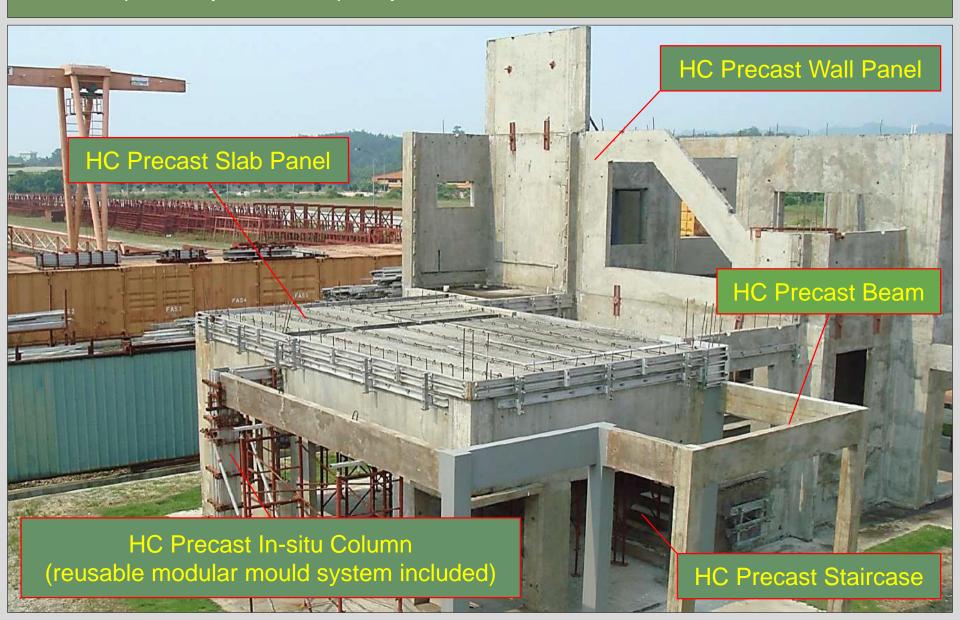
HC Precast System is a complete IBS solution particularly in a design and build precast system Developed by

IL HC PRECAST SYSTEM SDN. BHD.

- Through years of hard work and constant refinement to the system, HCPS through this proprietary system currently holds six (6) Intellectual Properties (IP). Among the highlights of the HCPS's system is the ability of the structure to withstand earthquake forces (test conducted in collaboration with UTM JOHOR).
- "Manual Book" contains full information on setting up a Precast Factory, Mould Engineering, Sequence of Work which includes conversion of conventional structural drawings, and the precast concrete SOP for our HCPS monolithic wall with multi-box system.
- IBS is a system, not merely a component. It consists of the main component the structural component but it requires an efficient and cost effective connection system to prevent the commonly-faced water leakage and crack at connection or joint which impede further the acceptance level of IBS.
- HCPS can suit to wider range of Architectural demand due to the in-house mould design, engineering and fabrication to have a proper construction sequence which is the number one key feature in any IBS construction method.
- > HC PRECAST SYSTEM SDN. BHD. (HCPS)'s success weighs heavily where most precast solutions have failed.
 Our revolutionary patented "shear key joint" system have managed to resolve the very issue which have plagued the precast industry, water leakages and crack.
 - Industrialised Building System "Provider"

Is one "Who" knows the "Why", goes the "Why" and shows the "Why".

HC Precast System is a complete IBS solution particularly in a design and build precast system developed by HC PRECAST SYSTEM SDN. BHD.



HC Precast System is a complete IBS solution particularly in a design and build precast system developed by HC PRECAST SYSTEM SDN. BHD.

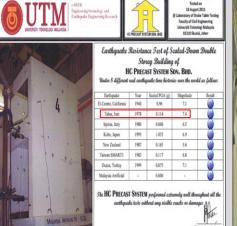


Your IBS One-Stop-Center for Industrial Building System (IBS) Solution

HCPS was founded in 2002 after years of Research and Development mainly focused on tackling the water leakage issue. Through years of hard work and constant refinement to the system, HCPS through this proprietary system currently holds six (6) Intellectual Properties (IP). Among the highlights of the HCPS's system is the ability of the structure to withstand earthquake forces (test conducted in collaboration with UTM JOHOR)



few one-stop precast system provider in which not only we own the earthquake resistant monolithic wall with multi-box system with key features of the connecting shear keys that possess tested structural integrity and preventing water leakage in wet climate environment as well as eliminating the possibility of zigzag crack along the connecting zone



Professor of Structural Earthquake Enginee

Faculty of Civil Engineering, Universiti Teknologi Malays















IR HC PRECAST SYSTEM SDN. BHD.

HCPS is open to all types of Potential business models, including "Technology Transfer" to interested parties. Our "Manual Book" contains full information on setting up a "Precast Factory", "Mould Engineering", "Sequence of Work" which includes conversion of conventional structural drawings, and the precast concrete SOP for our "HCPS "monolithic wall" with "multi-box system".





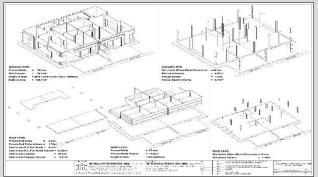














HCPS IBS SOLUTION



QUALITY

ECO-FRIENDLY

ECONOMICAL



HC PRECAST SYSTEM

MANUAL HANDBOOK
Installation Guide



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

HC PRECAST SYSTEM SDN. BHD. (586697-M)



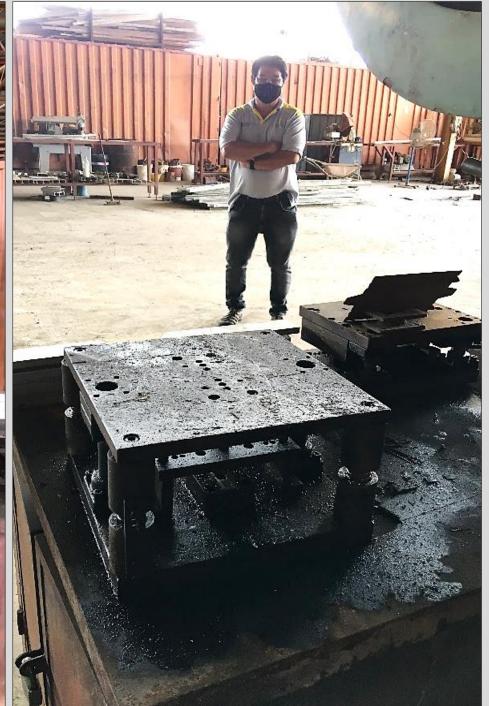
No.23B, Jalan Seri Sarawak 20B/KS2, Taman Seri Andalas, 41200 Klang, Selangor D. E. Tel:03-3323 5999 Fax:03-3323 8993 e-mail: enquiry@hcprecast.com.my Http: www.hcprecast.com.my

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) (SYSTEM PROVIDER)

Manual Book Contains

complete information on setting up a Precast Factory and Mould Engineering Facility

















































































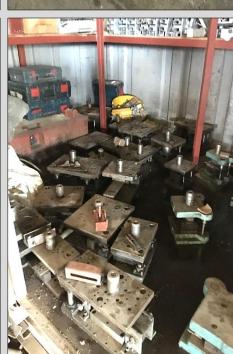






























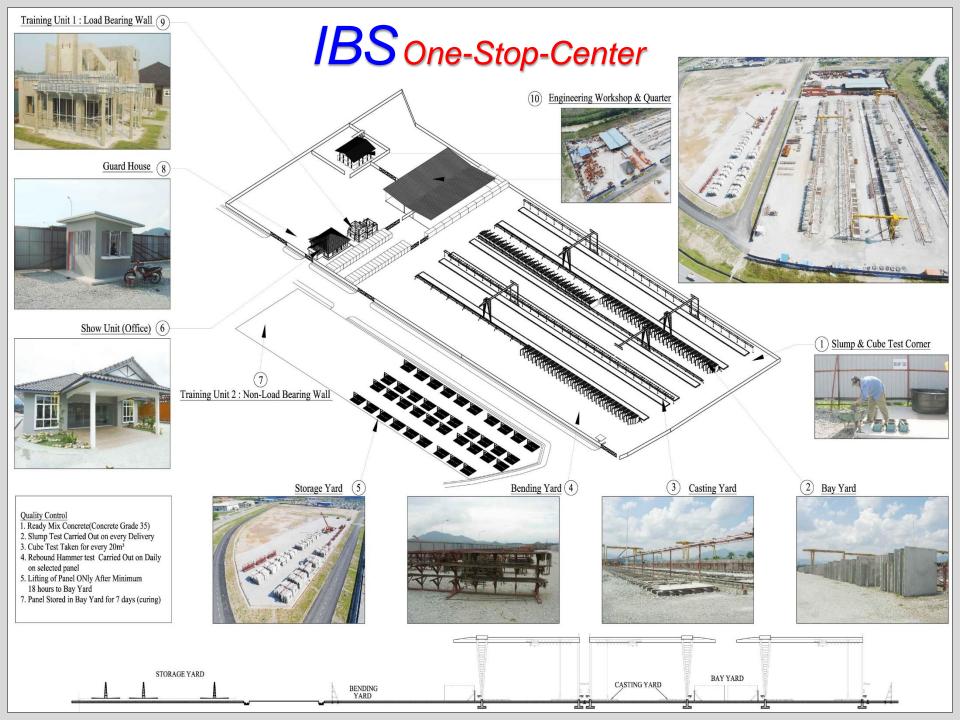


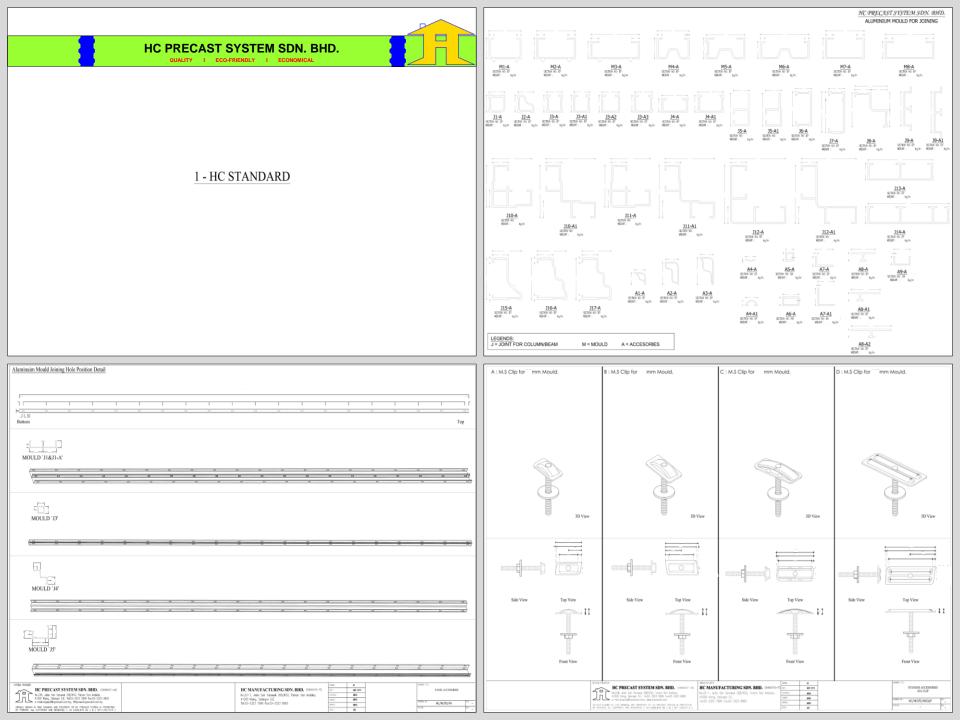


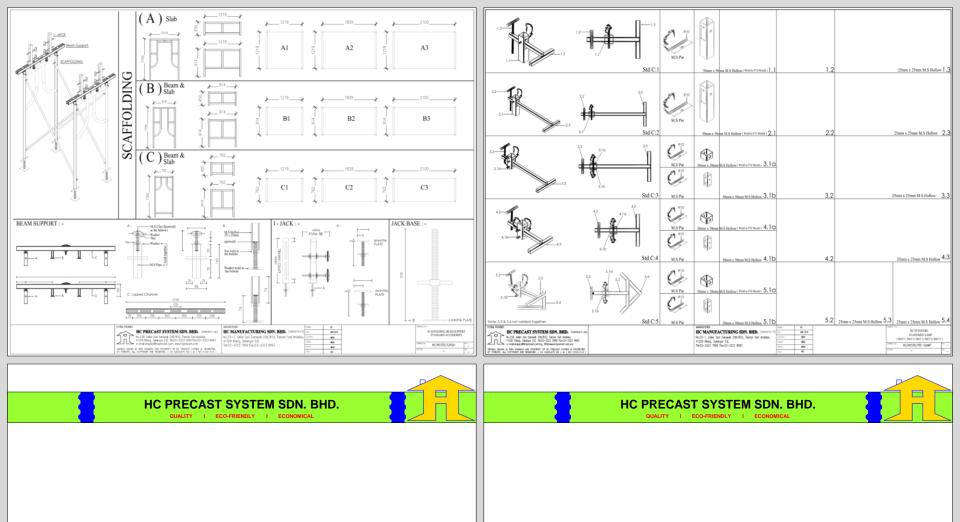








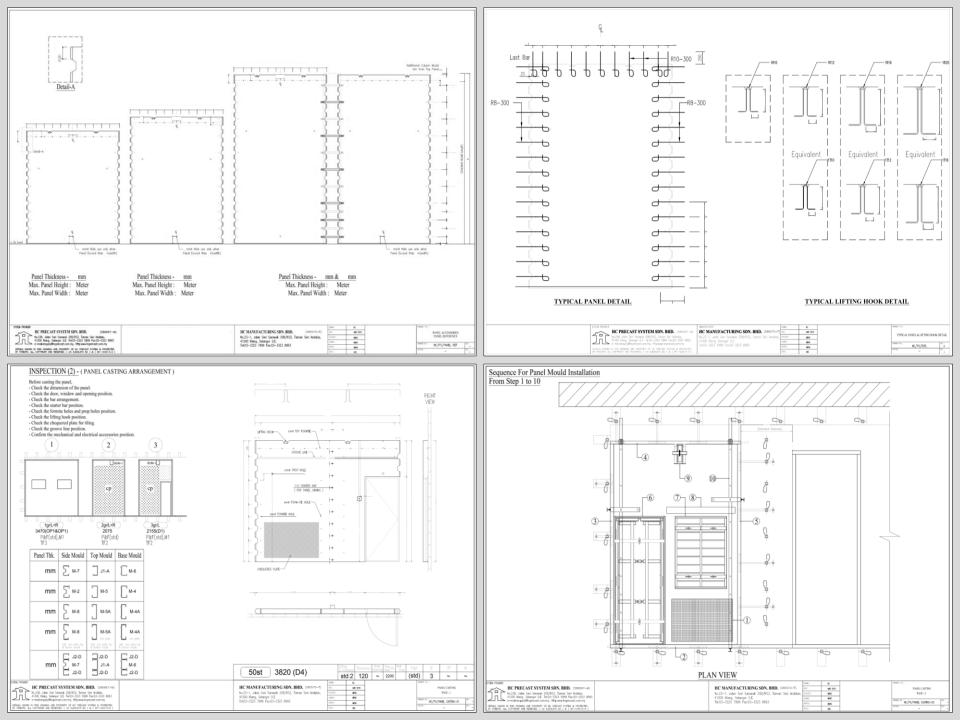


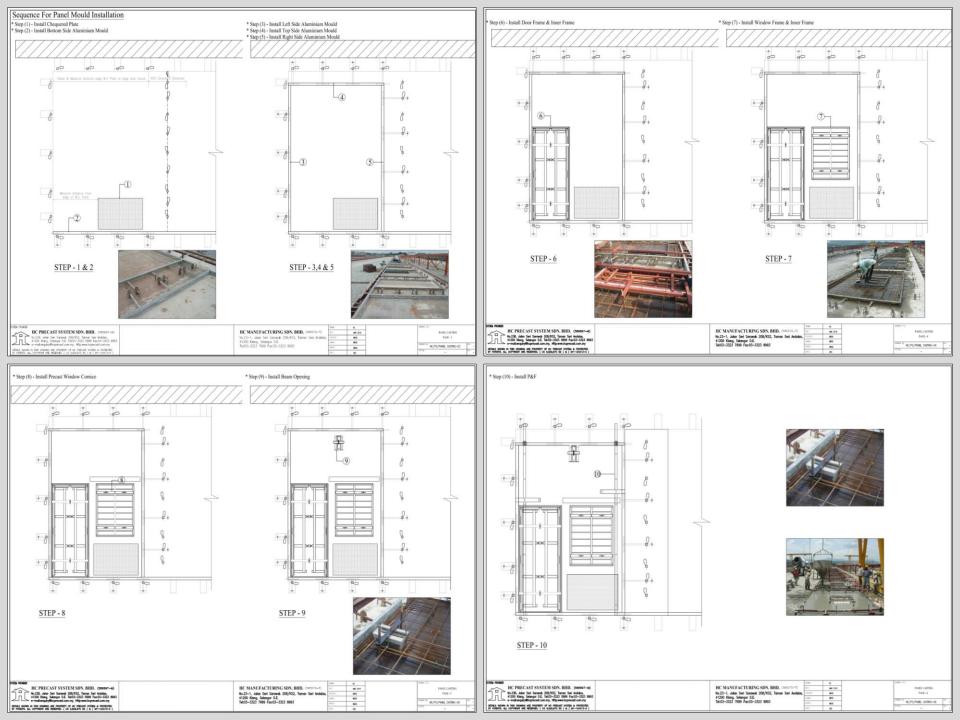


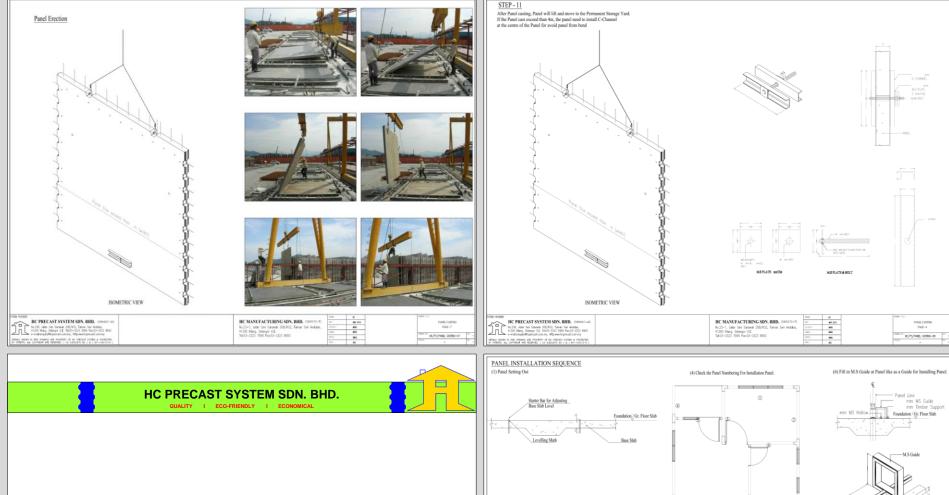
2 - PANEL STANDARD

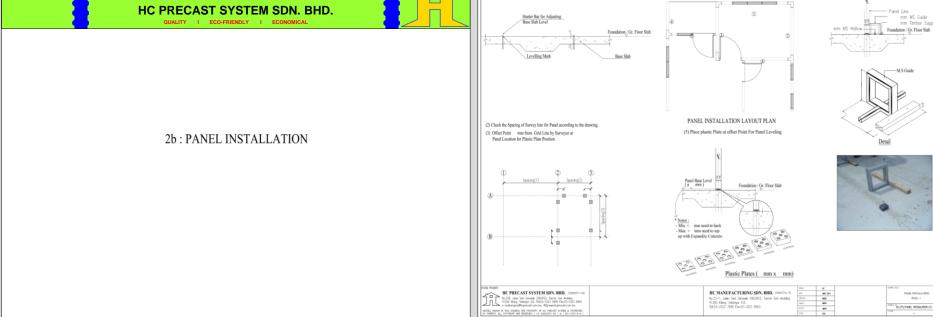
- 2a: panel casting
- 2b : panel installation
- 2c : panel prop
- 2d : panel storage
- 2e : panel accessories
- 2f: door & window

