Fully Prefabricated Concrete Structure

by McDB Co., Ltd.

About Us

McDB Co., Ltd. is an engineering firm established in 2018 by group of expertise engineers. We are professional engineering firm licensed by the Council of Engineers Thailand (COET) with wide range of experiences in many uses of residential, hospitality, commercial, and industrial in both Thailand and Cambodia. From 2022 onwards, we expand our services to the Civil Work & MEP engineering by establishing **MC MEP Co., Ltd.** which is subsidiary of McDB.

At McDB, service culture is at the core of our business. We sincerely hope that we can use our knowledge and expertise to help our clients to have a successful project.

About Us

สภาวิศวกร

ตามพระราชบัญญัติวิศวกร พ.ศ. ๒๕๔๒
ใบอนุญาตฉบับนี้ให้ไว้เพื่อแสดงว่า

บริษัท เอ็มซีดีบี จำกัด

ได้รับอนุญาตประกอบวิชาชีพวิศวกรรมควบคุม

เลขทะเบียน ๒๔๔๓/๖๕

ตั้งแต่วันที่ ๑๓ ธันวาคม ๒๕๖๕ ถึงวันที่ ๑๒ ธันวาคม ๒๕๖๘

(นายปิยะบุตร วานิชพงษ์พันธุ์)
นายกสภาวิศวกร

Fully Prefabricated Concrete Structure : Technology Transfer to McDB Co., Ltd.

TAISEI
For a Lively World

บริษัท คอนซัลแทนท์ ออฟ เทคโนโลยี จำกัด
Consultants of Technology Co., Ltd.

บริษัท เคพีซี พรีแฟบ จำกัด
KPC PREFAB

Butterfly Estate at Tuen Mun, Hong Kong

13th Asian Games Dormitory, Thailand

The Key Condominium Wutthakat II

"Standing on the shoulders of giants"

Using the understanding gained by major thinkers who have gone before in order to make intellectual progress

From the Past...

TAISEI
For a Lively World

HNICAL DATA

ON

THE TAISEI TILT-UP PROCESS

FOR

BUTTERFLY ESTATE

AT TUEN MUN AREA 28 SITE 'A'

JOINT VENTURE

OF

TAISEI CORPORATION
TAISEI PREFAB CONSTRUCTION CO., LTD.
C. ITOH & CO., LTD.
SUNG FOO KEE LTD.
T. K. SHEN CONSTRUCTION CO.

CONSULTANT

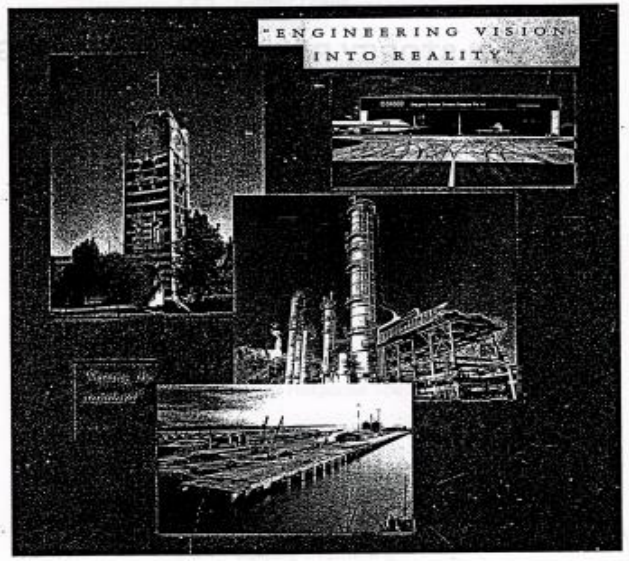
H. K. CHENG & ASSOCIATES

H. K. CHENG
BSc, DIC, CEng, FIStructE, F ASCE, F HKIE
Authorised Person - Registered Structural Engineer

Holmes

HOLMES CONSULTING GROUP
CONSULTING ENGINEERS

STRUCTURAL ENGINEERING



STRUCTURAL DESIGN OF MULTI-STOREY
RESIDENTIAL BUILDING CONSTRUCTED IN
PRECAST CONCRETE, FOR EARTHQUAKE ZONES

From the Past...

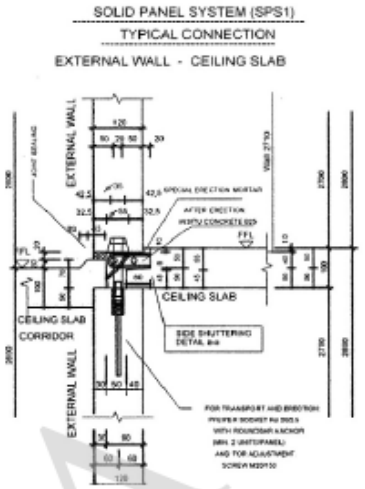
รายงานการศึกษาฉบับสุดท้าย (Final Report)

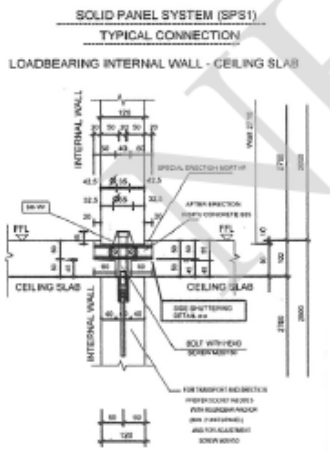
โครงการติดตามและประเมินผล
การก่อสร้างระบบอุตสาหกรรมอาคารพักอาศัย
กรณีศึกษาโครงการบ้านเอื้ออาทร

เสนอ
การเคหะแห่งชาติ (กคช.)
กระทรวงการพัฒนาสังคมและความมั่นคงของมนุษย์

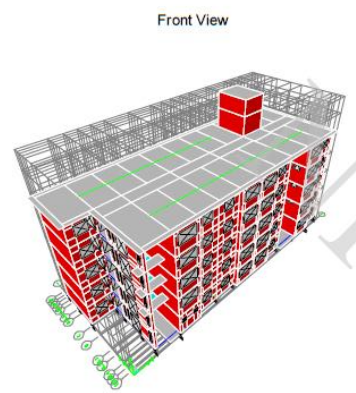
จัดทำโดย
บริษัท คอนซัลแทนท์ ออฟ เทคโนโลยี จำกัด
Consultants of Technology Co., Ltd.
39 ซอย ลาดพร้าว 124 แขวง/เขตวังทองหลาง กรุงเทพฯ 10310
Tel. 0 2934 3233-47 Fax. 0 2934 3249 e-mail : cot@cot.co.th

กันยายน 2548





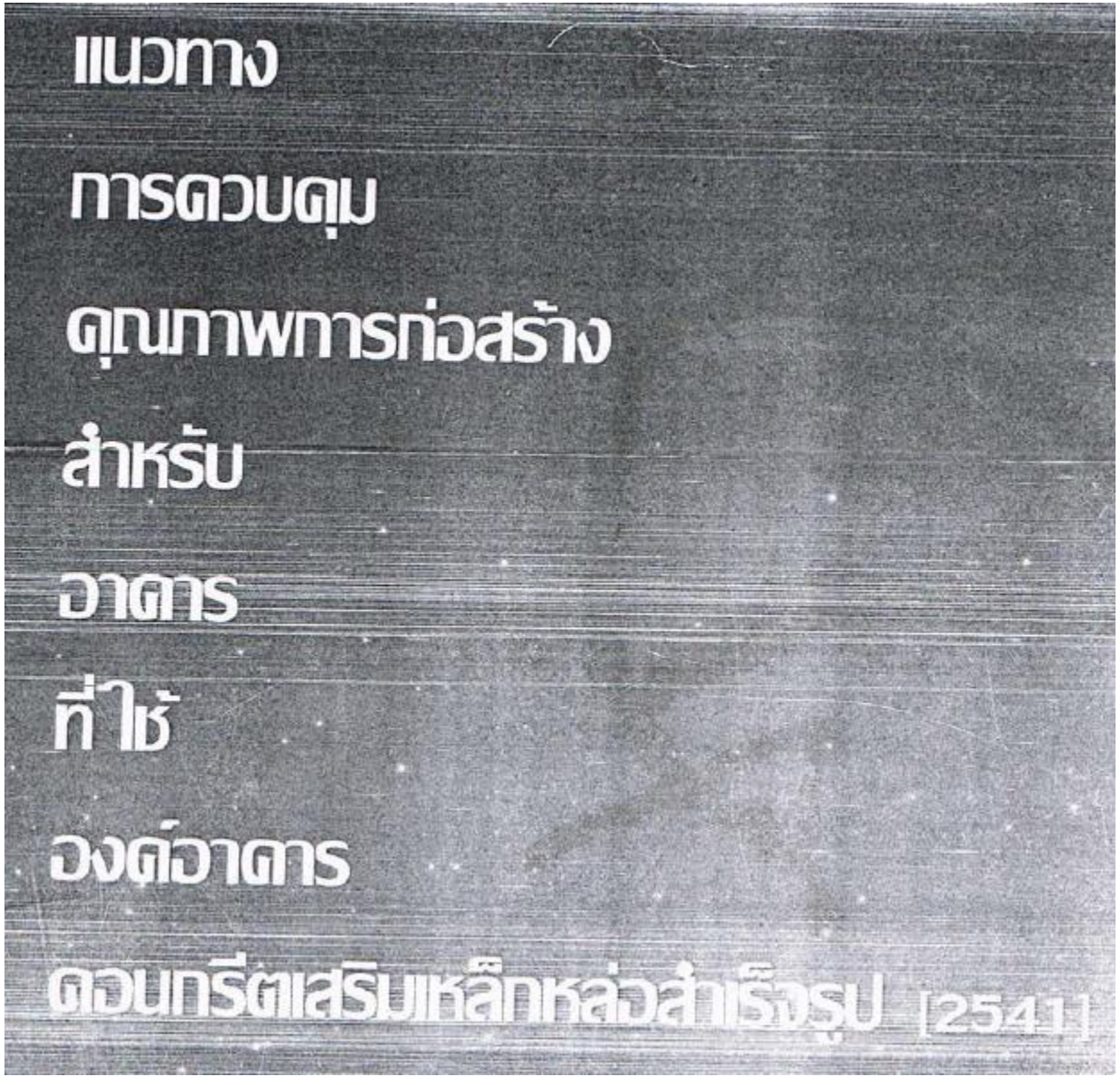
รูปที่ 4.3 แสดงรอยต่อระหว่างผนังกับพื้นของอาคารแฟลต 5 ชั้น F1 ระบบผนังรับน้ำหนัก



รูปที่ 3.5 แสดงลักษณะของ Battery Mould (Mould แนวตั้ง) ที่ควบคุมการทำงานด้วยไฟฟ้า

รูปที่ 3.6 แสดงลักษณะ Mould ของ บริษัท อิตาเลี่ยนไทยฯ

From the Past...



