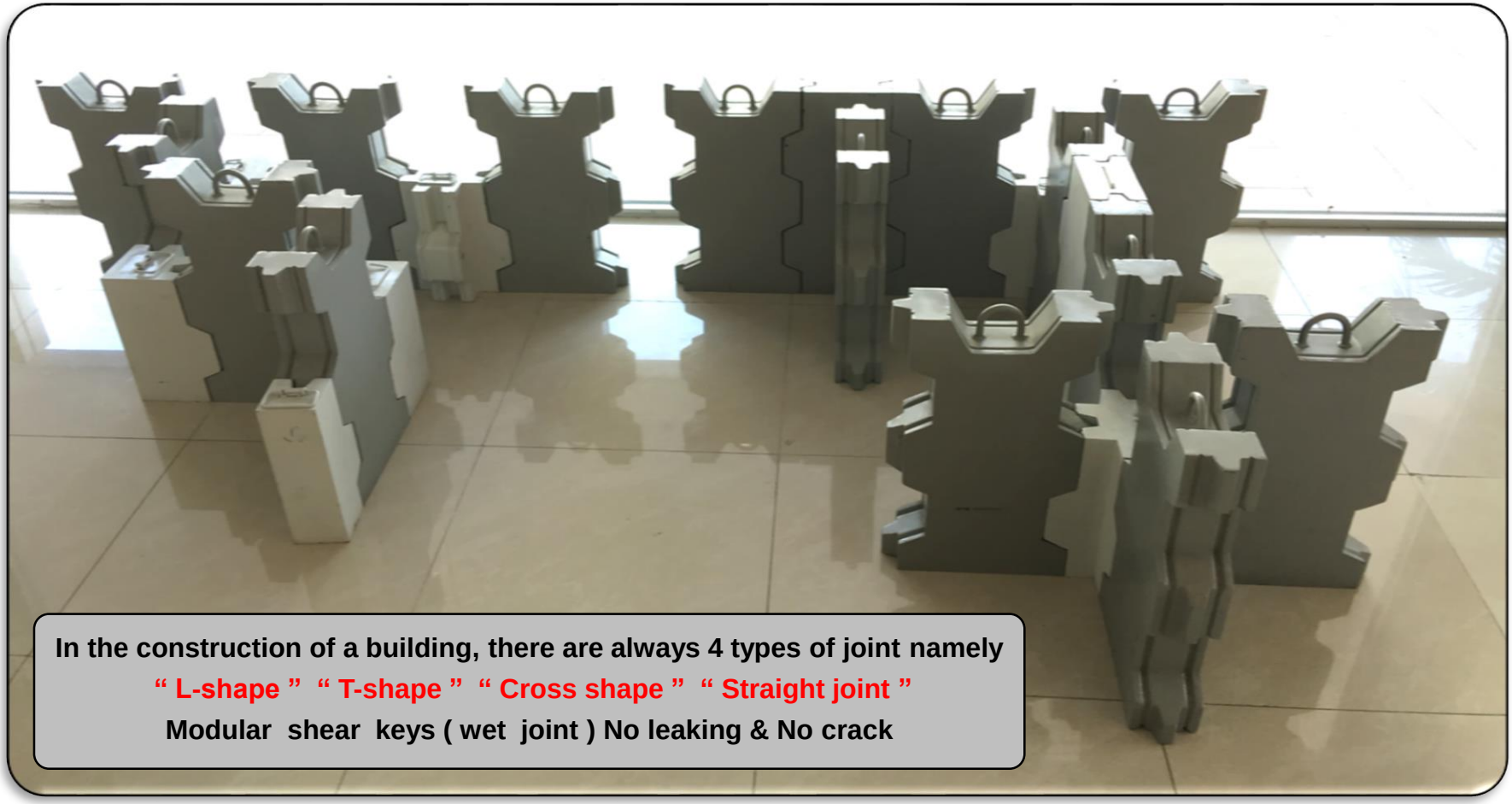
HC Precast System

(100 % Malaysia Technology With 6 IPs')

Economical . Eco Friendly . Quality

SCOPE OF WORKS



In the construction of a building, there are always 4 types of joint namely

" L-shape " " T-shape " " Cross shape " " Straight joint "

Modular shear keys (wet joint) No leaking & No crack

SCOPE OF WORKS

Responsibility

1. **Superstructure supply & install : - Frame & wall**
2. **Design calculation with PE endorsement**
3. **M & E IBS system shop drawing**
4. **Quality control**
5. **Assurance (B.S codes)**
6. **Comply board of engineers Malaysia / IBS guideline no. 002 item 2.8**
7. **Independent checker : HC Precast System R.C. modular shear keys precast wall panel**
8. **Precast element comply to the code & building by law**
   - **Precast elements must not involve many different manufactured components**

HC Precast System Sdn Bhd scope of works includes :-

a) Super structure design calculation with PE endorsement

b) Supply and install

c) Setting out panel TBM for each block (4+2 boundary point per unit must be provided)

d) Mobile crane

e) Shop drawing for M&E location layout related to panel wall casting
(subject to client / consultant confirmation)

