CONTRACT & ESTIMATING

First Edition

MEASUREMENT FOR

PILING WORKS

NORHANIZA.ZAHARI.MAZLINA

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NORHANIZA BINTI MOHD NOOR
ZAHARI BIN MOHAMAD
MAZLINA BINTI HARUN

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Tel : 09-8400800 Fax : 09-8458781
Email : webmaster@psmza.edu.my

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THANK YOU.

PREFACE

This e-book is written based on the curriculum by Polytechnic for the Diploma of Civil Engineering. It will covers a basic knowledge on preparing a taking off for piling works. The authors was hopeful that this e-book will be suitable to be used as reference for students or people who engaged with the quantity and measurement works.

Furthermore, we would like to thanks our friends in Department of Civil Engineering, Polytechnic of Sultan Mizan Zainal Abidin who gave a lot of encouragement and support for the completion of this e-book.

NORHANIZA BINTI MOHD NOOR
ZAHARI BIN MOHAMAD
MAZLINA BINTI HARUN

ABSTRACT

Piling is part of deep foundation works for Civil Engineering structure. There are many types of piling used in the industry. As for this e-book, the discussion will be focused on the quantity measurement of precast concrete pile works. The measurement shown on this e-book are based on Standard Method of Measurement 2. Drawing used for the taking-off procedure are for learning purposes only. All assumptions from the writer is from related reference.