คำนำ

เอกสารเรื่อง "แนวทางการควบคุมคุณภาพการก่อสร้างสำหรับอาคารที่ใช้องค์อาคารคอนกรีตเสริมเหล็กสำเร็จรูป(2541)" นี้ จัดทำขึ้นตามโครงการ"การพัฒนาเทคโนโลยีการก่อสร้างที่อยู่อาศัยราคาประหยัด" ซึ่งได้รับการสนับสนุนจากองค์การความร่วมมือระหว่างประเทศของญี่ปุ่นในช่วงปี พ.ศ. 2538–2541

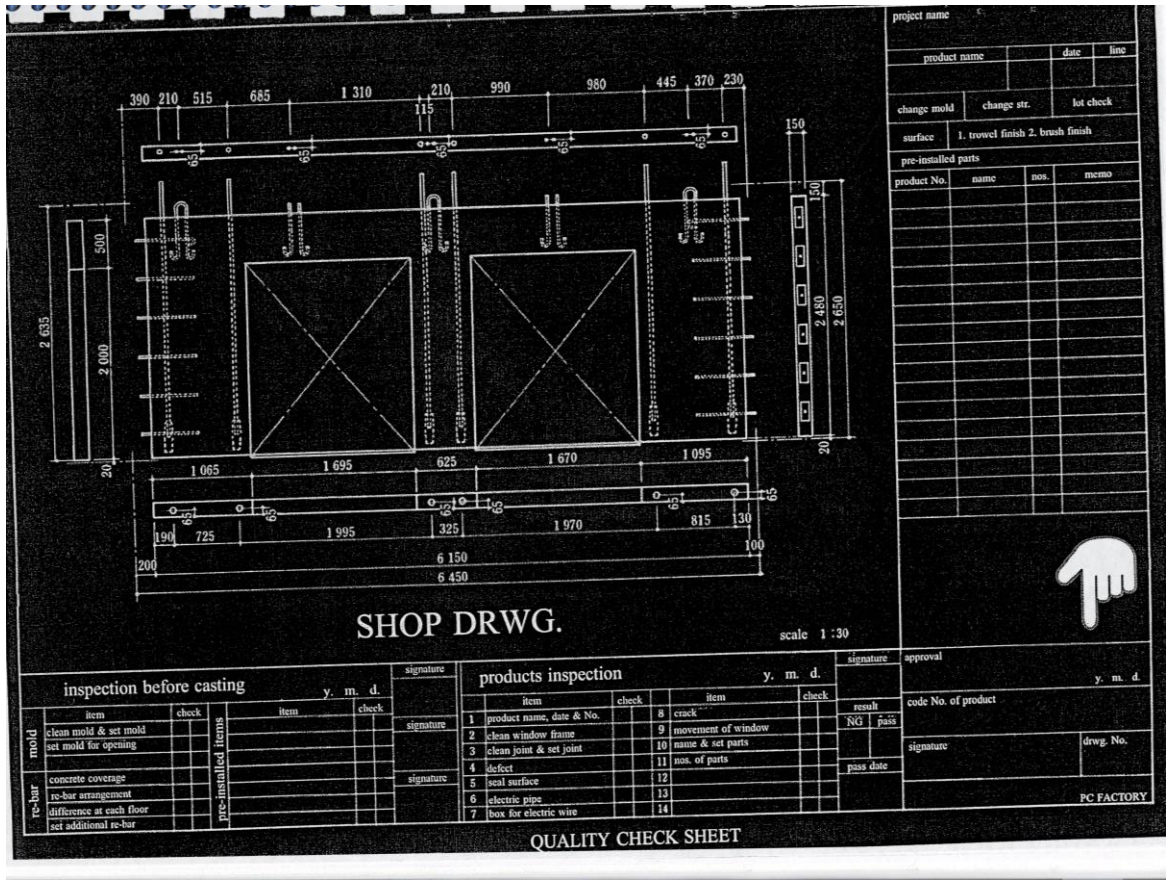
เดิมเอกสารฉบับนี้เรียบเรียงขึ้นเป็นภาษาอังกฤษในปี พ.ศ. 2541 และต่อมาได้ถูกแปลเป็นภาษาไทย โดยมีจุดมุ่งหมายให้ใช้ประโยชน์ในการควบคุมคุณภาพและมาตรฐานการก่อสร้าง แม้ว่าเนื้อหาของเอกสารนี้จะอิงมาตรฐานการก่อสร้างแบบญี่ปุ่นเป็นหลักก็ตาม คณะทำงานก็คาดหวังว่าจะอำนวยประโยชน์แก่ผู้เกี่ยวข้องกับสาขาวิชาชีพนี้ ตลอดจนถึงผู้สนใจอื่น ๆ บ้างตามสมควร

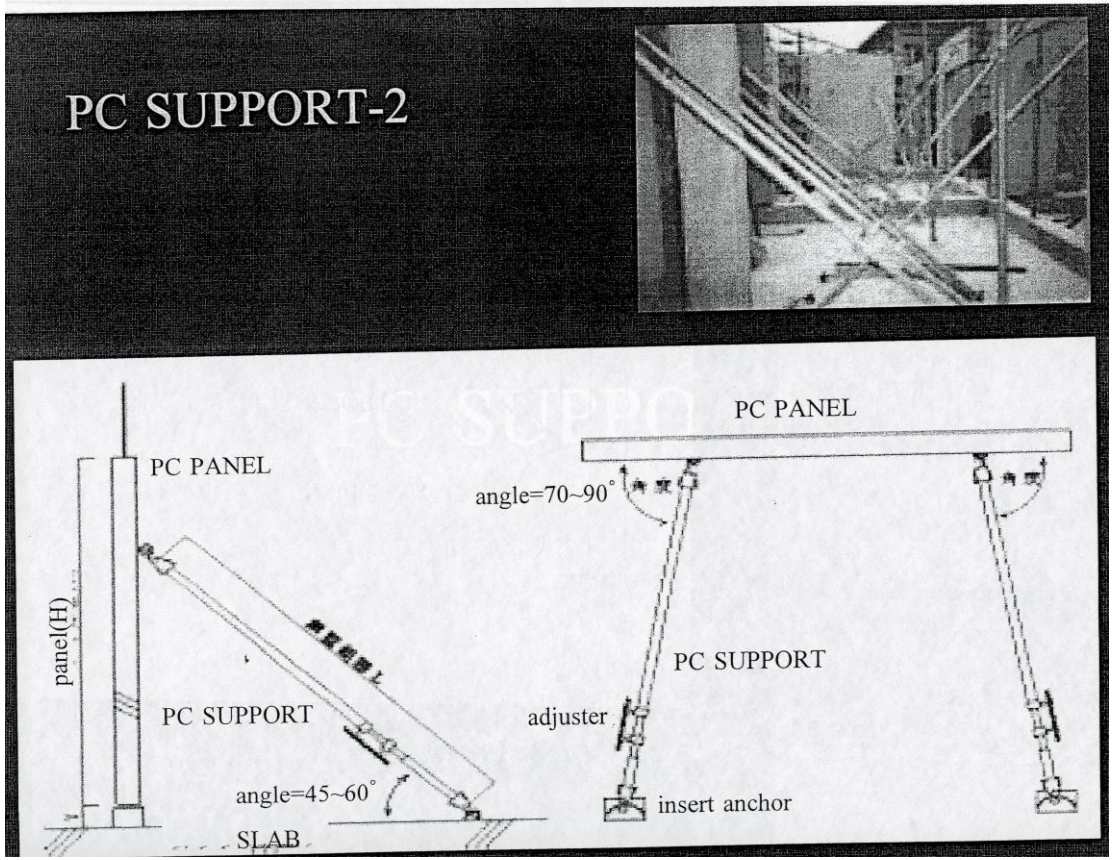
อนึ่ง เอกสารนี้เป็นรายงานการศึกษาเบื้องต้นเท่านั้น คณะทำงานจึงปรารถนาให้มีการปรับปรุงและปรับใช้เข้ากับรูปแบบของประเทศไทยต่อไป

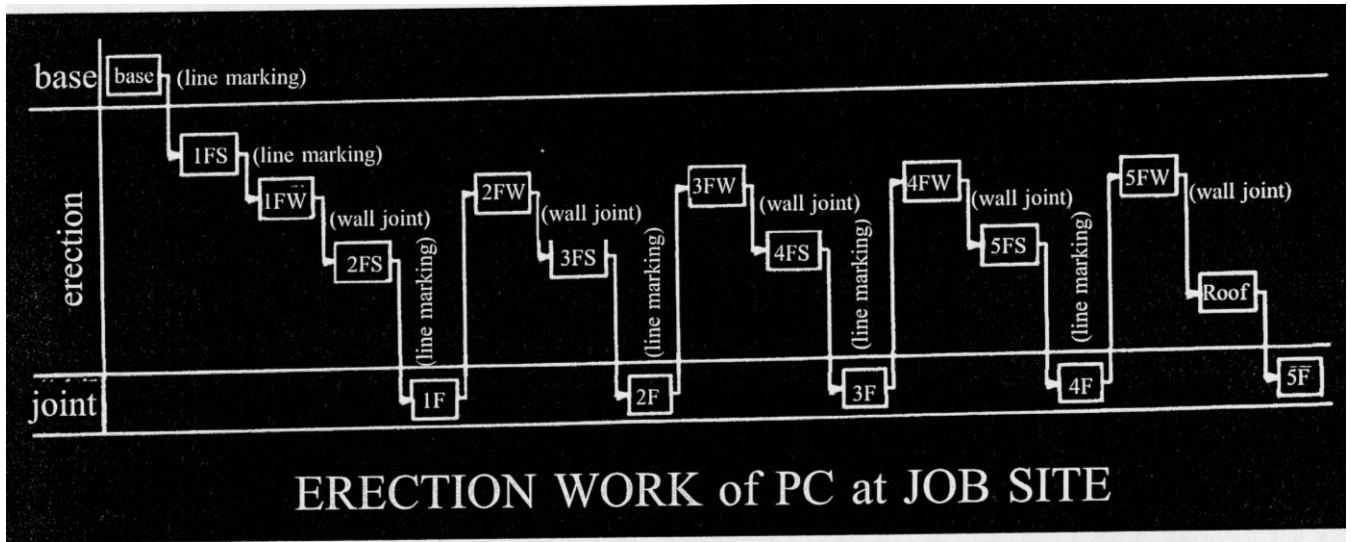
ฮิโระคะสุ อาซูมา
ผู้เชี่ยวชาญใจก้า
คณะทำงาน Mini Project
การเคหะแห่งชาติ

รายละเอียดเพิ่มเติม โปรดติดต่อ
นายชูเกียรติ นิมมานนิตย์
ฝ่ายโครงการก่อสร้าง 2 การเคหะแห่งชาติ
โทร. (02) 377-5501 ต่อ 6041
E-mail : chookiatn@yahoo.com

From the Past...







