Choose Industrialised Building System (IBS) for Economical Construction
Industrialised Building System (IBS) functions as a comprehensive superstructure construction system whereby flexibility in it's customisation allows Architect's creativity to flourish.

HC Precast System

(100 % Malaysia Technology With 6 IPs')

Economical . Eco Friendly . Quality Superstructure Specialist

Cost Saving Government & Private Developer

In the construction of a building, there are always 4 types of joint namely
" L-shape " " T-shape " " Cross shape " " Straight joint "
Innovative Modular shear keys (wet joint) - No leaking & No crack

Government & Private Developer

1. Cost saving by utilising Industrialized Building System (IBS).
2. Minimizing currency outflow because of reduction of foreign workers by 40%.
3. HC Precast System IBS is cheaper than conventional method.
   - Current Rate : November 2017 - conventional method supply & install.
4. Cost per Sqft GFA of superstructure work (frame & wall) for conventional & IBS is easily done.
5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.
6. Improved cash-flow position for Developer by utilising Industrialized Building System (IBS).
7. Conversion of conventional BQ description to IBS BQ description.
8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.
9. Independent checker : HC Precast System R.C. modular shear keys precast wall panel.
10. Consistency of quality using IBS for low cost / high end residential building.
11. Conquas or Q-Lassic should be carried-out upon the completion of the superstructure works (frame & wall) instead of upon completion of finishing work.
12. Customized & flexibility to suit all architectural demands.
13. A 10-year old 2 storey building (without maintenance & touch up) built by precast system and exposed to weather No leaking & No crack.
14. Propose to Government and Private Developer.

1. Cost Saving by utilising Industrialized Building System (IBS)

- **No preliminaries item.**
- **Reduce financing, overhead & earlier occupation of house due to shorter construction period.**
- **No variation order.**
- **No maintenance due to no leaking & crack.**
- **No rubbish clearing.**
- **M & E shop drawing produced by HC Precast System without any extra charges.**
- **No hacking for electrical and plumbing work.**
- **Smooth and even surface to received skim coat.**
- **No primary undercoat for painting due to smooth skim coat surface.**
- **Reduce the quantity of cement and screed to receive tiling work.**

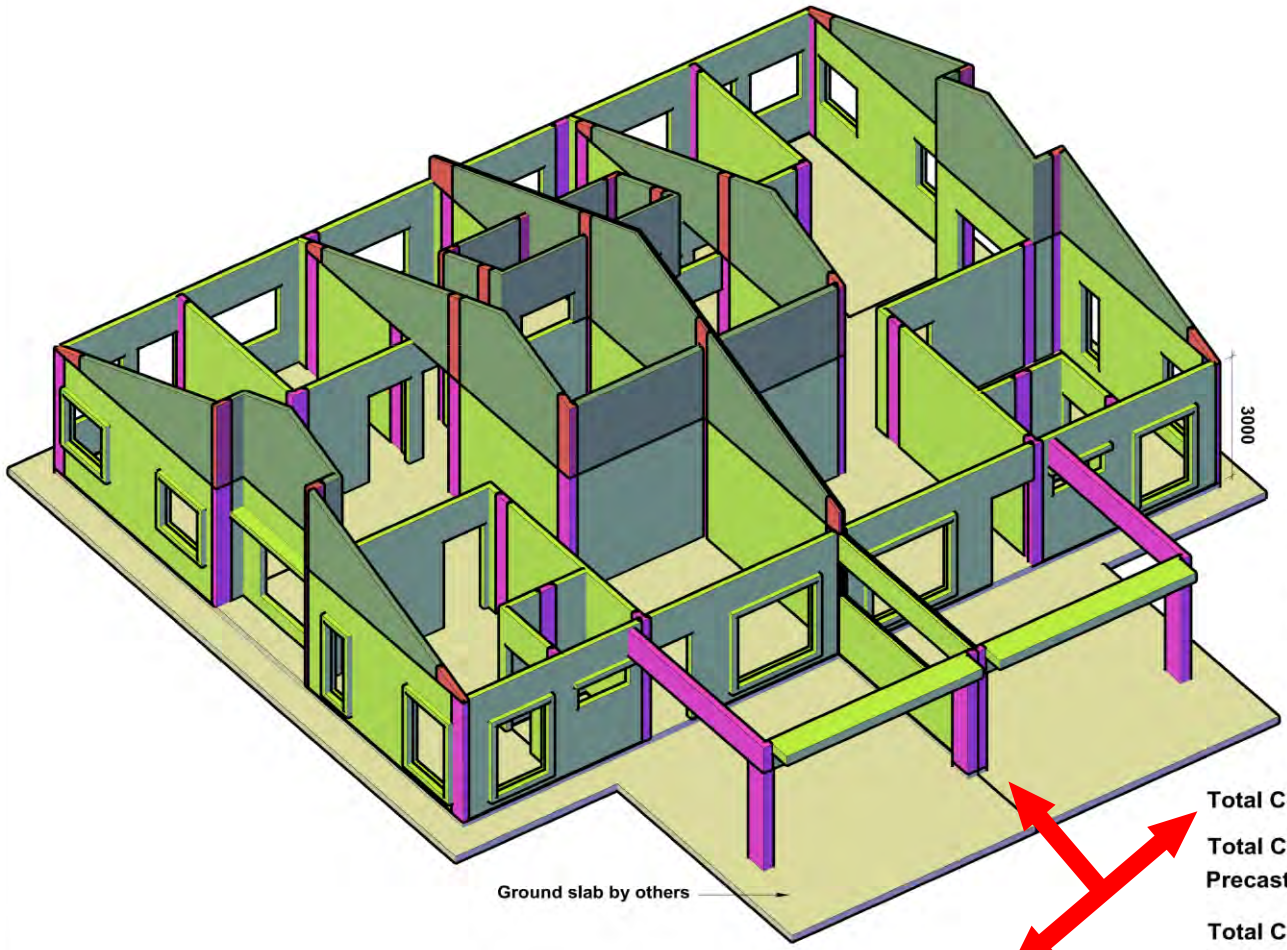
- **Reduce financing, overhead & earlier occupation of house due to shorter construction period.**

7 days completed with 6 workers superstructure (frame & wall).

- **Reduce financing, overhead & earlier occupation of house due to shorter construction period.**

10 days completed with 6 workers superstructure (frame, wall & flat roof).

- **No variation order.**



1 UNIT SEMI-D

Precast wall panels	: 27 nos.
Precast party walls	: 7 nos.
Precast beams	: 2 nos.
Cast in-situ RC water tank slab	: 1 no.
Cast in-situ wet joints	: 34 nos.
Cast in-situ columns	: 2 nos.
Cast in-situ beam	: 1 no.

Total Concrete Volume = 26.60m³

Total Concrete Volume for Precast Elements (Off-site) = 22.81m³ (86%)

Total Concrete Volume for Cast In-situ Elements (On-Site) = 3.79m³ (14%)

Accurate quantity of elements calculated by 3D AutoCAD software, compared to manual taking off using 2D drawing

3D VIEW - FRONT (LEFT SIDE)

SYSTEM PROVIDER
HC PRECAST SYSTEM SDN. BHD. (586697-M)
No.23B, Jalan Seri Sarawak 20B/KS2, Taman Seri Andalas, 41200 Klang, Selangor D.E. Tel:03-3323 5999 Fax:03-3323 8993
e-mail:enquiry@hcprecast.com.my, Http:www.hcprecast.com.my

DETAILS SHOWN IN THIS DRAWING ARE PROPERTY OF HC PRECAST SYSTEM & PROTECTED BY PATENTS. ALL COPYRIGHT ARE RESERVED. (US 6,829,870 B2) & (MY-124213-A)

MANUFACTURER
HC MANUFACTURING SDN. BHD. (585570-T)
No.23-1, Jalan Seri Sarawak 20B/KS2, Taman Seri Andalas, 41200 Klang, Selangor D.E.
Tel:03-3325 7999 Fax:03-3323 8993

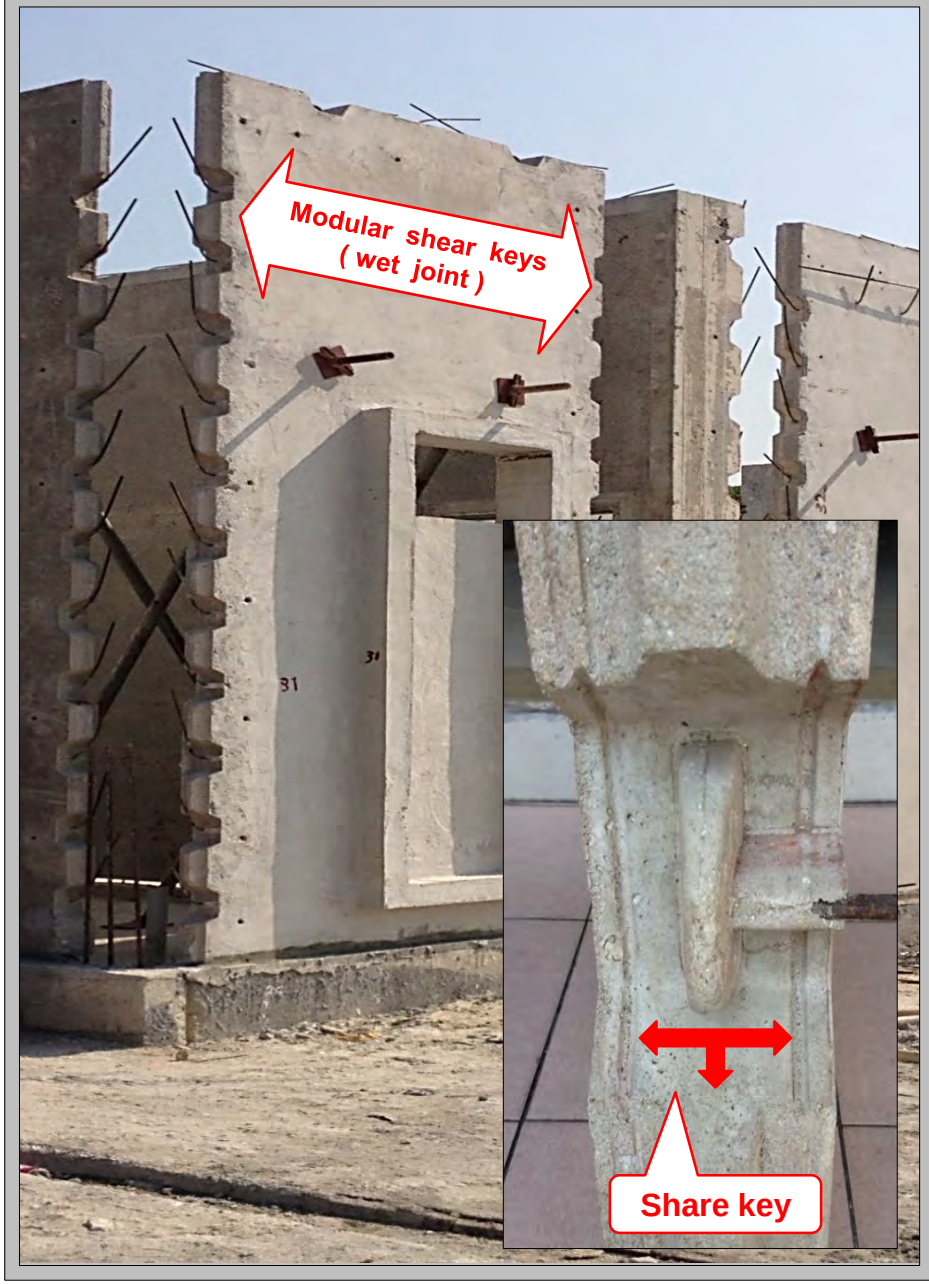
DRAWN	KC
DATE	AUG 2017
CHECKED	3993
APP'D	3993
APP'D	3993
SCALE	NTS

CADANGAN SKIM PERUMAHAN YANG MENGANDUNGI: -18 UNIT RUMAH BERKEMBAR 1 TINGKAT JENIS RB1
DI ATAS LOT 2614 (PM 4401) & LOT 15331 (PM 1868), MUKIM JENDERAK, DAERAH TEMERLOH, PAHANG DARUL MAKMUR.
UNTUK TETUAN:
KIAN MEGAH DEVELOPMENT SDN. BHD.

