0.25.fc'Ag Where, Pa =Working load, (kN) Ag= Shaft Area (m^2) fc' = 27.5 (MPa)	Pa =0.18.fc'Ag Where, fc' ≥ 18 (MPa)

Sectional Detail

PRECAST CONCRETE PILE FOR AXIAL LOADS

Sectional Dimensions			Reinforcement			Material Strength			Working
Vertical	Horizontal	Area	Dia	No	Are	fy	fc'	Re Bar	Load
mm	mm	mm2	mm		mm	MPa	MPa	%	kN
200	200	40000	8.0	4	200.96	500	27.5	0.50	275.00
225	225	50625	8.0	4	200.96	500	27.5	0.40	348.05
250	250	62500	10.0	4	314.00	500	27.5	0.50	429.69
275	275	75625	10.0	4	314.00	500	27.5	0.42	519.92
300	300	90000	12.0	4	452.16	500	27.5	0.50	618.75
325	325	105625	12.0	4	452.16	500	27.5	0.43	726.17

These recommended maximum allowable axial working loads are only the structural capacity of piles. The actual working capacities are dependent on soil conditions are other considerations but shall not exceed the maximum structural working load. Higher axial working capacity can be specially designed if required.

Lateral Loads On Piles

Lateral Loads applied to groups of piles can be carried either by the horizontal component of raking piles or by the lateral resistance of the soil surrounding vertical piles are subject to substantial horizontal forces, the upper levels of the ground should be able to resist these forces without excessive lateral movement occurring. It may be necessary to connect pile caps with horizontal beams to obtain sufficient resistance. It these measures are insufficient then raking piles should be used. For the short term case, the maximum bending moment occurs at a depth of between 0.5 and 1.5 m, and for long term case the critical depth is between 1 and 1.5m. There are three design consideration.

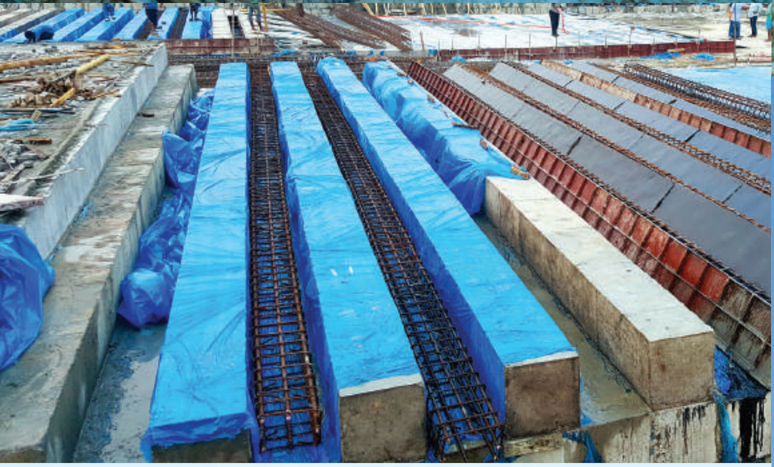
1. The pile must be able to carry the bending moments.
2. The soil must be able to support the loading.
3. The lateral deflection must be tolerable.

PRECAST CONCRETE PILE FOR LATERAL LOADS

	Section	ftk	Cracking	Allowable short term lateral load in clay (kN)		
Area	Modulus		Moment			
m^2	cm^3	MPa	kN-m	Su=10kN/m^2	Su= 25kN/m^2	Su=50kN/m^2
0.0400	1333.3	2.62	3.50	8	20	40
0.0506	1898.4	2.62	4.98	9	23	45
0.0625	2604.2	2.62	6.83	10	25	50
0.0756	3466.1	2.62	9.09	11	28	55
0.0900	4500.0	2.62	11.80	12	30	60
0.1056	5721.4	2.62	15.00	13	33	65