HC Precast System Sdn Bhd scope of works excludes :-

a) Substructure design & construction

b) Supply & install metal door & window frame

c) Supply & install M&E conduit

d) Skim coat

e) Storage yard at project site : 50mm thick crusher run base

f) Access road at project site

g) Temporary water & electricity supply

h) Quarters for workers

i) Security of our material & system works

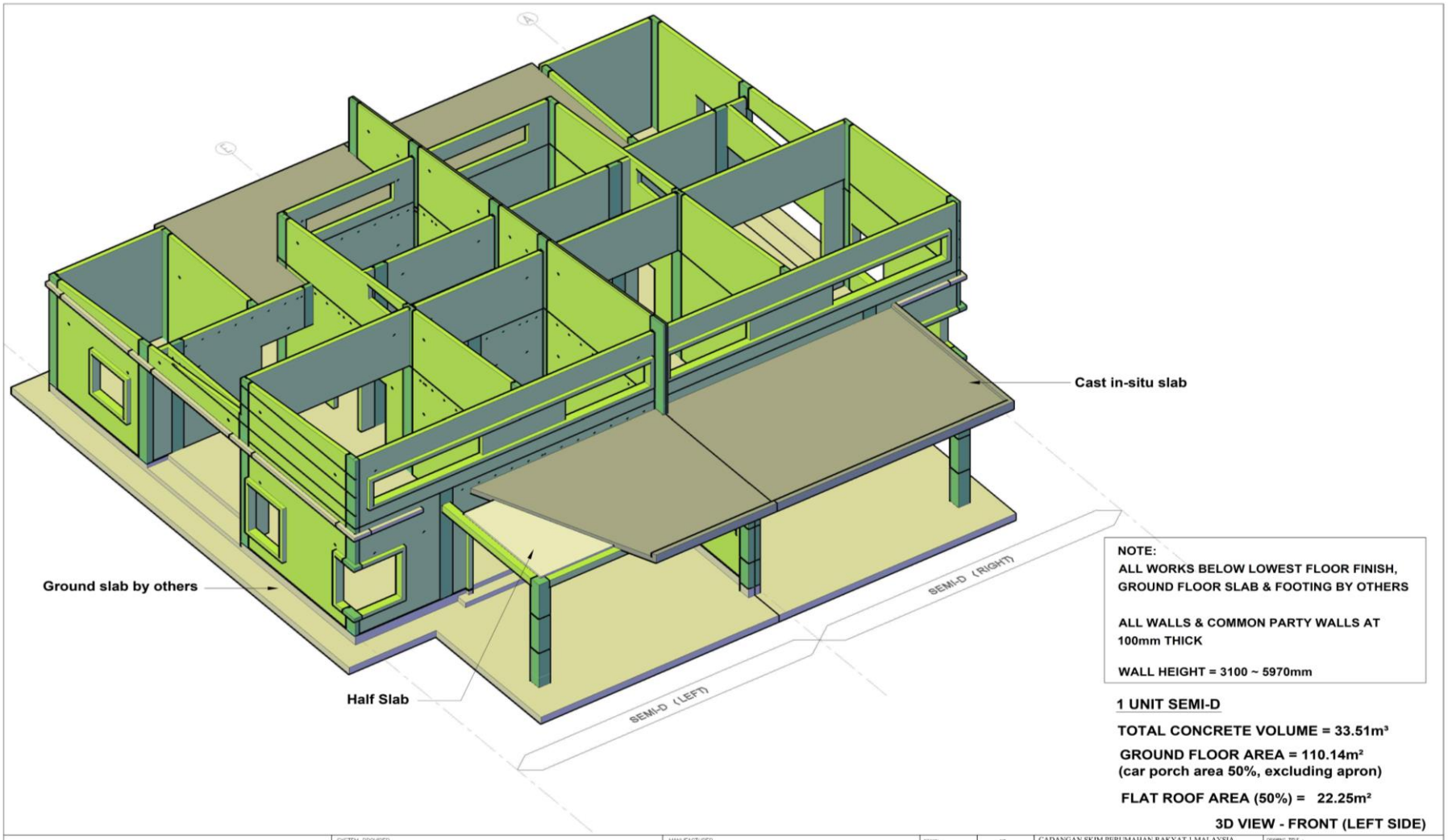
j) Contractor All Risks Insurance

1. Superstructure supply & install : - Frame & Wall

1. Superstructure supply & install : - Frame & Wall

Load bearing wall + Modular shear keys (wet joint) + Box system (flexibility to suit all Architectural demands)

1. Superstructure supply & install : - Frame & Wall



NOTE:
ALL WORKS BELOW LOWEST FLOOR FINISH, GROUND FLOOR SLAB & FOOTING BY OTHERS

ALL WALLS & COMMON PARTY WALLS AT 100mm THICK

WALL HEIGHT = 3100 ~ 5970mm

1 UNIT SEMI-D

TOTAL CONCRETE VOLUME = 33.51m³

GROUND FLOOR AREA = 110.14m²
(car porch area 50%, excluding apron)

FLAT ROOF AREA (50%) = 22.25m²

3D VIEW - FRONT (LEFT SIDE)

SYSTEM PROVIDER
HC PRECAST SYSTEM SDN. BHD. (586697-M)
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DRAWN :	HC
DATE :	FEB 2018
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APPR'D :	3993
SCALE :	NTS

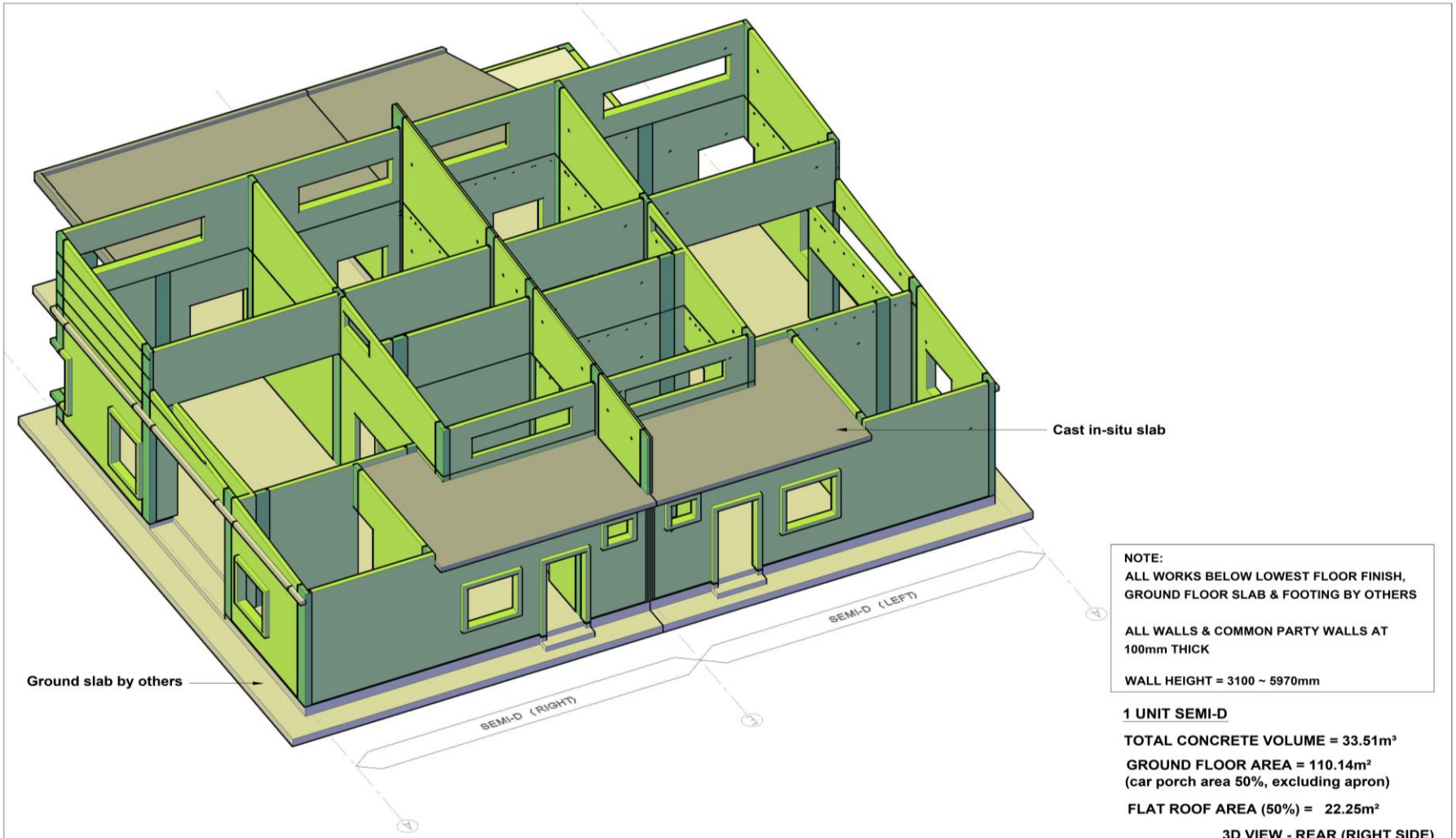
CADANGAN SKIM PERUMAHAN RAKYAT 1 MALAYSIA (PRIMA) BAGI RUMAH BERKEMBAR 1 TINGKAT
DI ATAS TANAH KERAJAAN DI PAMAH KASIH, CHARUK PUTING, MUKIM PERAK, DAERAH TEMERLOH, PAHANG.
UNTUK TETUAN:
BERGAMO DESIGN (M) SDN. BHD.

DRAWING TITLE :
SINGLE STOREY SEMI DETACHED OVERALL 3D DRAWING

DRAWING NO :	HC/BD/SD/3D-01	REV : -
SYSTEM :	-	REV : -

Customized & flexibility to suit all Architectural demands

1. Superstructure supply & install : - Frame & Wall



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SCALE :	NTS

CADANGAN SKIM PERUMAHAN RAKYAT 1 MALAYSIA (PRIMA) BAGI RUMAH BERKEMBAR 1 TINGKAT
DI ATAS TANAH KERAJAAN DI PAMAH KASIH, CHARUK PUTING, MUKIM PERAK, DAERAH TEMERLOH, PAHANG.
UNTUK TETUAN:
BERGAMO DESIGN (M) SDN. BHD.

DRAWING TITLE :
SINGLE STOREY SEMI DETACHED
OVERALL
3D DRAWING

DRAWING NO : HC/BD/SD/3D-01A REV : -
SYSTEM : - REV : -

Customized & flexibility to suit all Architectural demands

2. Design calculation with PE endorsement

CADANGAN SKIM PERUMAHAN RAKYAT 1 MALAYSIA (PRIMA) BAGI RUMAH BERKEMBAR 1 TINGKAT DI ATAS TANAH KERAJAAN DI PAMAH KASIH, CHARUK PUTING, MUKIM PERAK, DAERAH TEMERLOH, PAHANG UNTUK TETUAN BERGAMO DESIGN (M) SDN BHD.