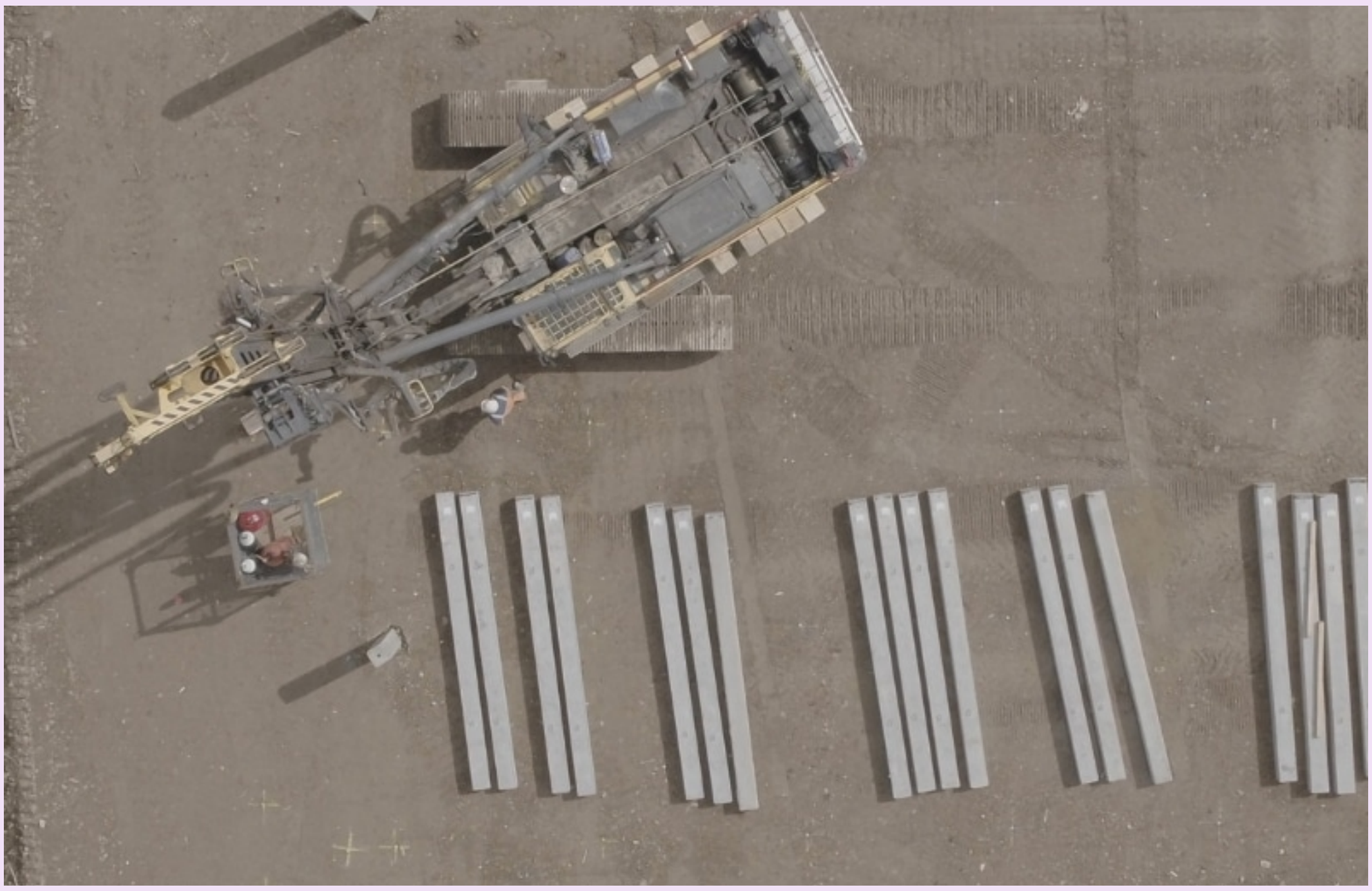
CONTENT

INTRODUCTION

PILING

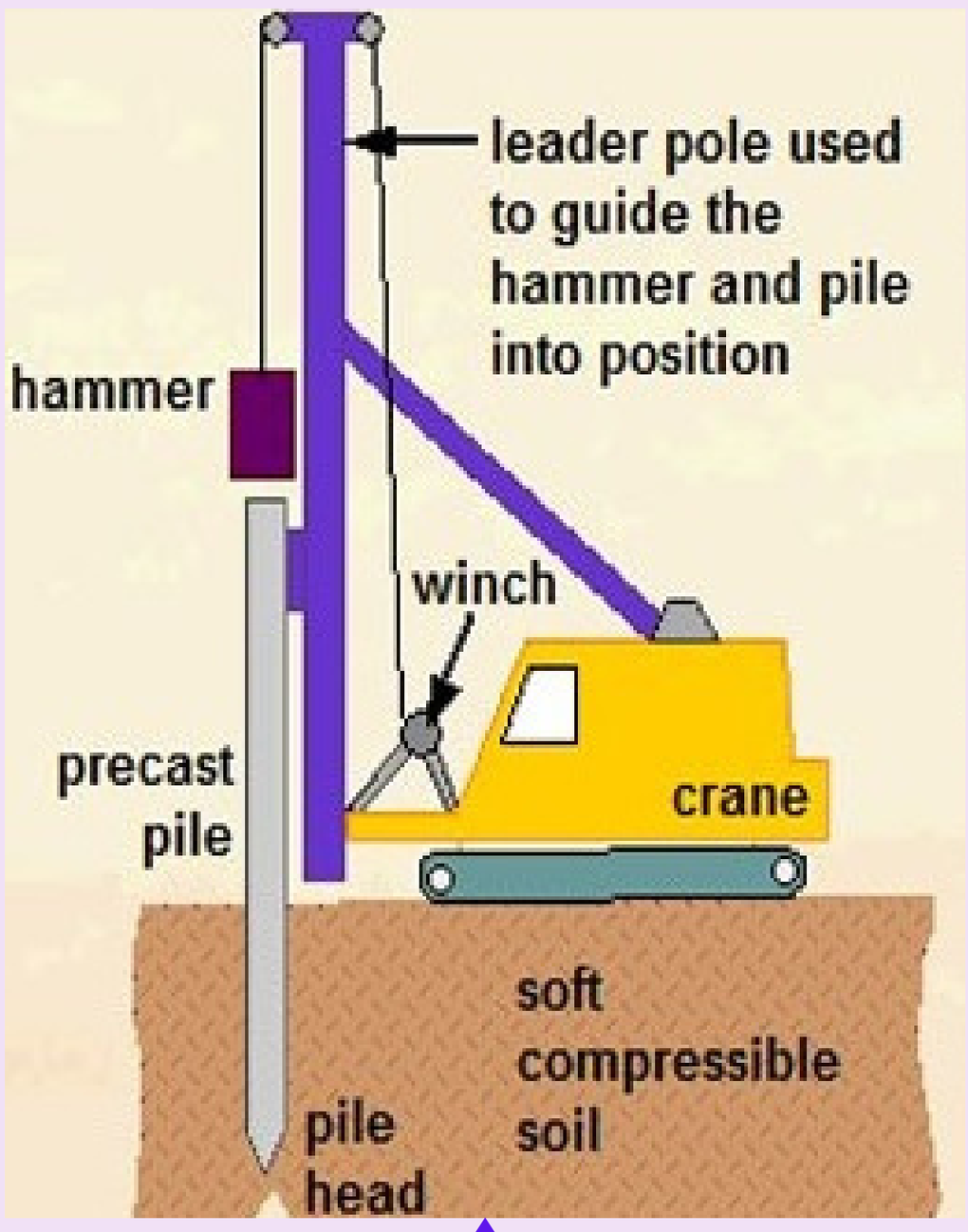
DEFINITION

Piles are either end bearing with the load being transferred to the end of the pile that rests on good load bearing strata or friction piles that transfer the loads by friction along the sides of the pile. It can be timber piles, Steel-H pile, poured in place concrete or precast concrete piles.



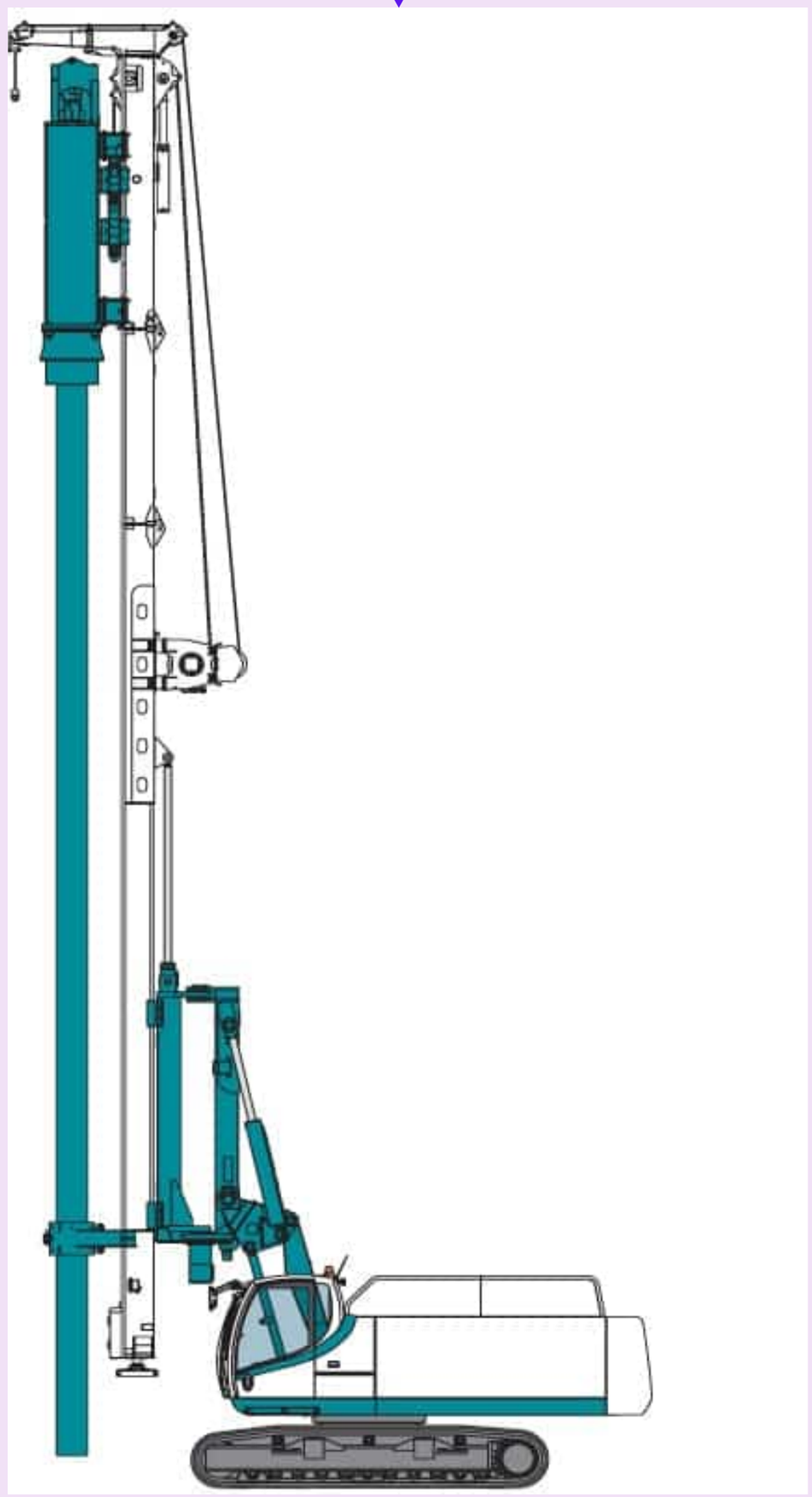
PRECAST CONCRETE PILE

Precast piles are used as foundations for all sorts of engineering structures in virtually every soil condition. They are particularly useful where there is a need for very deep piles, in soft ground or in aggressive or contaminated soils.