DRAWING TITLE:
SINGLE STOREY SEMI DETACHED HC PRECAST CONSTRUCTION 3D DRAWING

DRAWING NO. HC/KM/SD/3D-01K REV -
SYSTEM - REV -

- **No maintenance due to no leaking & crack.**



- **No rubbish clearing.**

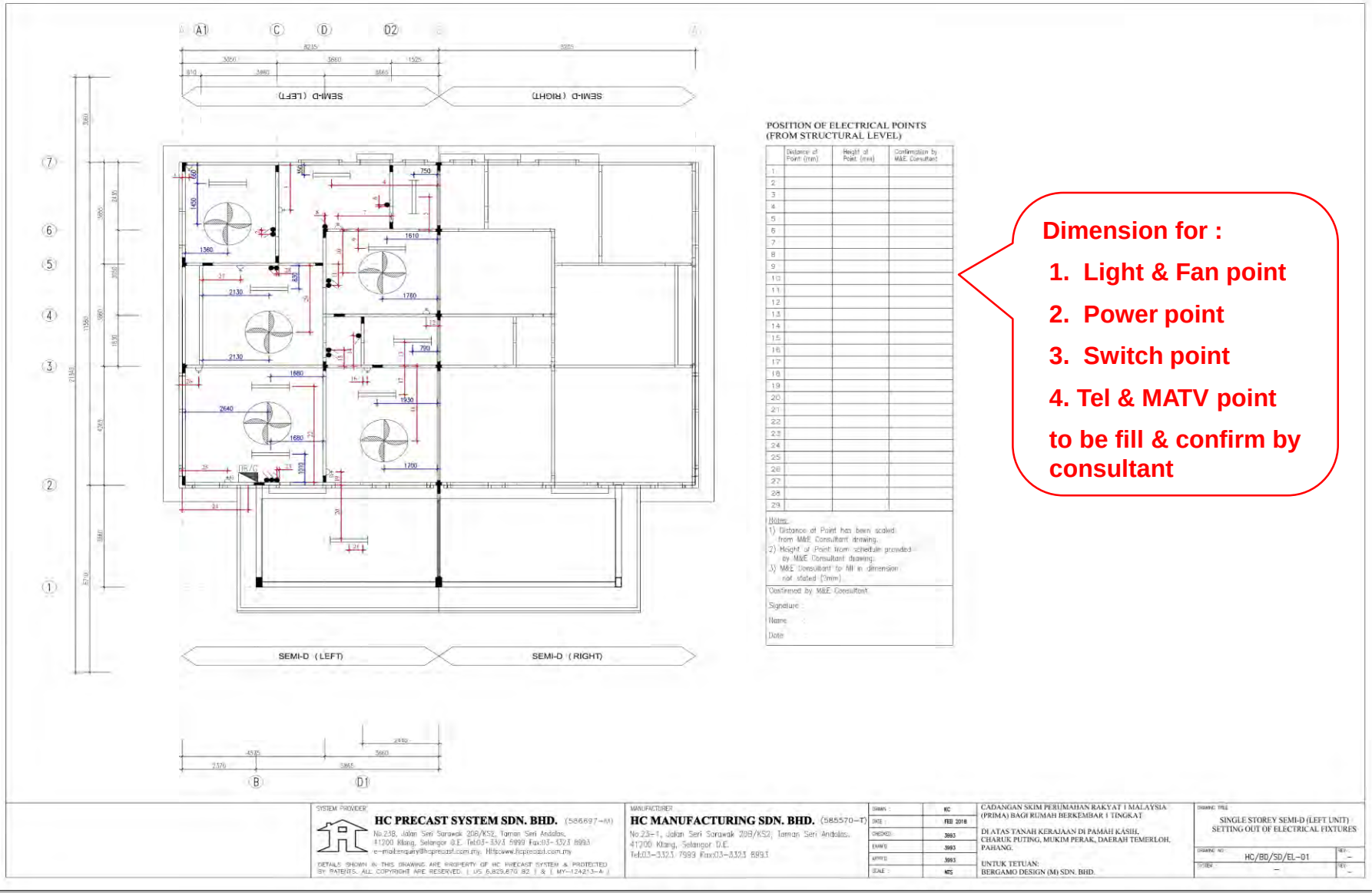
- **No rubbish clearing.**

- **No rubbish clearing.**

- **No rubbish clearing.**

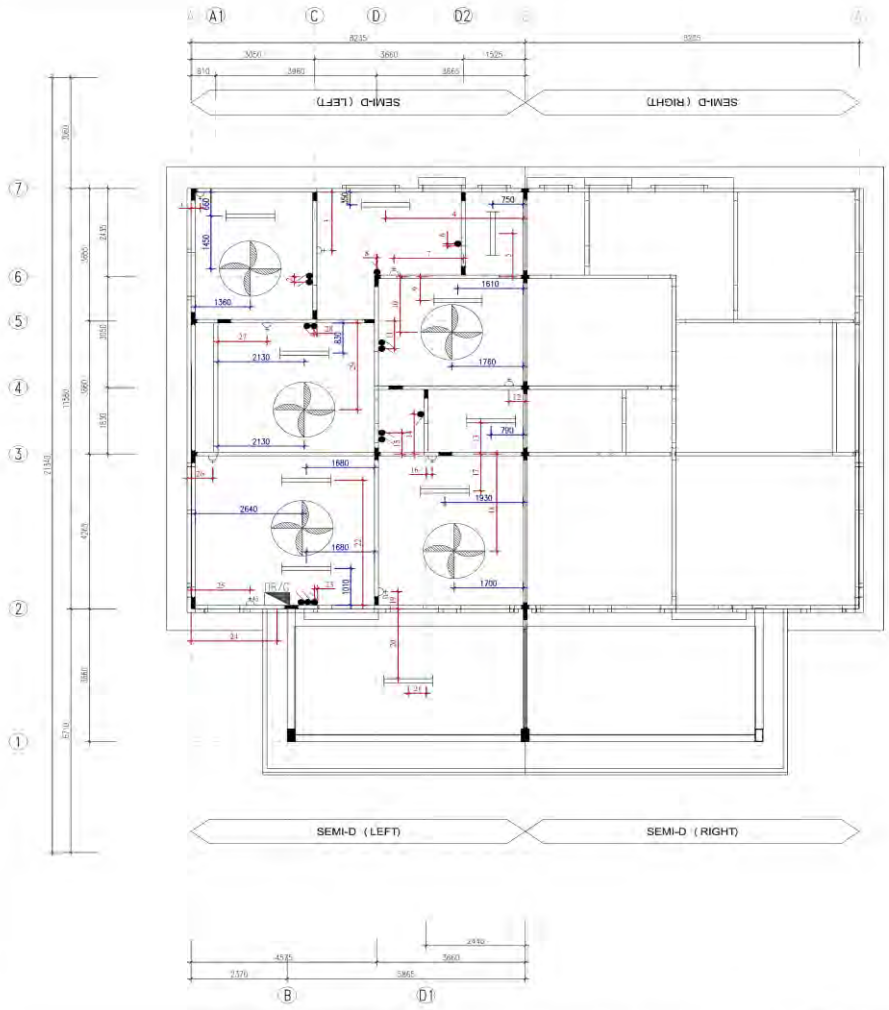
- **Conventional Method rubbish clearing.**

- **M & E shop drawing produced by HC Precast System without any extra charges.**



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

- **M & E shop drawing produced by HC Precast System without any extra charges.**



POSITION OF ELECTRICAL POINTS (FROM STRUCTURAL LEVEL)

	Distance of Point (mm)	Height of Point (mm)	Confirmation by M&E Consultant
1	300	300	
2	50	1500	
3	omitted		
4	3500	CL	
5	1300	CL	
6	200	1500	
7	1700	1500	
8	0	1500	
9	600	CL	
10	1550	CL	
11	650	1500	
12	350	300	
13	900	CL	
14	1100	1500	
15	650	1500	
16	100	300	
17	1000	CL	
18	2600	CL	
19	omitted		
20	2200	CL	
21	800	CL	
22	3700	CL	
23	150	1500	
24	2100	1700	
25	omitted		
26	500	300	
27	1300	300	
28	200	1500	
29	2500	CL	

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 :

SYSTEM PROVIDER
HC PRECAST SYSTEM SDN. BHD. (586697-M)
No.238, Jalan Seri Sarawak 20B/KS2, Taman Seri Andalas, 41200 Klang, Selangor D.E. Tel:03-3323 6999 Fax:03-3323 6993
e-mail:enquiry@hcprecast.com.my Http:www.hcprecast.com.my
DETAILS SHOWN IN THIS DRAWING ARE PROPERTY OF HC PRECAST SYSTEM & PROTECTED BY PATENTS. ALL COPYRIGHT ARE RESERVED. | US 6,829,870 B2 | & | MY-124213-A |

MANUFACTURER
HC MANUFACTURING SDN. BHD. (585570-T)
No.23-1, Jalan Seri Sarawak 20B/KS2, Taman Seri Andalas, 41200 Klang, Selangor D.E.
Tel:03-3323 7999 Fax:03-3323 6993

DRAWN :	HC
DATE :	FEB 2018
CHECKED :	3993
APPD :	3993
APPD :	3993
SCALE :	NTS

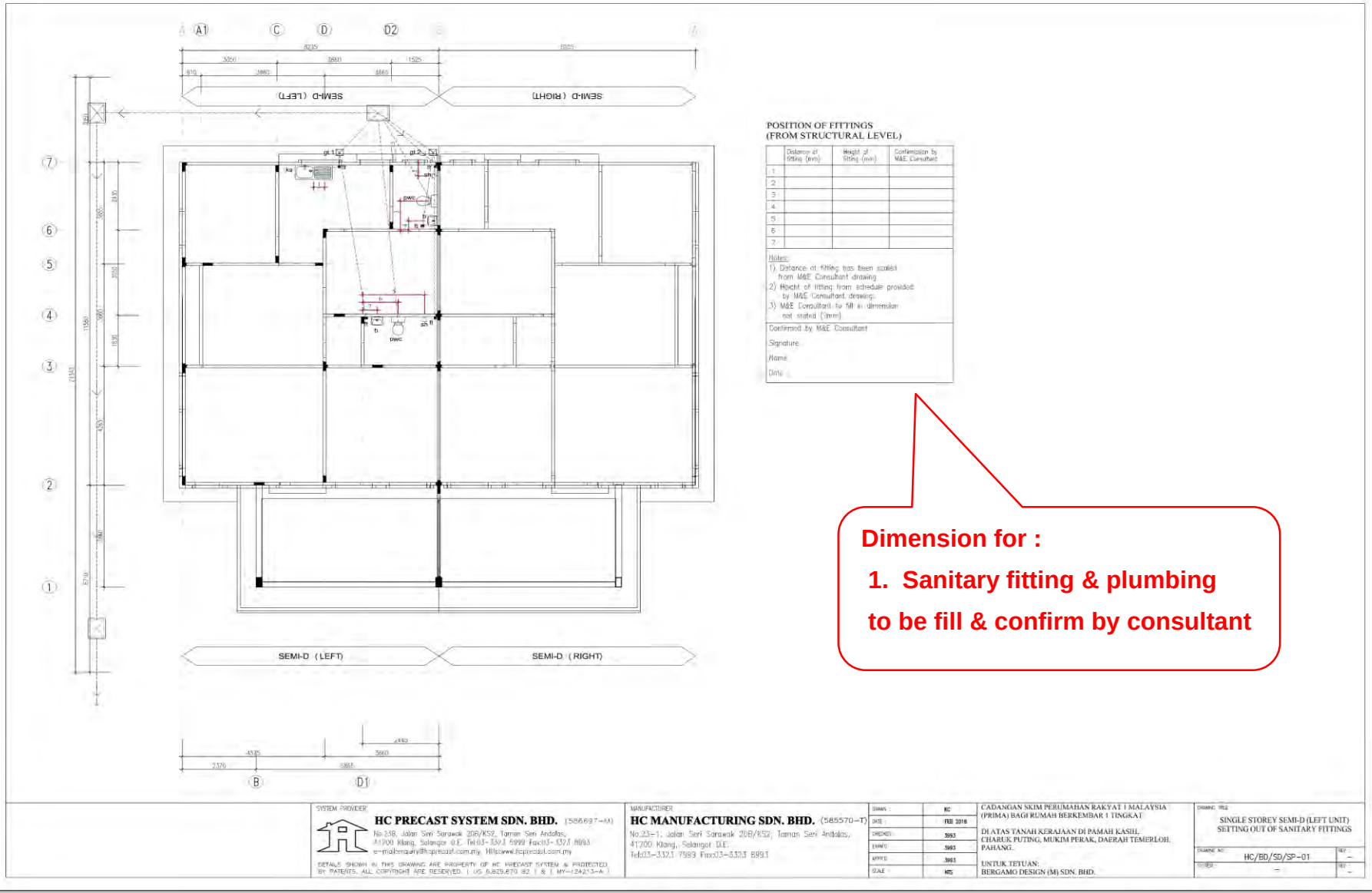
CADANGAN SKIM PERUMAHAN RAKYAT 1 MALAYSIA (PRIMA) BAGI RUMAH BERKEMBAR 1 TINGKAT
DI ATAS TANAH KERAJAAN DI PAMAH KASIH, CHARUK PUTING, MUKIM PERAK, DAERAH TEMERLOH, PAHANG.
UNTUK TETUAN:
BERGAMO DESIGN (M) SDN. BHD.