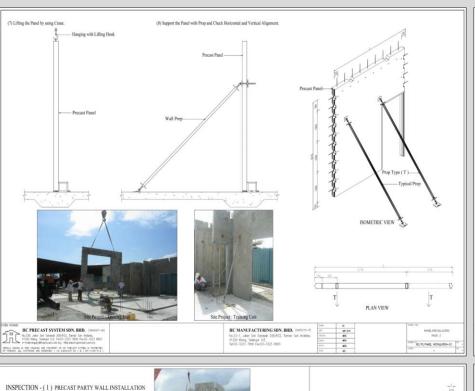
2a: PANEL CASTING

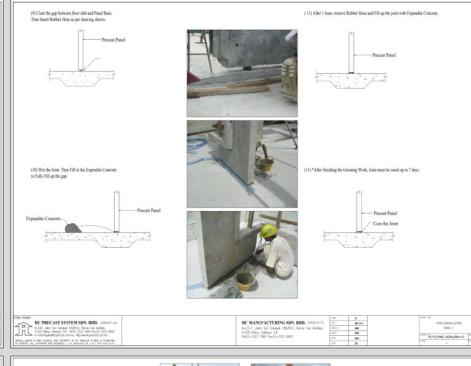


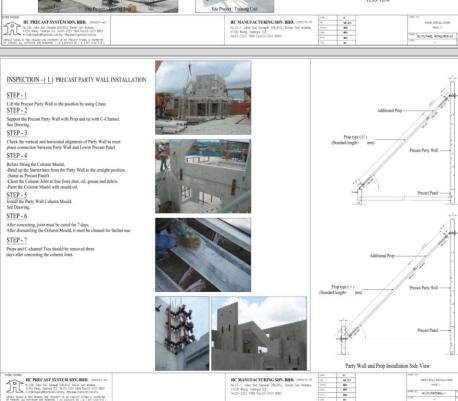


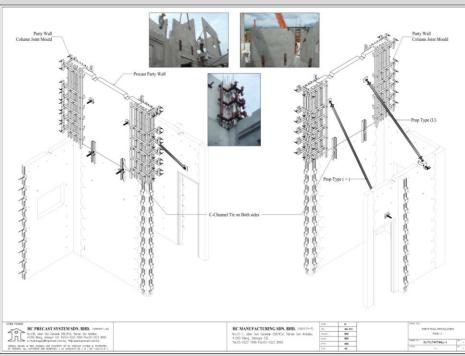


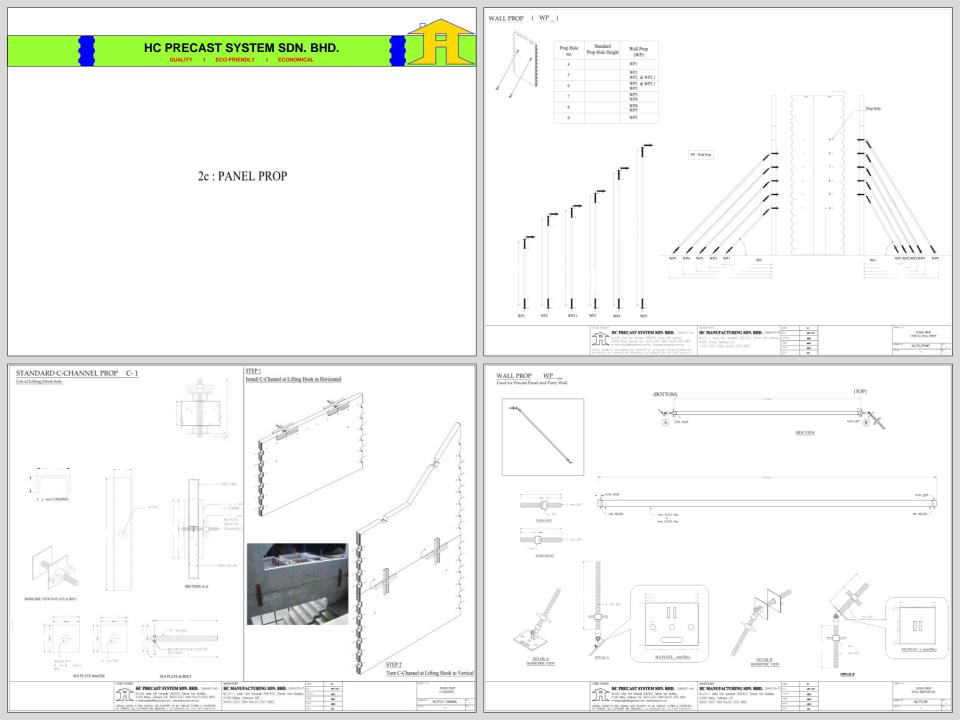


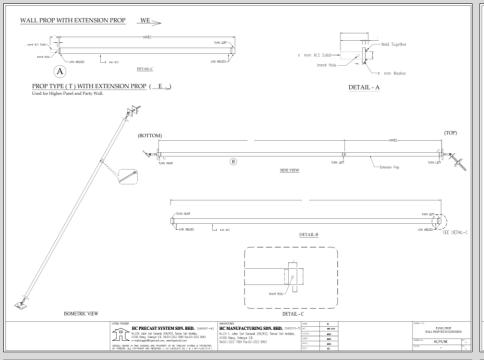


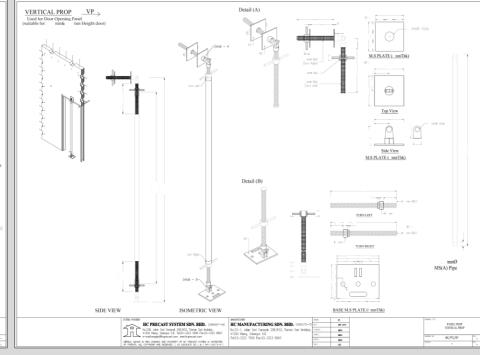


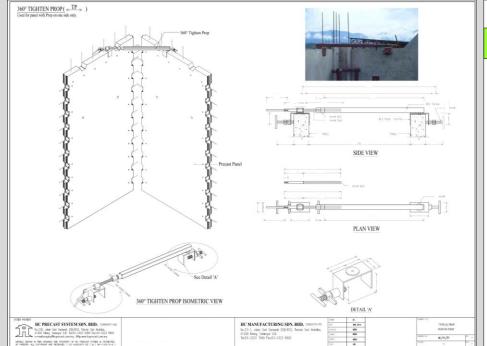






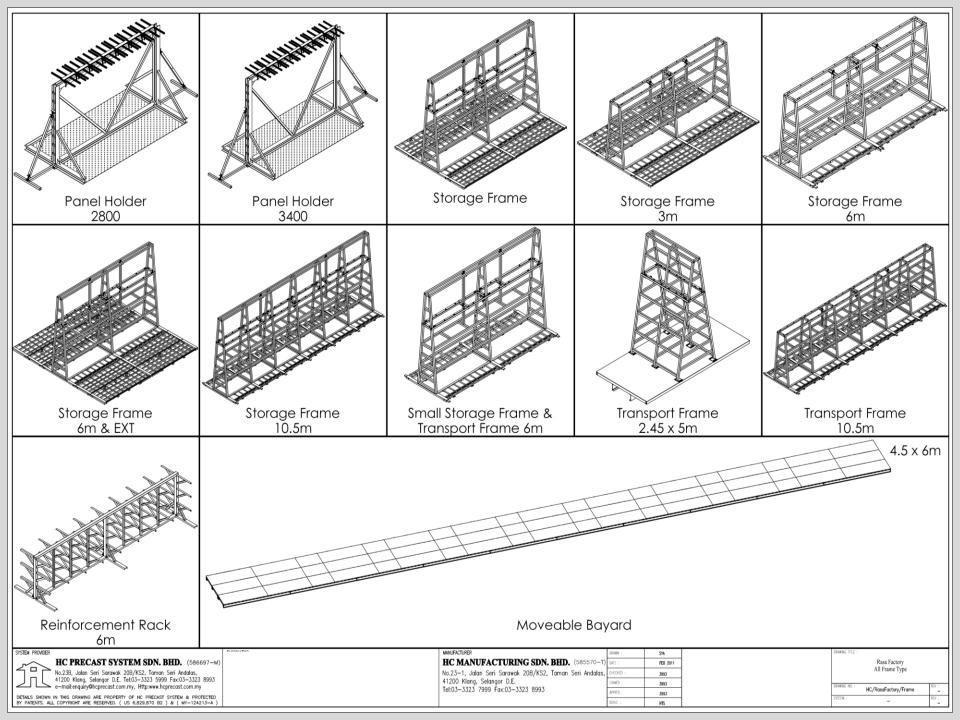


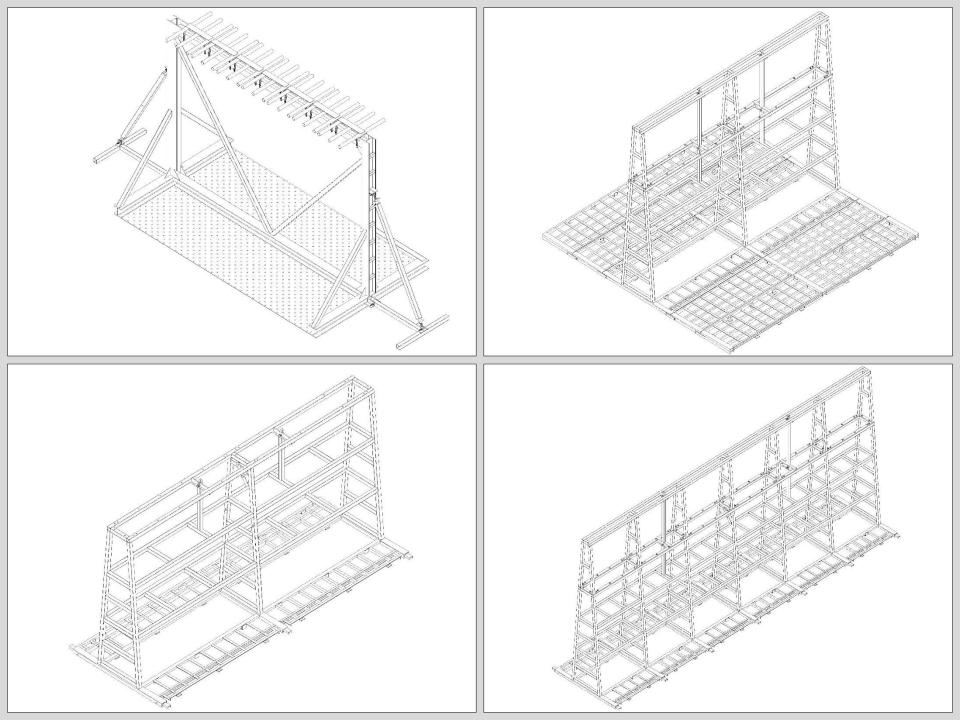


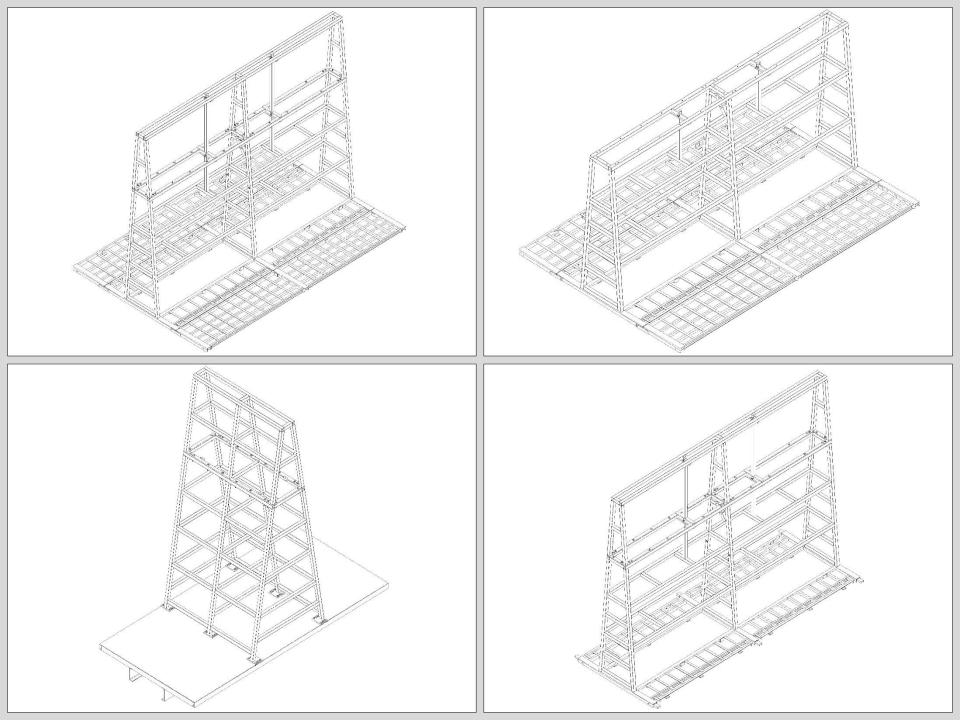


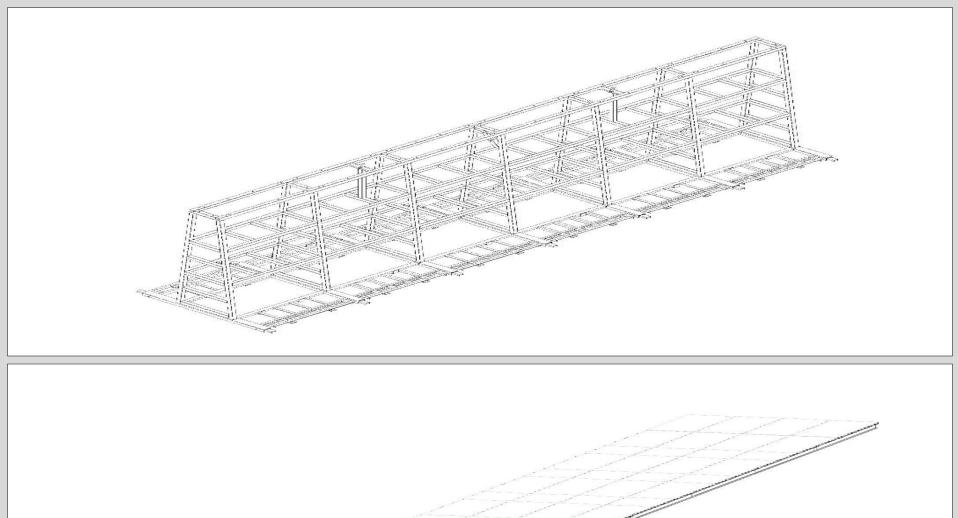


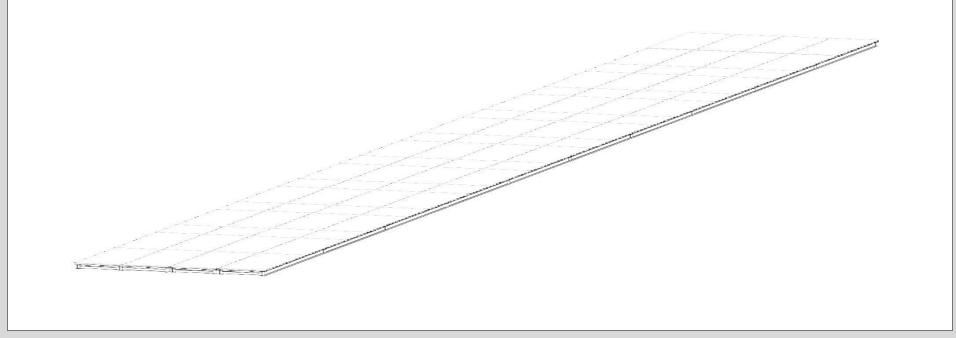
Real Experience
Ideal Technology
Professional Implementation
Not just Theory but it's Real