STRUCTURE DESIGN CALCULATIONS

CLIENT

PERBADANAN SETIAUSAHA KERAJAAN PAHANG
PEJABAT SETIAUSAHA KERAJAAN PAHANG
UNIT PERUMAHAN,
WISMA SRI PAHANG,
25503 KUANTAN
PAHANG DARUL MAKMUR

ARCHITECT

NATHAN-JONES ARCHITECT
SUITE 3A.6, LEVEL 3A,
WISMA GREAT EASTERN,
NO.25, LEBUH LIGHT,
10200, PENANG, MALAYSIA

STRUCTURE ENGINEER

PK Mak Consulting Engineer
B2-08, PJ Industrial Park
Jalan Kemajuan, Section 13
46200 Petaling Jaya
Selangor Darul Ehsan
Tel/Fax: 03-7931 8112

CONTENTS

2. Design calculation with PE endorsement

1) GENERAL

a) DESIGN DATA

CODE USED

STRUCTURAL CONCRETE	:	BS 8110
STRUCTURAL STEEL	:	BS 5950
LOADING	:	BS 6399

b) MATERIAL DATA

CONCRETE GRADE	:	30 N/mm^2
STEEL REINFORCEMENT	:	T = 460 N/mm^2
		R = 250 N/mm^2

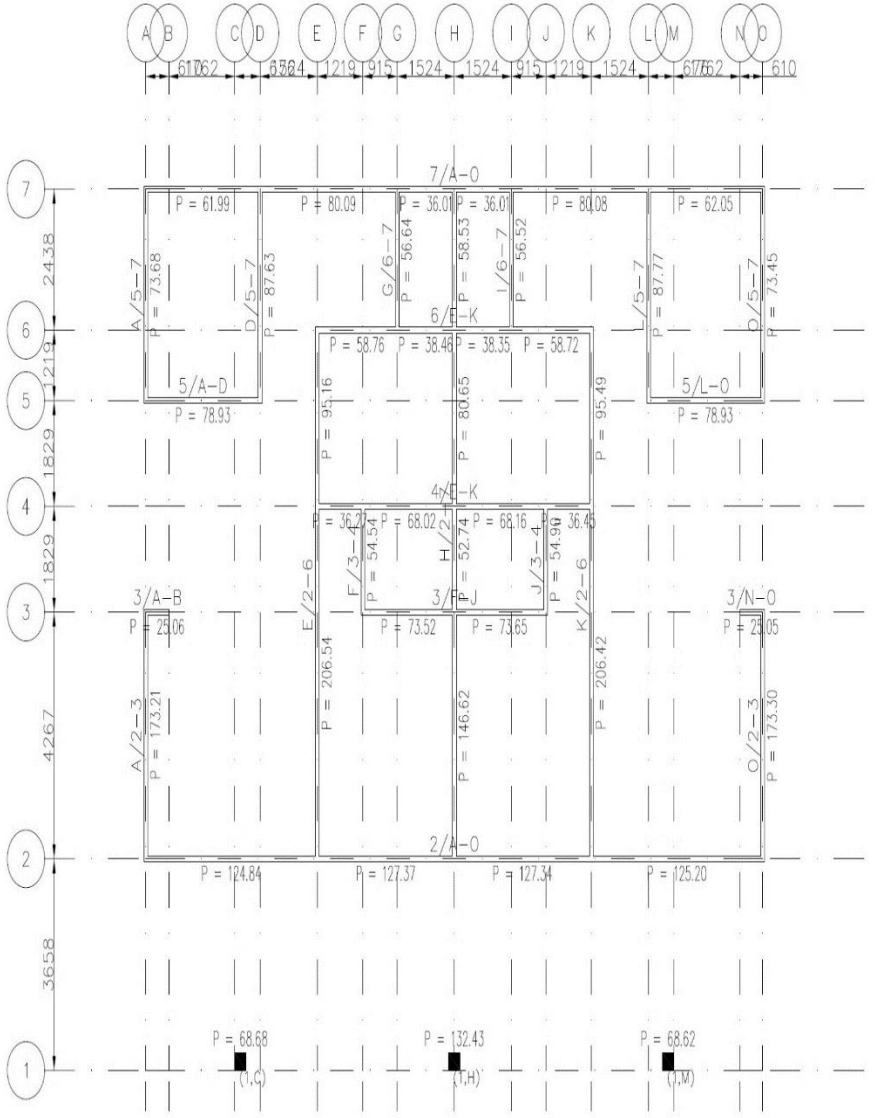
c) FOUNDATION USED : STRIP FOOTING

2) DESIGN CONSIDERATIONS

a) PRECAST WALLS ARE DESIGNED AS LOAD BEARING WALLS

b) STRIP FOOTING WILL BE INTEGRATED WITH THE GROUND SLAB

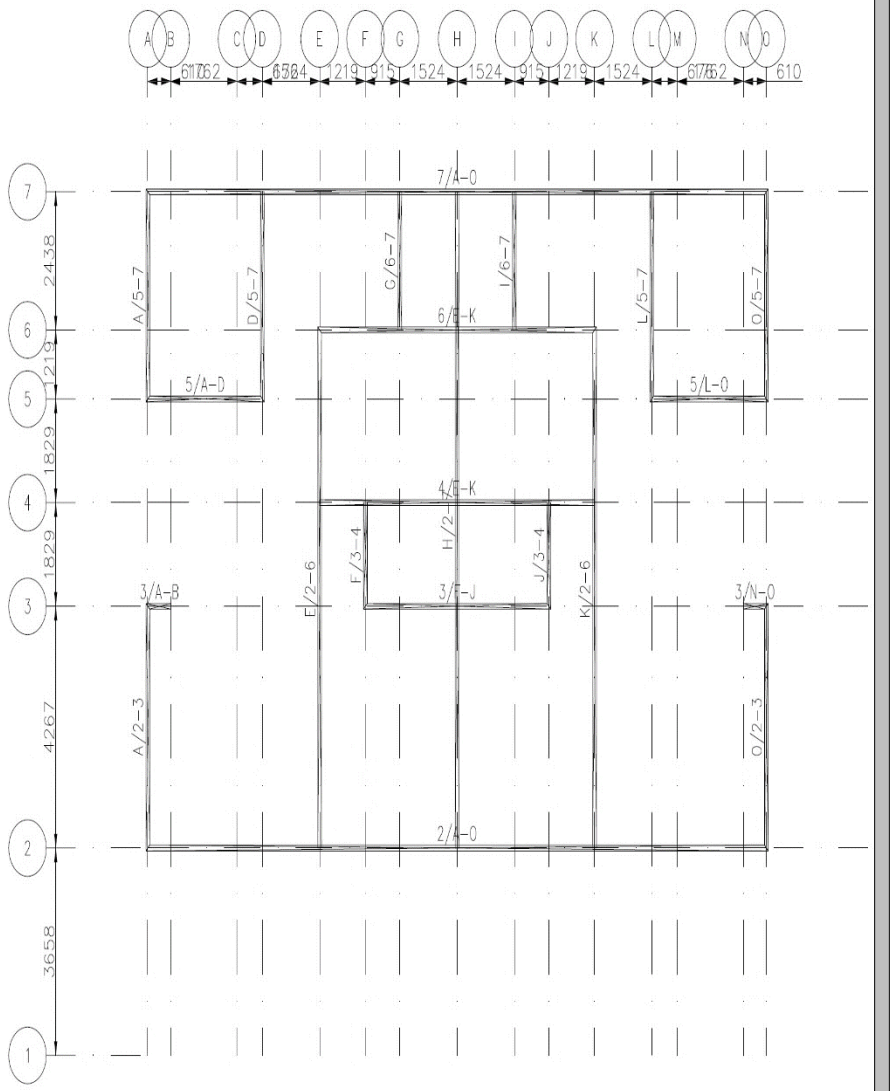
c) MINIMUM SOIL BEARING PRESSURE OF 50kN/m^2