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

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

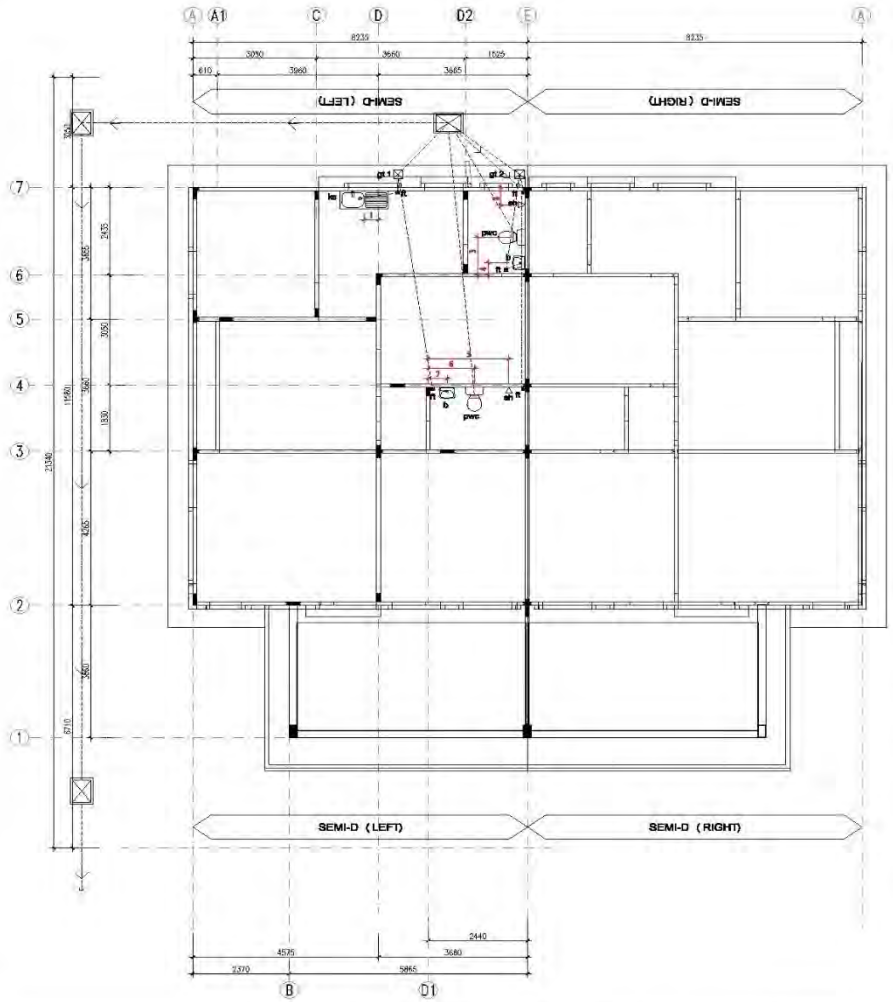
M&E IBS system shop drawing (Subject to client / consultant confirmation).

- **M & E shop drawing produced by HC Precast System without any extra charges.**



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

- **M & E shop drawing produced by HC Precast System without any extra charges.**



POSITION OF FITTINGS (FROM STRUCTURAL LEVEL)

	Distance of fitting (mm)	Height of fitting (mm)	Confirmation by M&E Consultant
1	450 mm	900 mm	
2	550 mm	1900 mm	
3	1100 mm	FFL	
4	380 mm	900 mm	
5	1900 mm	1900 mm	
6	1200 mm	FFL	
7	450 mm	900 mm	

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 : VENKATESAN CONSULT

Date : 10/10/2018

SYSTEM PROVIDER
HC PRECAST SYSTEM SDN. BHD. (586697-M)
No.23B, Jalan Seri Sarawak 20B/KS2, Taman Seri Andalas, 41200 Klang, Selangor D.E. Tel:03-3323 5999 Fax:03-3323 8993
e-mail:enquiry@hcprecast.com.my, Http:www.hcprecast.com.my
DETAILS SHOWN IN THIS DRAWING ARE PROPERTY OF HC PRECAST SYSTEM & PROTECTED BY PATENTS. ALL COPYRIGHT ARE RESERVED. (US 6,829,870 B2) & (MY-124213-A).

MANUFACTURER
HC MANUFACTURING SDN. BHD. (585570-T)
No.23-1, Jalan Seri Sarawak 20B/KS2, Taman Seri Andalas, 41200 Klang, Selangor D.E.
Tel:03-3323 7999 Fax:03-3323 8993

DRAWN	KC
DATE	FEB 2018
CHECKED	
EXAMD	
APPRD	
SCALE	NTS

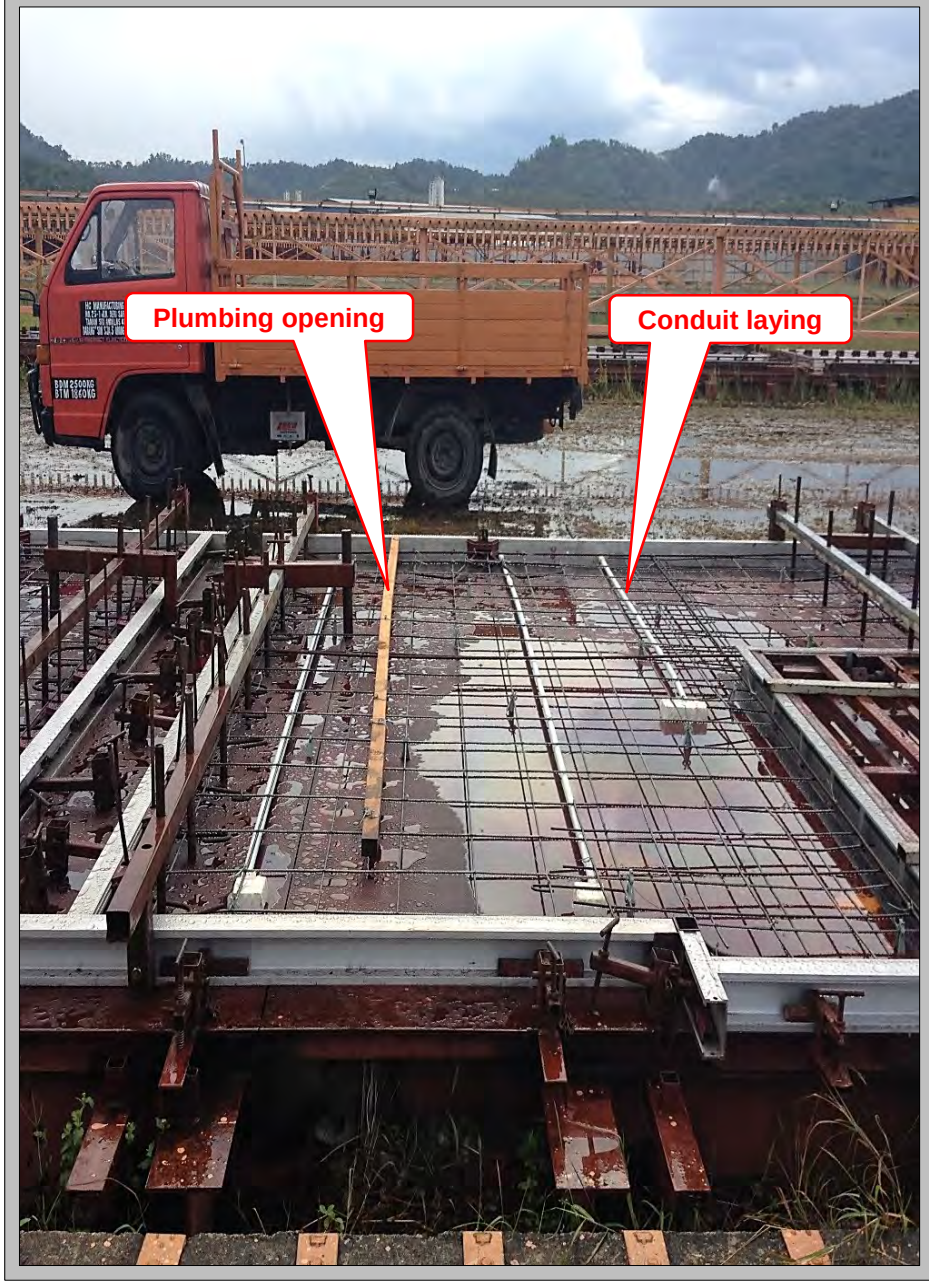
CADANGAN SKIM PERUMAHAN RAKYAT 1 MALAYSIA (PRIMA) BAGI RUMAH BERKEMBAR 1 TINGKAT
DI ATAS TANAH KERAJAAN DI PAMAH KASIH, CHARUK PUTING, MUKIM PERAK, DAERAH TEMERLOH, PAHANG.
UNTUK TETUAN:
BERGAMO DESIGN (M) SDN. BHD.

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

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

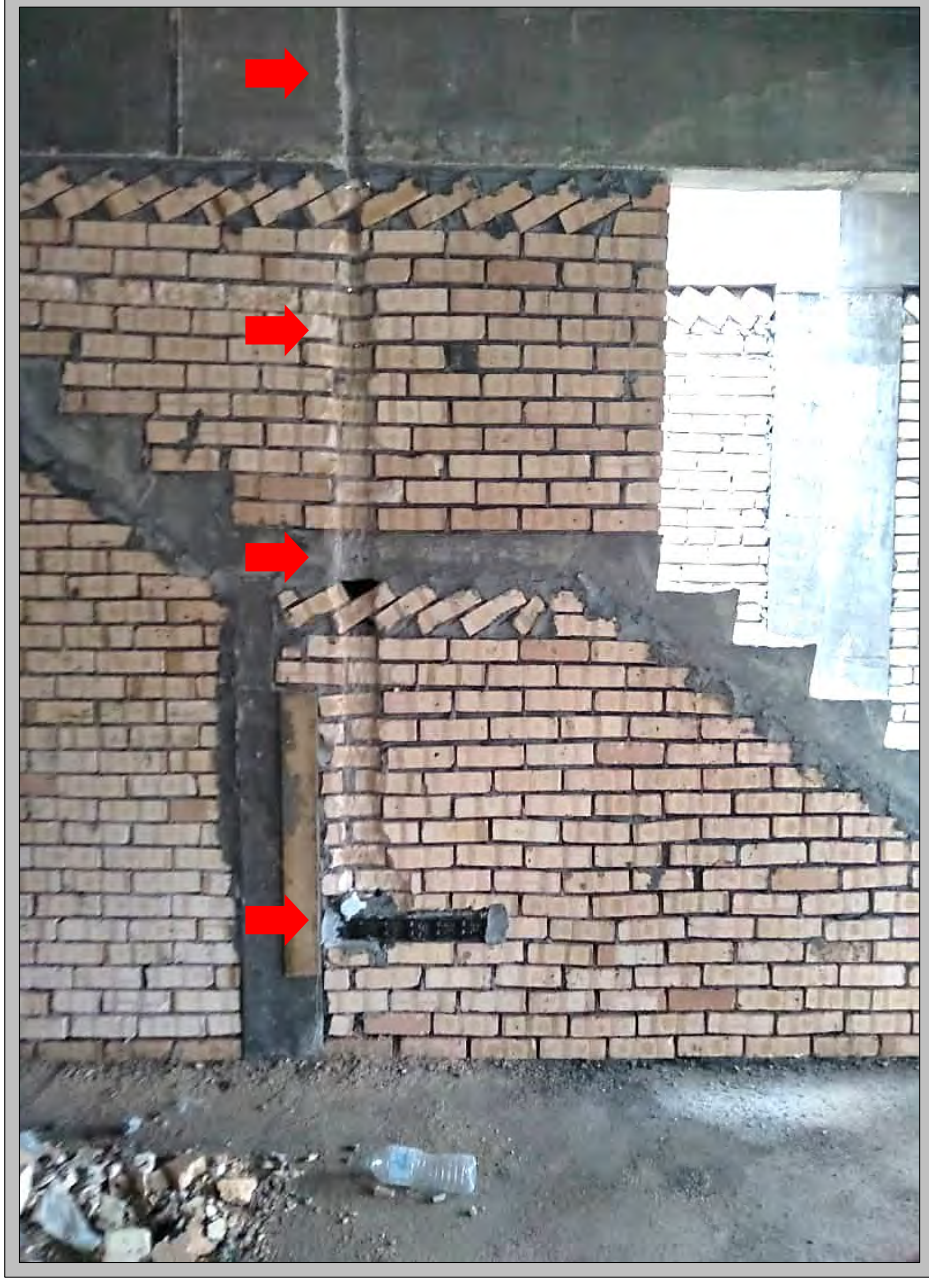
M&E IBS system shop drawing (Subject to client / consultant confirmation).