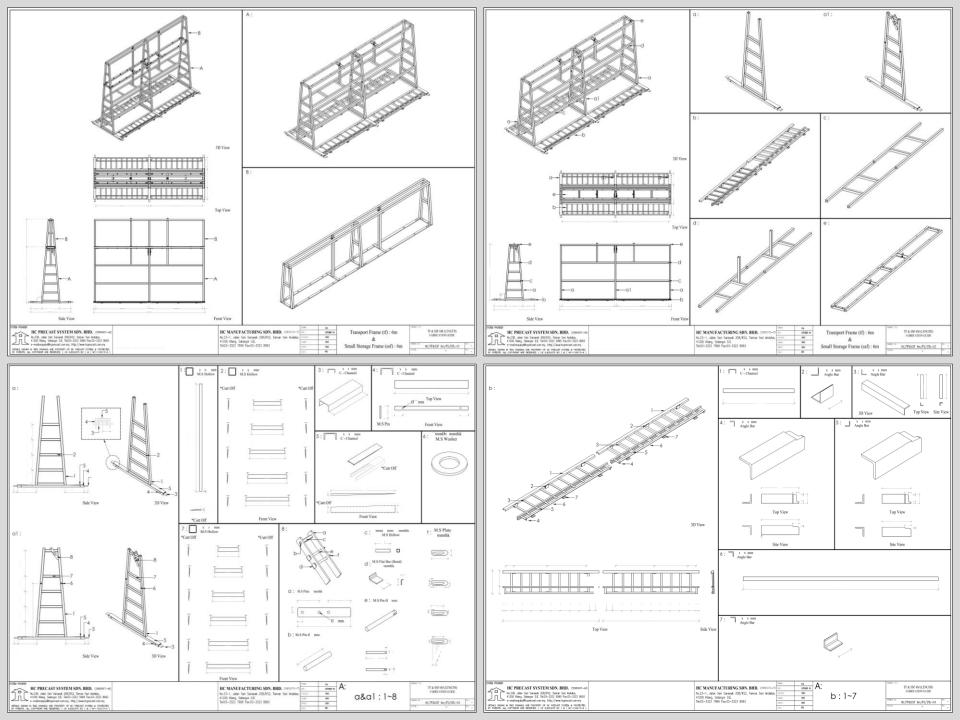


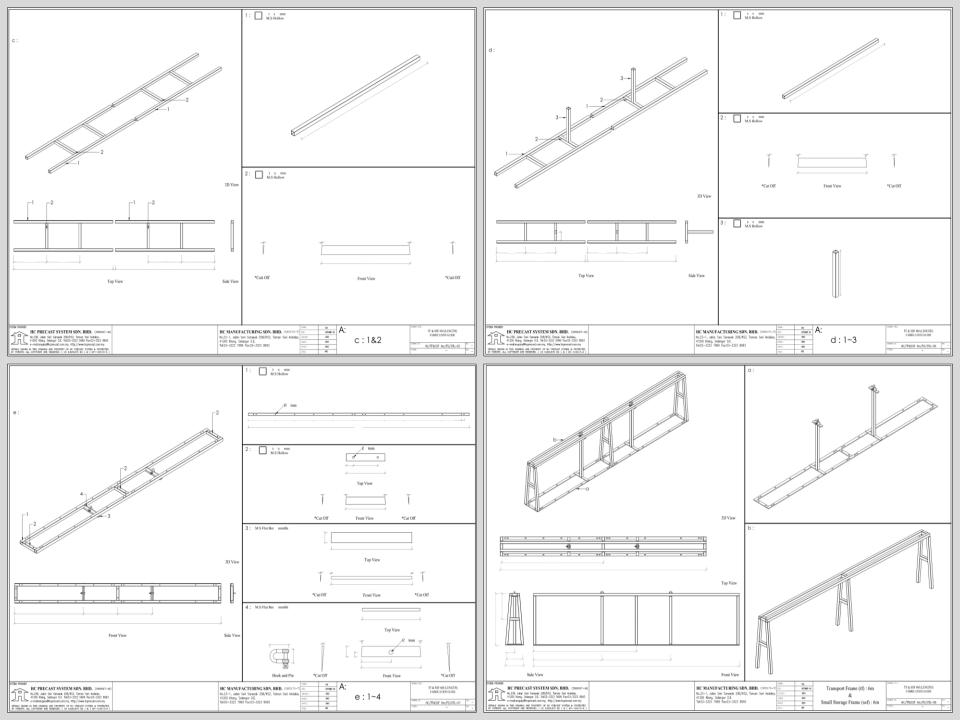


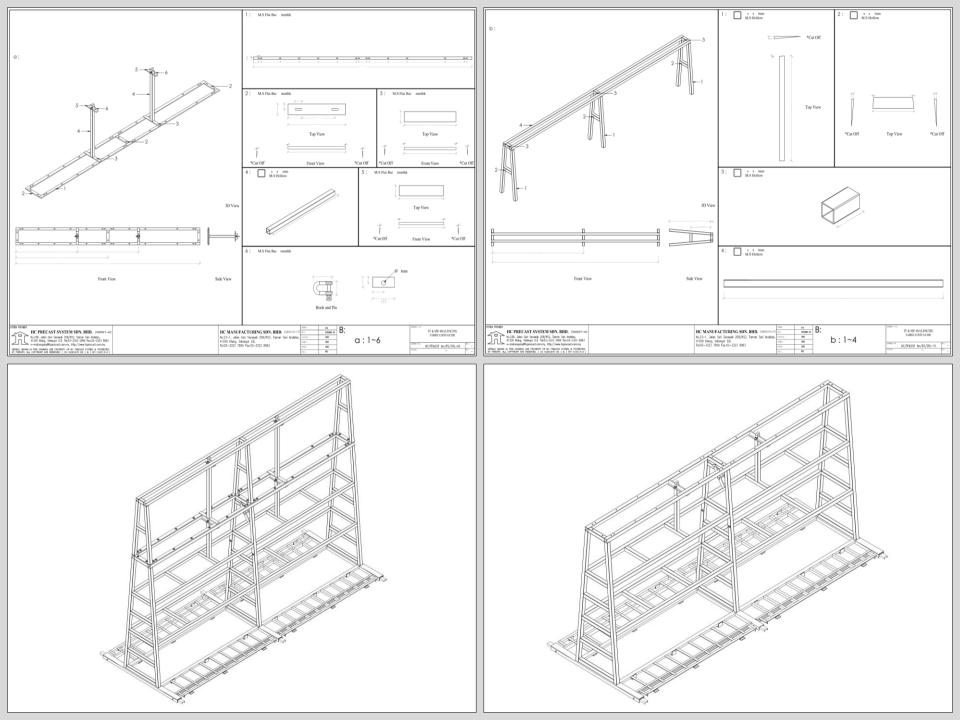


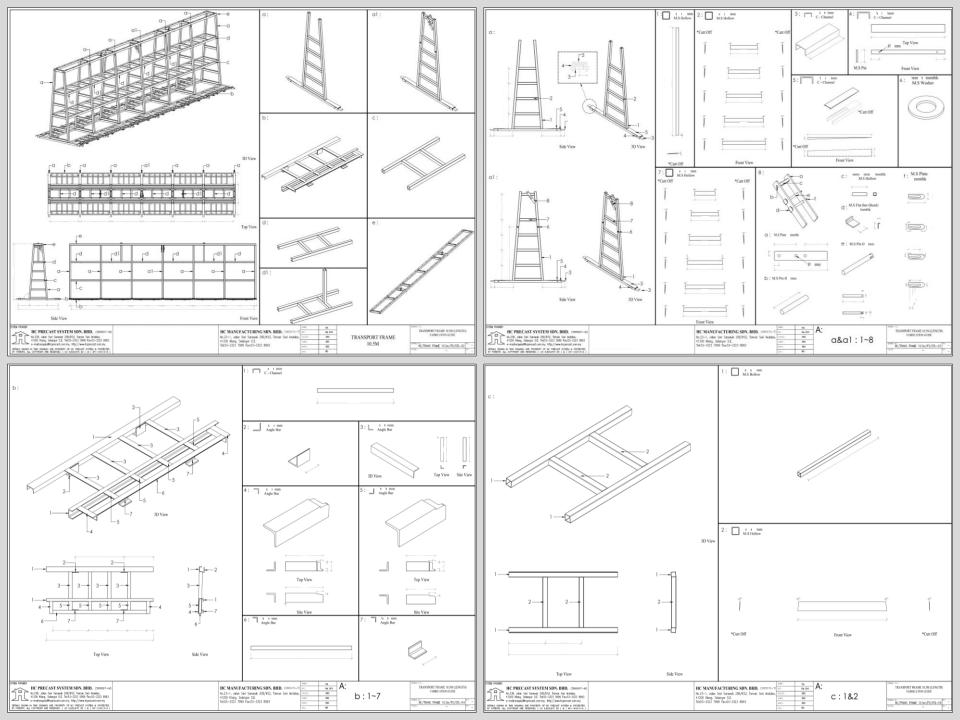


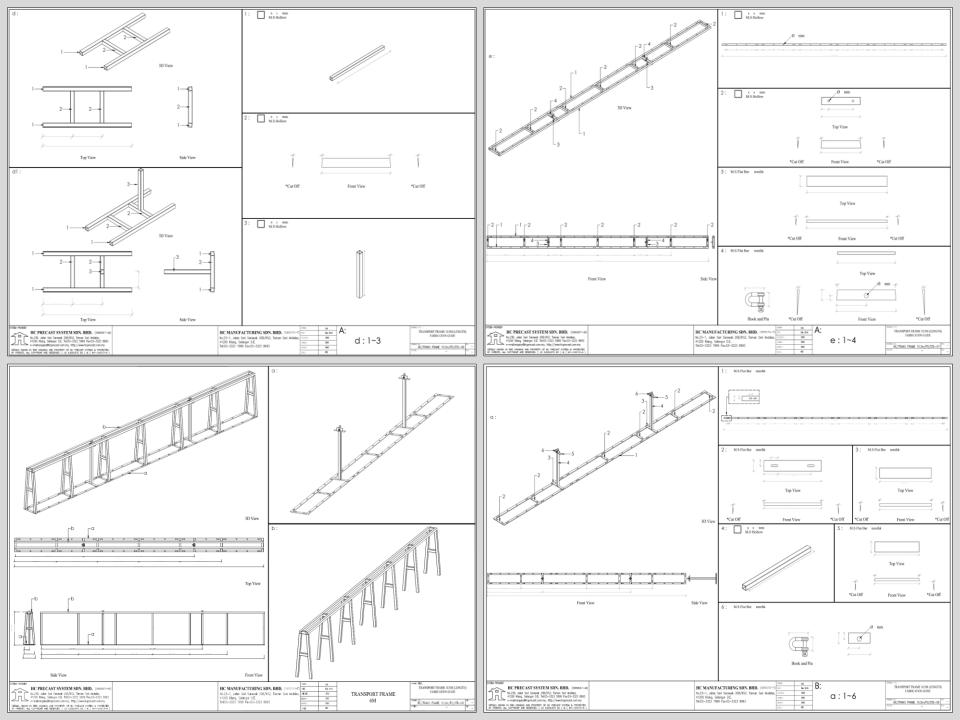


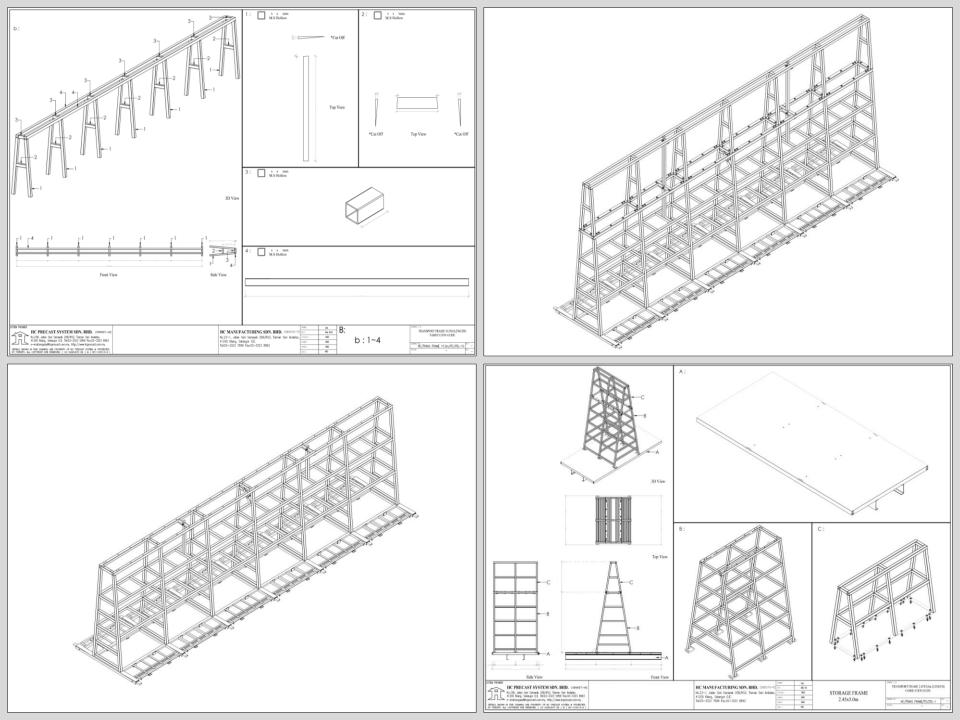


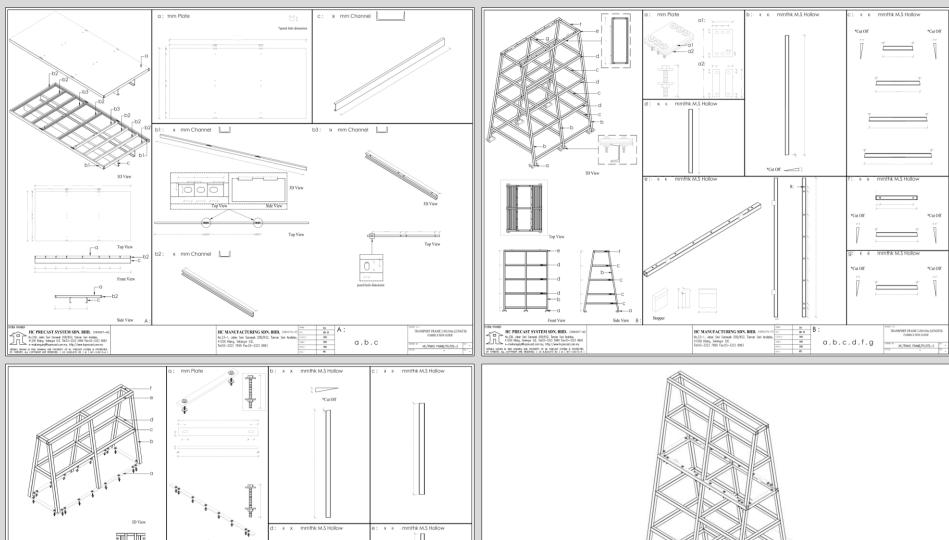


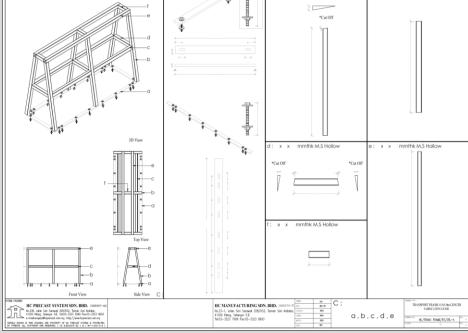


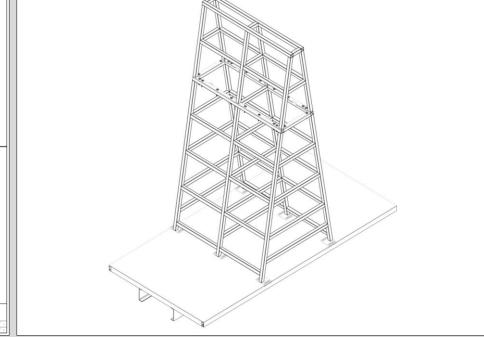


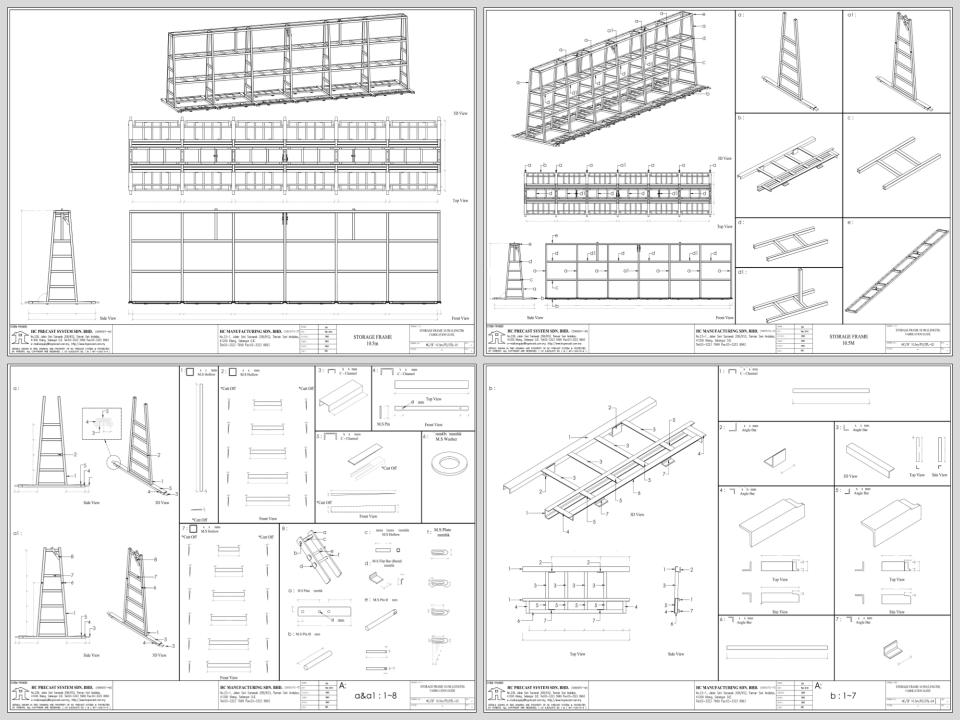


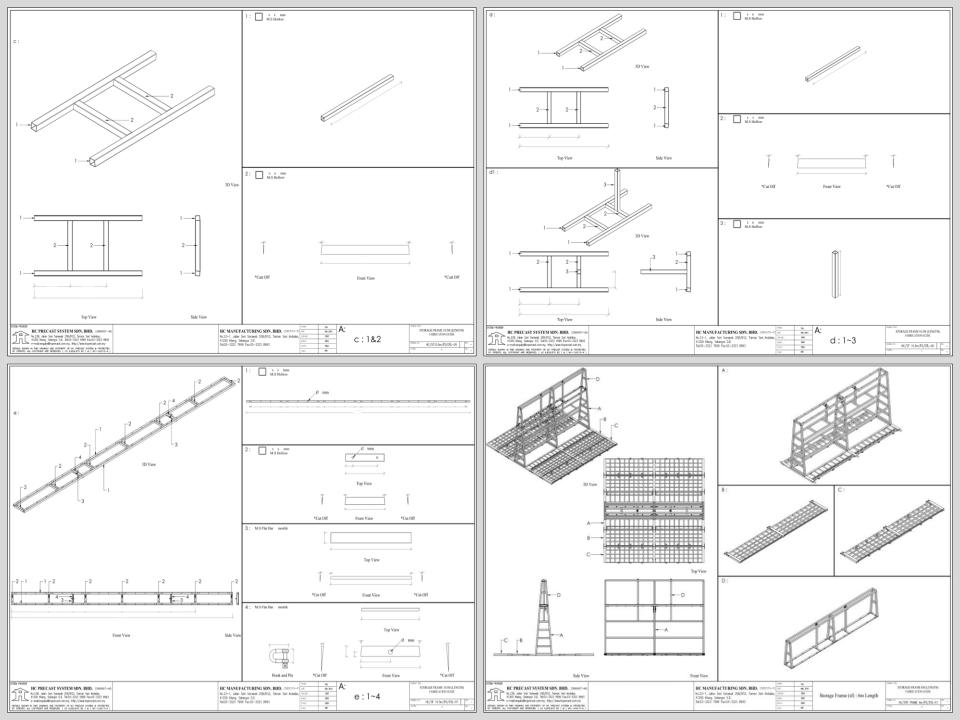


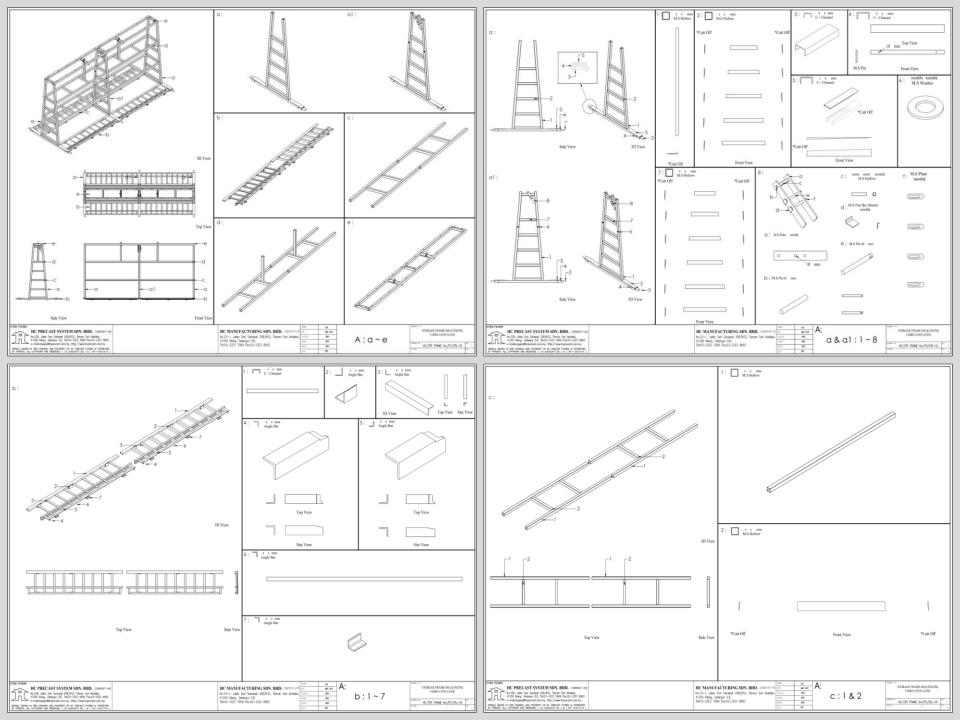


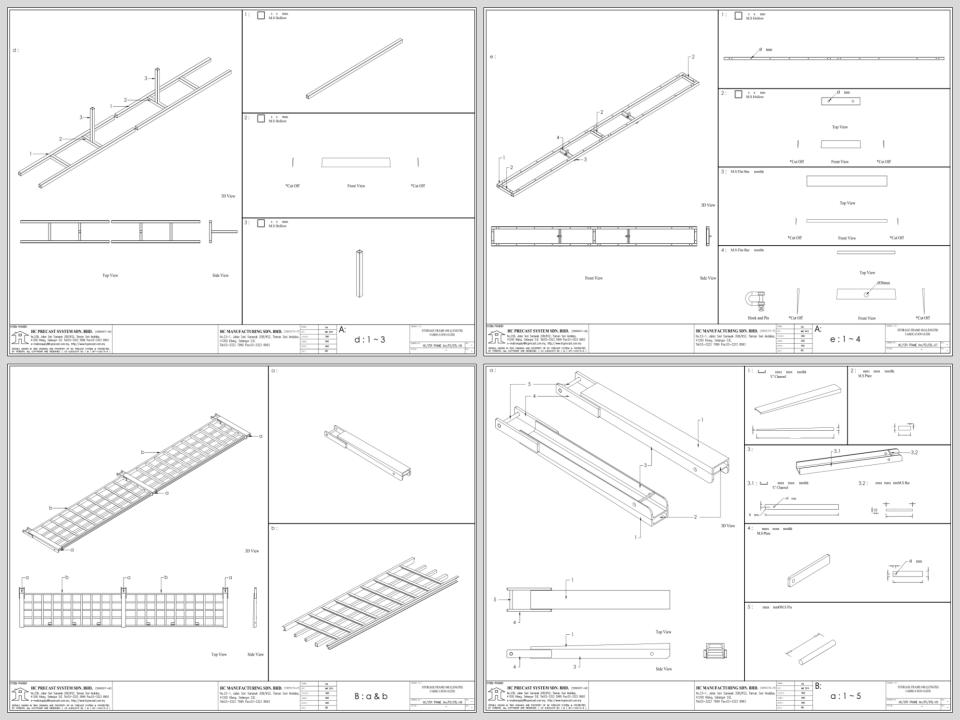