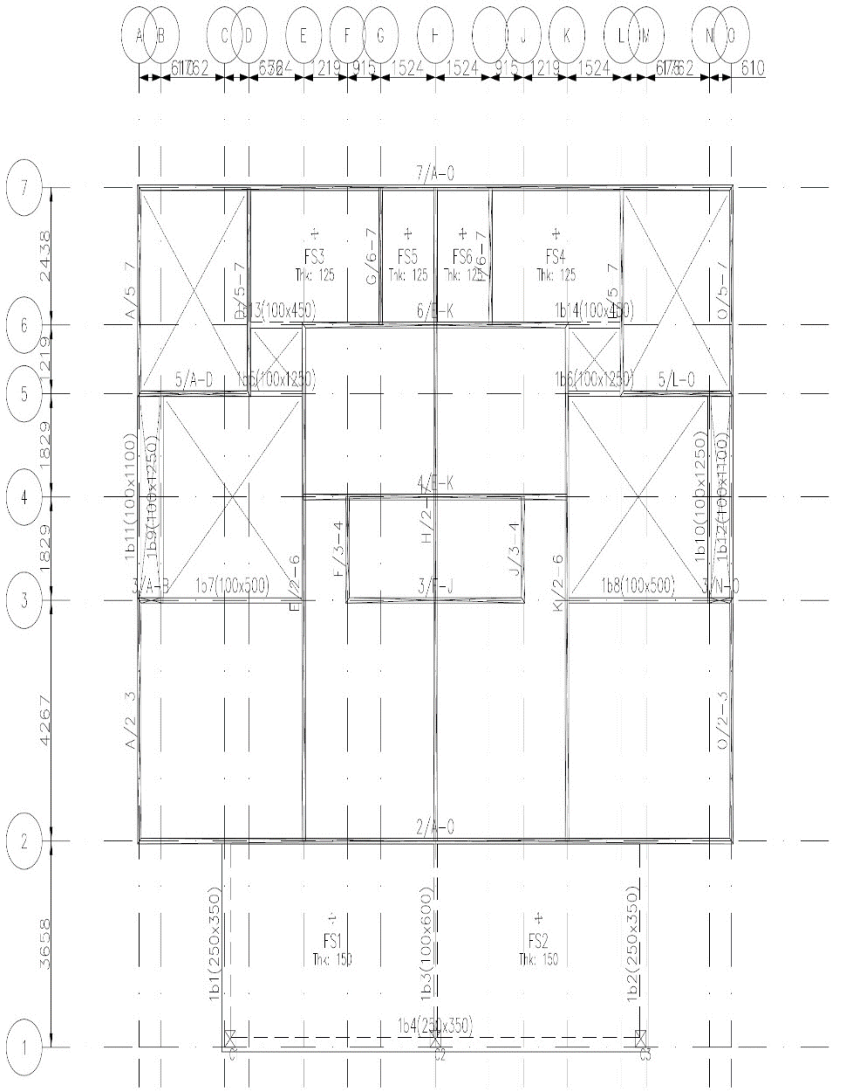
FOUNDATION LOADING PLAN

1. LOADS SHOWN ARE IN kN

2. Design calculation with PE endorsement

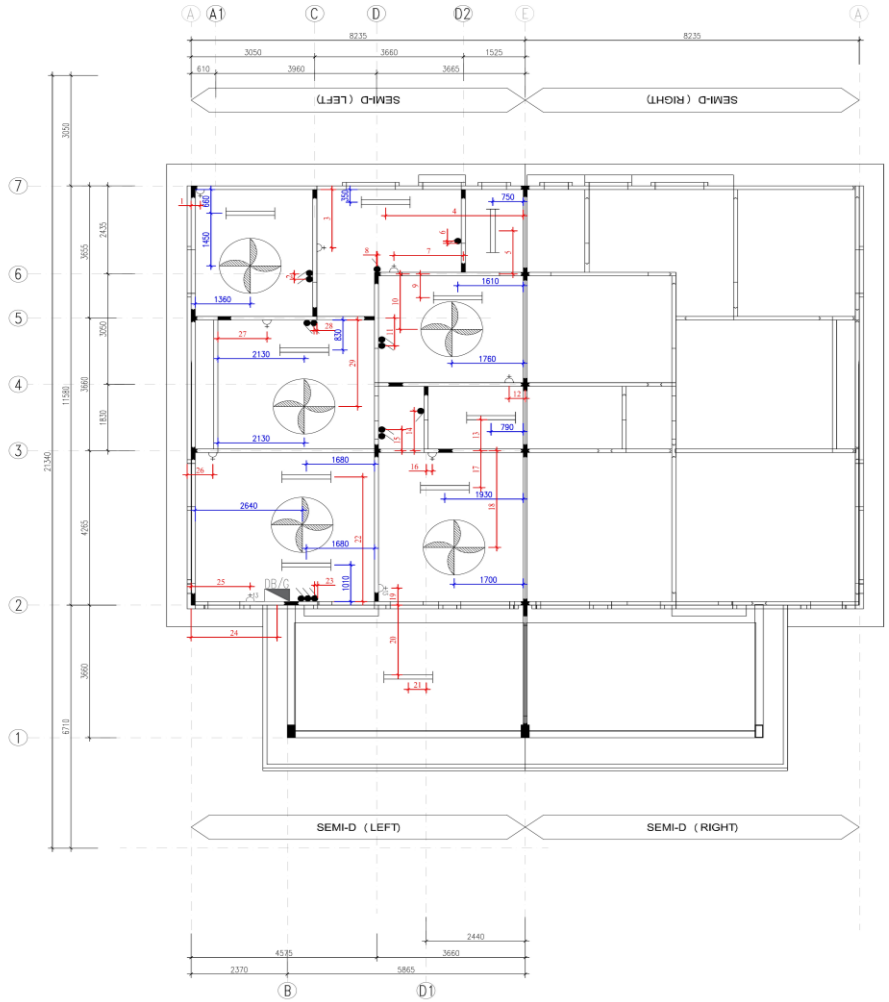


GROUND FLOOR PLAN



ROOF PLAN

3. M&E IBS system shop drawing



POSITION OF ELECTRICAL POINTS
(FROM STRUCTURAL LEVEL)

	Distance of Point (mm)	Height of Point (mm)	Confirmation by M&E Consultant
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			

Notes:
1) Distance of Point has been scaled from M&E Consultant drawing.
2) Height of Point from schedule provided by M&E Consultant drawing.
3) M&E Consultant to fill in dimension not stated (?mm)

Confirmed by M&E Consultant

Signature :

Name :

Date :

Dimension for :