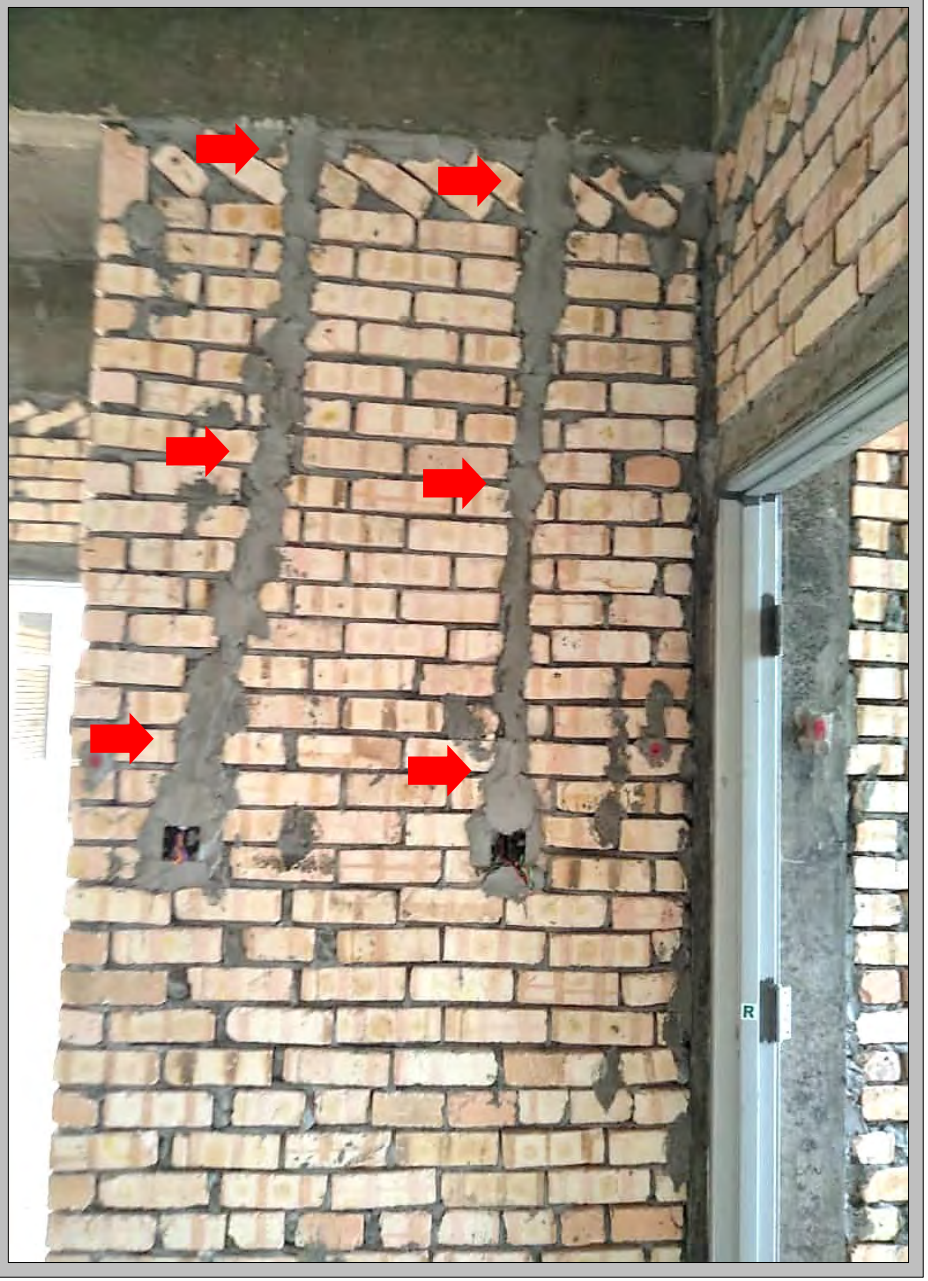
- **No hacking for electrical and plumbing work.**



- **No hacking for electrical work.**

- **Conventional method hacking for electrical work.**





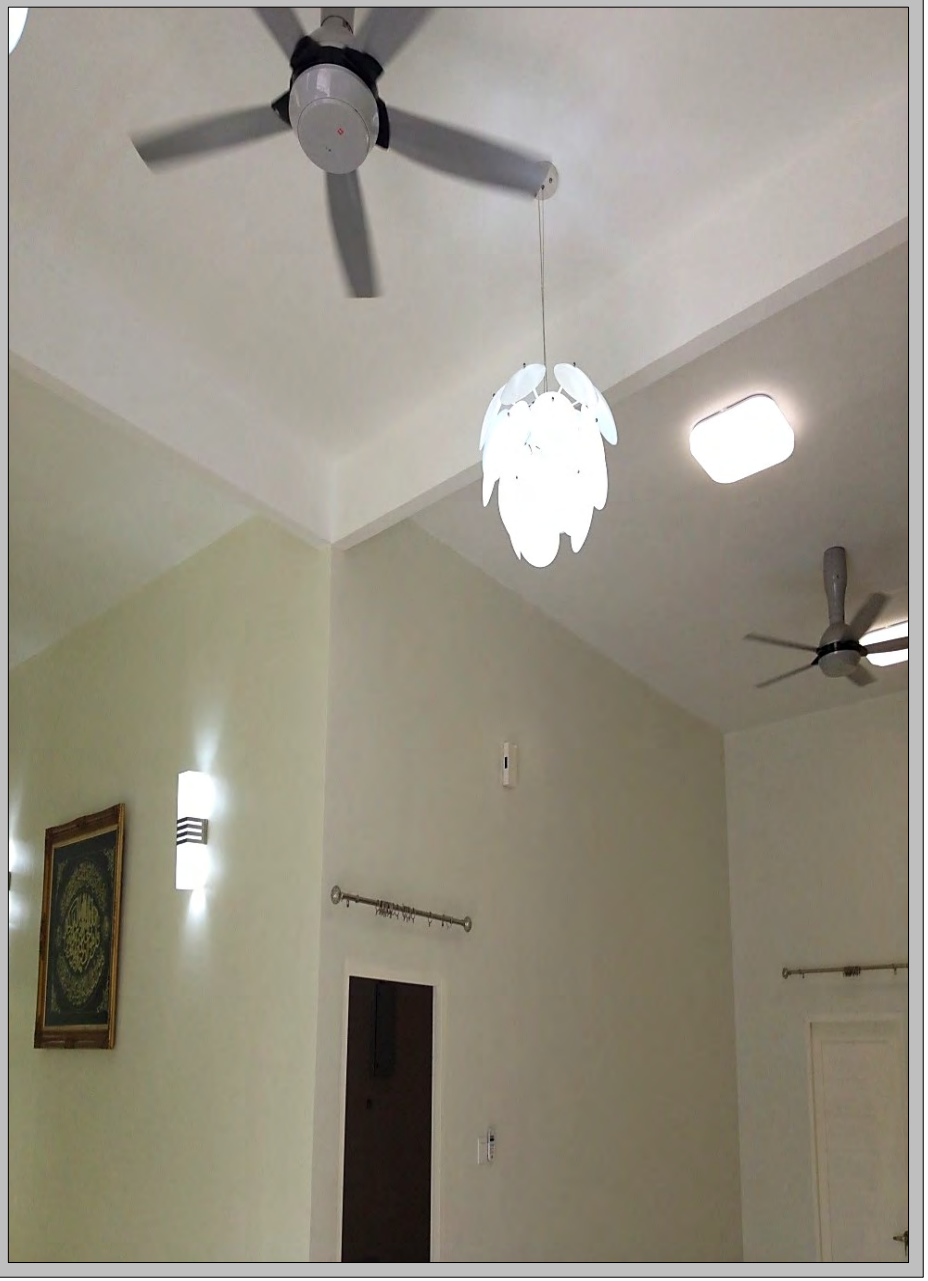
- **No hacking for plumbing work.**

- **Conventional method hacking for plumbing work.**

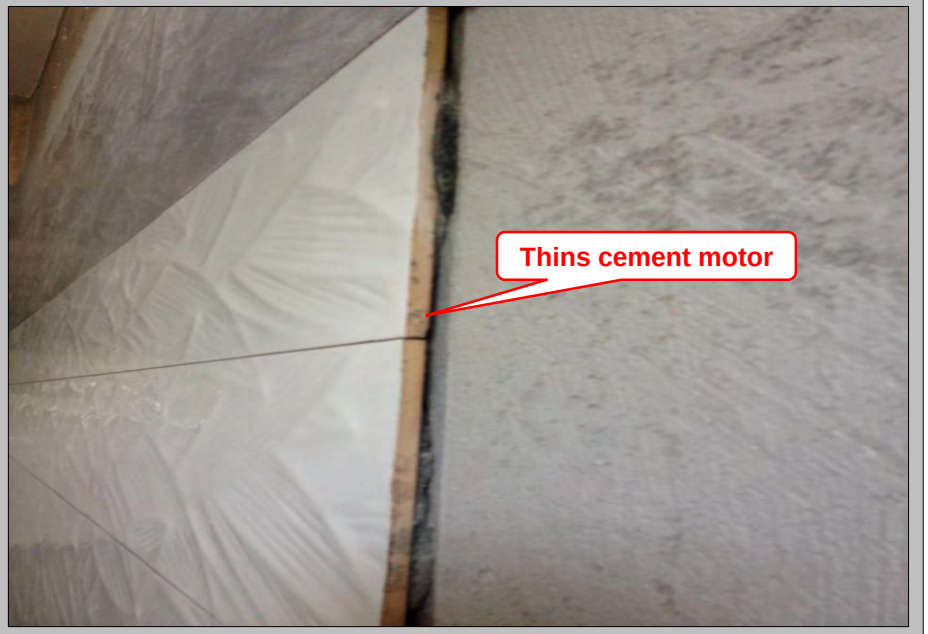
- **Smooth and even surface to received skim coat.**