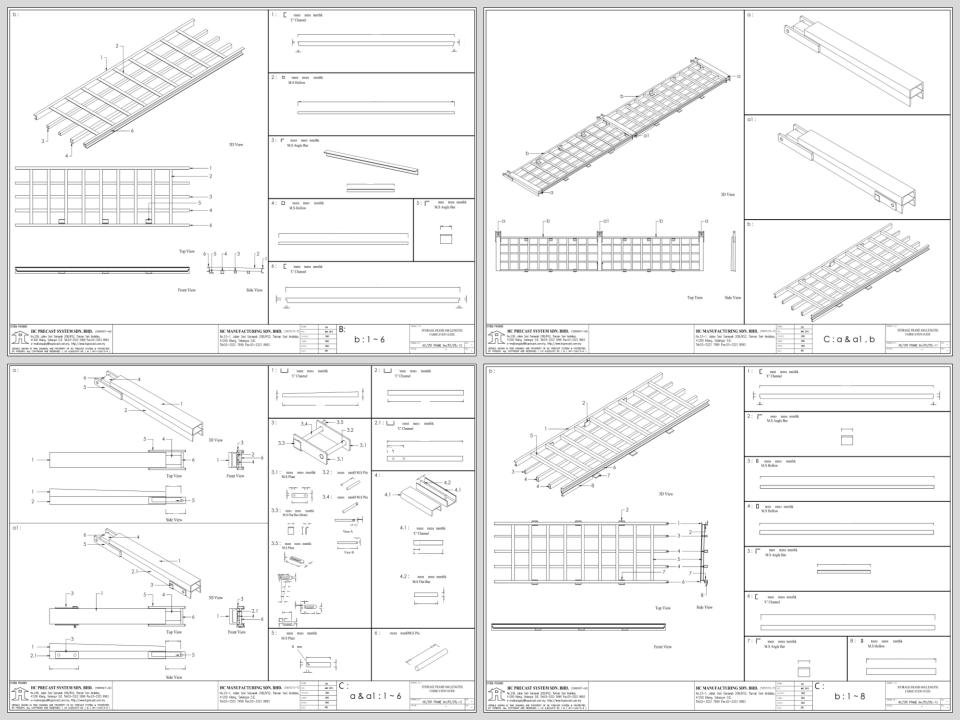


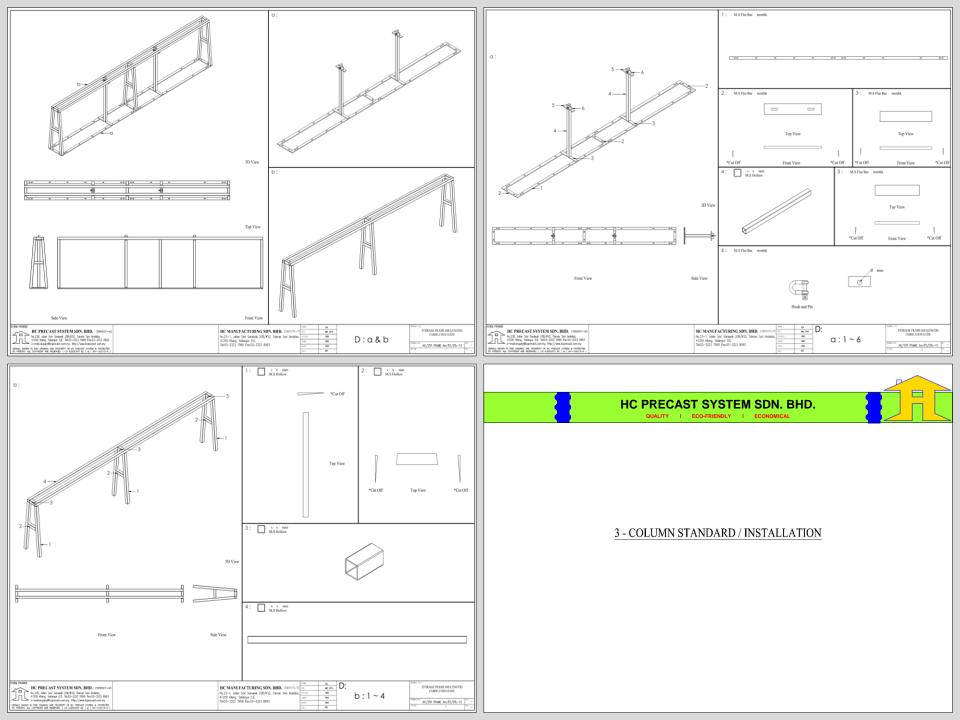


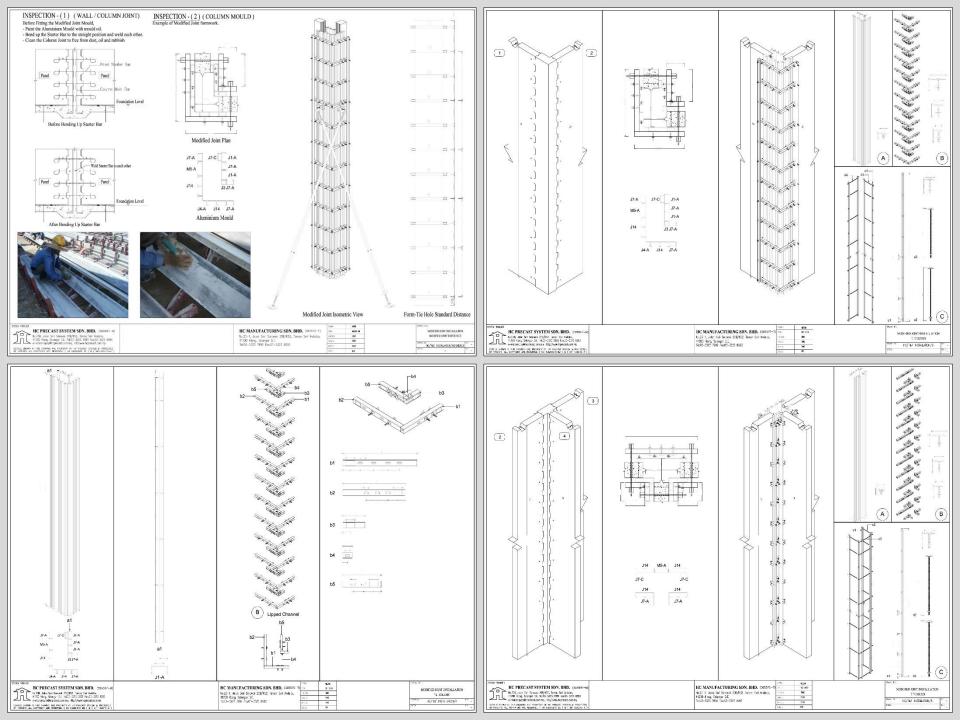


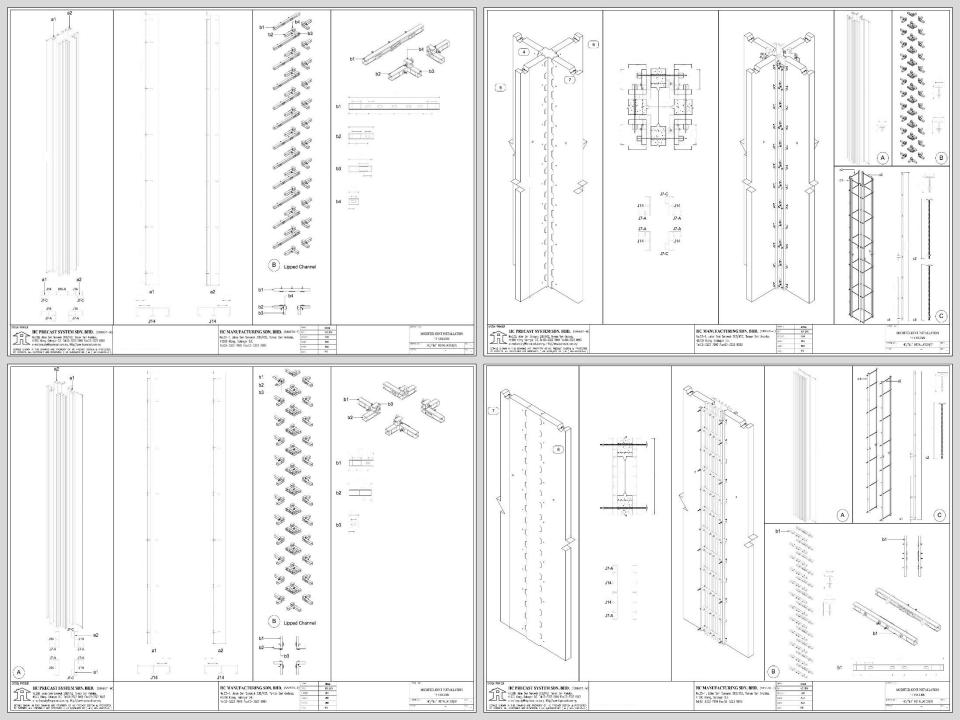


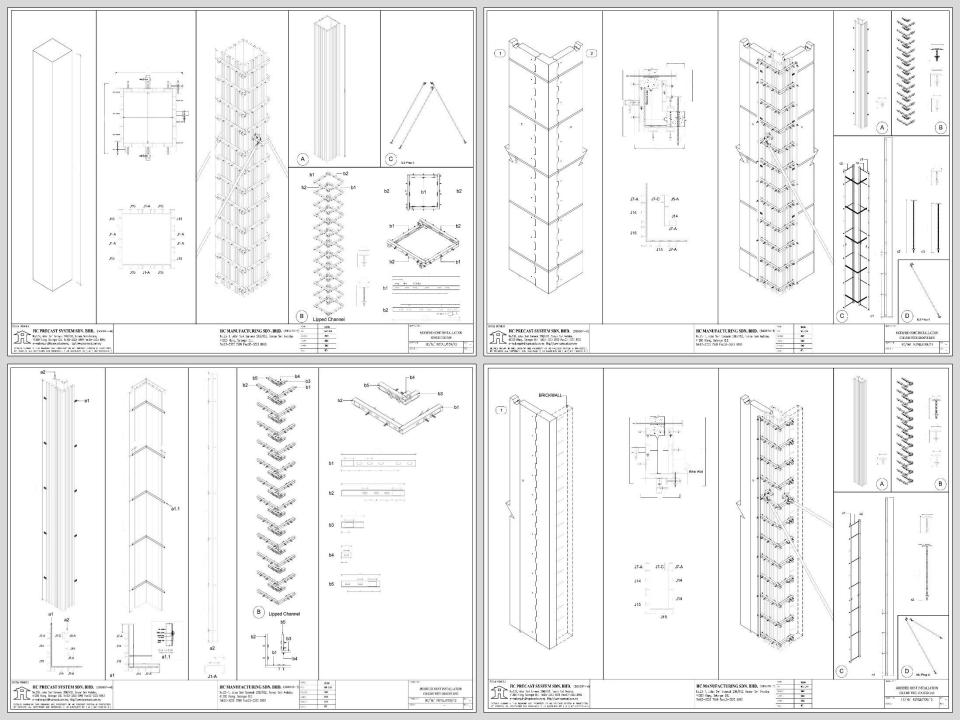


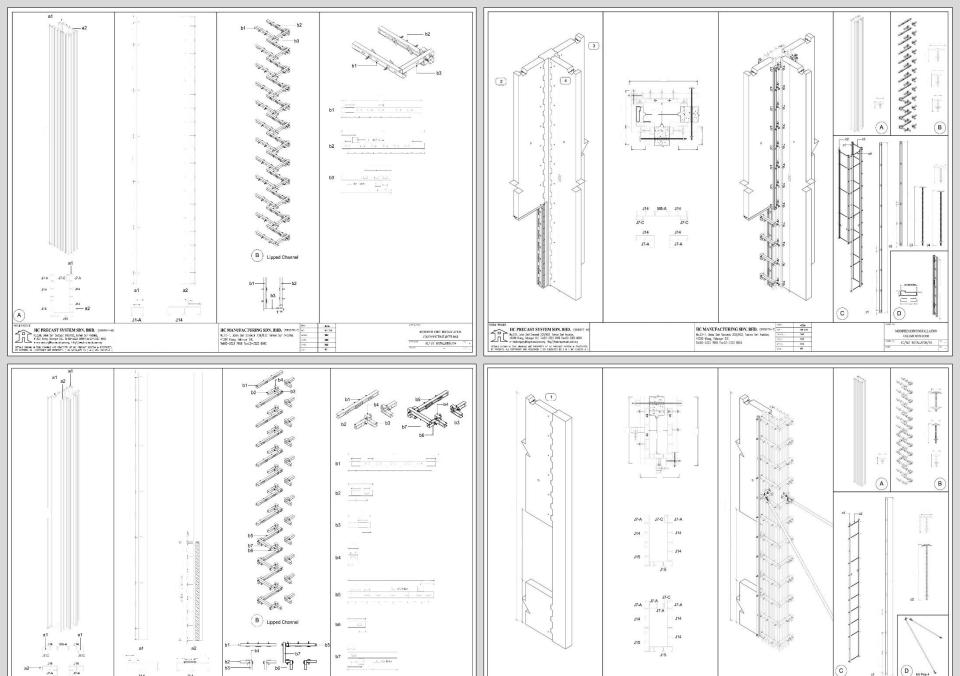












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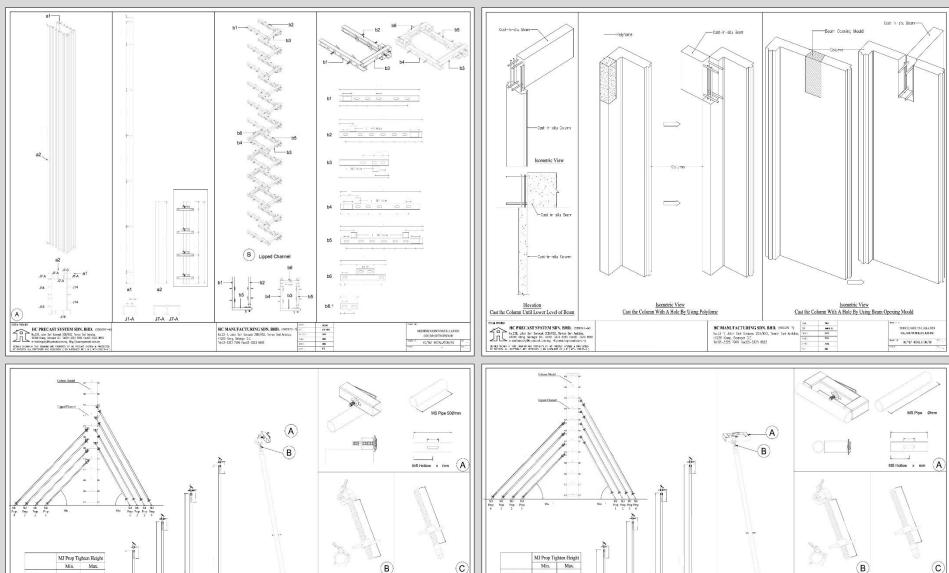
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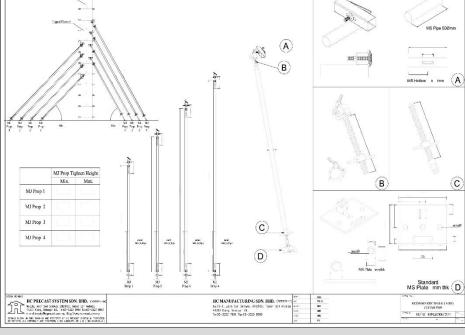
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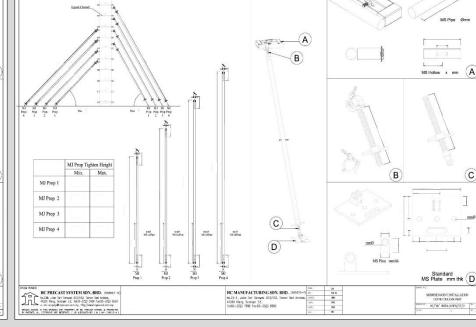