1. **Light & Fan point**
2. **Power point**
3. **Switch point**
4. **Tel & MATV point**

to be fill & confirm by consultant

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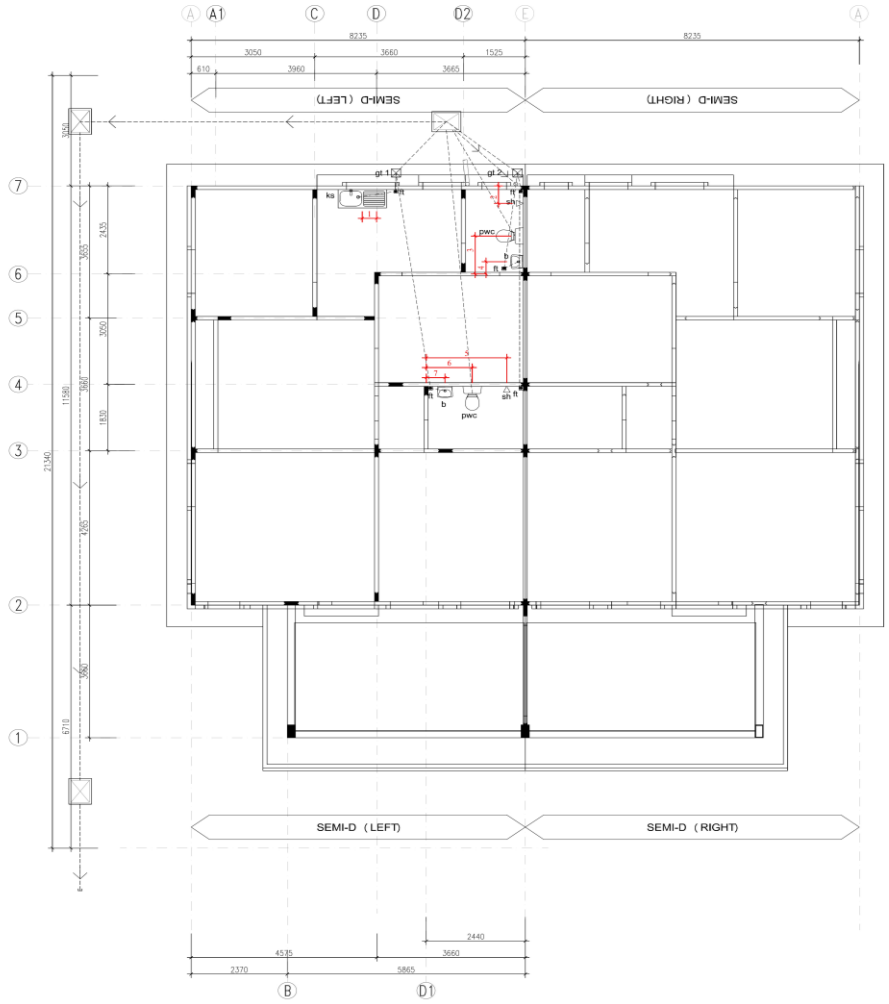
CADANGAN SKIM PERUMAHAN RAKYAT 1 MALAYSIA (PRIMA) BAGI RUMAH BERKEMBAR 1 TINGKAT
DI ATAS TANAH KERAJAAN DI PAMAH KASIH, CHARUK PUTING, MUKIM PERAK, DAERAH TEMERLOH, PAHANG.
UNTUK TETUAN:
BERGAMO DESIGN (M) SDN. BHD.

DRAWING TITLE :
SINGLE STOREY SEMI-D (LEFT UNIT)
SETTING OUT OF ELECTRICAL FIXTURES

DRAWING NO : HC/BD/SD/EL-01 REV : -
SYSTEM : - REV : -

M&E IBS system shop drawing (Subject to client / consultant confirmation)

3. M&E IBS system shop drawing



POSITION OF FITTINGS
(FROM STRUCTURAL LEVEL)

	Distance of fitting (mm)	Height of fitting (mm)	Confirmation by M&E Consultant
1			
2			
3			
4			
5			
6			
7			

Notes:
1) Distance of fitting has been scaled from M&E Consultant drawing.
2) Height of fitting from schedule provided by M&E Consultant drawing.
3) M&E Consultant to fill in dimension not stated (?mm)

Confirmed by M&E Consultant

Signature :

Name :

Date :

Dimension for :

1. Sanitary fitting & plumbing

to be fill & confirm by consultant

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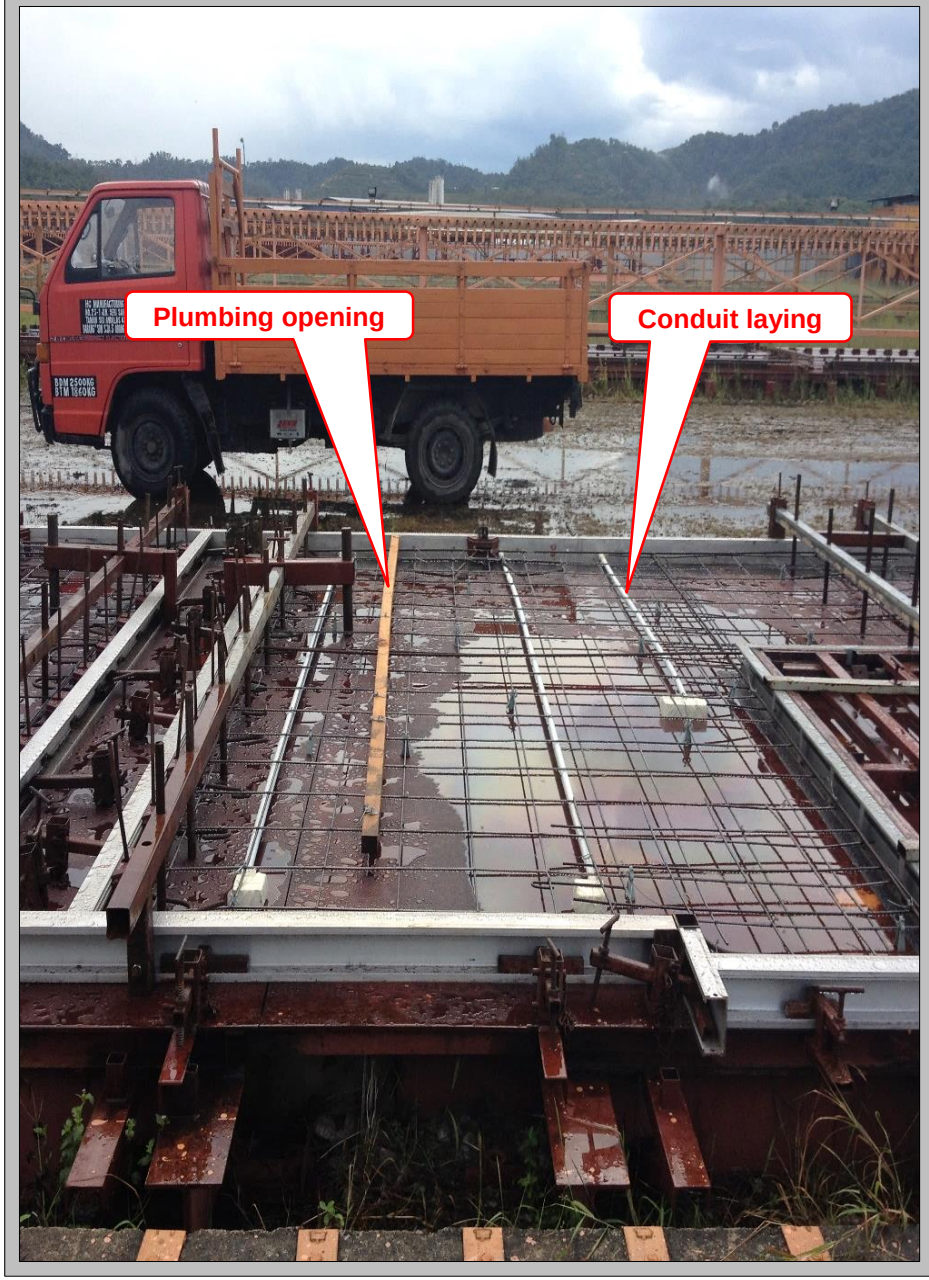
DI ATAS TANAH KERAJAAN DI PAMAH KASIH, CHARUK PUTING, MUKIM PERAK, DAERAH TEMERLOH, PAHANG.
UNTUK TETUAN:
BERGAMO DESIGN (M) SDN. BHD.