CROWN
CROWN
READY MIX CONCRETE





BORED CAST iN SiTU PiLES

Also called drilled piers or Cast-in-drilled-hole piles (CIDH piles). Rotary boring techniques offer larger diameter piles than any other piling method and permit pile construction through particularly dense or hard strata. Construction methods depend on the geology of the site. In particular, whether boring is to be undertaken in 'dry' ground conditions or through water-logged but stable strata – i.e. 'wet boring'. 'Dry' boring methods employ the use of a temporary casing to seal the pile bore through water-bearing or unstable strata overlying suitable material. Upon reaching the design depth, a reinforcing cage is introduced; concrete is poured in the bore through tremie pipe and brought up to the required level. The casing can be withdrawn or left in situ.

BORED CAST-IN-SITU PILES

‘Wet’ boring also employs a temporary casing through unstable ground and is used when the pile bore cannot be sealed against water ingress. Boring is then undertaken using a digging bucket to drill through the underlying soils to design depth. The reinforcing cage is lowered into the bore and concrete is placed by tremmie pipe, following which, extraction of the temporary casing takes place.

In some cases there may be a need to employ drilling fluids (such as bentonite suspension) in order to maintain a stable shaft. Rotary auger piles are available in diameters from 500mm to 2400mm or even larger and using these techniques, pile lengths of beyond 50 meters can be achieved.■

PILE LOAD TESTING

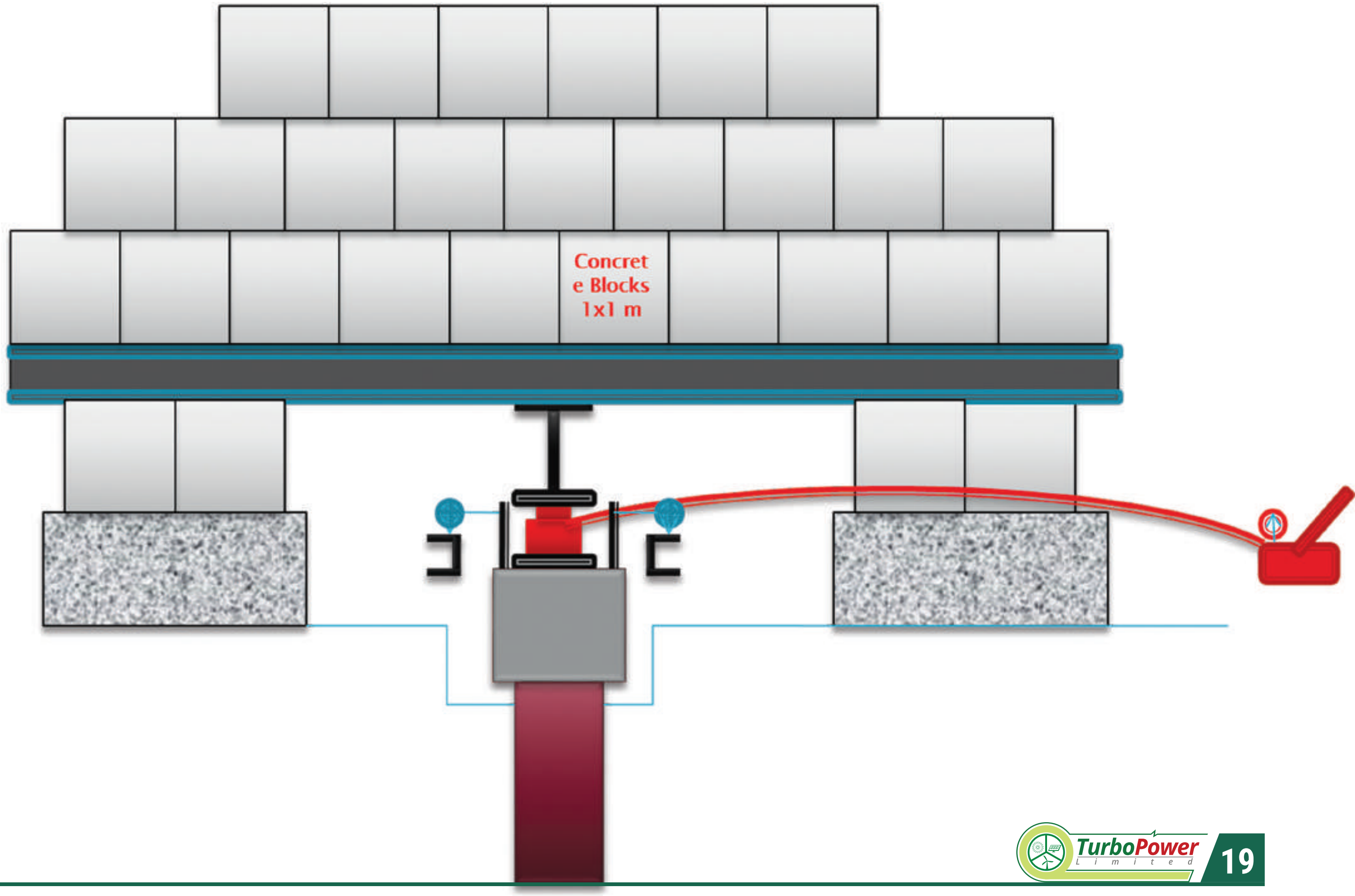
Pile foundation is a substructure working underneath the ground surface. We don't often pay attention to its existence when it is transferring loads from a structure to the soil or bedrock safely and as planned. However, possible shortcomings in the pile design or implementation are easy to observe when settlement occurs. Unfortunately, at this point, correcting those shortcomings are already too late or, at the very least, expensive.