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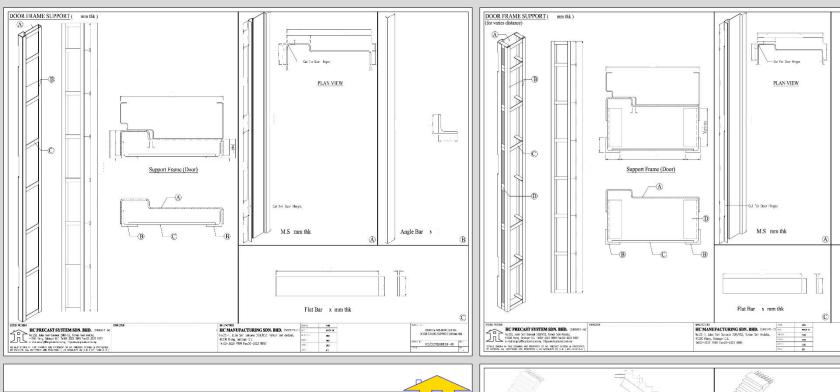




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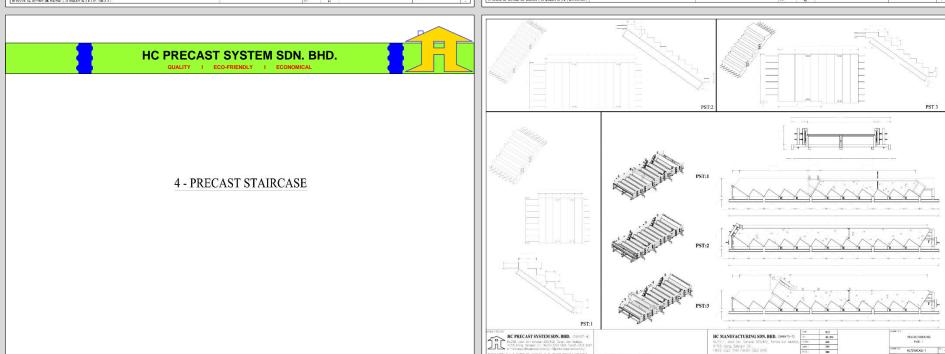
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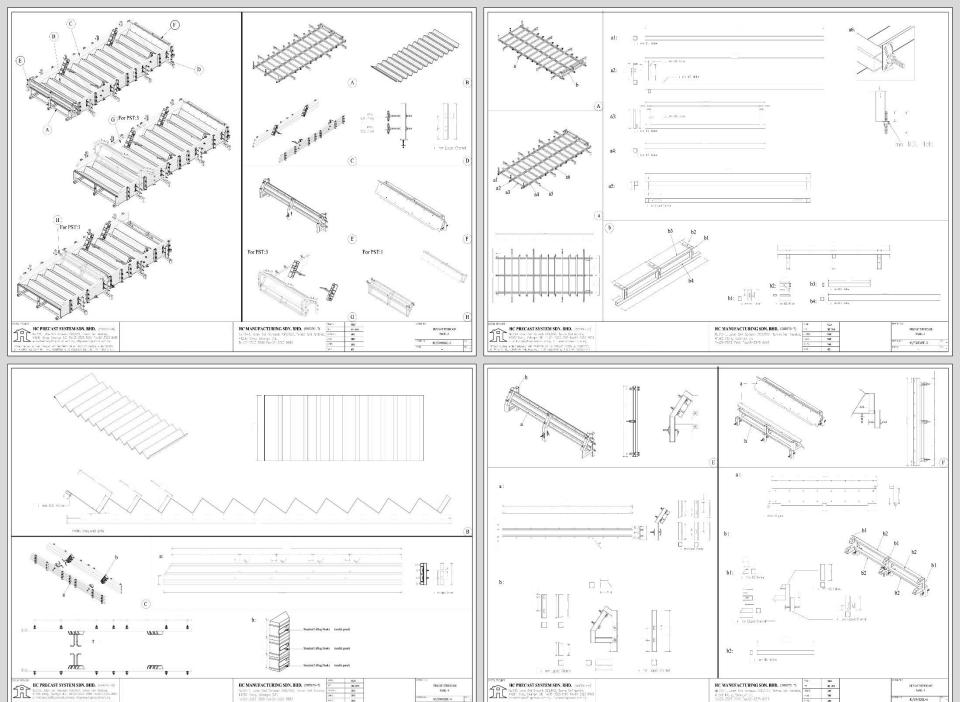
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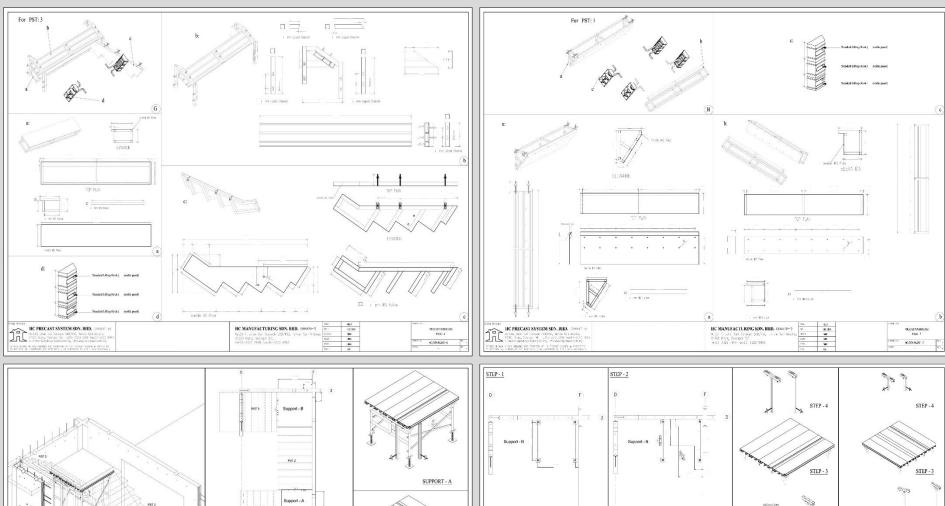


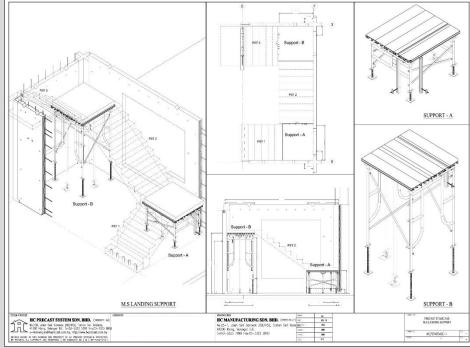
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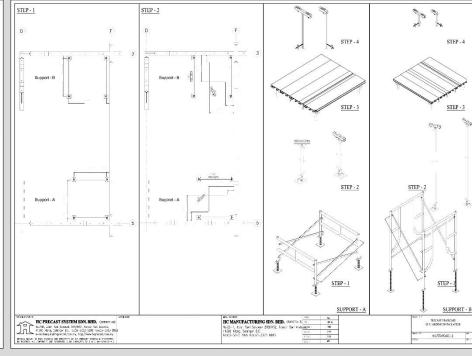
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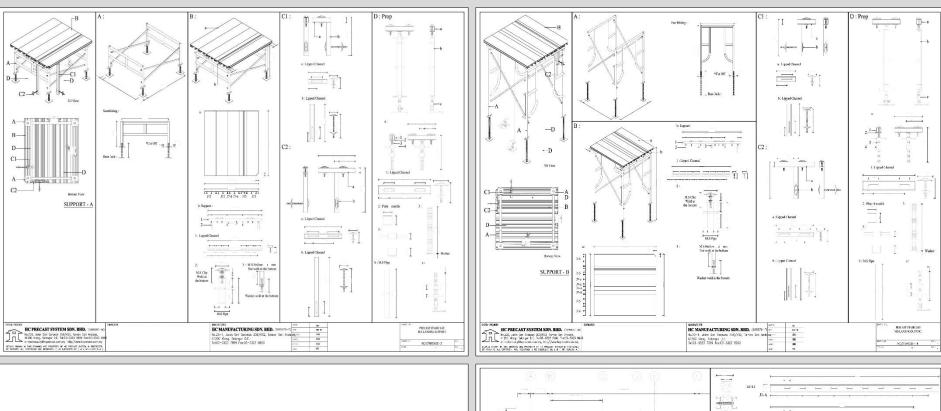