Pile driving with hammer

Pile driving with Hydraulic hammer



ADVANTAGES OF PRECAST CONCRETE PILE

There are many advantages using precast concrete pile such as:

High quality product

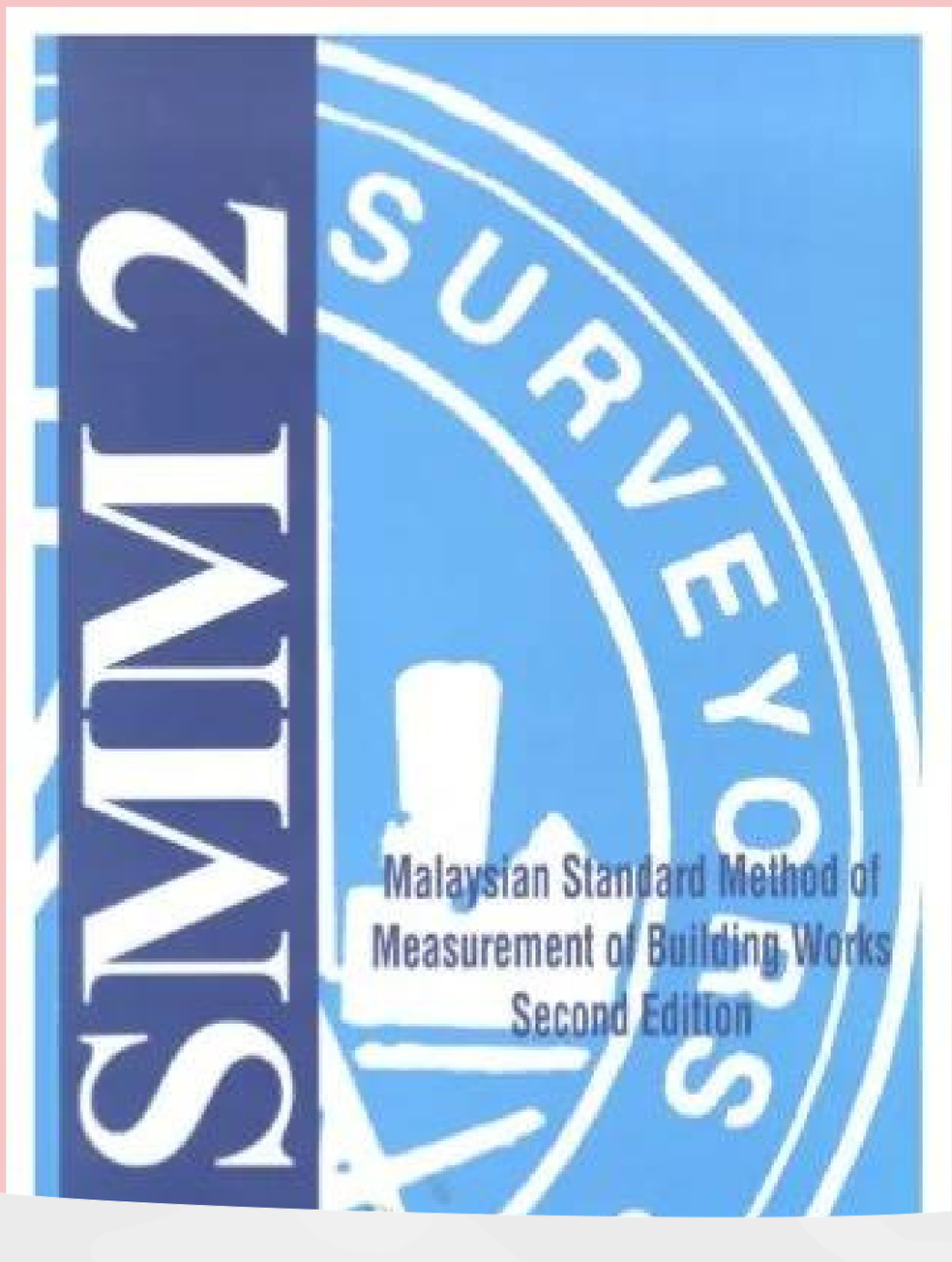
Saving time

Saving money

Uniformity

RULES OF MEASUREMENT

RULES OF MEASUREMENT



Standard Method Measurement 2 (SMM2) used for reference to prepare taking off for piling works.

Piling Works stated in Heading E - Piling and Diaphragm Walling in SMM2.

For the Piling Works, drawings should be supplied with the bills of quantities which show piling layout, types of pile and positions of the work within the site and of existing services.

RULES OF MEASUREMENT

Soil Description

The nature of the ground shall be given in description. Ground water level should be stated in the description.

Starting Levels

The levels from the work is expected to begin and from which measurements have been taken shall be stated. Normally, engineer determine the depth of penetration in drawing.

Plant

These two items should be given separately for each type of pile :

a) Bringing to site and removing from site all plant required.

b) Maintaining on site all plant.

RULES OF MEASUREMENT

Piling Description & Measurement

Precast Concrete Piles operation should be given separately with others type of pile.

These are items included for Precast Concrete Piles according to SMM2 :

a) Preliminary piles

b) Test piles (equipment and instruments shall be deemed to be included)

c) Piles to be extracted shall be identified and given separately.

d) Total number of piles stating the specified length. The size and weight of heads and shoes shall be stated in the description.

e) The total driven depth should be given in metres.

f) The total concreted length of the piles should be given in metres.

RULES OF MEASUREMENT

Piling Description & Measurement (cont'd)

g) The total number of pile extension.

h) The total length of pile extensions given in metres classified into the following ranges of pile length: not exceeding 3.00 m or exceeding 3.00 m.

i) The following shall be enumerated:

- Cutting off top piles
- Preparing concrete pile head

RULES OF MEASUREMENT

Quantities

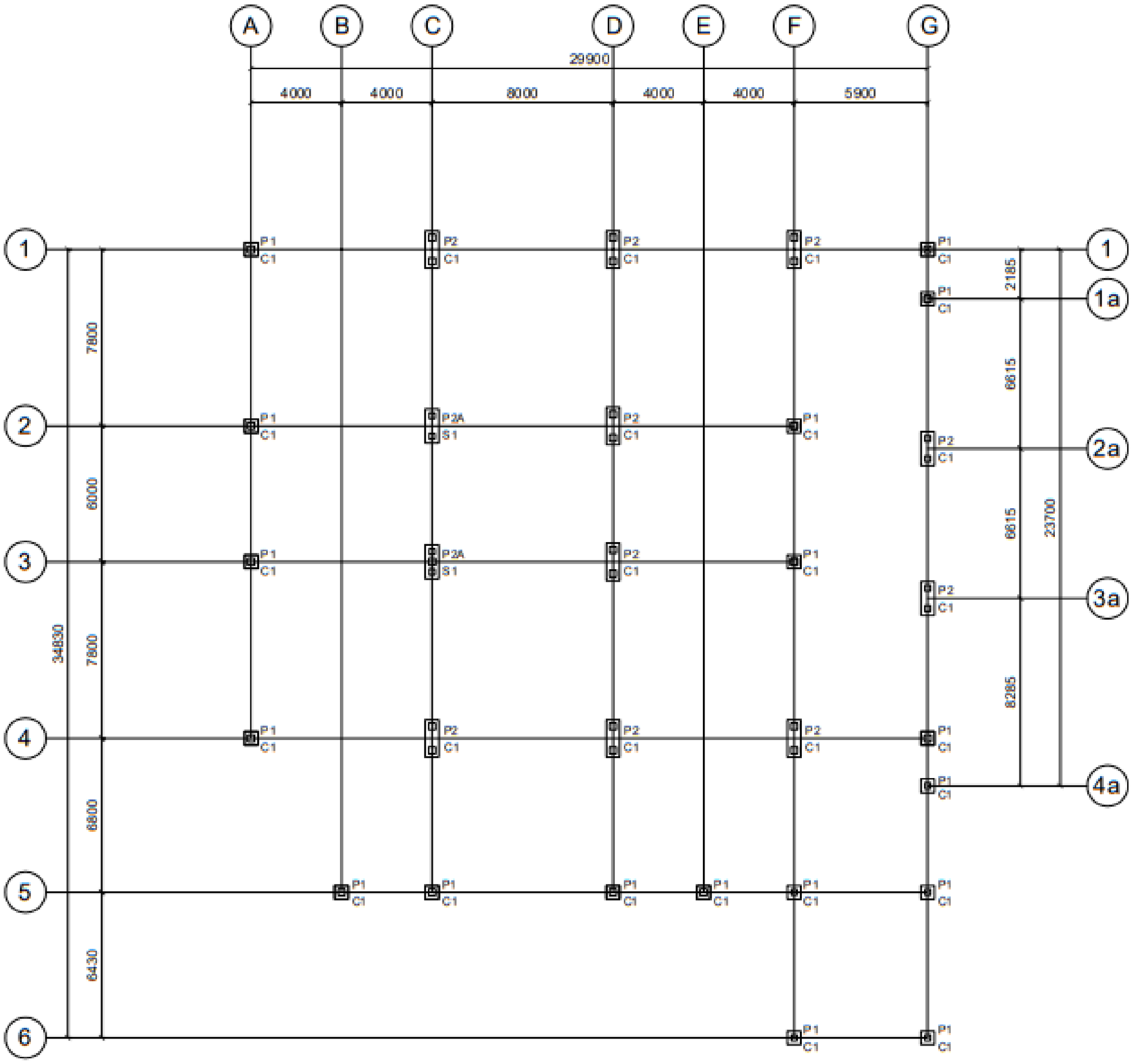
The quantities for piling work shall be calculated as follows:

a) The specified length shall be those which the Contractor is instructed to provide. Handling, transporting and pitching shall be deemed included.

b) The driven shall be measured from the level stated to the bottom of the toe.

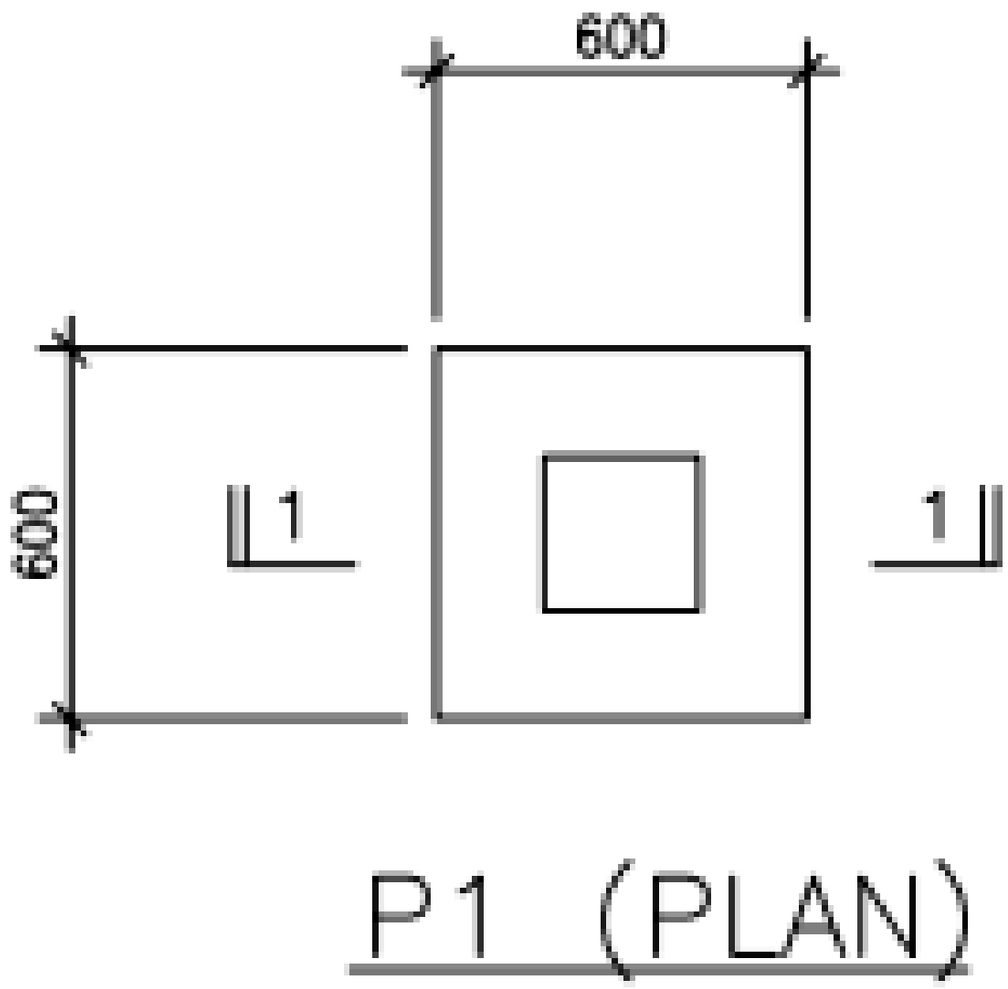
c) The measurement of pile extensions shall not include lengths formed of material arising from cutting off surplus lengths of other piles.