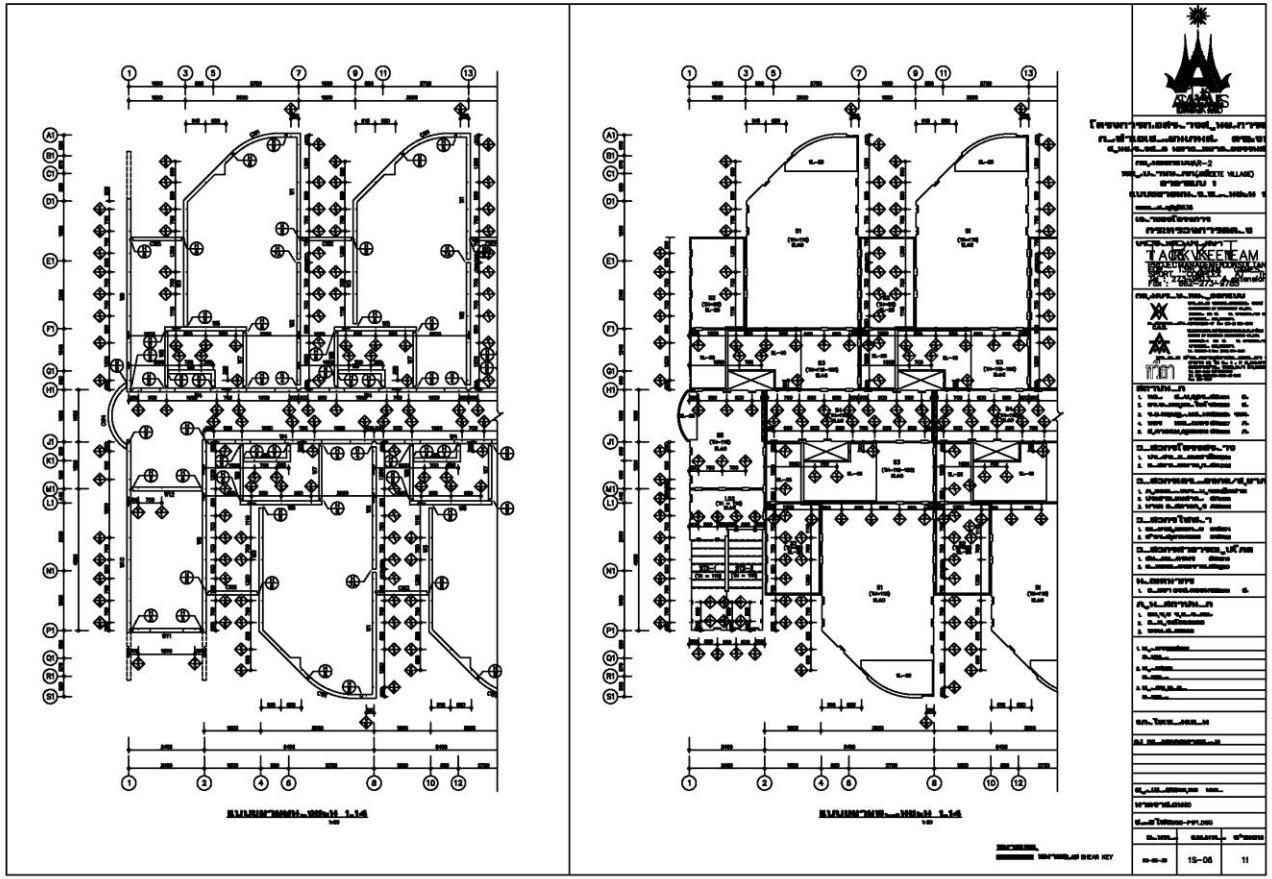
「JASS 10 プレキャスト鉄筋コンクリート工事」
の改定について

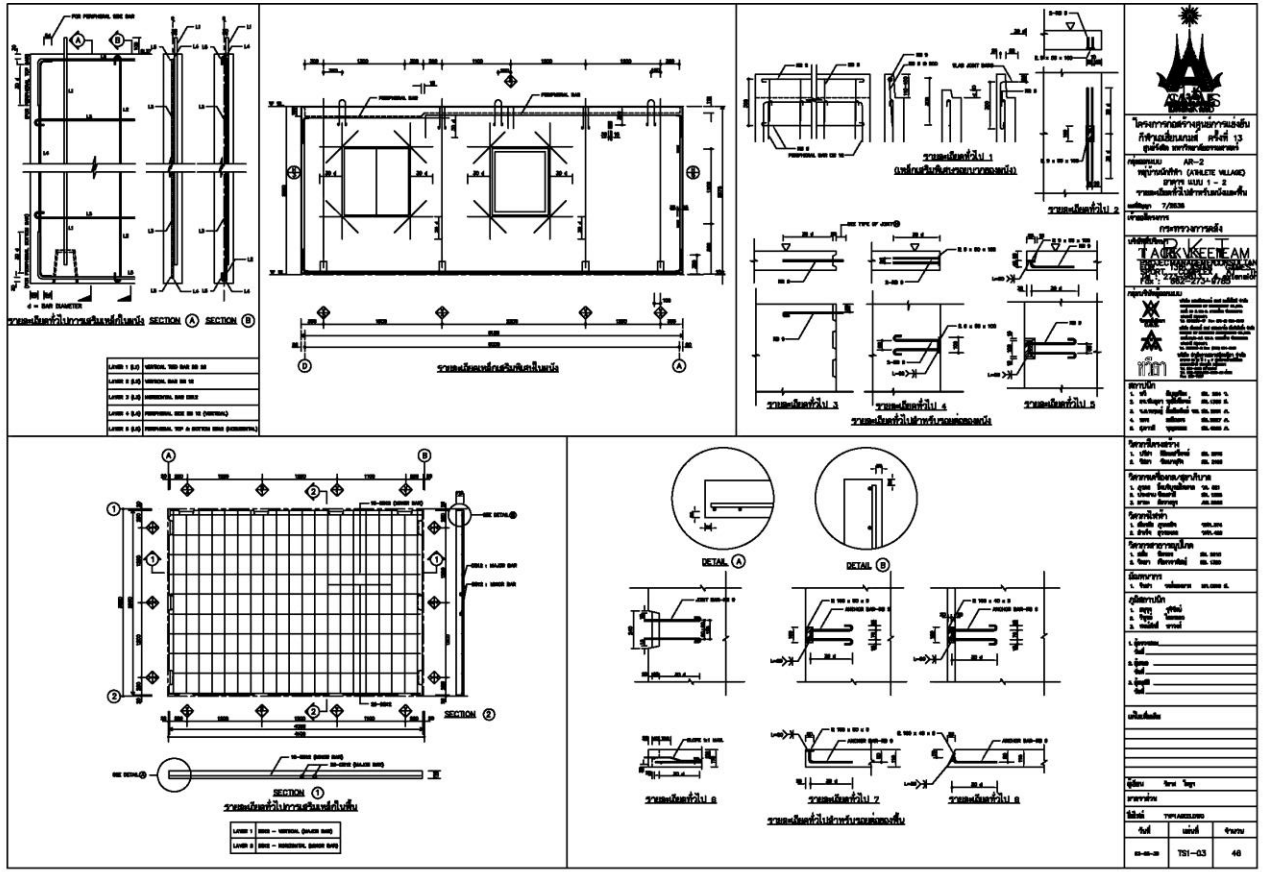
From the Past...

บริษัท คอนซัลแทนท์ ออฟ เทคโนโลยี จำกัด
Consultants of Technology Co., Ltd.

Project Information

13th Asian Games Dormitory
Residual Building 18 & 8 Stories, total 23 buildings [Fully Prefabricated Concrete System]





To the Present...

