

Project: **JABATAN KERJA RAYA NO. KONTRAK: HQ.62/2016(F)**
PROJEK MENAIKTARAF JALAN LINTAS KOTA KINABALU
TERMASUK TIGA PERSIMPANGAN BERTINGKAT (FASA 2)
1) PERSIMPANGAN JALAN PENAMPANG BYPASS-J5
2) PERSIMPANGAN LIDO-J6
3) PERSIMPANGAN LINTAS PLAZA-J11

JKR Training Centre-

A study tour program for JKR TA regarding to Bore piling work

a) Introduction

1) Flyover Junction J5

i) Total 40 nos. 1200mm diameter Bored Pile

Location	Pile Group (Nos. of Piles)	Rock Socket Length (m)	Working Load (KN)	Current Status
Abutment A	5	20	9000	In progress
Pier 1,2,3	5,5,5	23	9000	In progress
Pier 4,5,6	5,5,5	23	9000	Completed
Abutment B	5	20	9000	Completed

2) Flyover Junction J6

i) Total 40 nos. 1200mm diameter Bored Pile

Location	Pile Group (Nos. of Piles)	Rock Socket Length (m)	Working Load (KN)	Current Status
Abutment A	5	20	9000	Left 2 piles (TMP stage 2)
Pier 1,2,3	5,5,5	23/20	9000	Completed
Pier 4,5,6	5,5,5	20	9000	Pending
Abutment B	5	20	9000	Pending

3) Flyover Junction J11A & J11B

i) Total 33+33 nos.= 66nos. 1000mm diameter Bored Pile

Location	Pile Group (Nos. of Piles)	Rock Socket Length (m)	Working Load (KN)	Current Status
Abutment A	3	20	5000	Pending
Pier 1-6	2,2,2,2,2,2	20	5000	Pending
Pier 7&9	1,1	20	5000	Pending
Pier 8	3	20	5000	Pending
Pier 10-14	2,2,2,2,2	20	5000	Pending
Abutment B	3	20	5000	Pending

b) Method Statement of Bored Pile

Step 1:

Setting-out Piles Position

- 1) will be set-out by surveyor and counter-checked by consultant before commencement of piling.

Step 2:

Set Piling Rig/Installation of casing

- 1) Before pre-boring, the surveyed pile position will be offset in two perpendicular directions to countercheck the pile centre during pitching down of casing
- 2) Check verticality of casing during installation using a spirit level and plumb lines
- 3) Vibro hammer will be used to drive the temporary casing down to a predetermined depth which must over the unstable stratum

Step 3:

Borehole Excavation

- 1) If unstable stratum is encountered below the casing depth, following methods can be considered to stabilize the borehole
 - a) Extend the casing length and further install to prevent collapse.
 - b) To use water as stabilizing fluid.
- 2) Boring will cease when the agreed pile toe level has reached. Samples shall be taken at every change in stratum, put inside a plastic container with properly labeled and submit to consultant.
- 3) The base of borehole shall be cleaned with cleaning bucket and proceed with concreting
- 4) Soil Boring and Rock Coring
 - a) Tools for soil boring: Auger and Boring Bucket
 - b) Tools for rock coring: Rock Auger, Coring Bucket or Corebarrel
 - c) The boring operator will inform if bedrock is found on borehole base.

Step 4:

Reinforcement Cage Fabrication and Installation

- 1) Reinforcement cage is fabricated using circular links and main bars of appropriate size and spacing as per design. Welding is provided for rigidity to facilitate in lifting.
- 2) Top and bottom of steel cage to be jointed which 2m lapping length of starter bars by welding to be carried out. Meanwhile, plastic spacers shall thread through the links for 75mm cover.
- 3) Before pouring of concrete, the full length of reinforcement cage will be lowered into the borehole to the cut-off level.

Step 5:

Concreting

- 1) The pouring of concrete is carried out by using Tremie method
- 2) A 250mm diameter tremie pipe is lowered to the bottom of the borehole with a hopper attached on top.
- 3) To ensure separation of the concrete with the water during initial placing of concrete, a layer of polystyrene beads will be placed inside the tremie pipe before discharging the concrete.
- 4) During concreting, care should be taken to maintain the bottom of the tremie pipe embedded at least 3m below the concrete level to avoid discontinuity.
- 5) Unwanted sediments/collapsed material will be flushed out from the casing until

good concrete is seen. To ensure contaminated concrete will not be below the cut-off level. The overcast concrete can be hacked to receive pilecap at later stage.

- 6) Temporary casing will be extracted by vibro hammer and concrete will be refilled inside casing if necessary to prevent undercast of pile

b) Supervisor's or C.O.W's Duties on bored piling works

1) Piling: Supervisor Duty

- i) To plan sequence of piles & To ensure piling point peg is at actual position.
- ii) To know the pile cut off level, bedrock level and pile toe level from consultant's.
- iii) To ensure piles ECC and verticality are within the tolerance. (less than 75mm)
- iii) To ensure the casings and steel cages at site are sufficient.
- iv) To follow up 'taking soil sample at change in stratum with proper labeled' and submits to RE.
- v) To have proper management in water supplying to bored hole and discharging back to water storage tank.
- vi) To place order concrete, monitor the concrete slump and volume for preventing undercast pile (contaminated concrete below C.O.L).
- vii) To maintain the bottom of the tremie pipe embedded at least 3m below the concrete level to avoid discontinuity.