DRAWING

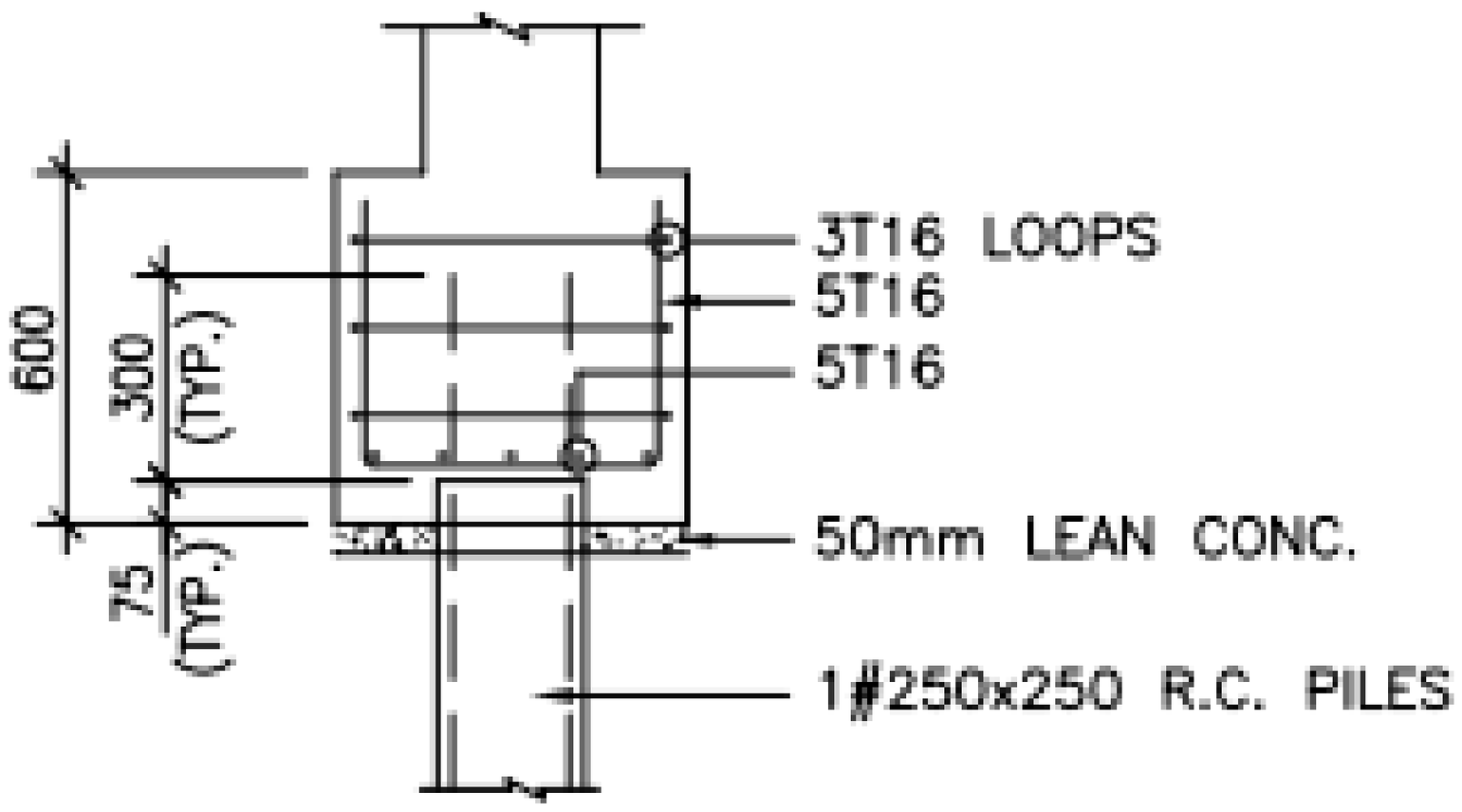


FOUNDATION PLAN

LAYOUT PLAN

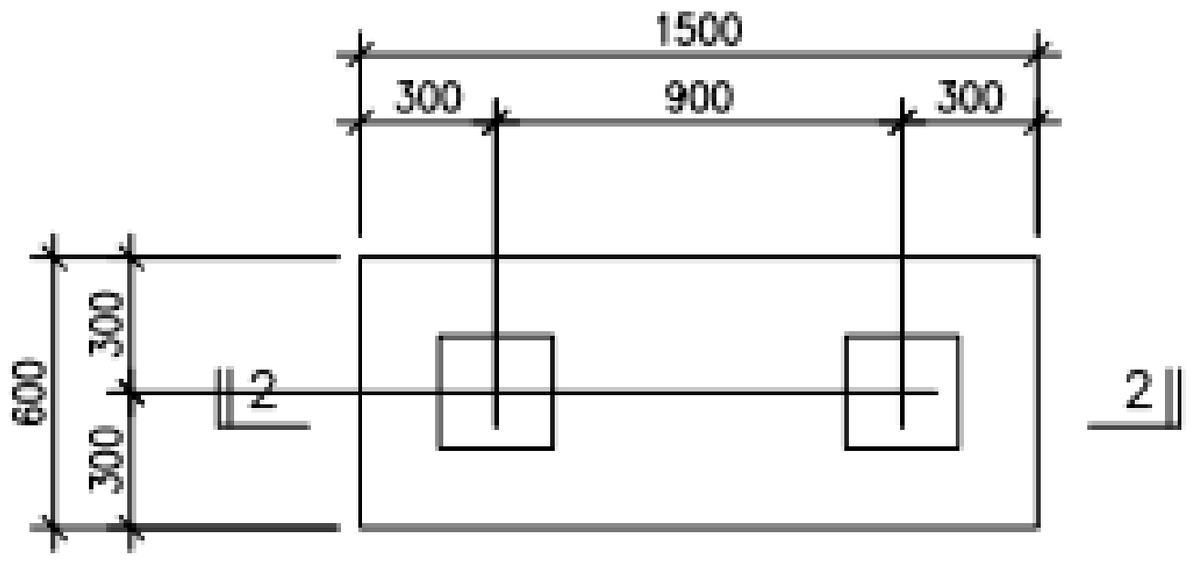


P1 (PLAN)