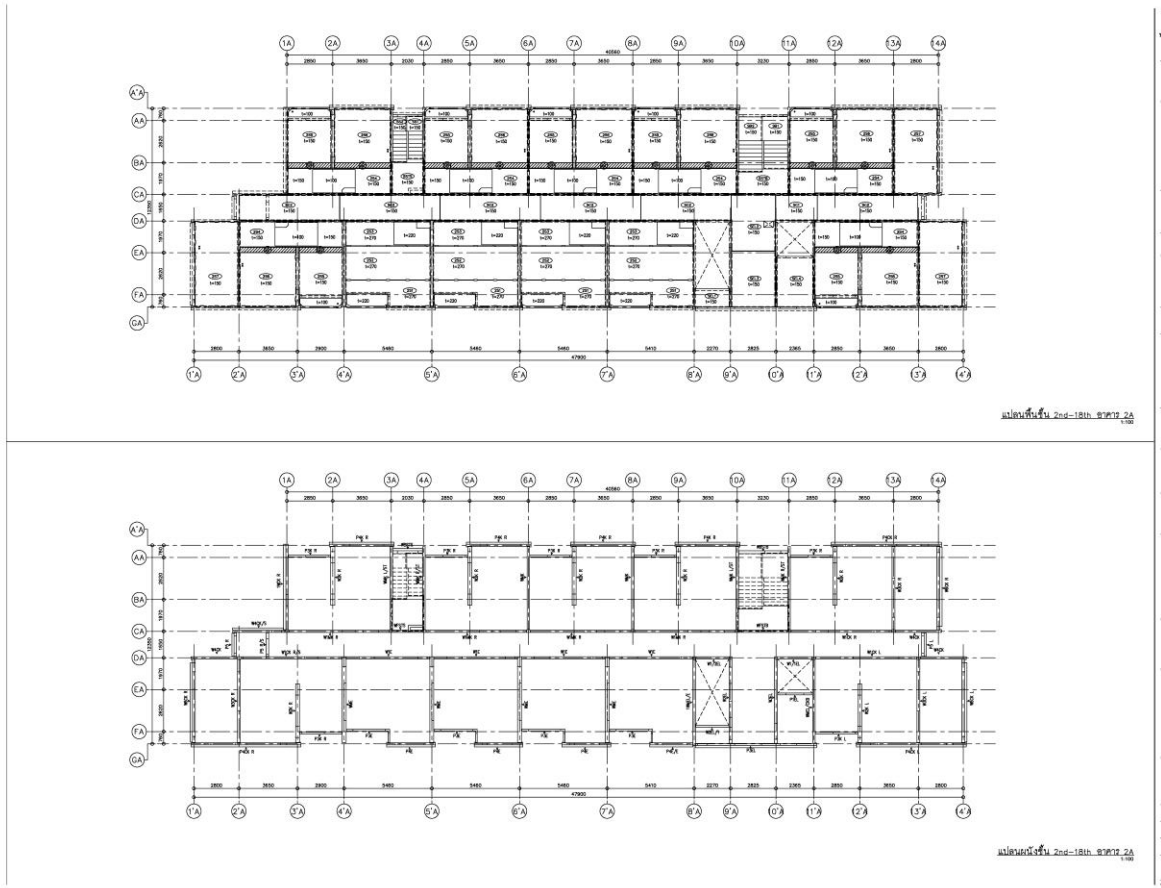
McDB Co., Ltd.

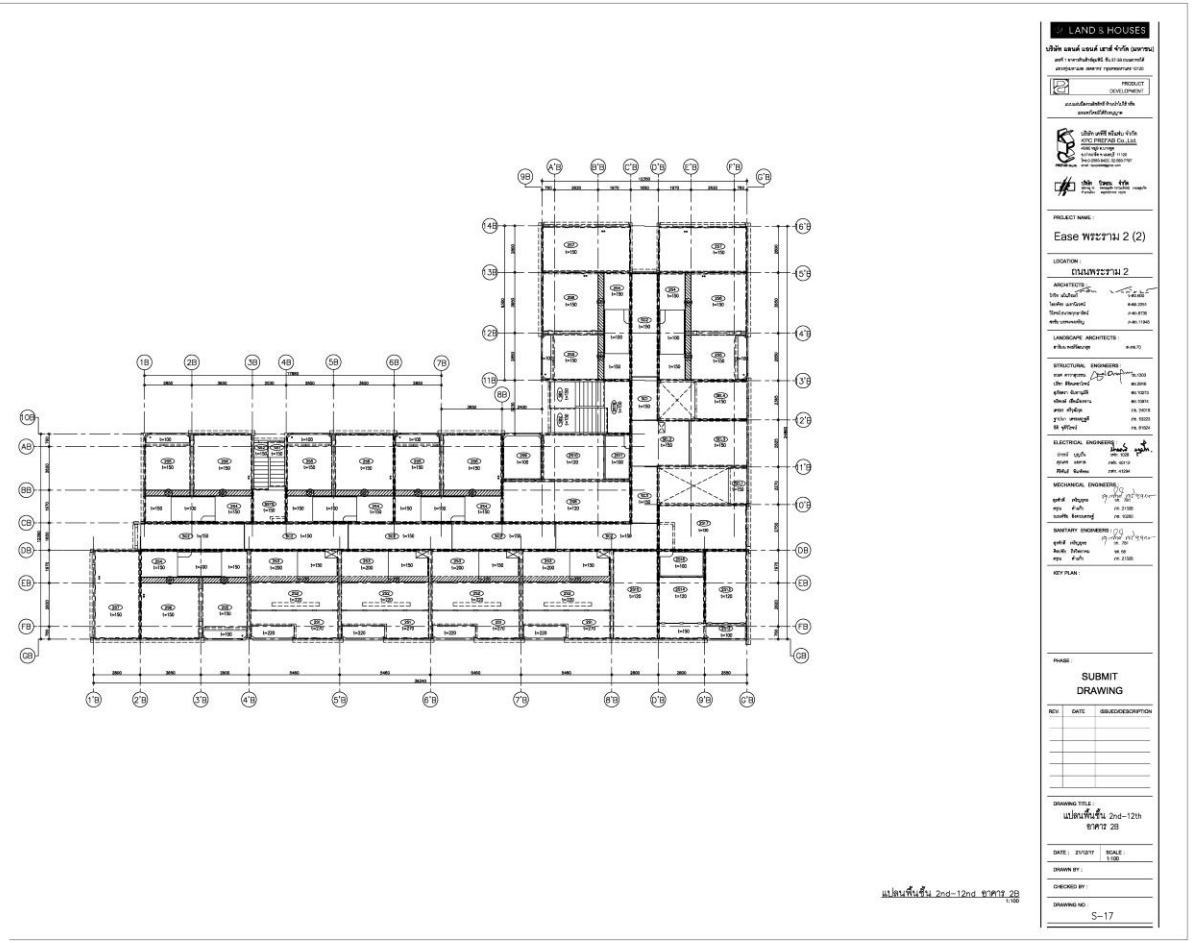
บริษัท เคพีซี พรีแฟบ จำกัด
KPC PREFAB

Ease 2 พระราม 2

Project Information

Ease Condo Rama 2 Phase 2 & 3 Project
Residual Building 12 & 18 stories [Fully Prefabricated Concrete System]





To the Present...

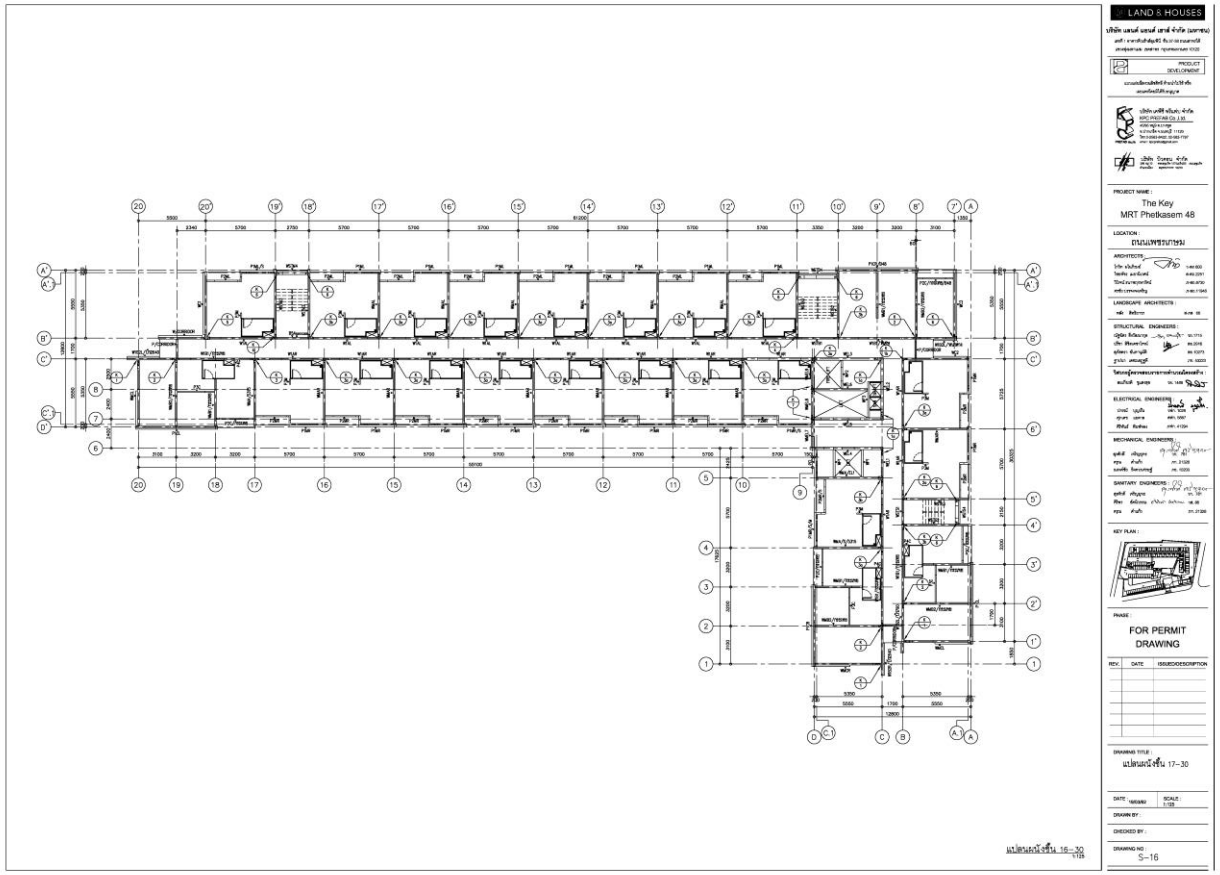
McDB Co., Ltd.