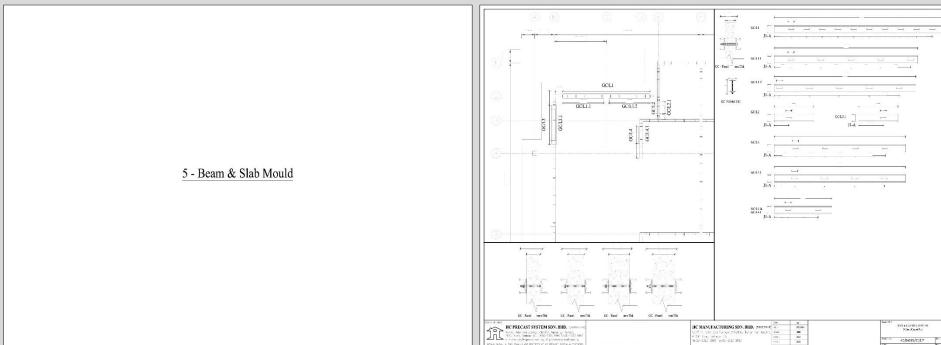


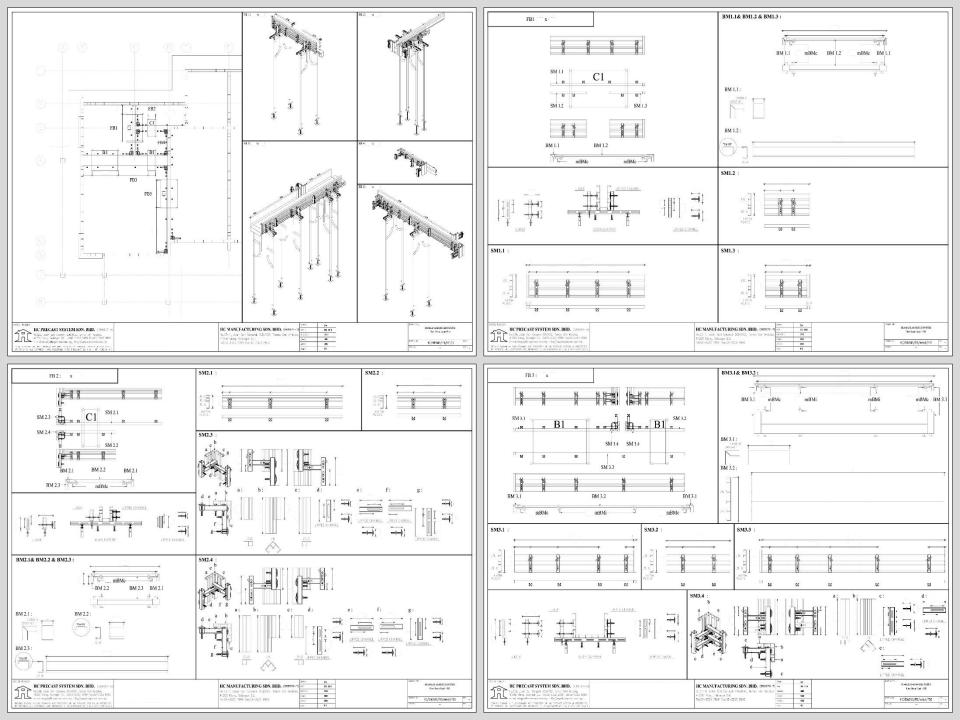


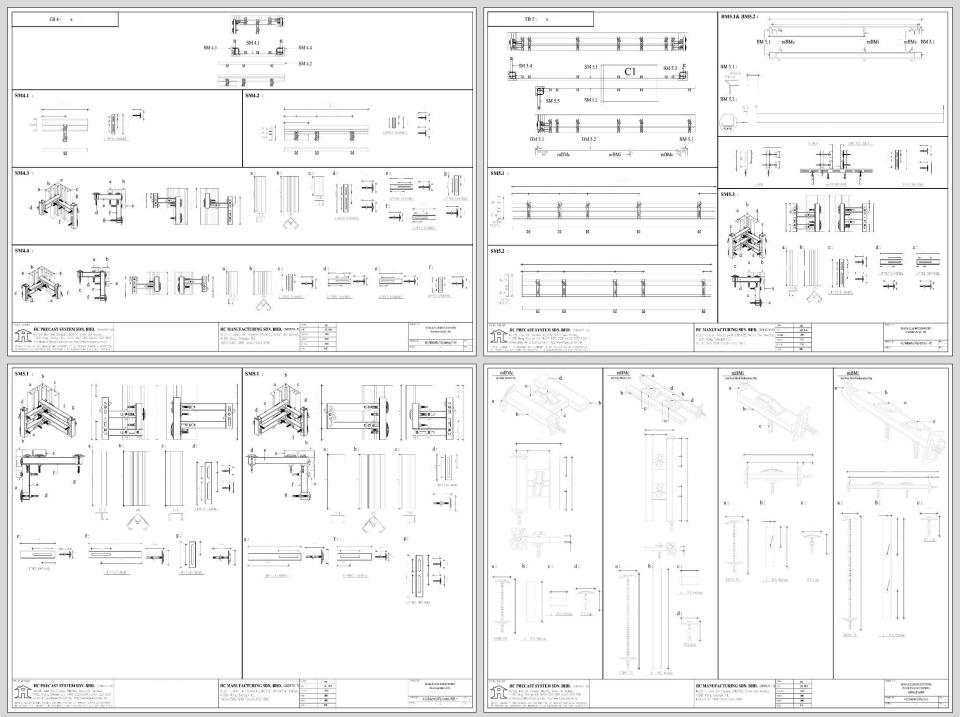


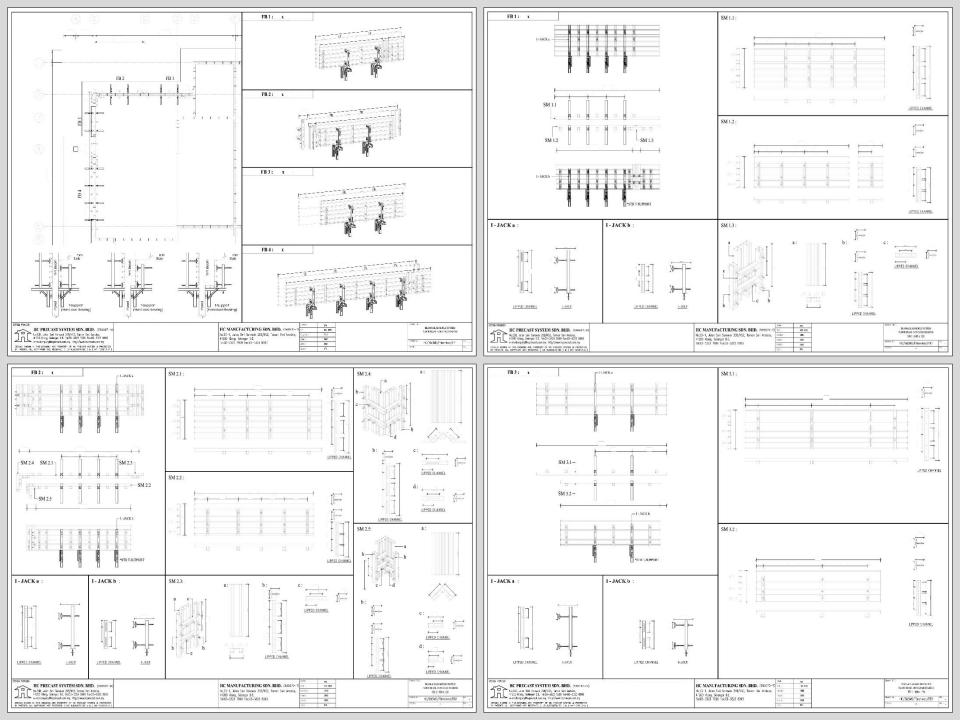


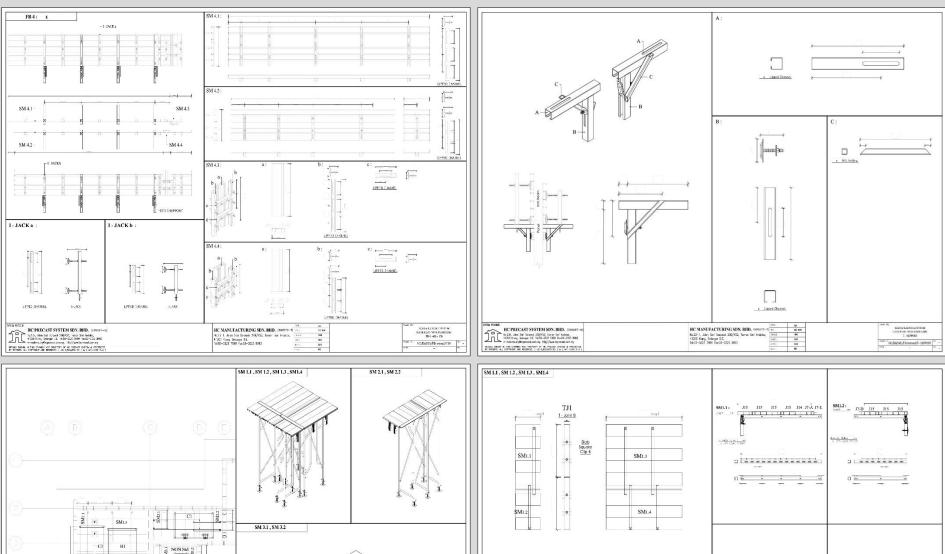


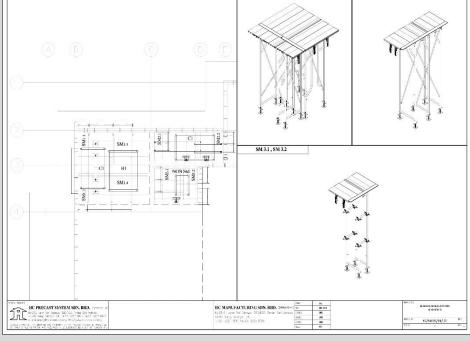


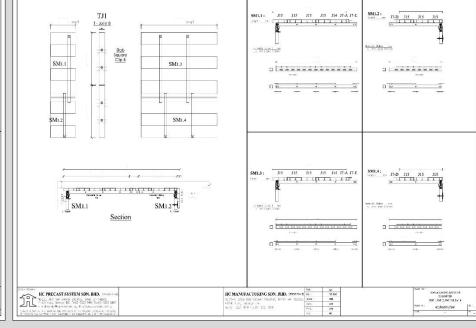


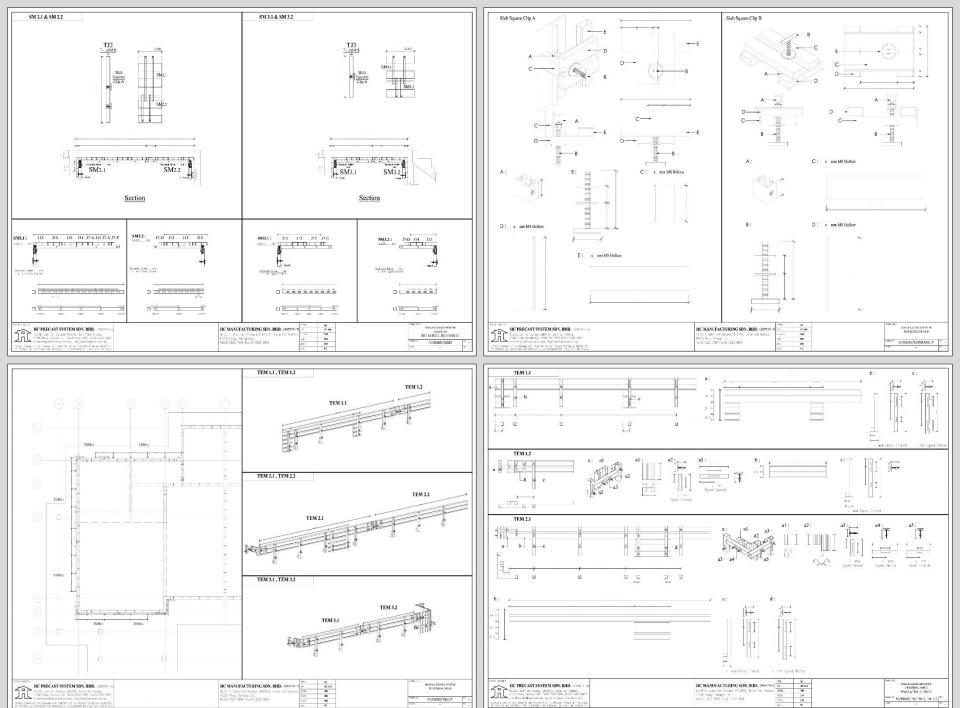










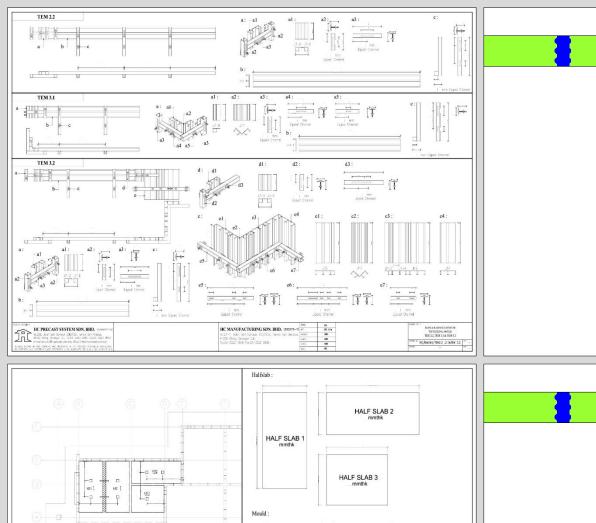


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* RO/ENSVS/ EVI 1612, TEV 2.1

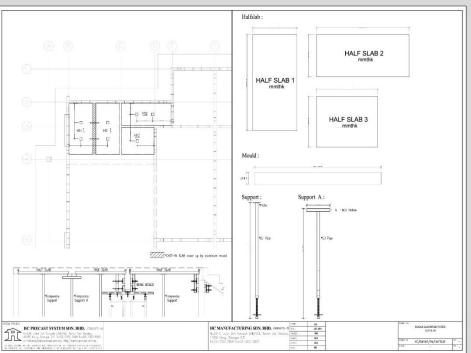
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HC MANUFACTURING SDN. BHD. (080070







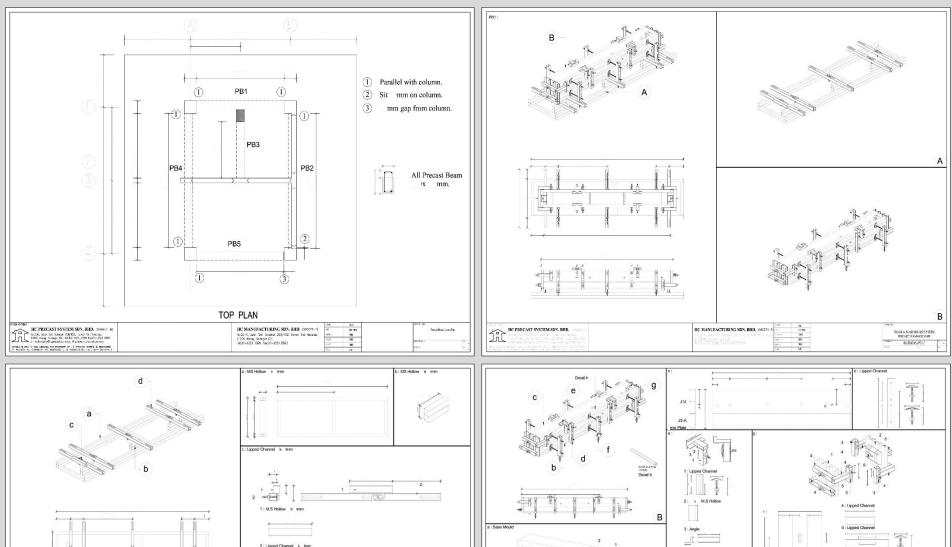


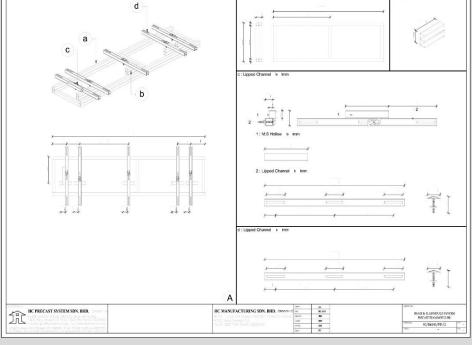


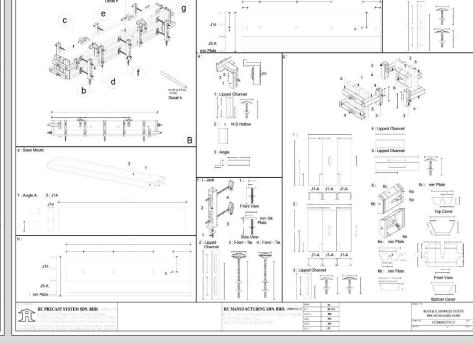
HC PRECAST SYSTEM SDN. BHD.