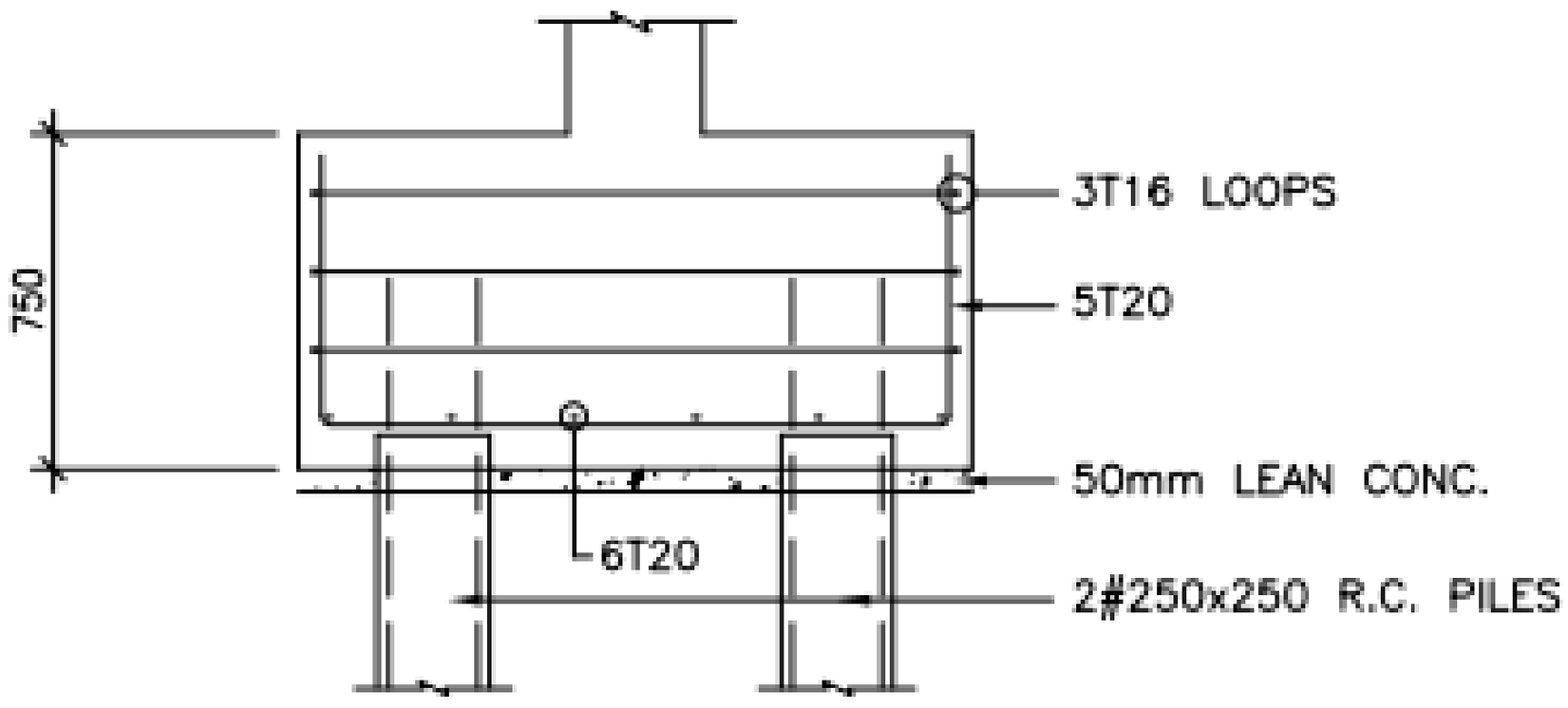


SECTION 1–1

DETAILS OF PILECAP P1



P2 (PLAN)



SECTION 2-2

DETAILS OF PILECAP P2

INFORMATION

1. The design of 250x250 R.C. Piles are to comply with the requirement of MS1314:1993, BS8004:1986 and CP116:1969.

2. Supply length of piles shall be:
   a) Starter pile - 6.00 m long
   b) Extension pile - 6.00 m long

3. Estimated penetration depth : 25m

4. Concrete shall be Grade C40 with a characteristic strength of 40 N/mm2 at 28 days

5. Reinforcement shall be high yield deformed bars (Type ii) with a minimum characteristic strength of 460 N/mm2.

6. The maximum design working load for 250x250 R.C. Pile after allowing negative skin friction is 40 tonnes.

MEASUREMENT FOR PILING WORKS

TAKING OFF LIST

No	Item	Unit
1	Bringing in & removing plant	Item
2	Maintaining plant on site	Item
3	Initial piles	No
4	Driven depth	M
5	Pile extension	No
6	Extension piles n.e. 3.00 m long	M
	Extension piles exc. 3.00 m long	M
7	Jointing	No
8	Cut off pile head & prepare pile head	No
9	Testing	No

This taking off is refer to drawing in page 9-11

Bringing in & removing plant

Drawing No.:	**Bill. No.:**	**Element:**	**Slip No.:** 1/9
Heading: Bringing in & removing plant			**Unit:** Item
Description: Bringing to and removing from site all plant required for this section of the work			**Quantity:** Item
	Item		

Maintaining plant on site

Drawing No.:	**Bill. No.:**	**Element:**	**Slip No.:** 2/9
Heading: Maintaining plant on site			**Unit:** Item
Description: Maintaining on site all plant required for this section of the work			**Quantity:** Item
	Item		

Initial piles

Drawing No.:	Bill. No.:	Element:	Slip No.: 3/9
Heading: Initial pile			Unit: No
Description: Supply, deliver & unload on site 6.00m long complete with 250mm x 250mm x 1.25 kg mild steel head & 250mm x 250mm x 10 kg mild steel shoe			Quantity: 42

Number of P1 points

Number of P2 points

2 pile for each point

18	1	18	P1)
12/2	1	24	P2)
		42	

Number of initial pile per point

Driven depth

Drawing No.:	Bill. No.:	Element:	Slip No.: 4/9
Heading: Driven depth			Unit: M
Description: Driven only vertical 250mm x 250mm reinforced concrete pile			Quantity: 1050.00

Penetration depth - refer drawings

Number of P1 points

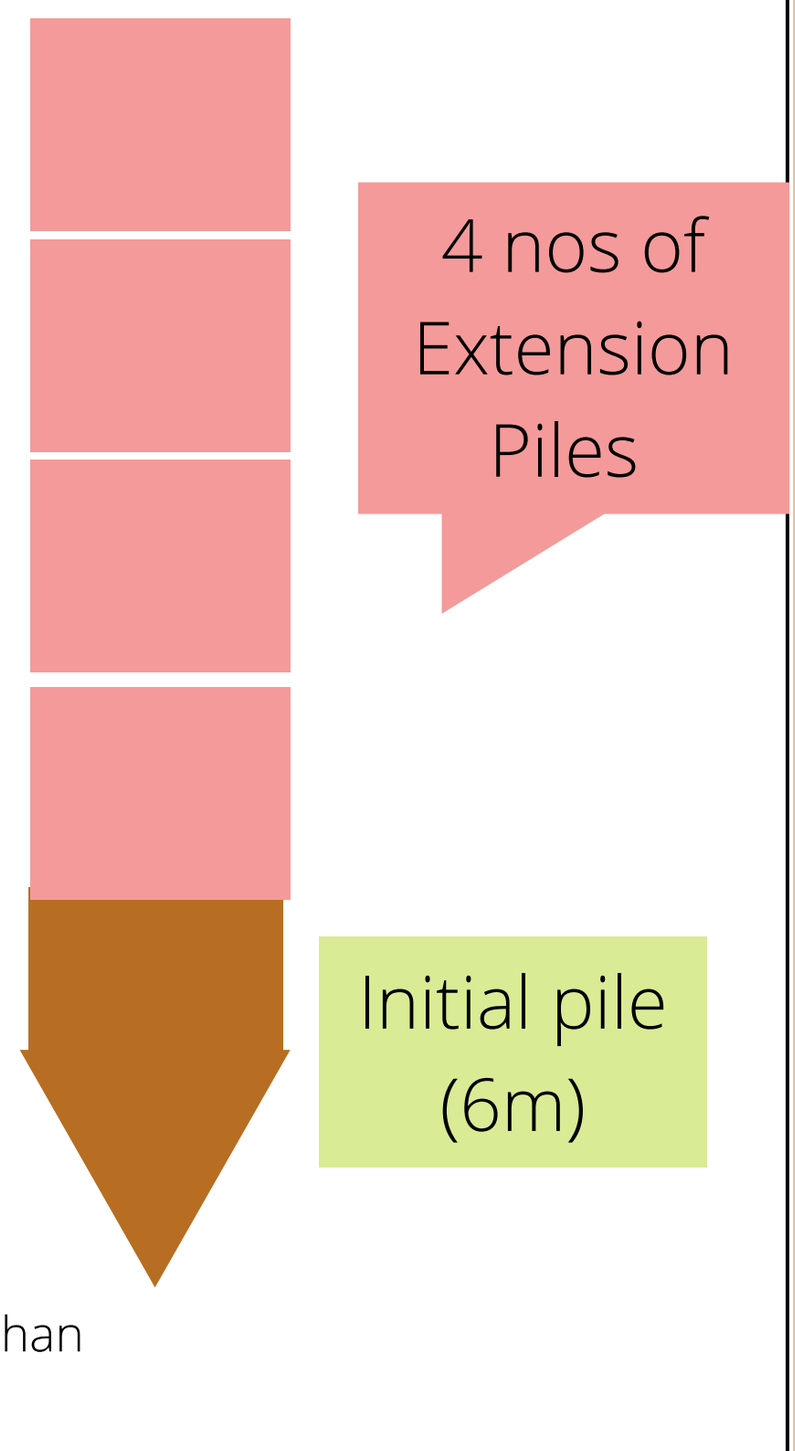
Number of P2 points

18	25.00	450.00	P1)	This 25 m included initial and extension piles
12/2	25.00	600.00	P2)	
		1050.00		