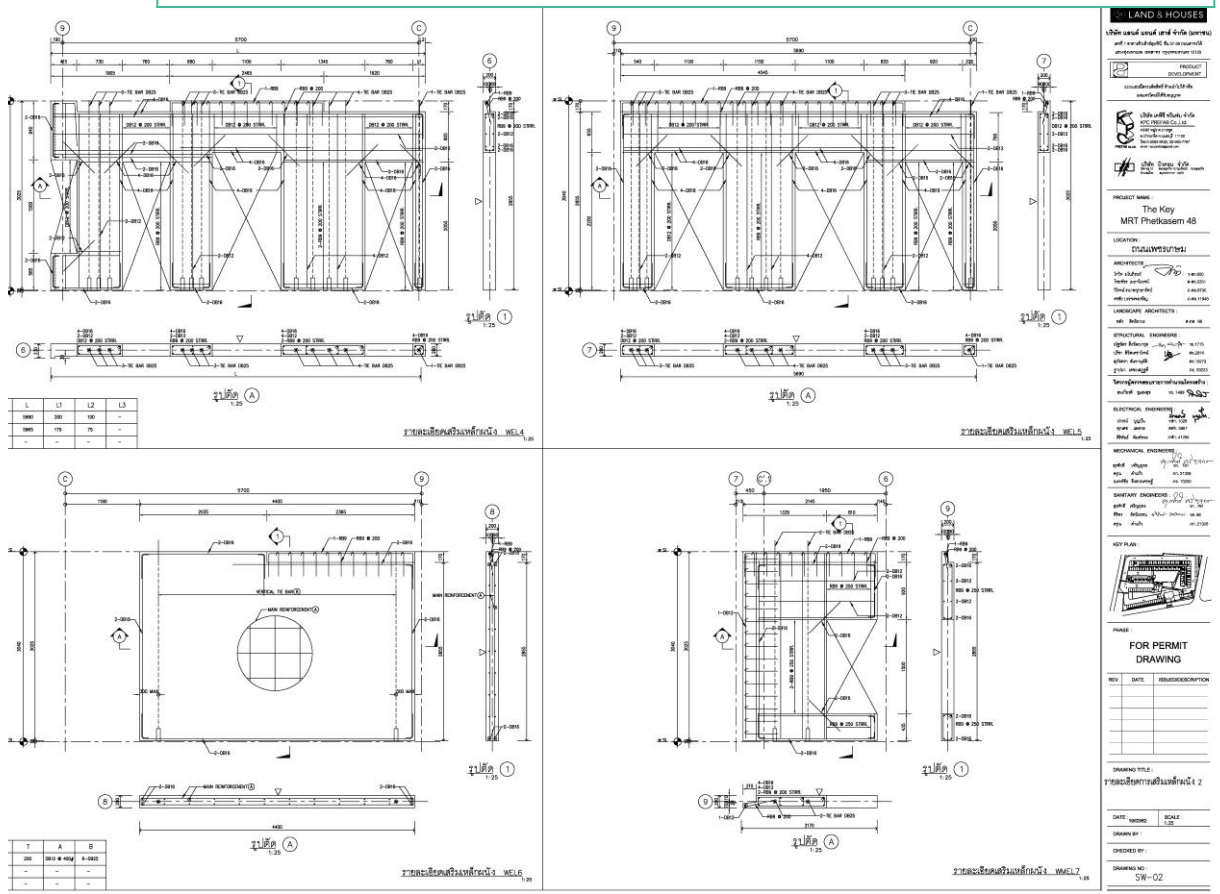
บริษัท เคพีซี พรีแฟบ จำกัด
KPC PREFAB

THE KEY MRT PHETKASEM 48

Project Information

The Key Phetkasem 48 Project
Residual Building 30 storeys 639 units [Fully Prefabricated Concrete System]
Parking Building 6 storeys
Utility Area approx. 35,000 sq.m.





...to the Future >>> Current Code of Practice, Research Journal and Text Book

Building Code Requirements for Structural Concrete (ACI 318-19)

ACI 318-19

18.5—Intermediate precast structural walls

18.5.1 *Scope*

18.5.1.1 This section shall apply to intermediate precast structural walls forming part of the seismic-force-resisting system.

18.5.2 *General*

18.5.2.1 In connections between wall panels, or between wall panels and the foundation, yielding shall be restricted to steel elements or reinforcement.

18.5.2.2 For elements of the connection that are not designed to yield, the required strength shall be based on $1.5S_y$ of the yielding portion of the connection.

18.5.2.3 In structures assigned to SDC D, E, or F, wall piers shall be designed in accordance with 18.10.8 or 18.14.

R18.5—Intermediate precast structural walls

Connections between precast wall panels or between wall panels and the foundation are required to resist forces induced by earthquake motions and to provide for yielding in the vicinity of connections. If mechanical splices are used to directly connect primary reinforcement, the probable strength of the splice should be at least 1.5 times the specified yield strength of the reinforcement.

12.5.3.6 For diaphragms that are interconnected precast elements without a concrete topping, and for diaphragms that are precast elements with end strips formed by either a cast-in-place concrete topping slab or edge beams, it shall be permitted to design for shear in accordance with (a), (b), or both.

(a) The nominal strength of grouted joints shall not exceed 0.55 MPa. Reinforcement shall be designed to resist shear through shear-friction in accordance with 22.9. Shear-friction reinforcement shall be in addition to reinforcement designed to resist tension due to moment and axial force.

(b) Mechanical connectors crossing joints between precast elements shall be designed to resist required shear under anticipated joint opening.

R12.5.3.6 This Code does not contain provisions for untopped diaphragms in buildings assigned to Seismic Design Categories D, E, and F. Diaphragm shear in untopped diaphragms can be resisted by using shear-friction reinforcement in grouted joints (FEMA P751). Required shear-friction reinforcement is in addition to reinforcement required by design to resist other tensile forces in the diaphragm, such as those due to diaphragm moment and axial force, or due to collector tension. The intent is to reduce joint opening while simultaneously resisting shear through shear-friction. Alternatively, or additionally, mechanical connectors can be used to transfer shear across joints of precast elements. In this case, some joint opening should be anticipated. The mechanical connectors should be capable of maintaining design strength under anticipated joint opening.

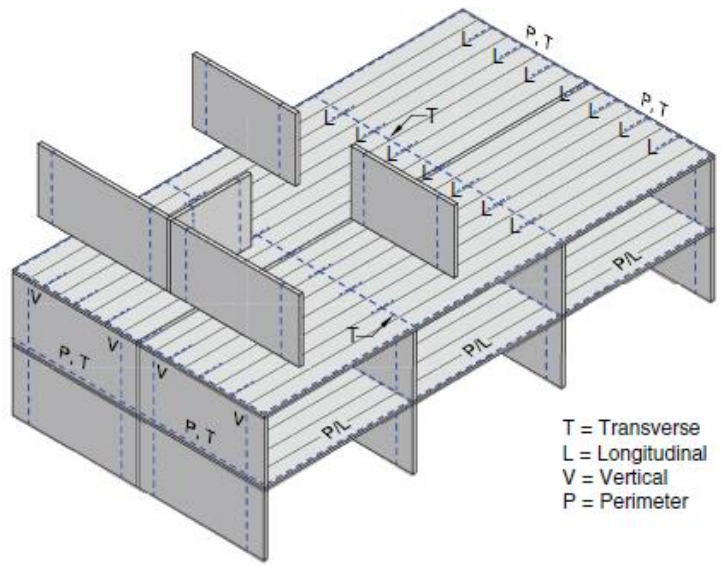


Fig. R16.2.5—Typical arrangement of integrity ties in large panel structures.

Code Requirements for the Design of Precast Concrete Diaphragms for Earthquake Motions (ACI 550.5M-18) and Commentary

Reported by Joint ACI-ASCE Committee 550

ACI 550.5M-18

1.2—Scope

1.2.1 This standard shall apply to precast concrete diaphragms and collectors that are part of the seismic-force-resisting system in structures assigned to SDC C, D, E, or F. It is permissible to use this standard for the design of the same elements in structures assigned to SDC B.

1.2.2 This standard shall apply to precast concrete diaphragms, including a) through c):

a) Diaphragms that consist of a cast-in-place composite topping slab with a thickness of less than 75 mm on precast concrete members

b) Diaphragms that comprise precast concrete members with end strips formed by either a cast-in-place composite topping or edge beams

c) Diaphragms of interconnected precast concrete members without cast-in-place concrete topping.

5.2—Diaphragm seismic design force

5.2.1 Diaphragm seismic design forces for Seismic Design Category (SDC) C, D, E, or F shall satisfy a) or b):

a) For diaphragms consisting of cast-in-place noncomposite topping slab on precast concrete members, forces shall be determined in accordance with Sections 12.10.1 and 12.10.2 or 12.10.3 of ASCE/SEI 7-16, as appropriate.

b) For all precast concrete diaphragms defined in 1.2.2, forces shall be determined in accordance with Section 12.10.3 of ASCE/SEI 7-16

CODE

CHAPTER 7—DIAPHRAGM CONNECTIONS AND REINFORCEMENT AT JOINTS

7.1—General

7.1.1 Precast concrete diaphragm connections and reinforcement at joints shall be assigned to a deformability classification based on reverse cyclic tension tests conducted in accordance with ACI 550.4M-18.

7.1.2 Precast concrete diaphragm connections or reinforcement at joints shall be classified as low, moderate, or high deformability elements in accordance with Table 7.1.2.

Table 7.1.2—Connection deformability classification

Element deformability	Deformability based on ACI 550.4M-18 testing
Low	Less than 8 mm
Moderate	Between 8 mm and less than 15 mm
High	15 mm and greater

Qualification of Precast Concrete Diaphragm Connections and Reinforcement at Joints for Earthquake Loading (ACI 550.4-18) and Commentary (ACI 550.4R-18)

Reported by Joint ACI-ASCE Committee 550

ACI 550.4-18

1.2—Scope

1.2.1 ACI 550.4 defines the minimum testing requirements and the acceptance criteria for different performance levels for connections or reinforcement at joints where used to connect precast concrete DT members subject to earthquake loading. Extrapolation of qualification results for connections and reinforcement at joints obtained using ACI 550.4 is not permitted. Project details shall match details qualified using ACI 550.4.