DRAWING TITLE :
SINGLE STOREY SEMI-D (LEFT UNIT)
SETTING OUT OF SANITARY FITTINGS

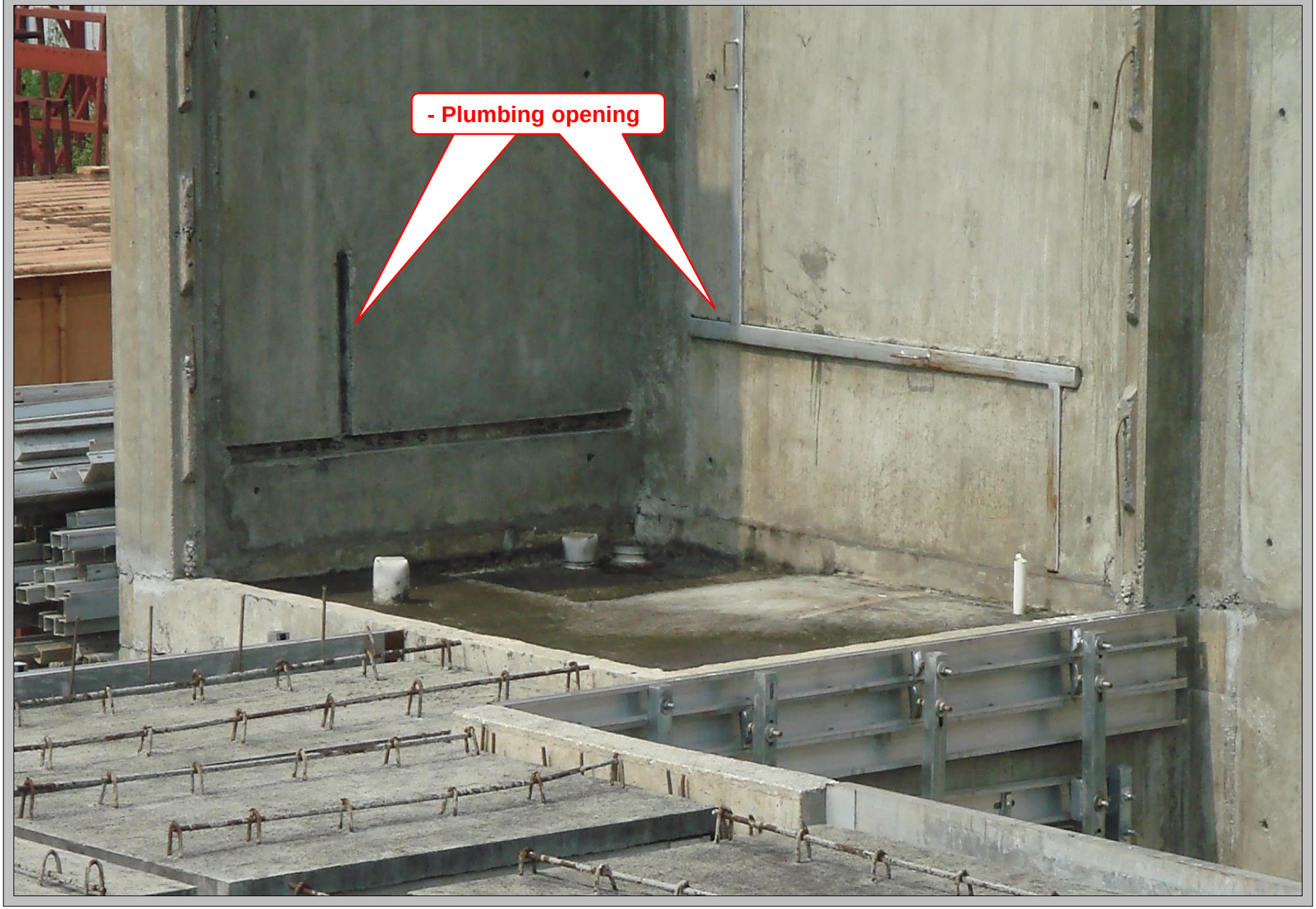
DRAWING NO : HC/BD/SD/SP-01 REV : -
SYSTEM : - REV : -

M&E IBS system shop drawing (Subject to client / consultant confirmation)

No hacking for electrical and plumbing work



No hacking for electrical and plumbing work



4. Quality control

Every Truck

Every 20 m3

Casting & Leveling

Mould Dismantling

Rebound Hammer Test

Panel Lifting

Vertical Curing 7 days

Proper Storage Yards

HC Precast System

(100 % Malaysia Technology With 6 IPs')

IBS Superstructure In Malaysia 3 in 1

- Load bearing wall

- Modular shear keys (wet joint)

- Box system

Customized & Flexibility To Suit All Architectural Demands

The system is a proprietary technology that has been established in accordance to British Standards (BSI) and is also a patented technology.

The main design of the connection system has also been subjected to detail checking by an Independent Checker.

Hence, the specifications are not to be altered without proper engineering study to ensure the safety and integrity of the precast system.

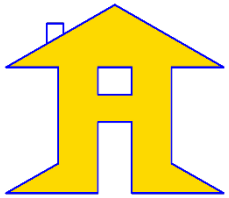


Table 6.2 — Minimum period before striking formwork (concrete made with Portland cement 42.5 to BS 12:1991 or sulfate-resisting Portland cement 42.5 to BS 4027:1991)

Type of framework	Minimum period before striking	
	Surface temperature of concrete	
	16 °C and above	t °C (any temperature between 0 °C and 16 °C)
Vertical formwork to columns, walls and large beams	12 h	$\frac{300}{t+10}$ h
Soffit formwork to slabs	4 days	$\frac{100}{t+10}$ days
Soffitt formwork to beams and props to slabs	10 days	$\frac{250}{t+10}$ days
Props to beams	14 days	$\frac{360}{t+10}$ days

NOTE This table can be applied to PC and SRPC of higher cement strength classes.

5. Assurance (B.S codes)

Every Truck

Rebound Hammer Test

Vertical Curing 7 days

Table 6.2 - Minimum period

6. Comply board of engineers Malaysia / IBS guideline no. 002 item 2.8

The Board of Engineers Malaysia has recently revised six (6) Circulars and approved two (2) new Guidelines. The following are links to the said Circulars and Guidelines for your easy reference.

CIRCULAR NO	TITLE
Circular No. 001	Code of Conduct of Registered Person
Circular No. 002	Continuing Professional Development (CPD)
Circular No. 003	Submission of Sewerage and Sanitary Plumbing Works
Circular No. 004	Supervision of Construction Works
Circular No. 005	Advertising by Registered Engineers
Circular No. 006	Engineer's Responsibility for Subsurface Investigation

GUIDELINE NO	TITLE
Guideline No. 001	The Role and Responsibility of Professional Engineers for Temporary Works During Construction Stage
Guideline No. 002	Industrialised Building System (IBS) Works and It's Impact on Scale of Fees

Rev. No.: 0
Date: 27.10.2016

BOARD OF ENGINEERS MALAYSIA

GUIDELINE NO. 002

INDUSTRIALISED BUILDING SYSTEM (IBS) WORKS AND IT'S IMPACT ON SCALE OF FEES

1.0 Introduction

1.1 The following two (2) modes of procurement for IBS works are considered –

(a) The Catalogue System
Where the Consulting Engineer (CE) designs around a set of preferred standard sizes that IBS providers have in common. The CE's scope of work will remain the same as described in the Scale of Fees (Revised 1998) on Stages of Payment of Fees (Stage 1 to 5).

(b) Registered IBS System Provider (RISP)
Where it is envisaged that the RISP provides part or full services related to detail design and calculation of the IBS components as described under Stage 3 – Design Stage (ii) of the Stages of Payment of Fees.

2.0 Rationale on Impact to the Scale of Fees

2.1 The key basis to be considered for fee computation involving IBS are –

(a) the amount of input (in terms of knowledge, experience and time) the CE has put into the design; and

(b) the responsibilities the CE carries for the design.

2.2 Any adjustment of fee for IBS content in design shall be analysed using these two criteria, irrespective of the type of IBS listed by CIDB.

2.3 The construction industry has been encouraged to use IBS as a means of reducing labour content and dependence on foreign labour. IBS may be able to deliver projects at an earlier completion period. However, IBS may not necessarily deliver projects below the cost of conventional construction methods. Generally it may cost more but is delivered with improved quality.