For a safe foundation to perform as desired the ultimate strength of each pile must fulfill both structural and geotechnical limits present. A pile load test is a direct method of determining the ultimate geotechnical capacity of a pile. Dynamic load testing (PDA-measurement) is a fast and reliable way to evaluate the bearing capacity of a pile. In addition to pile capacity, the dynamic load test provides information about structural integrity, driving stresses and hammer efficiency. If a dynamic load test is out of the question then a static load test can be performed to identify the pile behavior under a static load.

PILE LOAD TESTING

In challenging projects, a preliminary test pilling together with a dynamic load test can help you to pick the right pile type for the job, one which withstands the strains focused on the pile during driving. Guidelines usually give cautious end-of-driving requirements, which lead to unnecessarily long piles. With a PDA-measurement, it is possible to assign each pile rig with an individual end-of-driving requirement for a specific project and therefor cut the cost of overlong piles.
Possible structural defects from the pile installation can be detected afterwards with an integrity test carried out by Inspect a using either low strain or ultrasonic methods. This is an essential part of your quality control for both precast and cast-in-place concrete piles. Our services also include pile wave equation analysis and acceleration-based quality control for dynamic soil compaction where the impulse inflicted from the impact is recorded from the drop weight and then analyzed. (This is important especially when the required threshold value is hard to reach or if there's a doubt concerning the soil compaction.)

All of Inspector's pile testing services are carried out by experienced and skilled personnel who have demonstrated their competence in dynamic testing with a Dynamic Measurement and Analysis Proficiency Test. ■



PHOTOGRAPH OF PILLING WORKS AT DIFFERENT SITE


READY MIX CONCRETE
YOUR CONCRETE EXPERT

TURBO POWER

TurboPower Limited

POSTAL ADDRESS

Corporate Offiec

House No-436 (2nd Floor), Road#30
New DOHS,Mohakhali Dhaka- 1206

+88-02-9846443, 9846552

+88-02-9848941

info@turbopowerbd.com
www.turbopowerbd.com

Registered Office

48, Dilkusha C/A, (2nd Floor)
Dhaka- 1000, Bangladesh.

+88-02-9551640, 9558934

+88-02-9558805

Chittagong Office

House # 21/21, Rode # 11 CDA,
Agrabad, Chittagong, Bangladesh.

+88-01714-069813

marketing@turbopowerbd.com