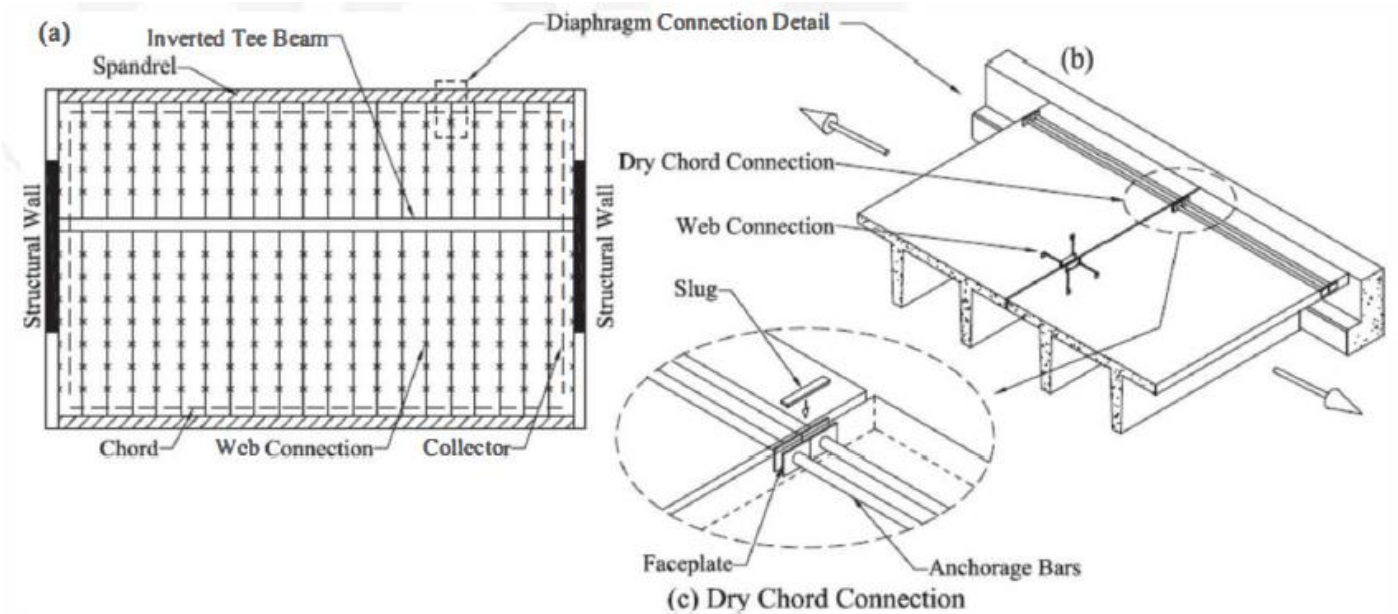


Fig. R4.1a—Typical double-tee diaphragm system with chord and web connections.

Guide for Emulating Cast-in-Place Detailing for Seismic Design of Precast Concrete Structures

Reported by Joint ACI-ASCE Committee 550

Reapproved 2017

ACI 550.1R-09(17)

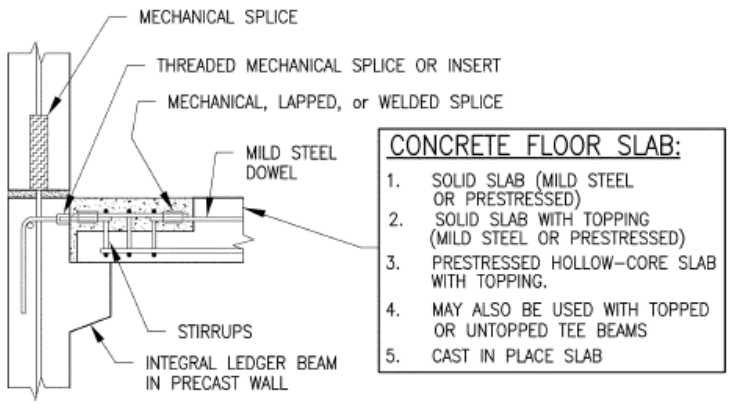


Fig. 5.7—End detail of a monolithic connection between precast concrete floor element and a precast concrete wall.

considered by the engineer as an alternative to the commonly used welded or bolted connections, which are not emulative.

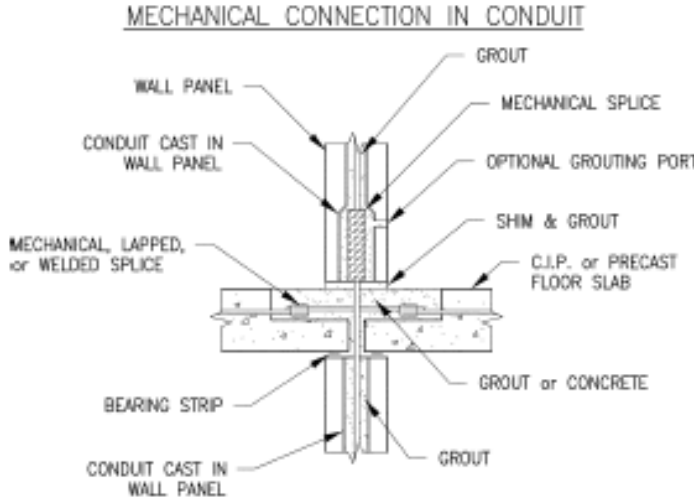


Fig. 5.2—Vertical bars in conduit are spliced and the system is grouted. (Procedures: (1) wall panel is erected, but held high; (2) loose vertical bars in the panel being erected are spliced to protruding bars from below; (3) panel is lowered to correct elevation; and (4) conduit is grouted by gravity flow from top or through optional grouting port from bottom of panel.) (Note: Welded and lapped splices must be located more than 2h *[where* h *is floor thickness] from the face of wall. Mechanical splices must be Type 2 if less than* 2h *from face of the wall.)*

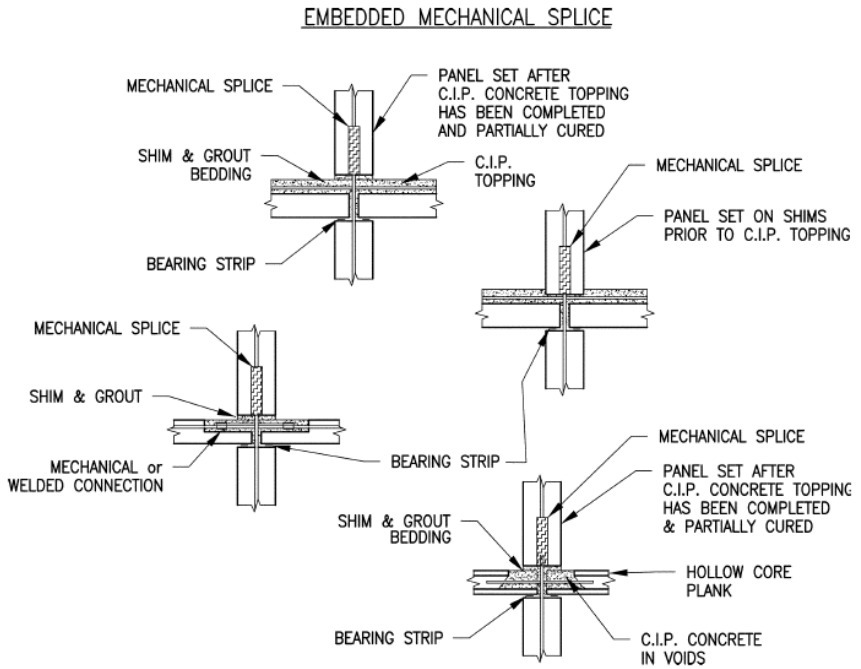
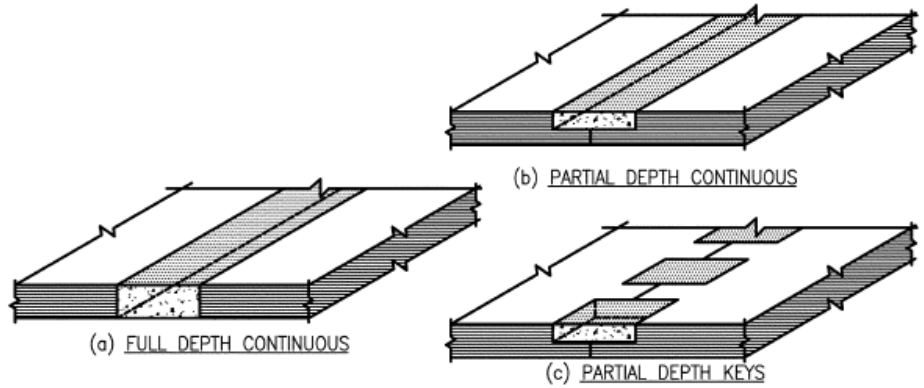


Fig. 5.3—Several types of mechanical splices for connection of various configurations of precast walls and floors. (Note: Welded and lapped splices must be located more than 2h *[where* h *is floor thickness] from the face of wall. Mechanical splices must be Type 2 if less than* 2h *from face of the wall.)*



Methods of developing monolithic longitudinal joints between side edges of untopped precast concrete floor slabs (see below for recommended reinforcing)

Minimum Design Loads and Associated Criteria for Buildings and Other Structures

ASCE STANDARD

ASCE/SEI

7-16

12.10 DIAPHRAGMS, CHORDS, AND COLLECTORS

Diaphragms, chords, and collectors shall be designed in accordance with Sections 12.10.1 and 12.10.2.

EXCEPTIONS:

1. Precast concrete diaphragms, including chords and collectors in structures assigned to Seismic Design Categories C, D, E, or F, shall be designed in accordance with Section 12.10.3.