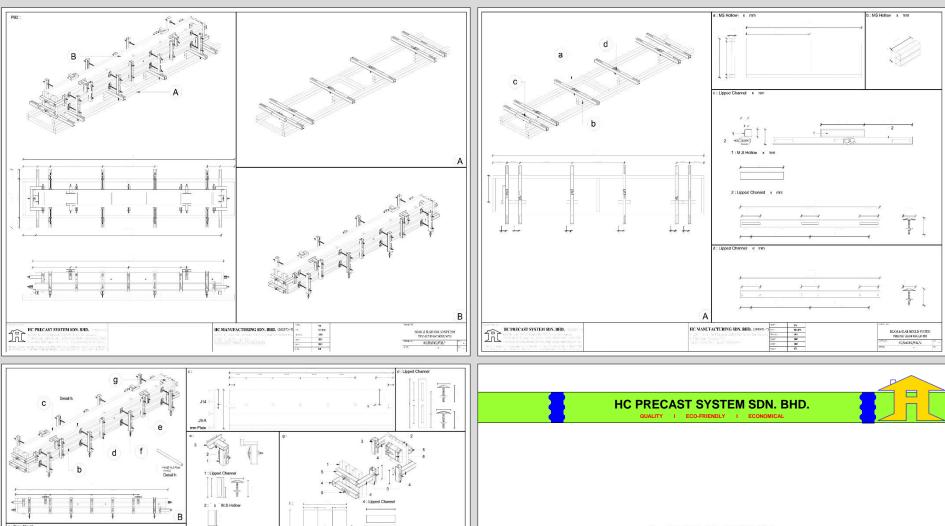
QUALITY I ECO-FRIENDLY I ECONOMICAL

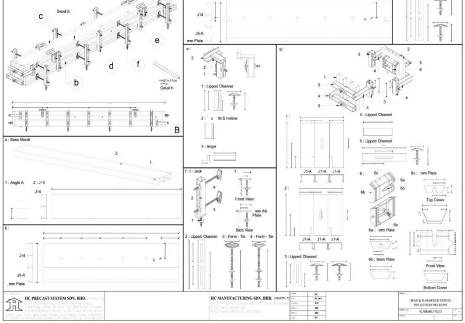
7 - PRECAST BEAM



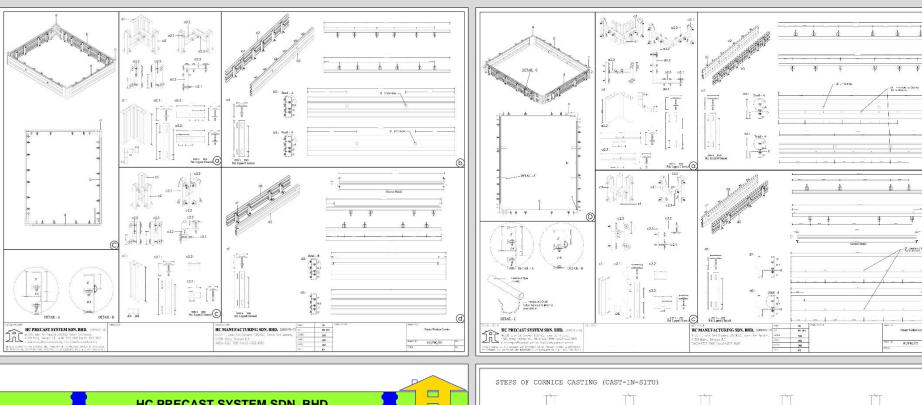


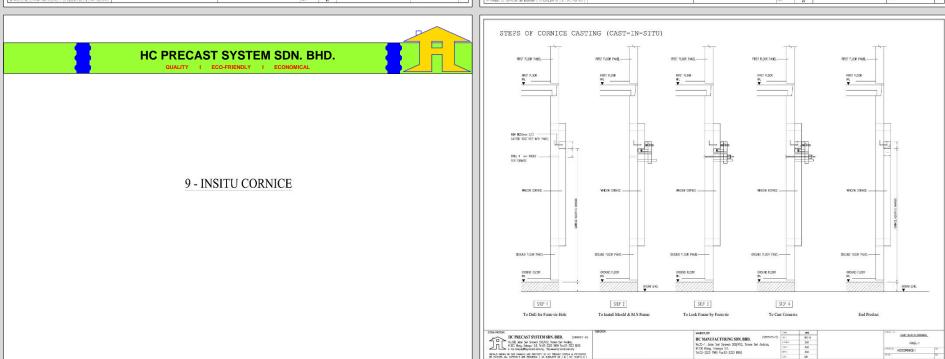


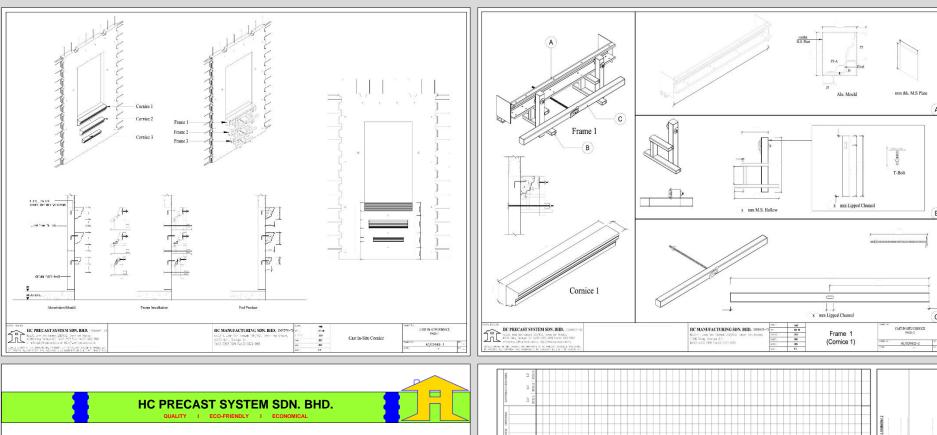


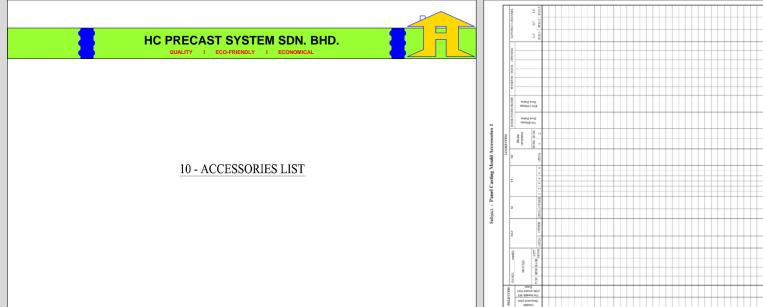


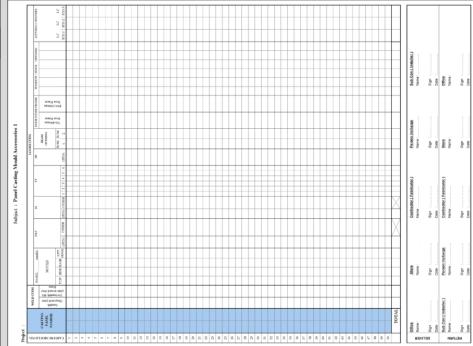


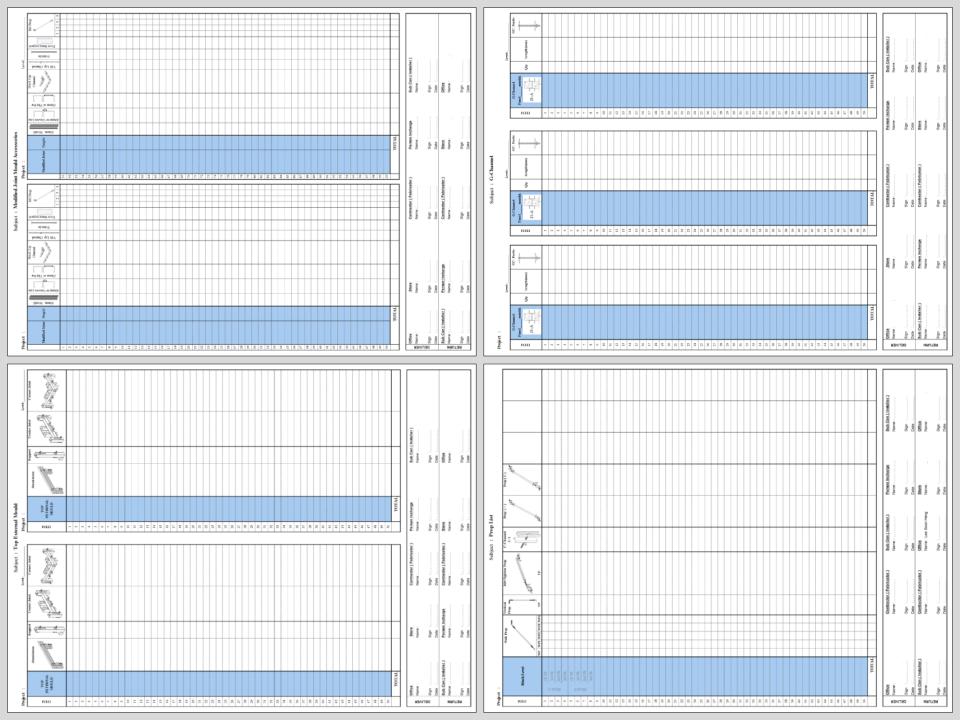










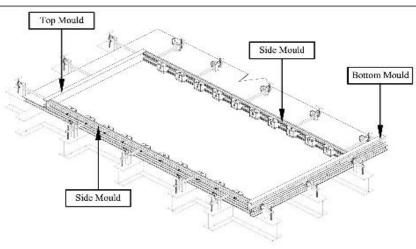


HCPS IBS SOLUTION



QUALITY I ECO-FRIENDLY I ECONOMICAL

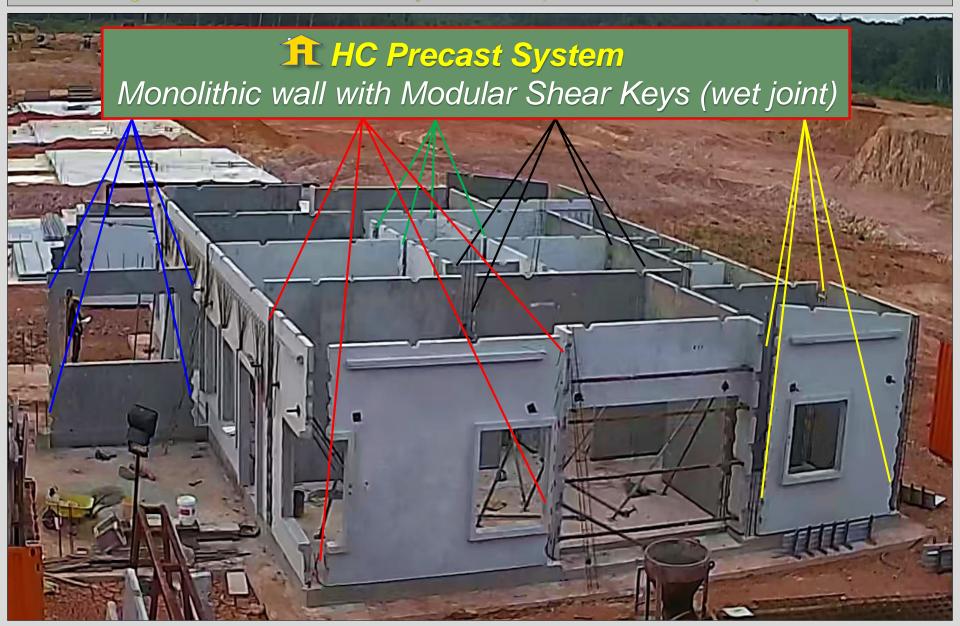




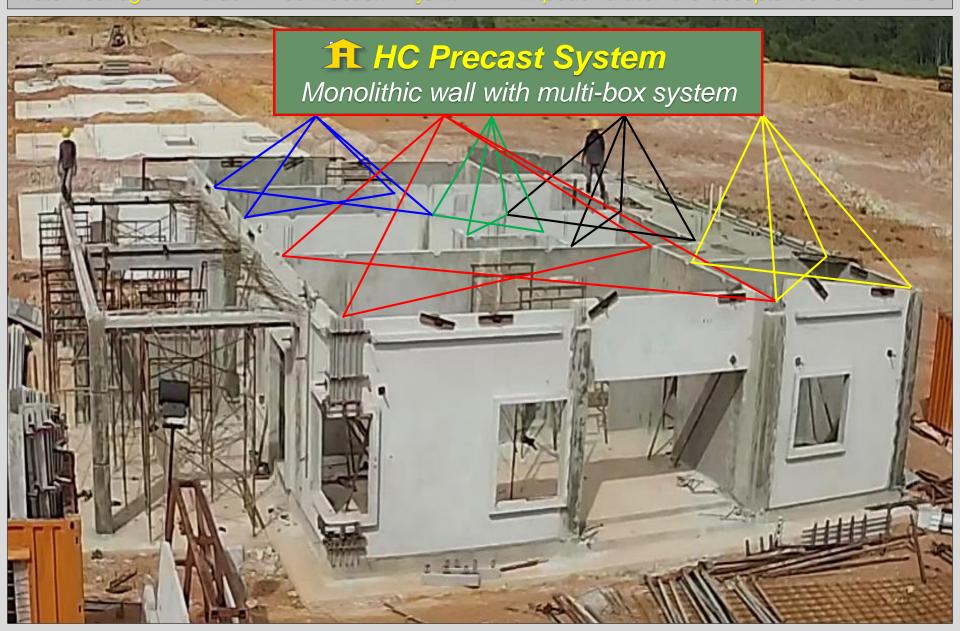
PRECAST PANEL									
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HC PRECAST SYSTEM SDN. BHD.	25.00	HC MANUFACTURING SDN, BHD, (S05576-) tet:	RE 30"	PANEL CASTING MOULD		PANEL CASTING MOULD	£.
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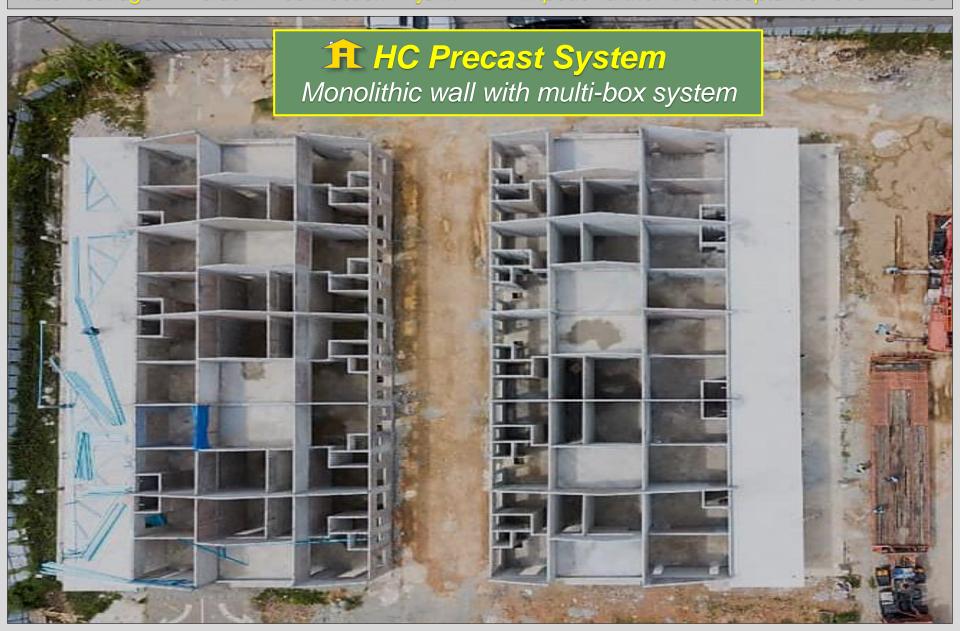
IBS is a **system**, not merely a component. It consists of the **main component** - the structural component but it requires an efficient and cost effective connection system to prevent the **commonly-faced** water leakage and **crack** at **connection** or **joint** which **impede further** the acceptance level of **IBS**.



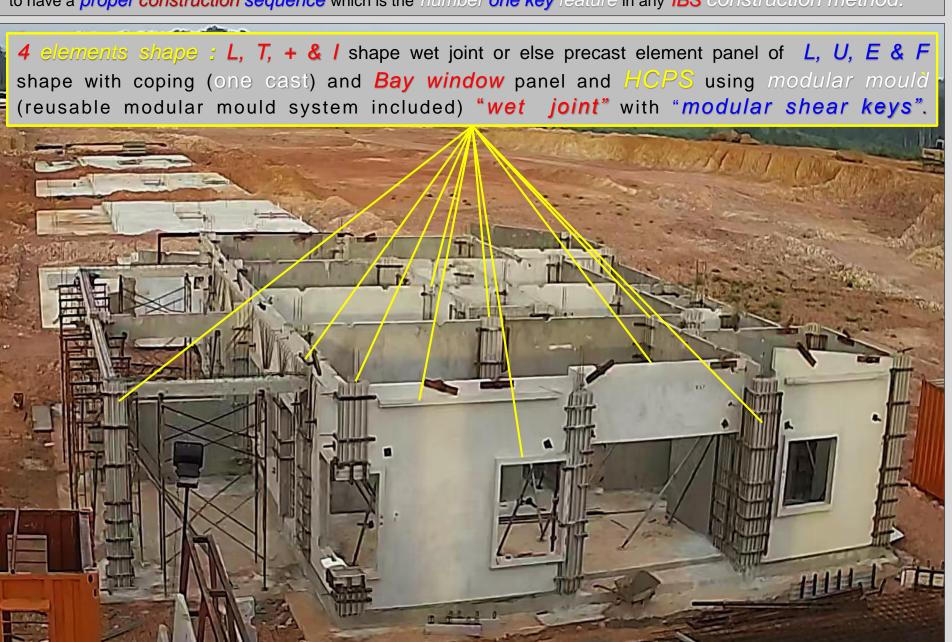
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HCPS can suit to wider range of Architectural demand due to the in-house mould design, engineering and fabrication to have a proper construction sequence which is the number one key feature in any IBS construction method.



HCPS can suit to wider range of *Architectural* demand due to the in-house *mould design*, *engineering* and *fabrication* to have a *proper construction sequence* which is the *number one key* feature in any *IBS* construction method.

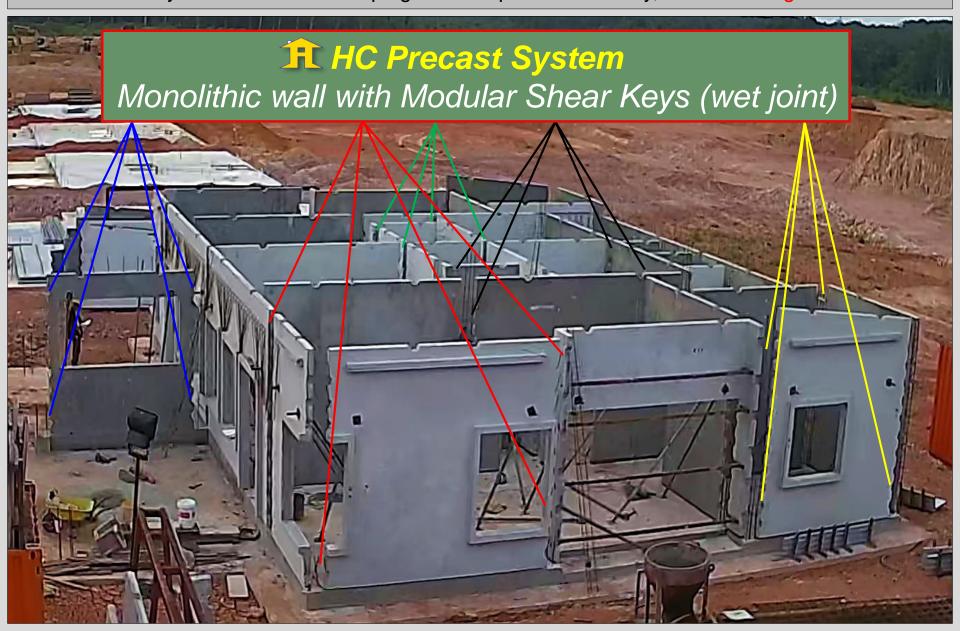




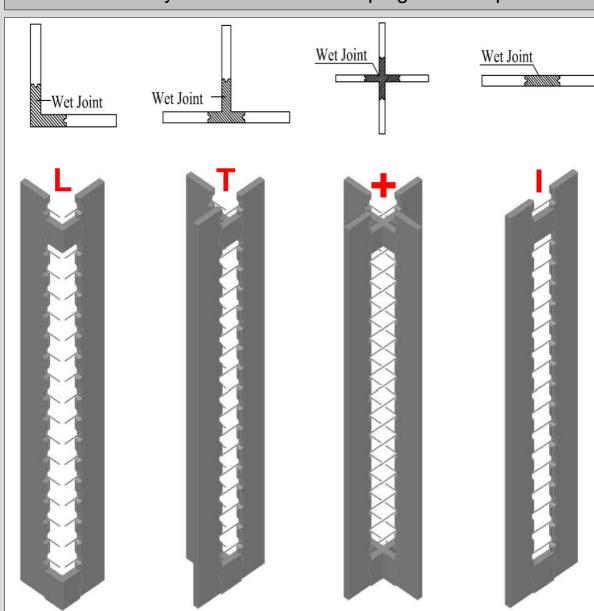




HC PRECAST SYSTEM SDN. BHD. (HCPS)'s success weighs heavily where most precast solutions have failed. Our revolutionary patented "shear key joint" system have managed to resolve the very issue which have plagued the precast industry, water leakages and crack.



HC PRECAST SYSTEM SDN. BHD. (HCPS)'s success weighs heavily where most precast solutions have failed. Our revolutionary patented "shear key joint" system have managed to resolve the very issue which have plagued the precast industry, water leakages and crack.



This patented system has helped to eradicate the most common issue with Precast Concrete construction, water leakages.