6. Comply board of engineers Malaysia / IBS guideline no. 002 item 2.8

2.4 When a CE is engaged for a building project, he is mandated, by virtue of his appointment, to be the Submitting Person (to the Local Authority) for civil and structural works for the project, unless it has been specifically stated otherwise by the client at the time of appointment.

2.5 A building system, or a building sub system, is a system consisting of components which, when assembled, will function on its own as designed. A building system using IBS is one in which almost all the building components are prefabricated (e.g. precast concrete column, walls, floor, beam. etc.) and altogether the components work as a system e.g. load bearing wall system for an apartment. A building sub system using IBS is one which can be designed and prefabricated independently and assembled on site in conjunction with other sub systems to form the whole building, e.g. roof truss, structural steel frame, load bearing wall, precast staircase, etc. For a building system or a sub system which incorporates IBS, adjustment of the CE's fees may be warranted under certain circumstances.

2.6 The use of precast components designed by the CE, or selected by the CE from commercial catalogues, or the use of reusable formwork, though considered as IBS by CIDB, does not warrant adjustment to the CE's fee because it is merely a different method of fabrication. The CE's design input and responsibilities remain unchanged.

2.7 The design of an IBS system or sub system shall be undertaken by a Professional Engineer (referred herein as **IBS Designer** for ease of reference) registered with the Board of Engineers, Malaysia. The IBS Designer shall be responsible for the design as well as the fabrication and installation of the system or sub system on site in coordination with other contractors of the project.

2.8 For any IBS system or sub system, the IBS Designer shall be considered, for his part of the work, as "PROVIDING SPECIALIST TECHNICAL ADVICE" referred to in Clause 2(2)(b)(i) of the Scale of Fees of the Board of Engineers. He shall be mandated to sign all design drawings of the IBS works. If the IBS is a proprietary system, the IBS Designer shall take professional liabilities for the design by endorsing the proprietary drawings. He shall also take full professional responsibilities for the system installation on site (and sign off as the installation contractor) in compliance with the requirements of issuance of the **Certificate of Completion and Compliance – Form G4**.

2.9 Where the CE has been instructed to prepare, and has prepared, preliminary drawings which include structural layout comprising beams, columns, slabs, etc. for tendering which allows the tenderers to offer their own IBS systems, the CE shall be paid the design fees of **Preliminary Stage** and **Design Stage (i)**, as stipulated in Clause 1.(2)(a) and (b)(i) of the Scale of Fees. In addition, he shall be paid a fee as described in (2.11) below.

2.10 The CE shall coordinate the work of the IBS Designer to ensure that the IBS works fit into the whole building structural system. The CE shall also undertake the administrative works of being the Submitting Person. The IBS Designer and RISP shall indemnify the CE jointly and severally in writing against claims for injuries or damages due to inadequacy or failure of the IBS works.

2.11 As the Submitting Person, the CE is required to check the design undertaken by IBS Designer as stipulated in Clause 1.(2)(b)(ii) which includes preparing all other drawings in sufficient details to enable construction to be carried out that would have been otherwise carried out by the CE. For this checking work, the CE becomes a design checker.

2.12 The CE shall be paid by his Client a portion of Design Stage (ii) fees for submission to any appropriate authority, advising on conditions of contract and specifications relevant to the works.

2.13 In conjunction with (2.11) and (2.12) should there be no change in the scope and responsibility of the CE, then no reduction in fees shall apply.

2.14 Notwithstanding the above, a Client may reduce the scope of services with mutual consent of the CE.

[321st Board Meeting / 27th October 2016]

DATUK Ir. ADANAN BIN MOHAMED HUSSAIN
President
BOARD OF ENGINEERS MALAYSIA

7. Independent checker : HC Precast System R.C. modular shear keys precast wall panel

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Company No: 268016T
CONSULTING ENGINEERS
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Johor Bahru Branch : 24-A, (1st Floor), Jalan Layang 16, Taman Perling, 81200 Johor Bahru. Tel No: 607-2418907 Fax: 607-2418358
E-mail: ppr@streamyx.com, padureka@gmail.com

Cadangan Pembinaan Kompleks Bank Gen Biji Benih Pertanian Di Ibu Pejabat Mardi, Serdang, Selangor

Supplementary Independent Checker Engineer's Report No. 5-1 on Shear Key Joints For Precast R.C. Wall Panels

JURUTERA PROFESIONAL
AWAM
IR. HO THEY SEE
4314
MALAYSIA

Prepared By :
Perunding PaduReka Sdn. Bhd.
41A Jalan Jejaka 2
Taman Maluri
Cheras
55100 Kuala Lumpur

18 January 2010

MUSA HJ. MD. YUNOS B.Sc (Hons.), CIVIL ENG. P.ENG. MIEM. ASEAN (Eng). CIDBM (Med).
ABDUL SHUKUR ALI B.E. (Hons.), P.ENG, MIEM.
HO THEY SEE B.E. (Hons.) MIEM. MICE. P.ENG.
KANG LIP TEIK B.E. (Hons.), MIEM. P.ENG.

1) In ICE Report No.5, the special recess and protruding keys at both ends of precast r.c. wall panels was mentioned under Section (2) (g). However the shear capacity of the shear key joints was not dealt with because the detailed dimensions / configuration of the shear keys was not made available at that time. On January 13, 2010, Perunding ACE Sdn. Bhd. released the details of the key joints and hence this supplementary ICE's Report No. 5-1 is meant to deal with the shear capacity of the special joint.

2) Ultimate Shear Capacity of the Key Joints

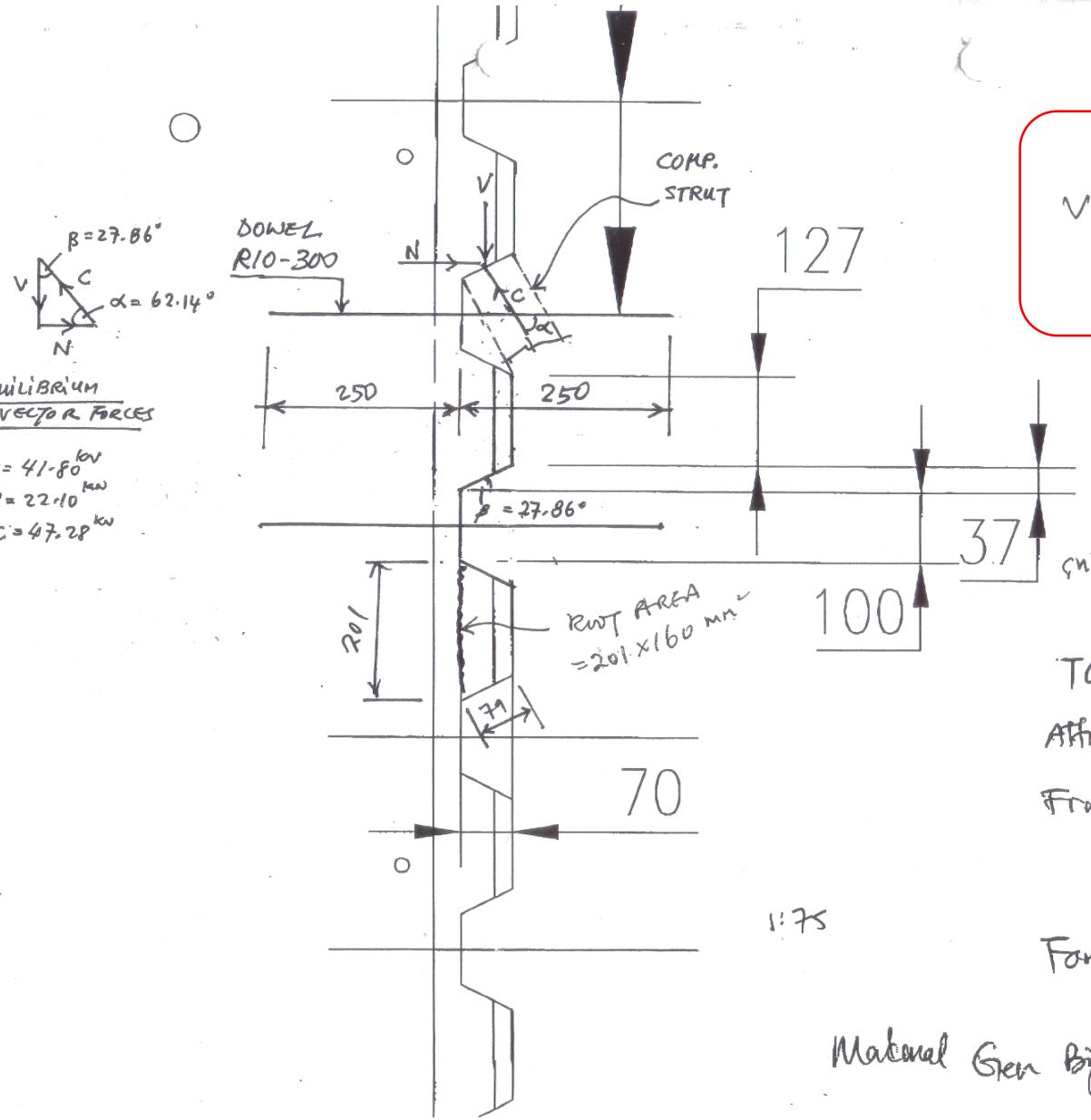
a) By definition, the shear keys can be classified as "castellated" joints and according to the requirements of joints transmitting shear under Clause 5.3.7 (c) of BS 8110; Part 1, no shear reinforcement is required if the shear stress due to ultimate loads is less than 1.3 N/mm², calculated on the minimum root area of a castellated joint.