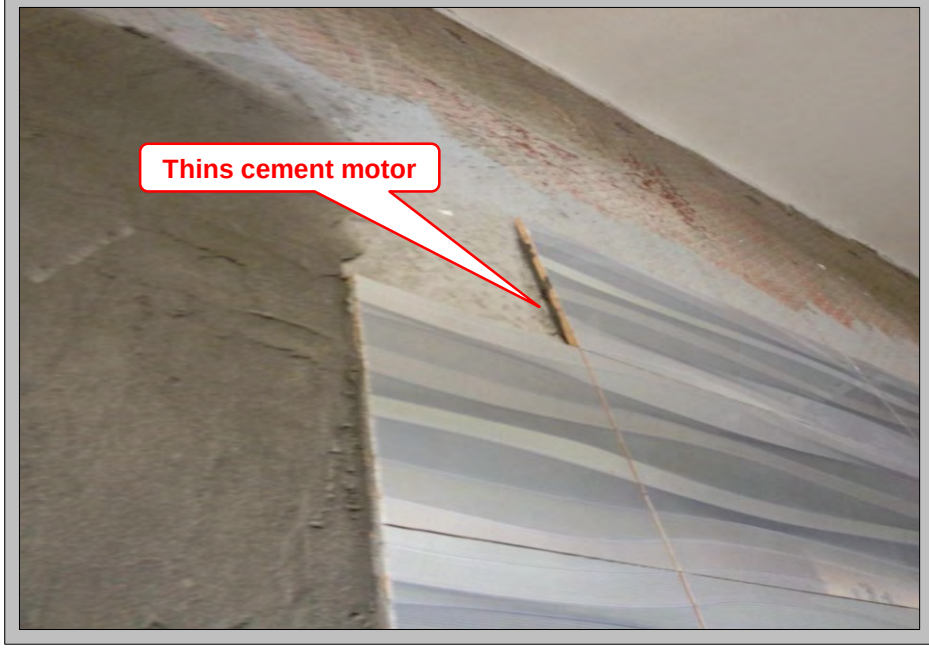
- **No primary undercoat for painting due to smooth skim coat surface.**

- **No primary undercoat for painting due to smooth skim coat surface.**



- **Reduce the quantity of cement and screed to receive tiling work.**



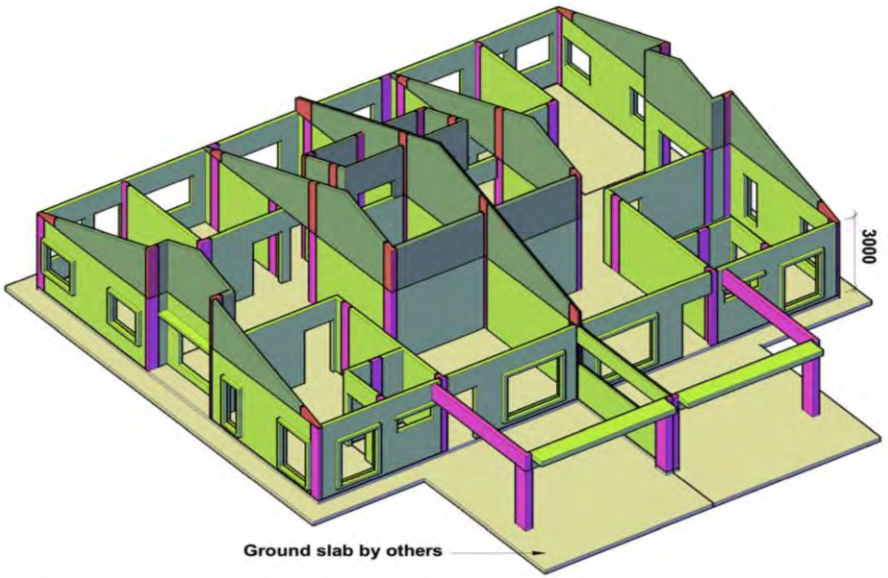


2. Minimizing currency outflow because of reduction of foreign workers by 40%.

HC Precast System :

Precast wall panels
precast beams,
In-situ beams & wet joints.
6 workers x 7 days x RM 100 per day
= RM 4,200 / unit

80% outflow currency
= RM 3,360



NOTE:
THICKNESS OF ALL WALLS & COMMON PARTY WALLS = 100mm

WALL HEIGHT = 3000mm

VOLUME & PERIMETER GIVEN IN THIS DRAWING ARE MEANT FOR 2 UNITS OF SEMI-D

TOTAL WALL AREA = 478.80m²

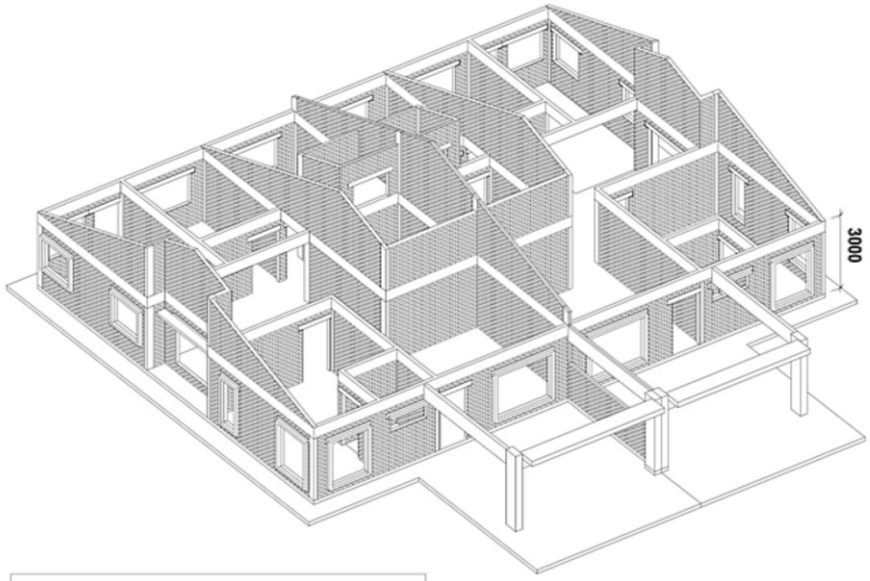
3D VIEW - FRONT (LEFT SIDE)

Conventional methods & Competitors :

Ground floor columns, roof beams & brickworks (Reinforcement, formwork, concreting, brick wall, coping, DPM & plastering)

= RM 10,000 / unit

80% outflow currency
= RM 8,000



NOTE:
THICKNESS OF ALL WALLS & COMMON PARTY WALLS = 115mm

WALL HEIGHT = 3000mm

VOLUME & PERIMETER GIVEN IN THIS DRAWING ARE MEANT FOR 2 UNITS OF SEMI-D

3D VIEW - FRONT (LEFT SIDE)

Labour Cost of Superstructure (Frame & Walls)

3. HC Precast System IBS is cheaper than conventional method.

Single Storey Semi-D : 1,297 sqft

Current material rate 2017

Summary : Cost per sqft GFA for Superstructure (Frame & Wall)

HC Precast System Vs Conventional Method

Item	Description	A) Wall Height - 3.71m				B) Wall Height - 3.30m				C) Wall Height - 3.00m			
		Conventional		HC Precast System		Conventional		HC Precast System		Conventional		HC Precast System	
		Page Ref	Amount (RM)	Page Ref	Amount (RM)	Page Ref	Amount (RM)	Page Ref	Amount (RM)	Page Ref	Amount (RM)	Page Ref	Amount (RM)
A	**Superstructure & Wall**	A2	47,485.61	A3	37,205.37	B2	43,081.78	B3	33,427.12	C2	39,496.20	C3	30,664.87
	(Excluding Carporch Column, Beam, Wall & Coping)												
	Amount of Different (RM)				*10,280.24*				*9,654.66*				*8,831.33*
	Percentage of Different (%)				*21.65%*				*22.41%*				*22.36%*
	Gross Floor Area (sqft)				*1,297.00*				*1,297.00*				*1,297.00*
	Cost / sqft GFA (RM/sqft)		***36.61***		***28.69***		***33.22***		***25.77***		***30.45***		***23.64***
B	**Carporch Column, Beam, Wall & Coping**	A4	4,902.01	A4	3,061.40	B4	4,902.01	B4	3,061.40	C4	4,902.01	C4	3,061.40
	Amount of Different (RM)				*1,840.61*				*1,840.61*				*1,840.61*
	Percentage of Different (%)				*37.55%*				*37.55%*				*37.55%*
	Gross Floor Area (sqft)				*1,297.00*				*1,297.00*				*1,297.00*
	Cost / sqft GFA (RM/sqft)		***3.78***		***2.36***		***3.78***		***2.36***		***3.78***		***2.36***
C	**Total (A + B)**		52,387.62		40,266.77		47,983.79		36,488.52		44,398.21		33,726.27
	Amount of Different (RM)				*12,120.85*				*11,495.27*				*10,671.94*
	Percentage of Different (%)				*23.14%*				*23.96%*				*24.04%*
	Gross Floor Area (sqft)				*1,297.00*				*1,297.00*				*1,297.00*
	Cost / sqft GFA (RM/sqft)		***40.39***		***31.05***		***37.00***		***28.13***		***34.23***		***26.00***

- **Current Rate : November 2017 - conventional method supply & install.**

Item	Description	Unit	Rate (RM)
1	Concrete		
	a) Grade 25	m3	278.00
2	Reinforcement	kg	3.85
3	Formwork	m2	44.00
4	BRC		
	a) A6	m2	10.80
	b) A7	m2	14.30
	c) A8	m2	18.90
	d) A9	m2	20.30
	e) A10	m2	24.50
5	Lintol (100mm x 200mm)	m	30.00
6	Common Clay Brick		
	a) 115mm Thick	m2	60.00
	b) 230mm Thick	m2	120.00
7	Cement & Sand Brick		
	a) 115mm Thick	m2	44.50
	b) 230mm Thick	m2	89.00
8	Plastering	m2	35.00
9	DPM	m	0.50
10	100mm Thick Panel Wall	m3	900.00
11	Logistic	m3	200.00
	(RM 200/m3 - RM 400/m3)		
12	Skimcoat	m2	8.50
13	Formcrete Coping (100mm x 100mm)	m	40.00
	- RM 30.00/m (material) + RM 10.00/m (labour)		
14	Formcrete Coping (300mm x 100mm)	m	60.00
	- RM 50.00/m (material) + RM 10.00/m (labour)		

4. Cost per Sqft GFA of superstructure work (frame & wall) for conventional & IBS is easily done.

Schedule of Rate : Gross Floor Area (GFA) - per sqft

Supply & install : Superstructure (frame & wall)

Negotiable

Item	Description	Unit	Estimate Qty	Ex-Factory			Logistic (Logistic Rate : RM 200 - RM 400 / m3)			Total (Ex-factory + Logistic)	
				Rate / m3	Amount	Rate / ft2	Rate / m3	Amount	Rate / ft2	Amount	Rate / ft2
A	Double Storey Terrace House										
	1) Intermediate Unit 1,600 ft2	m3	51 - 55	900.00	45,900.00 - 49,500.00	28.69 - 30.94	* 300.00	15,300.00 - 16,500.00	9.56 - 10.31	61,200.00 - 66,000.00	38.25 - 41.25
B	Single Storey Terrace House										
	1) Intermediate Unit 1,000 ft2	m3	17 - 20	900.00	15,300.00 - 18,000.00	15.30 - 18.00	* 300.00	5,100.00 - 6,000.00	5.10 - 6.00	20,400.00 - 24,000.00	20.40 - 24.00
C	Single Storey Semi - D House										
	1) End Left Unit 1,150 ft2	m3	21 - 23	900.00	18,900.00 - 20,700.00	16.43 - 18.00	* 300.00	6,300.00 - 6,900.00	5.48 - 6.00	25,200.00 - 27,600.00	21.91 - 24.00
D	Double Storey Shop Lot										
	1) Intermediate Unit 2,750 ft2	m3	70 - 75	900.00	63,000.00 - 67,500.00	22.91 - 24.55	* 300.00	21,000.00 - 22,500.00	7.64 - 8.18	84,000.00 - 90,000.00	30.55 - 32.73

Notes :

* *Logistic Average Rate : RM 300.00 / m3*

5. **Reduce financing, overhead & earlier occupation of house due to shorter construction period.**

7 days completed with 6 workers superstructure (frame & wall)

5. **Reduce financing, overhead & earlier occupation of house due to shorter construction period.**

10 days completed with 6 workers superstructure (frame, wall & flat roof)

5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.

5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.

5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.

5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.

5. **Reduce financing, overhead & earlier occupation of house due to shorter construction period.**

5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.

5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.

5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.

5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.

5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.