Supply Piles Extension

Drawing No.:	Bill. No.:	Element:	Slip No.: 5/9
Heading: Supply pile extenstion			Unit: No
Description: Supply and deliver on site 6.00 m long with 250mm x 250mm extension precast reinforced concrete pile			Quantity: 168

18	4	72	P1)
12 / 2	4	96	P2)
		168	



Handling Pile Extension

Drawing No.:	Bill. No.:	Element:	Slip No.: 6/9
Heading: Handling pile extension			Unit: M
Description: Handle, transport, pitch and drive pile extension for pile length exceeding 3.00 m			Quantity: 168

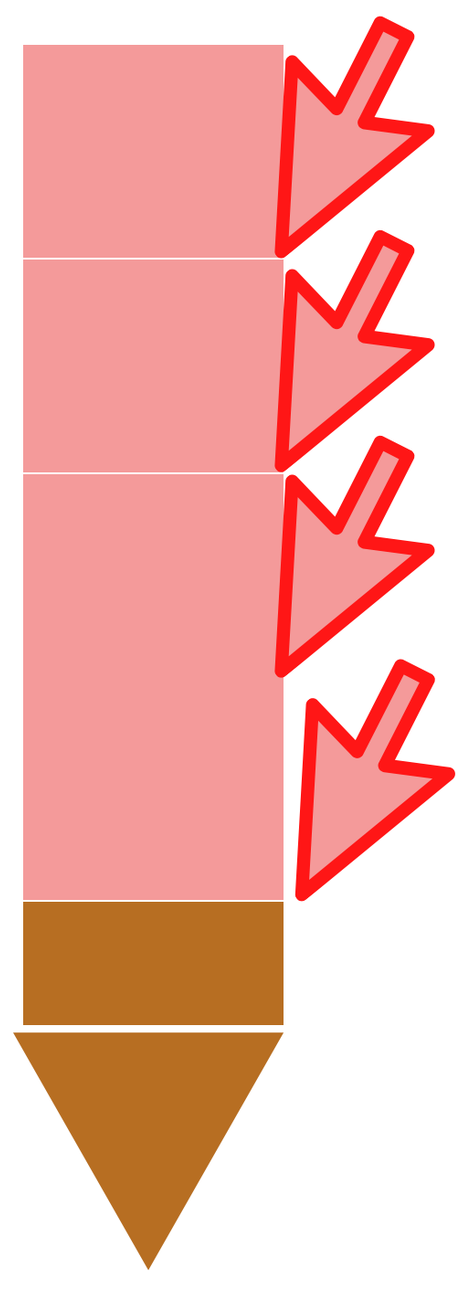
each point have 4 nos of pile extension

18 / 4 /	6.00	432.00	P1)
12 / 2 / 4 /	6.00	576.00	P2)
		1008.00	

Jointing

Drawing No.:	Bill. No.:	Element:	Slip No.: 7/9
Heading: Jointing			Unit: No
Description: Total number of jointing			Quantity: 168

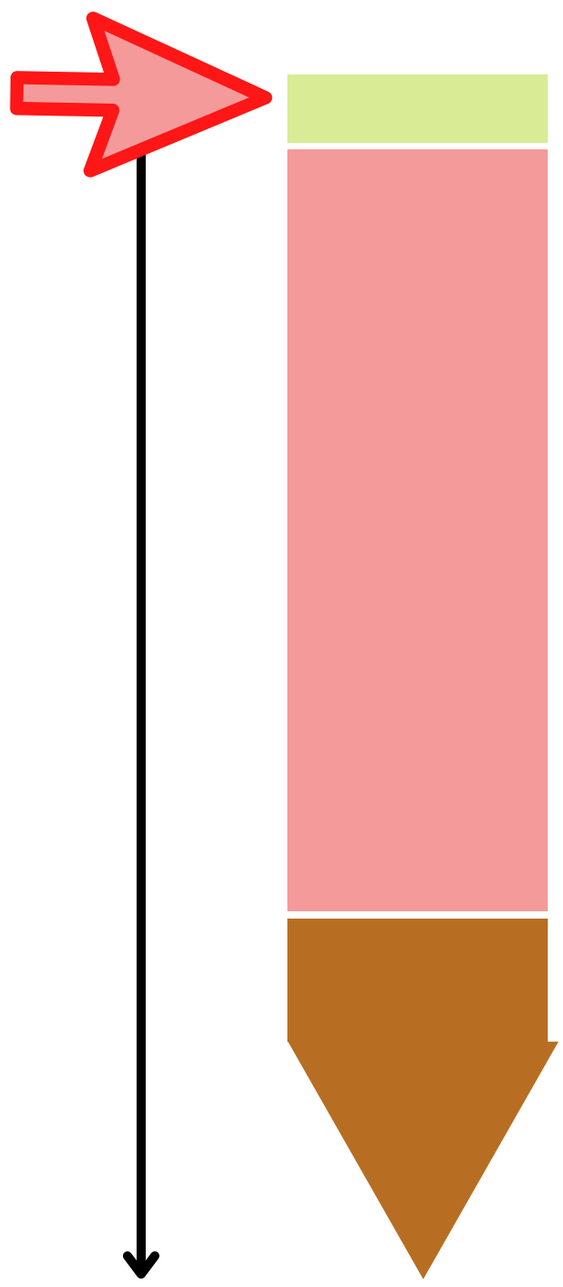
18 / 4	72	P1)	
12 / 2 / 4	96	P2)	
	168		



Cut off pile head
& Prepare pile head

Drawing No.:	Bill. No.:	Element:	Slip No.: 8 /9
Heading: Cut off pile head & Prepare pile head			Unit: No
Description: Cut off top of piles to required level & Prepare pile heads and reinforcement for capping			Quantity: 42