- Wet joint
- Tongue and groove
- Seamless interfacing



Industrialised Building System Provider

is one "Who" knows the "Way", goes the "Way" and shows the "Way"

IBS CONCEPT

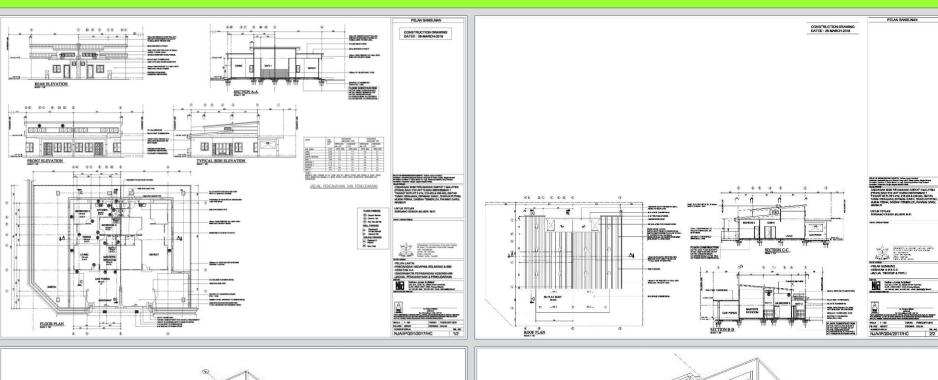
Precast Elements requirements to complete a building is sequence of work - 5 Steps

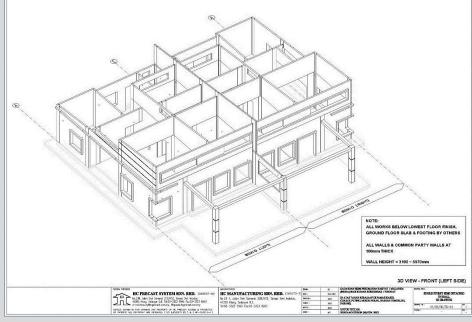
- i) Step 1 Drawing conversion:
 - 2D Architect drawing to 3D IBS system drawing
 - Original M&E drawing to M&E IBS system shop drawing
- ii) Step 2 (off-site): Mould fabrication
- iii) Step 3 (off-site): Production sequence (advance casting)
- iv) Step 4 (off-site): Delivery sequence (4 options)
- v) Step 5 (on-site): Installation sequence (numbering)

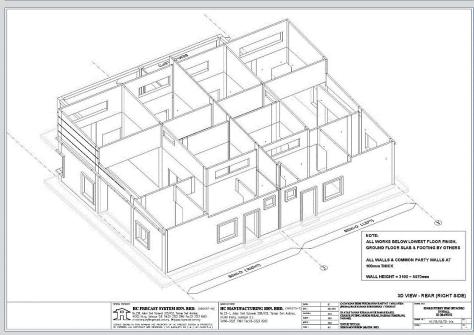
Speed
Decide by
Client

- Precast element comply to the Building by Law & Bsi code
- > Independent Checker on Shear Key (Wet Joint) for Precast R.C. wall panels

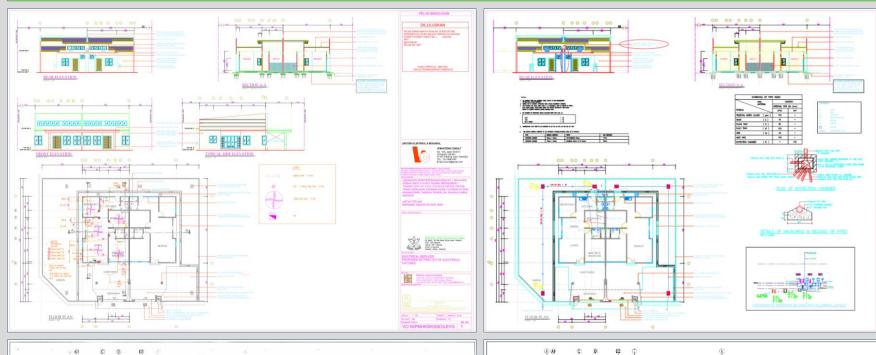
Step 1 - Drawing conversion: - 2D Architect drawing to 3D IBS system drawing (1 month)

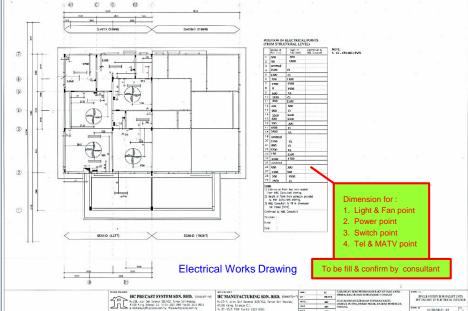


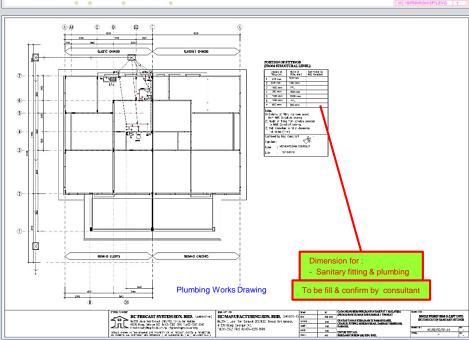




Step 1 - Drawing conversion : - Original M&E drawing to M&E IBS system shop drawing (1 month)

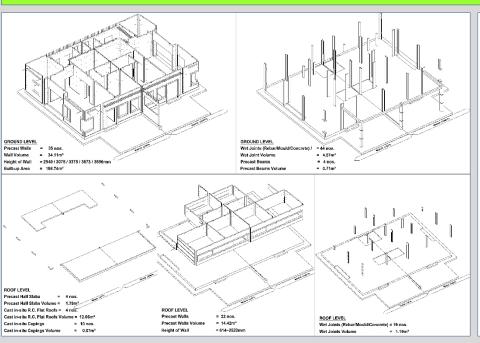






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Produce State-of-art Systemized Integrated 3D Digital Model

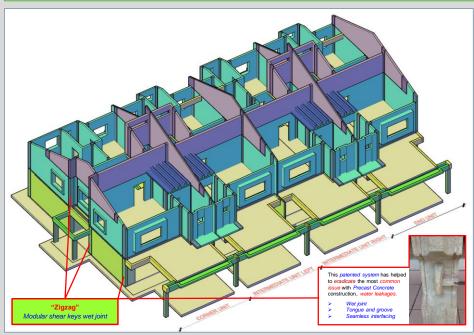




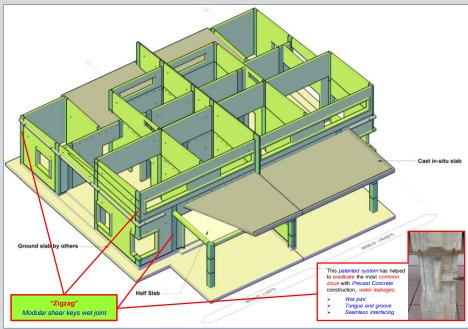


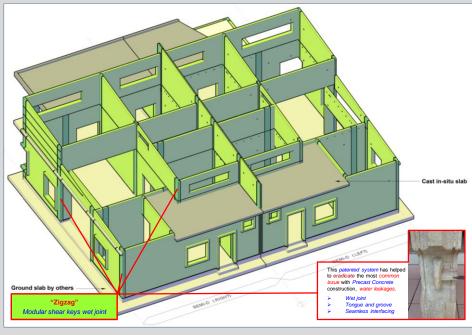


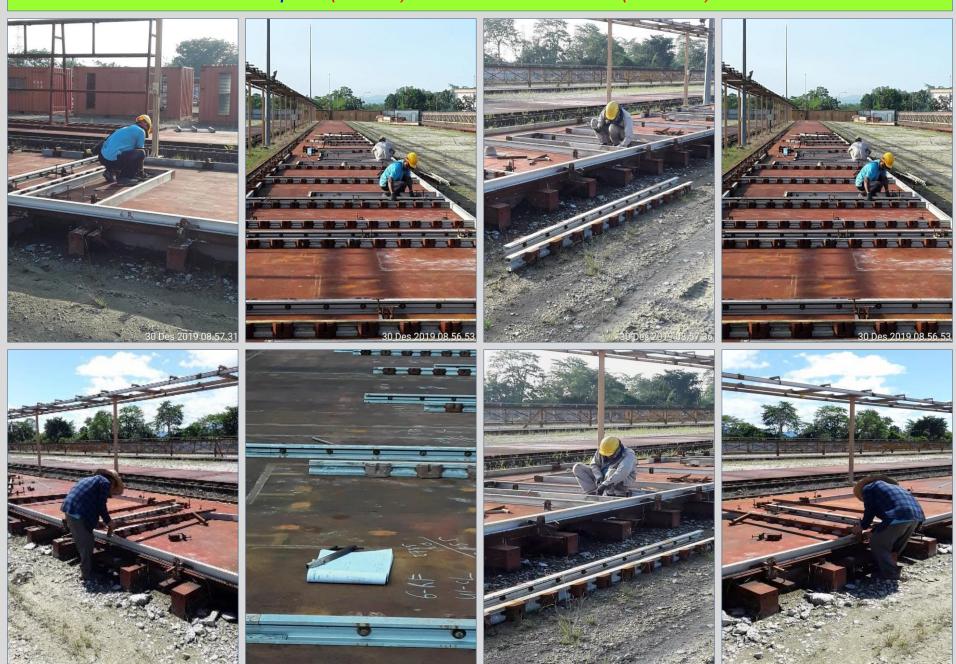
Produce State-of-art Systemized Integrated 3D Digital Model









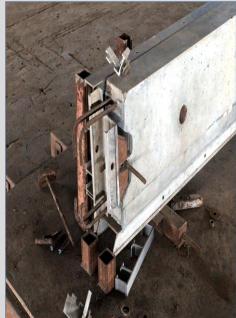














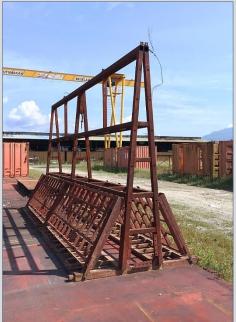










































Step 3 - (off-site): - Production advance casting (1 month)











Step 4 - (off-site & on-site): - Delivery sequence (4 options)

<u>Logistic Option (Decide by Client)</u>

- 1 Option 1
- Bay yard (factory) to block yard (project site)
- 2 Option 2 : Advance Casting
- Bay yard (factory) to site yard (project site)
- 3 Option 3: Advance Casting
 - Storage yard (factory) to block yard (project site)
- 4 Option 4: Advance Casting
 - Storage yard (factory) to site yard (project site)

Notes:

- a) Client / Consultant / Main contractor need to choose which option to be used before production.
- b) Rate for RM 900.00 / m3 includes for option 1 & 3.
- c) An additional of RM 30.00 / m3 need to be charges for option 2 & 4
- d) Crusher run base to be provided at site yard for option 1 4.













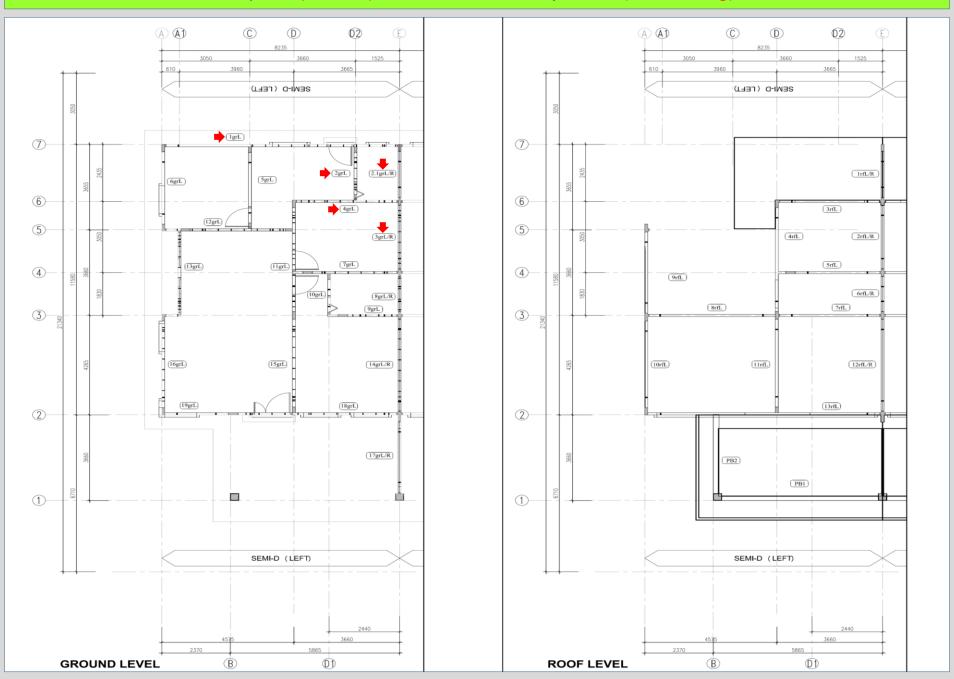








Step 5 - (on-site): - Installation sequence (numbering)



Precast element comply to the Building by Law & Bsi code

Uniform building by law:

- Page 35 section 86 (2) clearly stated the single storey house may be in load-bearing 100mm solid masonry or in-situ concrete.



- (3) Every brick or masonry wall of a building founded on strip ootings shall be provided with a damp proof course which shall
- eath 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;
- (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 abject to water pressure, that portion of the floor or wall below round level shall be waterproof.
- 85. For the purposes of this Part wherever references are made Monitor to the thickness of any brick wall, the maximum or minimum distress thickness of such wall shall not exceed the nominal thickness plus of wells or minus the maximum tolerance permissible under any standard



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

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			
Vertical formwork to columns, walls and large beams	12 h	$\frac{300}{t+10}\mathbf{h}$		
Soffit formwork to slabs	4 days	$\frac{100}{t+10}$ days		
Soffitt formwork to beams and props to slabs	10 days	$\frac{250}{t+10} \text{days}$		
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.

British Standard (BSI):

- BS 8110_1:1997 Page 21 Table 3.3
- Nominal cover to all reinforcement and Table 3.4
- Nominal cover to all *reinforcement* (including links) to meet specified periods of fire resistance



BS 8110-1:1997

Table 3.3 — Nominal cover to all reinforcement (including links) to meet durability requirements (see NOTE 1)

Conditions of exposure (see 3.3.4)	Nominal cover Dimensions in millimetres						
ld	25	20	20°	20°	20°		
derate	-	35	30	25	20		
rere	- :	-	40	30	25		
ry severe	-	-	50h	40°	30		
et severe	-	-	-	-	50		
rasive	-		-	See NOTE 3	See NOTE 3		
ximum free water/cement ratio	0.65	0.60	0.55	0.50	0.45		
nimum cement content (kg/m ³)	275	300	325	350	400		
west grade of concrete	C30	C35	C40	C45	C50		
TE 1 This table relates to normal-weight regates other than 20 mm nominal maxi TE 2. Use of sulfate resisting conent on	mum size are	detailed in Table	8 of BS 5328-1:1	997.			

re resistance	Nominal cover							
	Beams*		Floors		Ribs		Columns ³	
	Simply supported mm	Continuous	Simply supported mm	Continuous	Simply supported mm	Continuous	mm	
5	20 ^b	20°	20°	20°	20°	20°	20 ^h	
	20°	20 ^b	20	20	20	20 ^h	20 ^b	
	20	20 ^b	25	20	35	20	20	
	40	30	35	25	45	35	25	
	60	40	45	35	55	45	25	
	70	50	55	45	65	55	25	

Clearly stated of these BSI code are complied with.

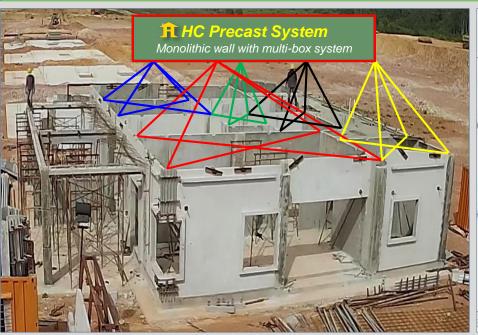


British Standard (BSI):

- BS 8110_1:1997 : Page 134. 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).



Independent Checker on Shear Key (Wet Joint) for Precast R.C. wall panels





Perunding PaduReka Sdn. Bhd.

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



IR. HO THEY SEE

55100 Kuala Lumpu

18 January 2010

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

- 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
- 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.
 - 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
 - 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 / 103 = 41.8 kN per key.

Page 1 of 3

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

> 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, $f_c \approx 47 \times 10^3 / 160 \times 79 \approx 3.72 \text{ N/mm}^2 (0.106 f_{cu})$ 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 π x 10 x 1.66 x 250 / 103 = 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 π x 10 x 2.96 x 250 / 3 = 23 kN per key and the ultimate shear capacity can remain at 41.8 kN per key

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

F_b is 0.95 f_yA_s; or the anchorage value of the reinforcement, whichever

 $F_b = 13 \text{ kN for } f_y = 250 \text{ N/mm}^2 \text{ (} f_b = 0.28 \sqrt{35} = 1.66 \text{ N/mm}^2 \text{)}$

 $F_b = 23 \text{ kN for } f_y = 460 \text{ N/mm}^2 (f_b = 0.5 \sqrt{35} = 2.96 \text{ N/mm}^2)$ 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

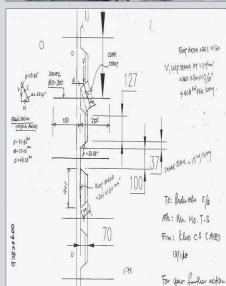
- is the angle of internal friction between the faces of the joint tanof is 1.7 from Table 5.3 of BS 8110; Part 1. However, this tanof is best determined by tests under Research and Development if

It is interesting to note that 0.6 tanof $\,\pm\,$ 1.0 and V $\,\approx\,$ F_b.

The total ultimate shear capacity of the shear key joint is assessed as

From (c) above, for R10 dowel, V_c = From (d) above, for R10 dowel, $V_a =$ 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



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 with out 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.