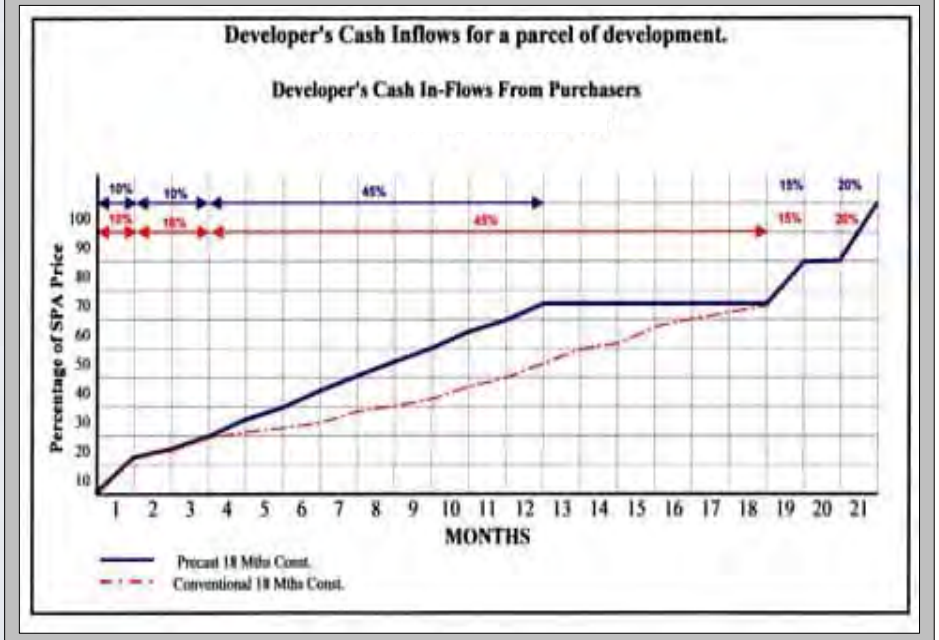
5. Reduce financing, overhead & earlier occupation of house due to shorter construction period.

5. **Reduce financing, overhead & earlier occupation of house due to shorter construction period.**

6. Improved cash-flow position for Developer by utilising Industrialized Building System (IBS).

4. Improved Cash-flow Position for developer as illustrated in Figure 1.
   -> Based on the standard SPA, precast construction allows for 45% claim from purchasers within a period of two weeks upon the erection of panels, i.e. RC frames (15%), walls, doors, and window frame (10%), roofing and internal M&E (10%), and internal and external plastering (10%).
   -> By comparison, based on the conventional construction method, a similar claim can only be made on the 14th month, which is 10 months later compared to the precast method.

Figure 1 Developer's Cash Inflows for a parcel of development



7. Conversion of conventional BQ description to IBS BQ description.

Conversion of Conventional BQ Description to IBS BQ Description

Semi-D House - Single Storey

Conventional					
PAGE REF	DESCRIPTION	UNIT	RATE (RM)	TYPE B	
				QTY	AMOUNT (RM)
	BILL NO. 1 - REINFORCED CONCRETE FRAME				
	REINFORCED CONCRETE (GRADE 25-20 MM AGGREGATE) as described				
SUP/1/1/A.	In column and stiffeners	M3		1.96	
SUP/1/1/B.	In roof beam	M3		4.94	
	SAWN FORMWORK as described				
SUP/1/1/C.	To sides of column and stiffeners	M2		40.08	
SUP/1/1/D.	To sides and soffit of roof beam	M2		84.79	
	MILD STEEL ROD REINFORCEMENT as described				
SUP/1/1/E.	10 mm Diameter rod in column and stiffeners as links	Kg		25.17	
SUP/1/1/F.	6 mm Ditto	Kg		51.80	
SUP/1/1/G.	6 mm Diameter in roof beam ditto	Kg		103.89	
	HIGH TENSILE STEEL ROD REINFORCEMENT				
	In Column and Stiffeners				
SUP/1/2/A.	12 mm Ditto	Kg		235.28	
	In Roof Beam				
SUP/1/2/B.	16 mm Diameter rod	Kg		89.11	
SUP/1/2/C.	12 mm Ditto	Kg		472.65	
	Sub-total to Summary				
	BILL NO. 3 - WALLS AND PARTITIONS				
	REINFORCED CONCRETE (GRADE 25-20 MM AGGREGATE) as described				
SUP/4/1/A.	In lintol (PROVISIONAL)	m3		0.82	
	SAWN FORMWORK as described				
SUP/4/1/B.	To sides and soffit of lintol (PROVISIONAL)	m2		15.88	
	MILD STEEL ROD REINFORCEMENT as described				
SUP/4/1/C.	6 mm Diameter rod in lintol (PROVISIONAL)	Kg			
	HIGH TENSILE STEEL ROD REINFORCEMENT				
SUP/4/1/D.	10 mm Diameter rod in lintol (PROVISIONAL)	Kg		69.71	
SUP/3/1C.	Horizontal damp proof course as described laid on half brickwall (measured net-no allowance made for laps)	m		90.48	
SUP/3/1A.	Half common claybrickwall in gauged mortar reinforced with brick reinforcement as described (Party Wall)	m2		48.10	
SUP/3/1B.	Half brickwall in cement and sand brick in gauged mortar reinforced with brick reinforcement as described	m2		164.19	
	Sub-total to Summary				

HC Precast System Sdn Bhd				
DESCRIPTION	UNIT	RATE (RM)	TYPE B	
			QTY	AMOUNT (RM)
REINFORCED CONCRETE FRAME WORKS				
REINFORCED CONCRETE (GRADE 25) as described :				
In column joint to panel & party wall	M3		3.75	
REINFORCED CONCRETE (GRADE 30) as described :				
In precast roof beam	M3		0.38	
Sub-total to Summary				
WALLS AND PARTITIONS				
REINFORCED CONCRETE (GRADE 30) as described :				
In Precast Wall Panel (Internal & External wall)	M3		20.81	
In Precast Wall Panel (Party wall)	M3		1.38	
Sub-total to Summary				

7. Conversion of conventional BQ description to IBS BQ description.

Conversion of Conventional BQ Description to IBS BQ Description

Semi-D House - Single Storey

Conventional						HC Precast System Sdn Bhd				
PAGE REF	DESCRIPTION	UNIT	RATE (RM)	TYPE B		DESCRIPTION	UNIT	RATE (RM)	TYPE B	
				QTY	AMOUNT (RM)				QTY	AMOUNT (RM)
SUP/6/1/B.	**BILL NO. 6 - INTERNAL WALL FINISHES** 20 mm Thick cement and sand (1:3) with an approved plasticiser as described plainface to wall **BILL NO. 8 - EXTERNAL FINISHES**	m2		462.76						
	Sub-total to Summary									
SUP/8/1/B	**CEMENT AND SAND (1:3) WITH AN APPROVED PLASTICIER as described** 20 mm Thick plainface to wall and column	m2		122.23						
	Sub-total to Summary									
	Summary BILL NO. 1 - REINFORCED CONCRETE FRAME BILL NO. 3 - WALLS AND PARTITIONS BILL NO. 6 - INTERNAL WALL FINISHES BILL NO. 8 - EXTERNAL FINISHES					**Summary** REINFORCED CONCRETE FRAME WORKS WALLS AND PARTITIONS				
	TOTAL AMOUNT					**TOTAL AMOUNT**				

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

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.

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

- Economical . Eco Friendly . Quality

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

Proper storage yards | G30 design mixed 14 hours hoist | Panel 18 hours hoist | Bay yard storage 7 days

External transport to project

Internal transport to block yard

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

Every truck

Rebound hammer test

Vertical curing 7 days

BSI Code 6.2 – Minimum period

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

- Supply & Installation

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

- Supply & Installation

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

- Supply & Installation

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

LAWS OF MALAYSIA

UNIFORM BUILDING BY-LAWS

All amendments up to May, 2006

ACT 133

Head Office:
MDC Building, 2717 & 2718,
Jalan Permata Empat, Taman Permata,
Ulu Kelang, 53300 Kuala Lumpur.
Tel: 03-41086600 Fax: 03-41081506
E-mail: inquiries@mdcp.com.my
Website:http://www.mdcppd.com.my

Compiled by: MDC Legal Advisers

K.L. Showroom:
Lot L3-04,
3rd Floor, Shaw Parade,
Changkat Thambi Dollah,
55100 Kuala Lumpur.
Tel: 03-21457745

PRICE: RM 18.00

2006

(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.