b) The shear keys rely on mechanical interlock and the development of a confined diagonal compressive strut across the shear plane. A taper is provided for the keys to facilitate removal of formwork. This also assists in confining the concrete in the cast insitu r.c. columns. The interfaces are prevented from moving apart by the R10-300 dowel bars (500mm long) spaced at every corresponding shear key position of 300 mm c/c. Current detailing indicates shorter anchorage length in the precast wall panels and longer into the cast insitu columns. Correct detailing should be of equal length of 250mm on both sides from the interface.

c) Based on the details of the castellated joint provided (see attached joint), the minimum roof area is 32,160 mm² (201mm x 160mm).

Hence, ultimate shear V = 32,160 x 1.3 / 10^3 = 41.8 kN per key.

7. Independent checker : HC Precast System R.C. modular shear keys precast wall panel



ROUT AREA = 201 x 160

V, ULT. SHEAR AT 1.3 N/mm²
= 201 x 160 x 1.3 / 10³
≈ 41.8 kN PER KEY.

SHEAR BAR = 13 kN/KEY

TO: Padu Reka S/B

Attn: Mr. Ho. T-S

Frm: Khoo CS (AGE)

13/1/10

For your further action.

Makmal Gen Bijih, Mardi Serdang.

9.2820600

7. Independent checker : HC Precast System R.C. modular shear keys precast wall panel

The compressive strut force, C is estimated at 47 kN while the force normal to the shear joint, N is about 22 kN. As such, the compressive stress in concrete, $f_c \approx 47 \times 10^3 / 160 \times 79 \approx 3.72$ N/mm² ($0.106 f_{cu}$) is satisfactory while normal force, N of 22 kN tends to separate the panel, which in turn resisted by the R10 dowel bars. However, If the dowel bar is of mild steel, the capacity of anchorage is only estimated at $\pi \times 10 \times 1.66 \times 250 / 10^3 = 13$ kN which is inadequate to resist 22 kN for maximum ultimate shear stress of 1.3 N/mm². Therefore, the shear capacity should be proportionately reduced to 41.8 kN x 13 / 22 ≒ 24.7 kN per key if the dowel shear is of mild steel.

Nevertheless, if the T10 dowel bars are used, the anchorage force is estimated at $\pi \times 10 \times 2.96 \times 250 / 3 = 23$ kN per key and the ultimate shear capacity can remain at 41.8 kN per key

d) Further enhancement of shear capacity can be achieved by calculating the dowel shear in accordance with Clause 3.3.7 (d) of BS 8110; Part 1.

The shear force, V should not exceed the value given by

$V = 0.6 F_b \tan\alpha f$

Where

F_b is $0.95 f_y A_s$; or the anchorage value of the reinforcement, whichever is lesser

$F_b = 13$ kN for $f_y = 250$ N/mm² ($f_b = 0.28 \sqrt{35} = 1.66$ N/mm²) and

$F_b = 23$ kN for $f_y = 460$ N/mm² ($f_b = 0.5 \sqrt{35} = 2.96$ N/mm²) based on 10 mm bar of anchorage length of 250 mm

Cadangan Pembinaan Kompleks Bank Gen Biji Benih Pertanian Di Ibu Pejabat Mardi, Serdang, Selangor
- **Supplementary Independent Checker Engineer's Report No. 5-1 on Shear Key Joints For Precast R.C. Wall Panels**

A_s is the minimum area of dowel reinforcement

αf is the angle of internal friction between the faces of the joint. $\tan\alpha f$ is 1.7 from Table 5.3 of BS 8110 ; Part 1. However, this $\tan\alpha f$ is best determined by tests under Research and Development if possible.

It is interesting to note that $0.6 \tan\alpha f \div 1.0$ and $V \approx F_b$.

e) The total ultimate shear capacity of the shear key joint is assessed as follows :-

From (c) above, for R10 dowel, V_c = 24.7 kN
From (d) above, for R10 dowel, V_d = 13 kN
Total, V_t = 37.7 kN per key

The number of effective keys times 37.7 kN shall determine the ultimate shear capacity of the shear key joint of a precast r.c. wall panel.

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The number of effective keys times 37.7 kN shall determine the ultimate shear capacity of the shear key joint of a precast r.c. wall panel.

8. Precast element comply to the code & building by law

LAWS OF MALAYSIA

UNIFORM BUILDING BY-LAWS

All amendments up to May, 2006

ACT 133

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(3) Every brick or masonry wall of a building founded on strip footings shall be provided with a damp proof course which shall be—

(a) at a height of not less than 150 millimetres above the surface of the ground adjoining the wall; and

(b) beneath the level of the underside of the lowest timbers of the ground floor resting on the wall, or where the ground floor is a solid floor, not higher than the level of the upper surface of the concrete or other similar solid material forming the structure of the floor.

(4) Where any part of a floor of the lowest or only storey of a building is below the surface of the adjoining ground and a wall or part of a wall of the storey is in contact with the ground—

(a) the wall or part of the wall shall be constructed or provided with a vertical damp proof course so as to be impervious to moisture from its base to a height of not less than 150 millimetres above the surface of the ground; and

(b) an additional damp proof course shall be inserted in the wall or part of the wall at its base.

(5) Where the floor or any part of the walls of a building is subject to water pressure, that portion of the floor or wall below ground level shall be waterproof.

Nominal thickness of walls.

85. For the purposes of this Part wherever references are made to the thickness of any brick wall, the maximum or minimum thickness of such wall shall not exceed the nominal thickness plus or minus the maximum tolerance permissible under any standard specification.

Party walls.

86. (1) All party walls shall generally be of not less than 200 millimetres total thickness of solid masonry or *insitu* concrete which may be made up of two separate skins each of not less than 100 millimetres thickness if constructed at different times:

Provided that in multi-storeyed flats and terrace houses of reinforced concrete or of protected steel framed construction having floors and roofs constructed to the requirements of these By-laws, the party wall thereof shall not be less than 100 millimetres total thickness.

(2) Party walls in single storeyed houses may be in load-bearing 100 millimetres solid masonry or *insitu* concrete provided the requirements of Part V, VI and VII of these By-laws are complied with.

(3) All party walls shall be carried above the upper surface of the roof to a distance of not less than 230 millimetres at right angles to such upper surface.

- Precast elements must not involve many different manufactured components

8. Precast element comply to the code & building by law

- Precast elements must not involve many different manufactured components

THANK YOU