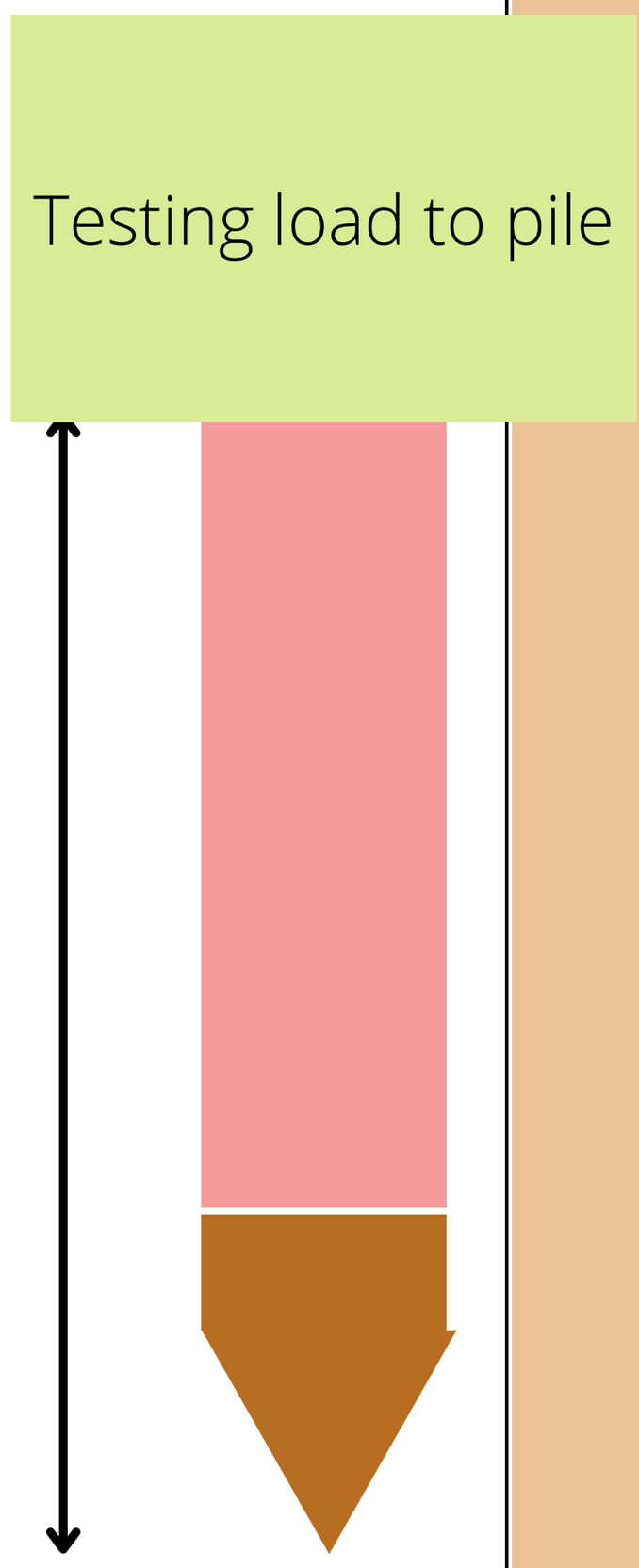
18	1	18	P1)	Cutting top of surplus pile (2m)
12	2	24	P2)	
	1	42		



Testing

Drawing No.:	Bill. No.:	Element:	Slip No.: 9/9
Heading: Testing			Unit: No
Description: Allow for testing on 250mm x 250mm piles by kentledges to a total load of 80 tonnes			Quantity: 2

1	1	P1)	
1	1	P2)	
	2		
		Normally engineer will specify in drawing how many pile point to be tested	



EXERCISE

QUESTION

Based on the information, prepare a taking off for items below:

i. Initial pile
ii. Supply of extension pile
iii. Jointing

Notes:

1. All pile is precast reinforced concrete pile

2. All pile should be in 350mm x 350mm size

3. Supply length of pile should be:
   i. starter pile : 6.00m long
   ii. Extension pile : 6.00m long

4. Estimated penetration depth is 22 metre

5. P1 = 1 pile point
   P2 = 2 pile points
   P3 = 3 pile points
   P4 = 4 pile points

Location	Types of pile cap			
	P1	P2	P3	P4
1/A-D		4	1	1
2/A-D	2		3	
3/A-D		1	1	2
4/A-D	1	1	1	2
5/A-D	2		1	

ANSWER

Drawing No.:	Bill. No.:	Element:	Slip No.: 1/3
Heading: Initial Pile			Unit: No
Description: Supply, deliver & unload on site 6.00m long complete with 350mm x 350mm head and shoe.			Quantity: 58

5 / 6	1	5	P1)
2 /	1	12	P2)
7 / 3 /	1	21	P3)
5 / 4 /	1	20	P4)
		58	

ANSWER

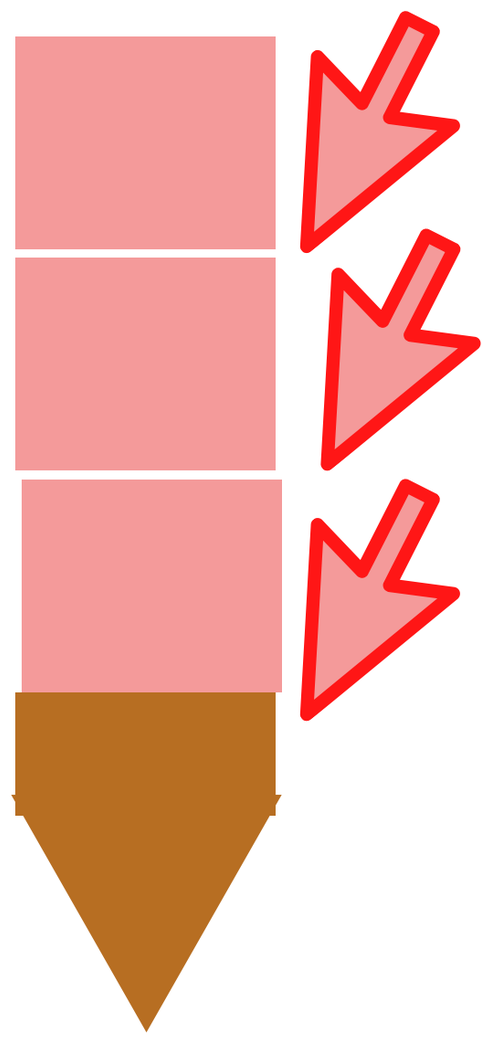
Drawing No.:	Bill. No.:	Element:	Slip No.: 2/3
Heading: Supply of Extension pile			Unit: No
Description: Supply and deliver on site 6.00 m long with 350mm x 350mm extension precast reinforced concrete pile			Quantity: 174

5 / 6	3	15	P1)
2 /	3	36	P2)
7 / 3	3	63	P3)
5 / 4	3	60	P4)
		174	
			6m (initial pile) + 6m (ext. pile) + 6m (ext. pile) + 6m (ext. pile)

ANSWER

Drawing No.:	Bill. No.:	Element:	Slip No.: 3/3
Heading: Jointing			Unit: No
Description: Total number of jointing			Quantity: 174

$5 \times \frac{3}{6} \times 2$	3	15	P1)
	3	36	P2)
$7 \times \frac{3}{3} \times 3$	3	63	P3)
$5 \times \frac{4}{5} \times 3$	3	60	P4)
		174	



REFERENCES

REFERENCES

1. Ahamad Abdullah, K. A. (2004). *Pengukuran Kuantiti Bangunan*. Kuala Lumpur: Pearson Malaysia.

2. Frank R. Dagostino, L. F. (2008). *Estimating In Building Construction*. Canada: Pearson Education.

3. Fleming, K., Weltman, A., Randolph, M. & Elson, K., (2008), *Piling Engineering, Third Edition*. Taylor and Francis, Oxford.

4. Institution of Surveyors Malaysia, (2000). *Malaysian Standard Method of Measurement of Building Works, Second Edition.*

5. Standard Specifications For Building Works, (2005) JKR Malaysia

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