- Comply to Building by Law

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

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

- Design calculation with PE endorsement

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

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

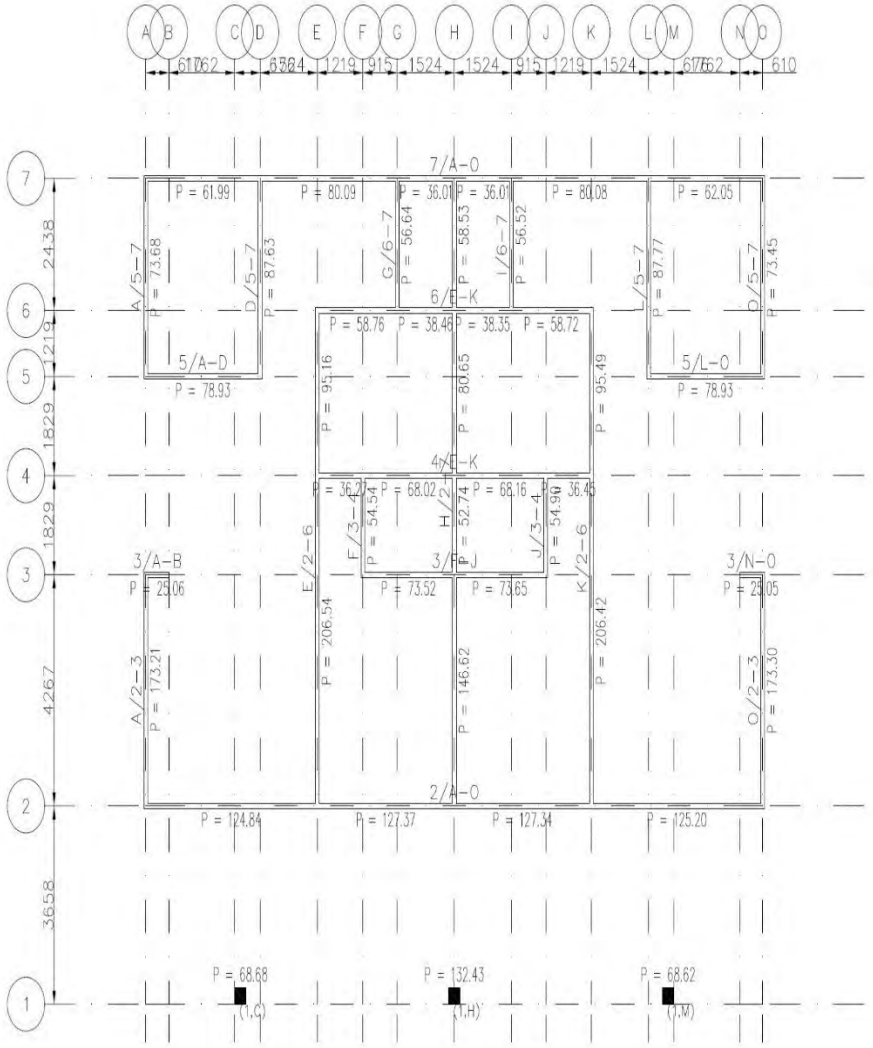
c) FOUNDATION USED : STRIP FOOTING

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

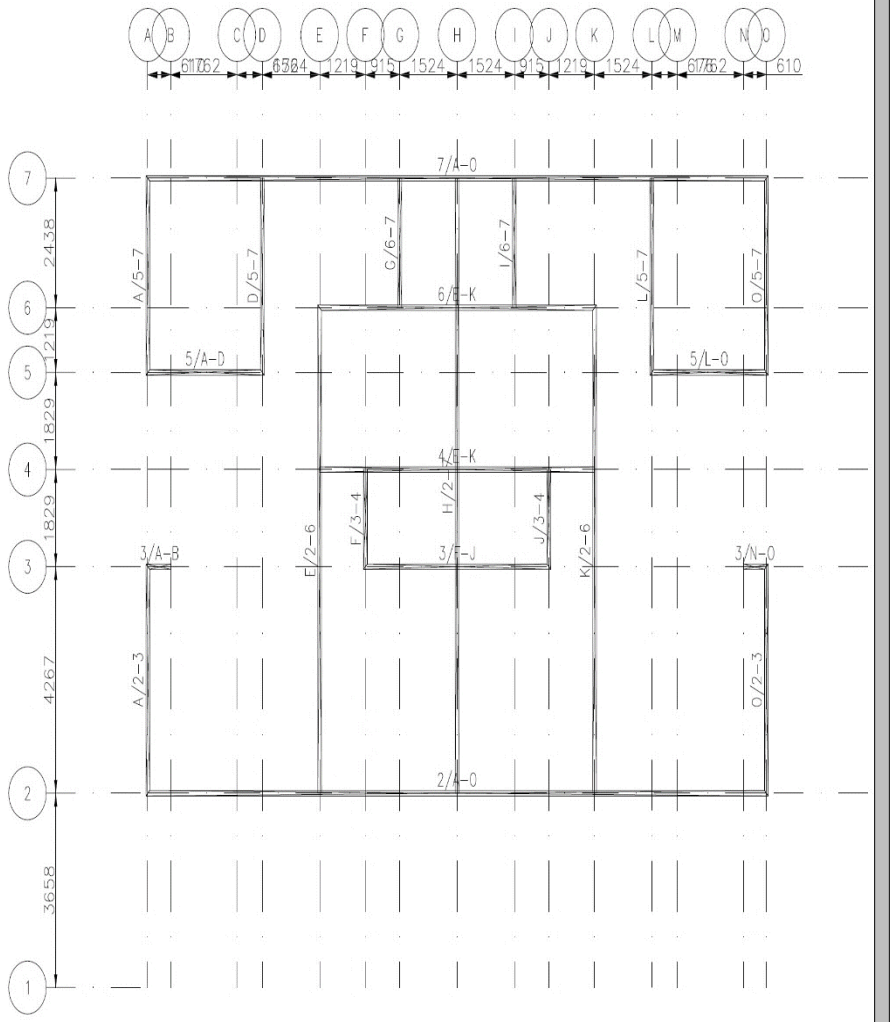


FOUNDATION LOADING PLAN

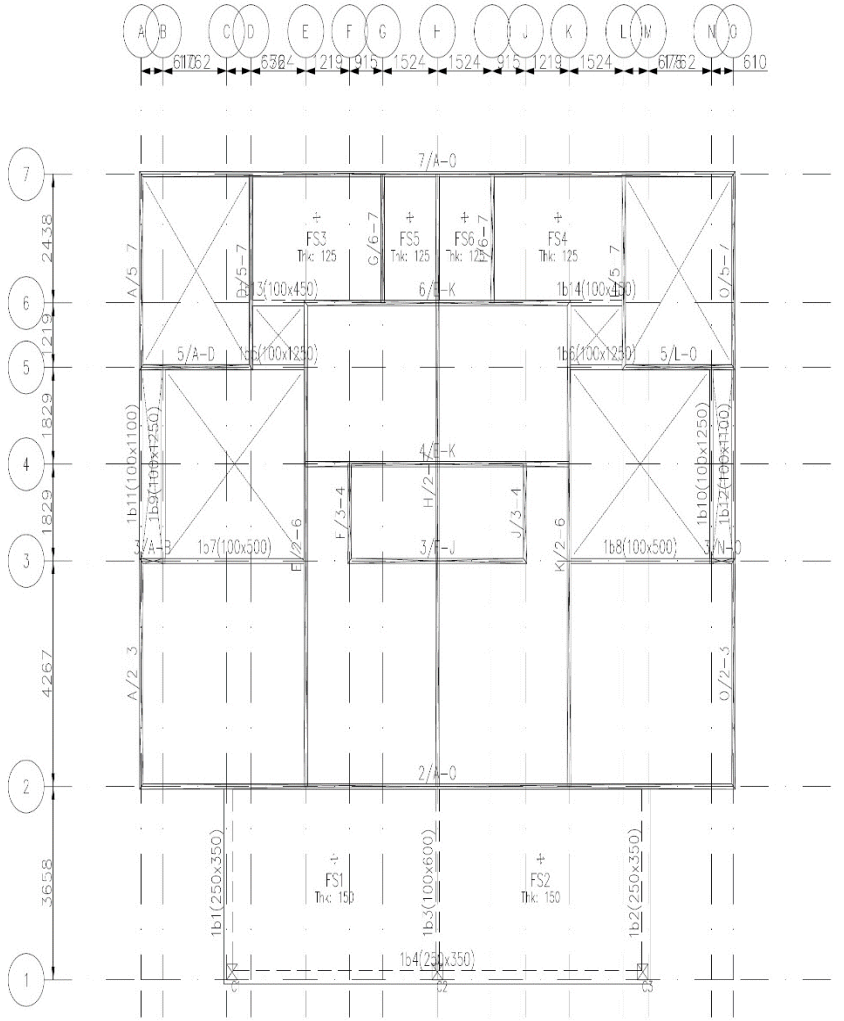
1. LOADS SHOWN ARE IN kN

- Design calculation with PE endorsement

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.



GROUND FLOOR PLAN



ROOF PLAN

- Design calculation with PE endorsement

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

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.

1

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

8. Responsibility of IBS System Provider & Manufacturer is to comply to Building by Law & BSI Code.

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

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

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

Perunding PaduReka Sdn. Bhd.
Company No: 268016T
CONSULTING ENGINEERS
Head Office : No. 41A, Jalan Jejaka 2, Taman Maluri, Cheras, 55100 Kuala Lumpur. Tel No: 603-92826269, 92838637, 92838625 Fax: 603-92820600, 92875572
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

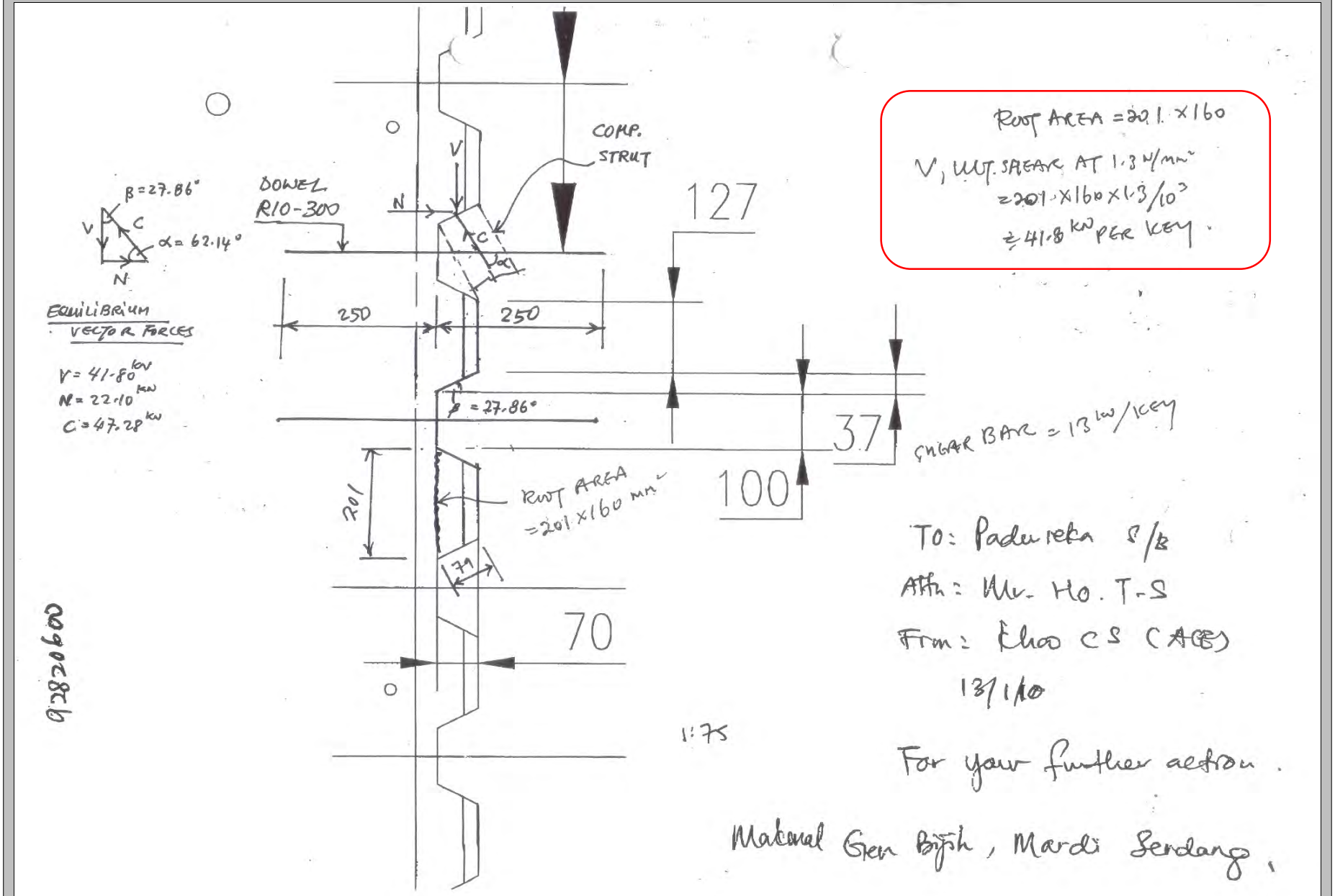
a) By definition, the shear keys can be classified as "castellated" joints and according to the requirements of joints transmitting shear under Clause 5.3.7 (c) of BS 8110; Part 1, no shear reinforcement is required if the shear stress due to ultimate loads is less than 1.3 N/mm², calculated on the minimum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

9. 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.

TO: Padu Reka S/B
Attn: Mr. Ho. T-S
Frm: Khoo CS (ACE)
13/1/10

For your further action.

Makasih Gen Bijih, Mardi Serdang.

9. 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.

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.

10. Consistency of quality using IBS for low cost / high end residential building.

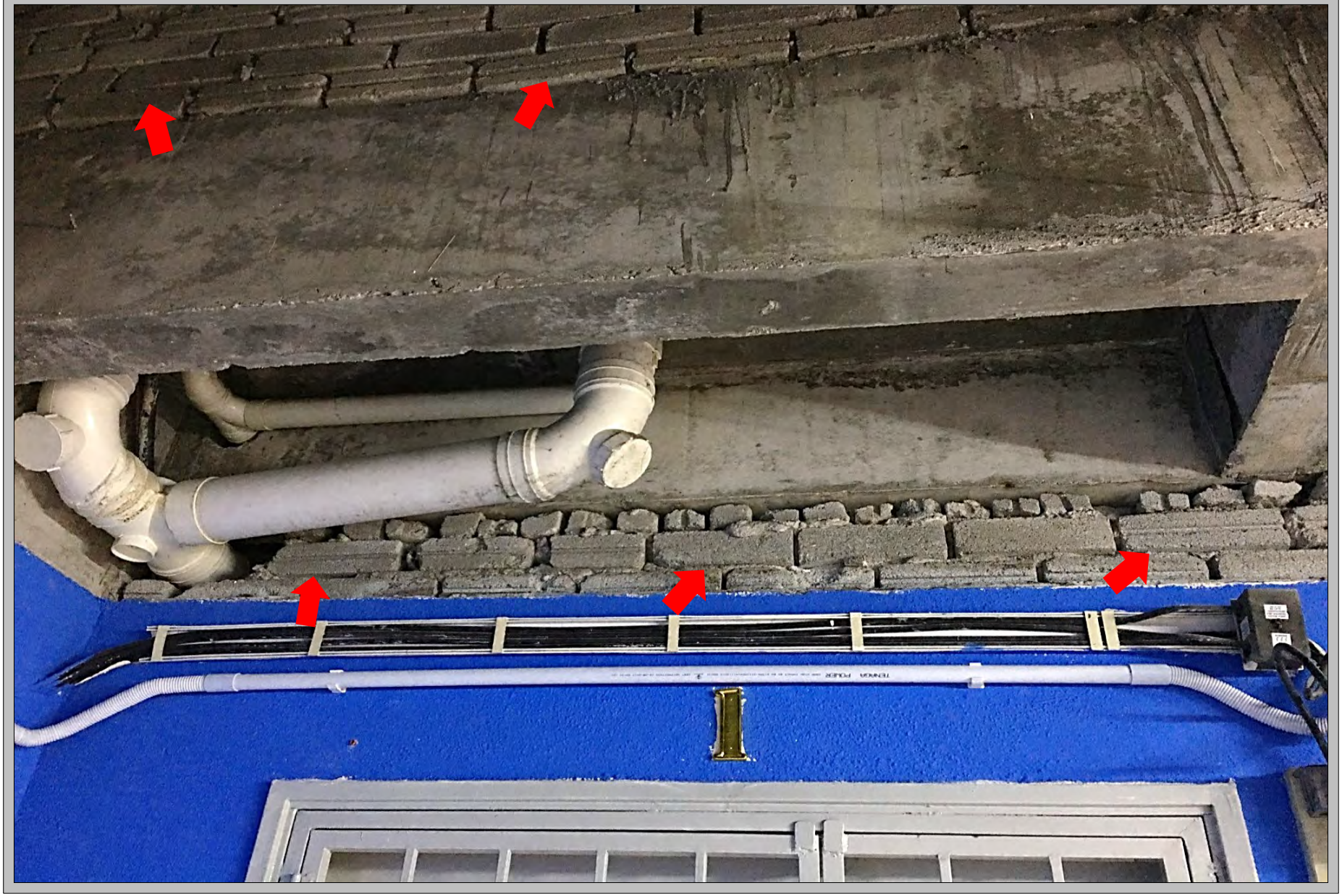
11. Conquas or Q-Lassic should be carried-out upon the completion of the superstructure works (frame & wall) instead of upon completion of finishing work.