Table 12.2-1 Design Coefficients and Factors for Seismic Force-Resisting Systems

Seismic Force-Resisting System	ASCE 7 Section Where Detailing Requirements Are Specified	Response Modification Coefficient, R^a	Overstrength Factor, $\Omega_0{}^b$	Deflection Amplification Factor, $C_d{}^c$	Structural System Limitations Including Structural Height, h_n (ft) Limits[d] — Seismic Design Category B	C	D[e]	E[e]	F[f]
A. BEARING WALL SYSTEMS									
1. Special reinforced concrete shear walls[g,h]	14.2	5	2½	5	NL	NL	160	160	100
2. Ordinary reinforced concrete shear walls[g]	14.2	4	2½	4	NL	NL	NP	NP	NP
3. Detailed plain concrete shear walls[g]	14.2	2	2½	2	NL	NP	NP	NP	NP
4. Ordinary plain concrete shear walls[g]	14.2	1½	2½	1½	NL	NP	NP	NP	NP
5. Intermediate precast shear walls[g]	14.2	4	2½	4	NL	NL	40[i]	40[i]	40[i]
6. Ordinary precast shear walls[g]	14.2	3	2½	3	NL	NP	NP	NP	NP
7. Special reinforced masonry shear walls	14.4	5	2½	3½	NL	NL	160	160	100
8. Intermediate reinforced masonry shear walls	14.4	3½	2½	2¼	NL	NL	NP	NP	NP
9. Ordinary reinforced masonry shear walls	14.4	2	2½	1¾	NL	160	NP	NP	NP
10. Detailed plain masonry shear walls	14.4	2	2½	1¾	NL	NP	NP	NP	NP
11. Ordinary plain masonry shear walls	14.4	1½	2½	1¼	NL	NP	NP	NP	NP
12. Prestressed masonry shear walls	14.4	1½	2½	1¾	NL	NP	NP	NP	NP
13. Ordinary reinforced AAC masonry shear walls	14.4	2	2½	2	NL	35	NP	NP	NP
14. Ordinary plain AAC masonry shear walls	14.4	1½	2½	1½	NL	NP	NP	NP	NP
15. Light-frame (wood) walls sheathed with wood structural panels rated for shear resistance	14.5	6½	3	4	NL	NL	65	65	65
16. Light-frame (cold-formed steel) walls sheathed with wood structural panels rated for shear resistance or steel sheets	14.1	6½	3	4	NL	NL	65	65	65
17. Light-frame walls with shear panels of all other materials	14.1 and 14.5	2	2½	2	NL	NL	35	NP	NP
18. Light-frame (cold-formed steel) wall systems using flat strap bracing	14.1	4	2	3½	NL	NL	65	65	65

Table 12.10-1 Diaphragm Design Force Reduction Factor, R_s

Diaphragm System		Shear-Controlled	Flexure-Controlled
Cast-in-place concrete designed in accordance with Section 14.2 and ACI 318	—	1.5	2
Precast concrete designed in accordance with Section 14.2.4 and ACI 318	EDO[a]	0.7	0.7
	BDO[b]	1.0	1.0
	RDO[c]	1.4	1.4
Wood sheathed designed in accordance with Section 14.5 and AWC SDPWS-15	—	3.0	NA

[a]EDO is precast concrete diaphragm elastic design option.
[b]BDO is precast concrete diaphragm basic design option.
[c]RDO is precast concrete diaphragm reduced design option.

Seismic design of precast concrete building structures

fib bulletin 27

CEB-FIP

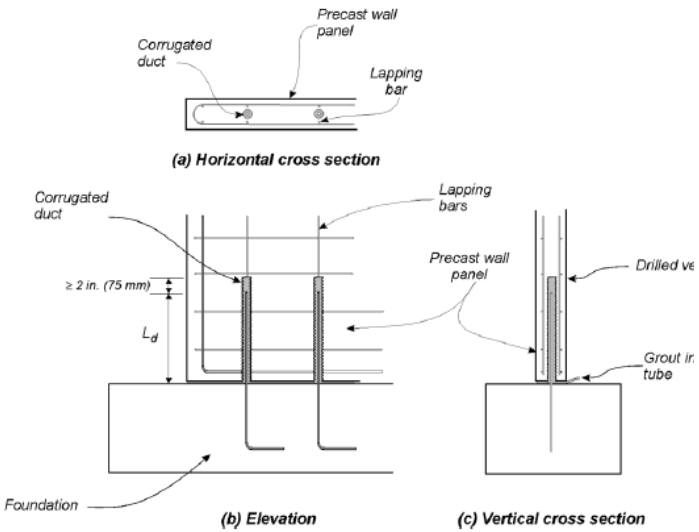


Fig. 5-50: Wall-foundation beam connection through grouted ducting

Fig. 5.56 shows another possible connection detail. The transverse hoops protruding from the wall panels overlap, making it possible to have a narrow vertical joint. This arrangement is most suitable when the wall panels are connected through a cast-in-place side strip or are embedded in the foundation beam. Fig. 5.57 illustrates the use of vertical wall panel connections in the construction of three low-rise theatre buildings. The vertical connections between wall panels in the buildings in the foreground and background have already been cast and some temporary inclined props have already been removed as the partially completed roof structure provides stability. The walls in the middle building have not been cast yet and the gaps between the walls are clearly visible in the photo.

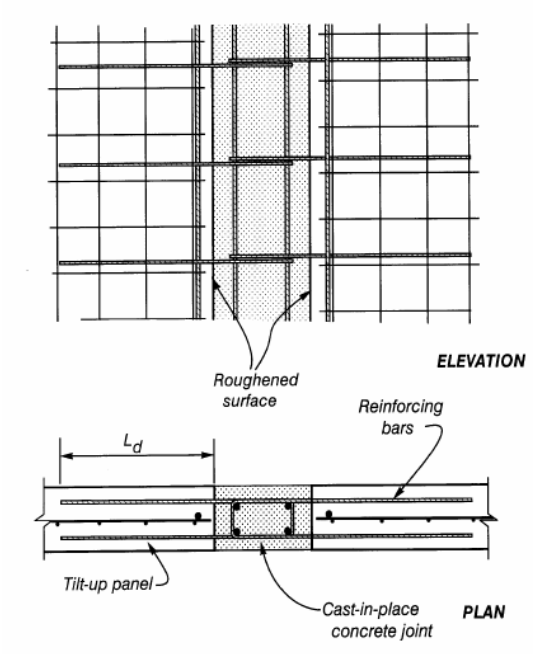


Fig. 5-56: Vertical connection detail between walls: Connection with overlapping hoops

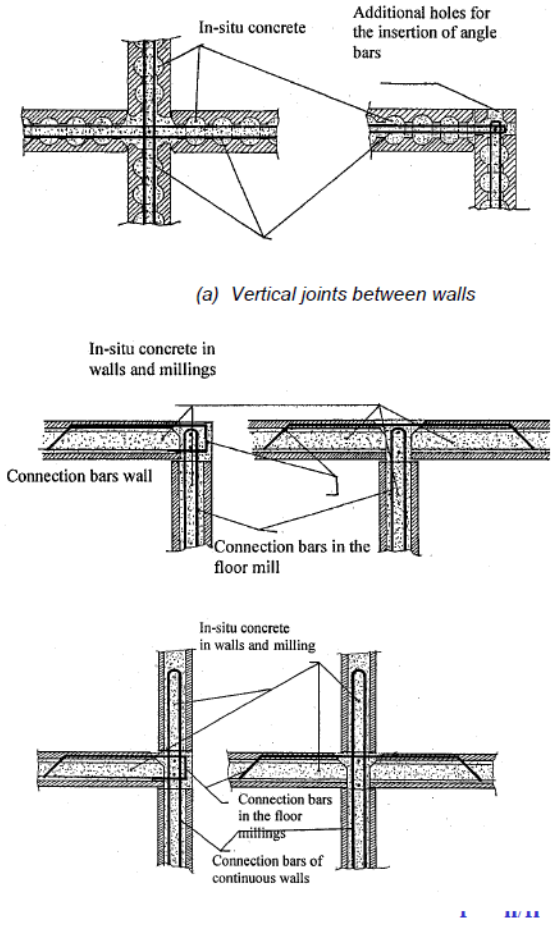


Fig. 5-46: Typical connection details in large panel construction (Courtesy of M. Menegotto)

Guidelines for the Use of Structural Precast Concrete in Buildings

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NEW ZEALAND SOCIETY FOR EARTHQUAKE ENGINEERING
CAE Centre for Advanced Engineering
University of Canterbury, Christchurch, New Zealand

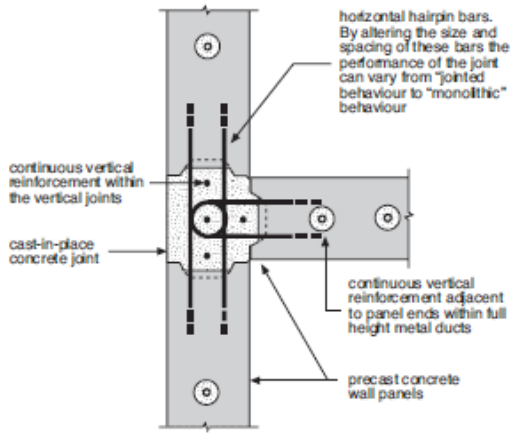


Figure 4.2: Nearly monolithic precast wall construction vertical joint of the SCT System, Yugoslavia (Reference 4.12)

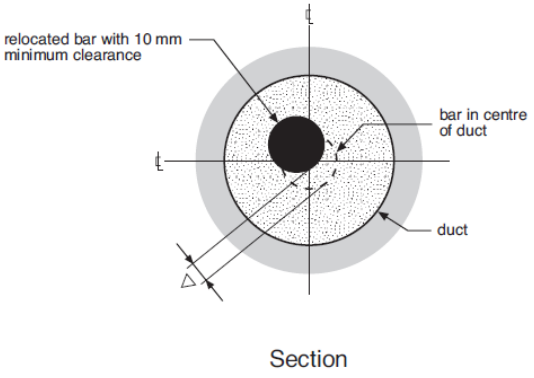
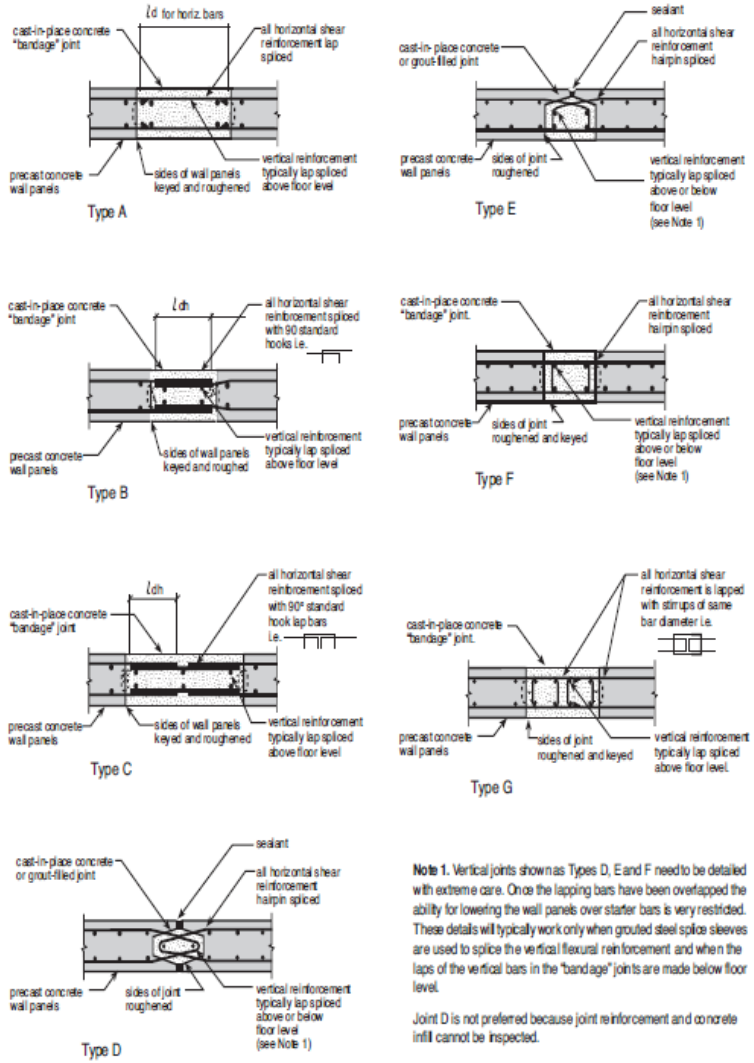


Figure 6.10: Column bar and duct clearance

Typically, duct diameters range from two to three times the nominal diameter of the grouted bar. (The Canadian Prestressed Concrete Institute [6.2] recommends three bar diameters for the internal duct size.)