2) Piling C.O.W's Duties

- i) To confirm the required pile toe level and cleaned base is achieved.
- ii) To ensure the full length steel cage (from pile toe to cut-off level) is sufficient, sufficient welds for lapping and plastic covers are placed.
- iii) To ensure the concrete slump is 200 +/-25mm, and proper cubes making on site.

c) How to determine the Cut-Off Levels between Soil and Rock

- 1) R.E shall refer to S.I report to determine the soil and rock transition zone.
- 2) If the boring operator changes from Auger/Boring Bucket (soil boring) to Rock Auger/ Coring Bucket (rock coring) and shall be no far from the depth for 1st coring indicated in S.I report.

d) How to determine the End Socket is enough

- 1) As consultant's site staffs, we will follow the rock socket length proposed by Flyover Structural Engineer which are 20m or 23m from bedrock level for J5&J6 piers and abutments

e) What are the Important Things that a Technician needs to know in regards to Bored Pile works

- 1) Concrete Grade and Slump
- 2) Description of soil type and bedrock type and hardness
- 3) Sequence of works for bored piling
- 4) Steel cages fabrication (Rebars sizes/nos, links spacing and lapping length)
- 5) Tests such as Static Load Test, PDA, PIT and Sonic Logging test
- 6) Pile's Cut-Off and Pile Toe Level, Temporary Casing Length and Theoretical & Actual Concrete Volume Poured in Borehole

f) Tremie Concreting- What to check

- 1) Concrete Grade and Slump
- 2) Steel Cages (Rebars nos./sizes, Links spacing, welds condition for lapping, plastic spacer blocks)
- 3) The total length of tremie pipe which must reach to bottom of borehole.
- 4) To maintain the bottom of the tremie pipe embedded at least 3m below the concrete level to avoid discontinuity. (measured the depth, compare theoretical and actual concrete volume)
- 5) Unwanted sediments/collapsed material will be flushed out from the casing until good concrete is seen. To ensure contaminated concrete will not below the cut-off level and the overcast concrete can be hacked to receive pilecap at later stage.

**SITE PHOTOS OF BORED PILING ACTIVITIES
(12th June 2017, 18th August 2017- Present)**

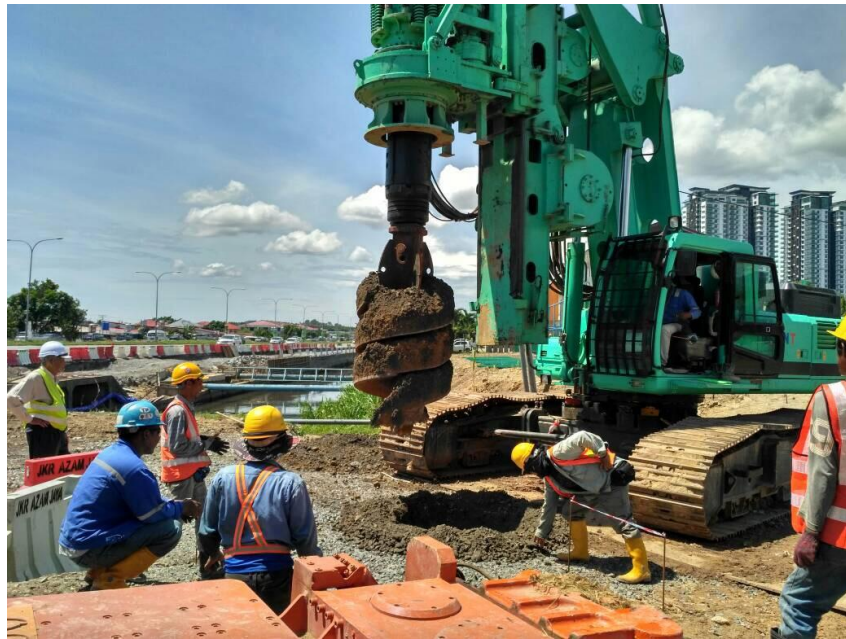


Photo 1: J5- Preliminary Test Pile:-
Pre-boring and offset in two perpendicular directions to countercheck the pile centre



Photo 2: Installation Temporary Casing by 7 tons Double Jaws Vibro Hammer

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Photo 3: J5- Boring Works



Photo 4: J6- Boring Works

**SITE PHOTOS OF BORED PILING ACTIVITIES
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Photo 5: Bored out soil/rock using Rock Auger



Photo 6: Confirmed Pile Toe Level after Cleaning Base

**SITE PHOTOS OF BORED PILING ACTIVITIES
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Photo 7: Inspection of Steel Cages



Photo 8: Jointing of steel cages , 2m lapping length of starter bars by welding

**SITE PHOTOS OF BORED PILING ACTIVITIES
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Photo 9: Hoisting/lifting of Steel Cages



Photo 10: Full length Steel Cages and Tremie Pipe were installed for PDA pile

**SITE PHOTOS OF BORED PILING ACTIVITIES
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Photo 11: Concreting Works



Photo 12: Borehole after Temporary Casing was Extracted

**SITE PHOTOS OF BORED PILING ACTIVITIES
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Photo 13: Temporary Storage Pond (filter cloth) for water before pumping to storage tank



Photo 14: Boring tools (Boring & Coring Bucket and Cleaning Bucket), Water from storage tank supplying to borehole

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Photo 15: PDA Test



Photo 16: J6- Instrumented Bi-Directional Load Test (BDLT)

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Photo 17: Bedrock Samples for Confirmation (Shale and Sandstone)



Photo 18: J6- Checking the Rock's Hardness and Record the Description