11. Conquas or Q-Lassic should be carried-out upon the completion of the superstructure works (frame & wall) instead of upon completion of finishing work.

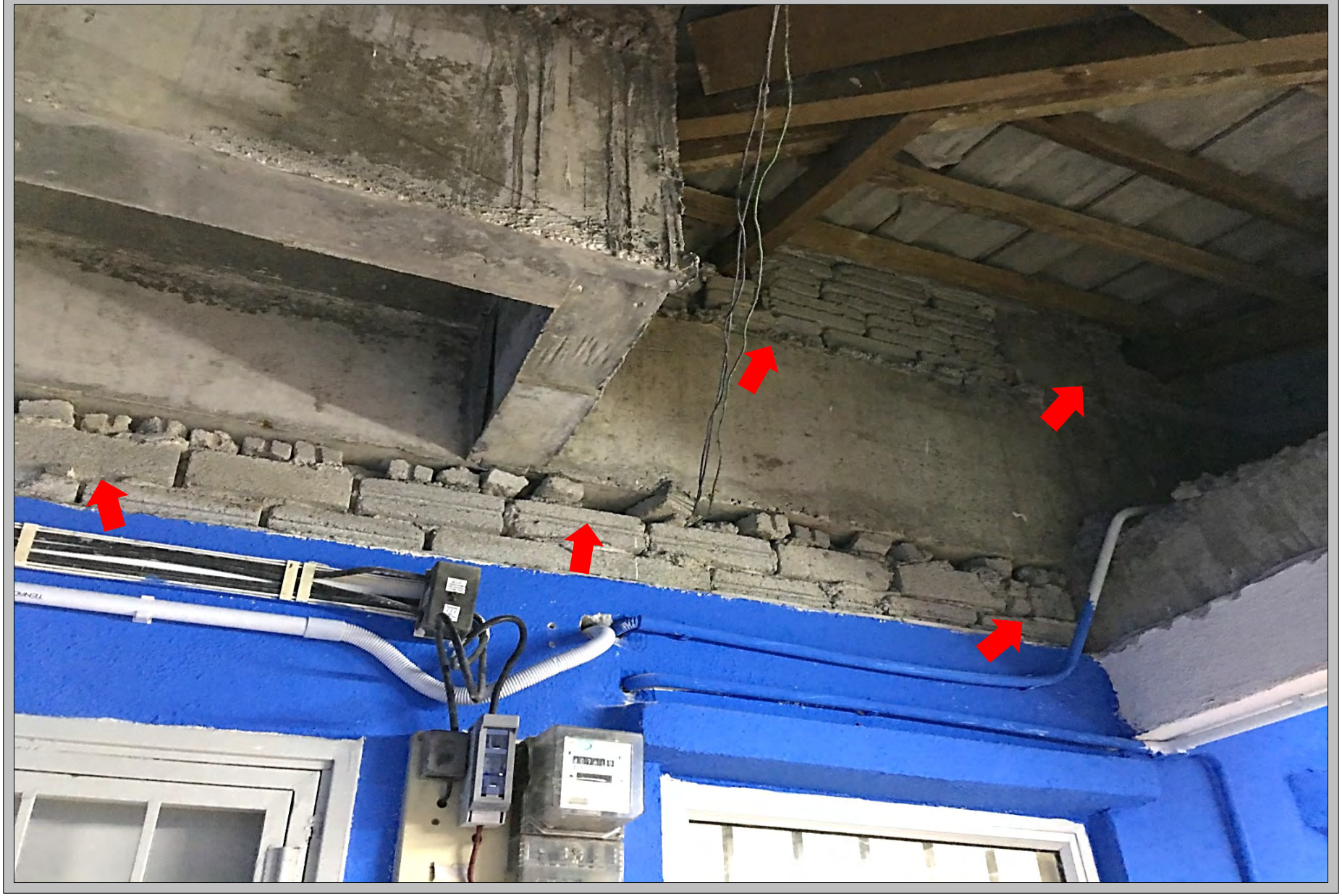
11. Conquas or Q-Lassic should be carried-out upon the completion of the superstructure works (frame & wall) instead of upon completion of finishing work.

11. Conquas or Q-Lassic should be carried-out upon the completion of the superstructure works (frame & wall) instead of upon completion of finishing work.

11. Conquas or Q-Lassic should be carried-out upon the completion of the superstructure works (frame & wall) instead of upon completion of finishing work.



11. Conquas or Q-Lassic should be carried-out upon the completion of the superstructure works (frame & wall) instead of upon completion of finishing work.



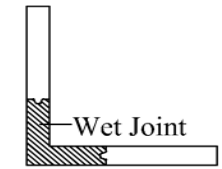
11. Conquas or Q-Lassic should be carried-out upon the completion of the superstructure works (frame & wall) instead of upon completion of finishing work.

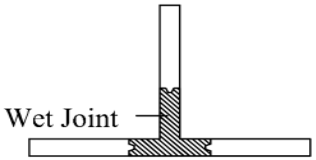
11. Conquas or Q-Lassic should be carried-out upon the completion of the superstructure works (frame & wall) instead of upon completion of finishing work.

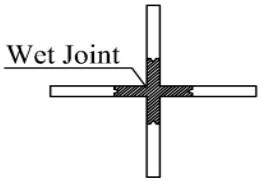
12. Customized & flexibility to suit all architectural demands.

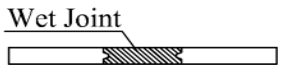
In the construction of a building, there are always 4 types of joint namely

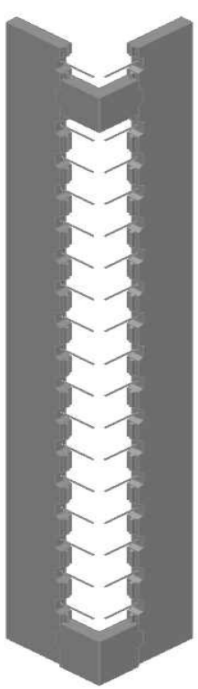
" L-shape " " T-shape " " Cross shape " " Straight joint "

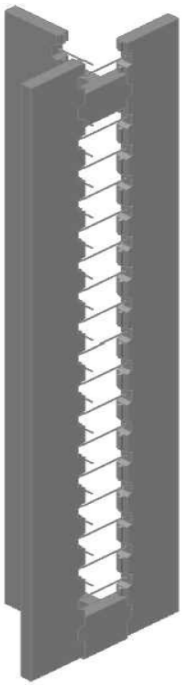


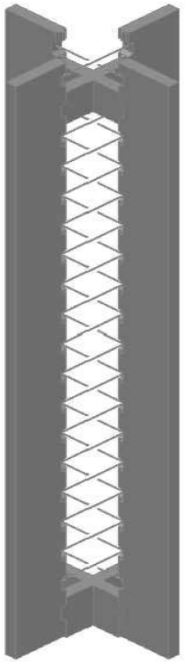


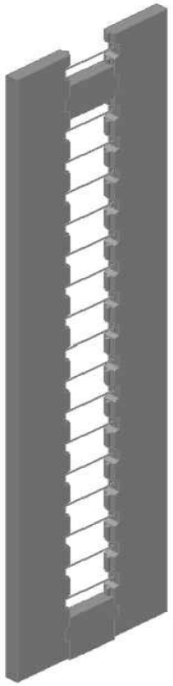


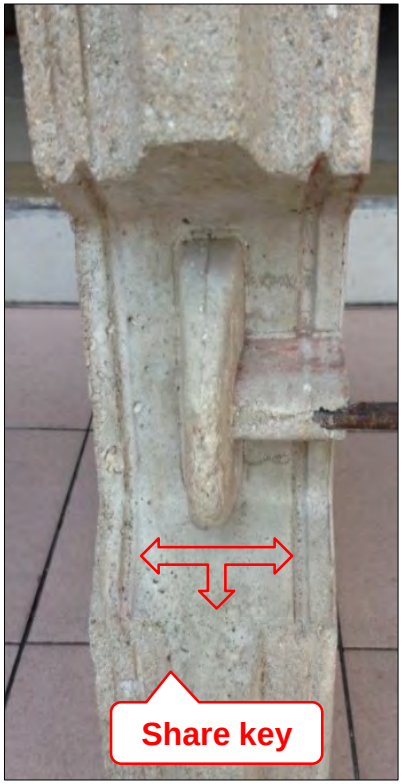












SYSTEM PROVIDER
HC PRECAST SYSTEM SDN. BHD. (566697-M)
No.23B, Jalan Seri Sarawak 20B/KS2, Taman Seri Andalas,
41200 Klang, Selangor D.E. Tel:03-3323 3993 Fax:03-3324 3993
e-mail:enquiry@hcprecast.com, www.hcprecast.com
DETAILS SHOWN IN THIS DRAWING ARE PROPERTY OF HC PRECAST SYSTEM & PROTECTED BY PATENTS. ALL COPYRIGHT ARE RESERVED. (US 6,625,570 B2) & (MY-124215-A)

MANUFACTURER
HC MANUFACTURING SDN. BHD. (585570-T)
No.23-1, Jalan Seri Sarawak 20B/KS2, Taman Seri Andalas,
41200 Klang, Selangor D.E.
Tel:03-3323 3993 Fax:03-3324 3993

DRAWN : JUL
DATE : JUNE 2015
CHECKED : HJC
EXAMD : HJC
APPVD : HJC
SCALE : HJC

DRAWING TITLE :
DRAWING NO : HC/MP
SYSTEM : –
REV : –
REV : –

12. Customized & flexibility to suit all architectural demands.

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

“ L-shape ” “ T-shape ” “ Cross shape ” “ Straight joint ”

- Supply & Installation

13. A 10-year old 2 storey building (without maintenance & touch up) built by precast system and exposed to weather No leaking & No crack.

14. Propose to Government and Private Developer.

Invite industrialized building system provider with manufacturing facility (flexibility to suit all architectural demands) to participate to built the show unit with work below and superstructure without finishing for the Government & Private Developer to identify the system in terms of green, environment, quality and speed for supply in Its development.

---

1. **Architect**

   - **Appointed by the Government & Private Developer .**
   - **Design of single storey bungalow of 1,000 ft2 (affordable home), up to superstructure without finishing.**
   - **With M&E requirement.**
   - **Wall finishing with plaster or skim coat only.**
   - **Door and window frame opening.**
   - **Ground floor without tiling.**

2. **Industrialized building system manufacturer have formed their BQ for superstructure (in terms of wall area) and to submit work program with sequence of work for record purposes.**

3. **Proper record by the Government & Private representative during construction, in terms of labour and machinery involved per day up to completion (superstructure only).**

4. **Cost Comparison for each Industrialized Building System Manufacturer by the Government & Private Developer (for superstructure only). Cost will be fixed for the selected manufacturer and supply to its development .**

THANK YOU