Note 1. Vertical joints shown as Types D, E and F need to be detailed with extreme care. Once the lapping bars have been overlapped the ability for lowering the wall panels over starter bars is very restricted. These details will typically work only when grouted steel splice sleeves are used to splice the vertical flexural reinforcement and when the laps of the vertical bars in the "bandage" joints are made below floor level.

Joint D is not preferred because joint reinforcement and concrete infill cannot be inspected.

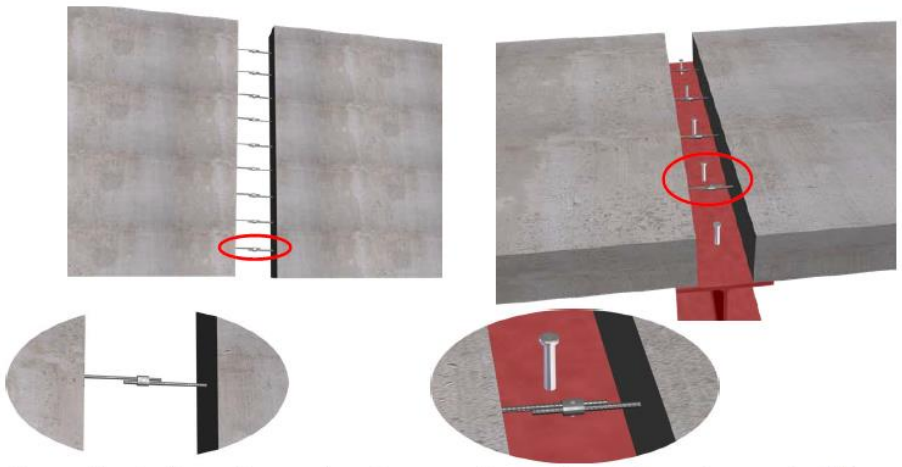
Figure 4.9 : Monolithic precast concrete wall construction vertical joints

Mechanical lap splicing for rebars

OKABE Splice Clip joint (OS Clip joint)

OKABE Co.,Ltd.

OS Clip joint — Typical applications in Japan



Connection for Precast-concrete walls

Connection for Precast-concrete slabs

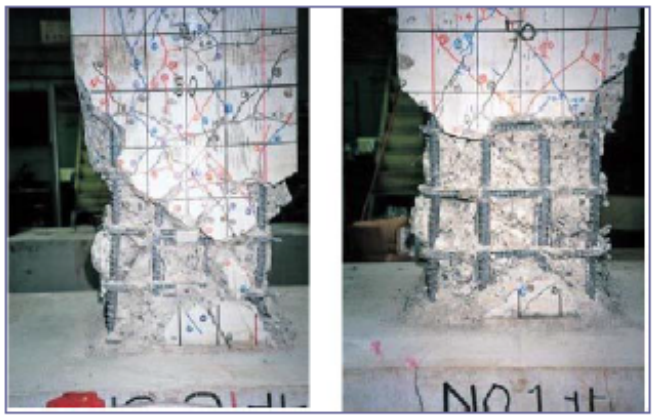
Performance of OS Clip joint (2/3)

Multi-cyclic bending test for RC columns

As the result of multi-cyclic bending test of RC columns;
specimen A: **hoops using OS Clip joints**
specimen B: **hoops using flare-welding splices**

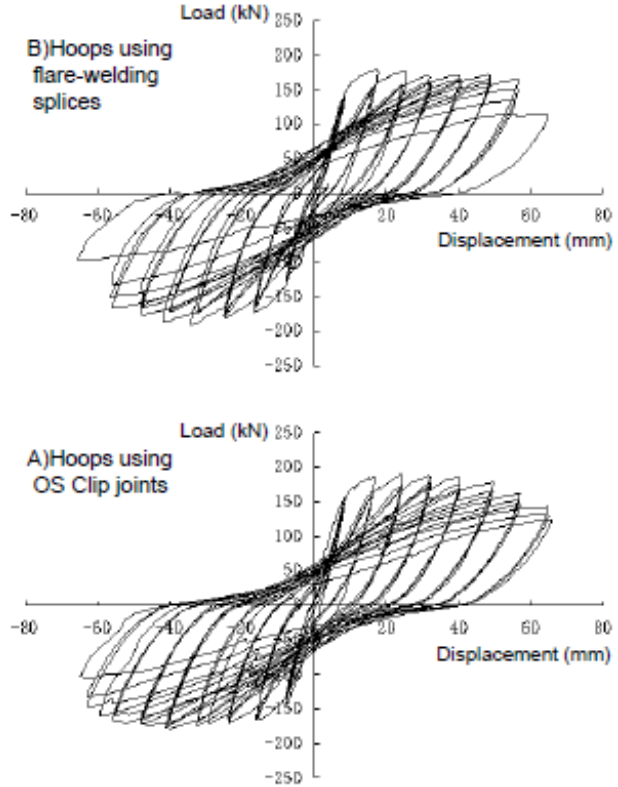
・OS clip joint eith almost equal performance with buckling-constraint of longitudinal rebars and confined
-effect of core-concrete compared with hoops using flare
-welding splices.

It is expected that hoops using OS Clip joints shoe effective performance in plastic hinge area.



A) Hoops with OS Clip joints B) Hoops with flare-welding splices

Photo) Plastic hinge area after loading



Bending load – displacement relationship

Shear Stiffness and Capacity of Joints Between Precast Wall Elements

Semiha Kaya
Delvin Salim

June 2017
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2.3.1 Continous Shear Key Joints

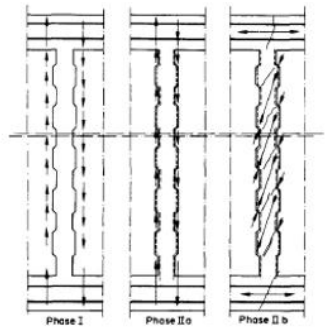


Figure 2.8: Working phases of a key joint (Cholewicki, 1975).

1. Phase I: This phase shows the behaviour of the joint when moment gives rise to splitting along one edge of the wall.

2. Phase II: This phase shows the behaviour of the joint after splitting in two stages, before and after the appearance of the diagonal cracks.

The diagonal cracks correspond to the direction of longitudinal cracks or principal stresses caused by longitudinal shear stresses, in both phases. The splitting of the key joint does not mean that it is a failure. The shear forces can be handled by transversal reinforcement in the joint (Cholewicki, 1971).

Shear Stiffness and Capacity of Joints Between Precast Wall Elements, TYRENS

F

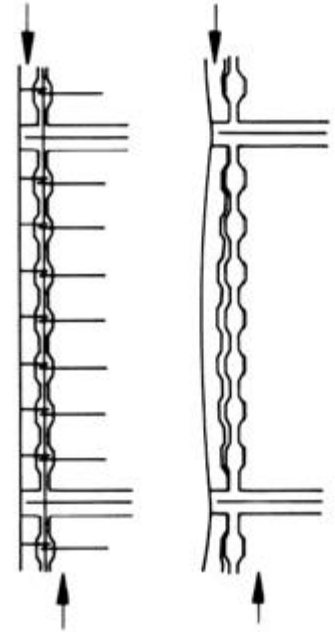
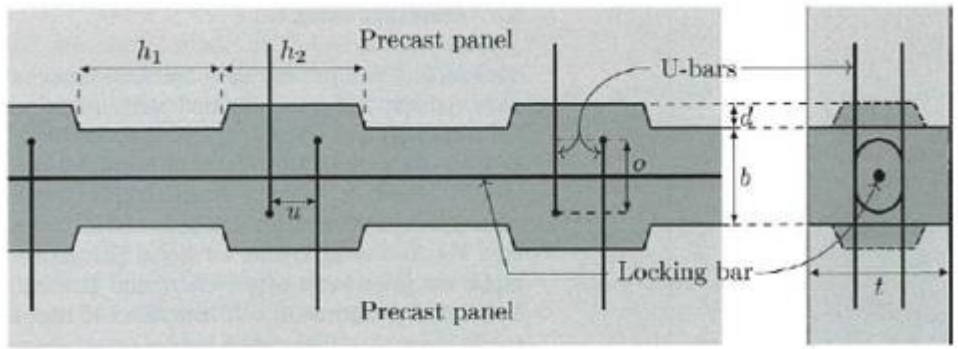


Fig. 2.60 Deformation of joints between longitudinal and transverse stability girders with different reinforcement arrangements [73]



igure 2.16: Elevation and section through reinforced shear key joint (Herfelt et al., 2016).

HERON contains contributions based mainly on research work performed in I.B.B.C. and STEVIN and related to strength of materials and structures and materials science.

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Contents

LOOP CONNECTIONS BETWEEN PRECAST CONCRETE COMPONENTS LOADED IN BENDING

Ir. M. Dragosavić
Ir. A. van den Beukel
Ir. F. B. J. Gijsbers

Loop connections between precast concrete components loaded in bending

1 Introduction

This report is concerned with an investigation of the strength and behaviour of connections formed between precast concrete floor slabs by means of looped reinforcing bars and in-situ concrete placed in the joints. This type of connection is shown schematically in figure 1.
A loop connection, i.e., a joint constructed in this way, may fail as a result of three possible causes:

a. yielding of the steel;
b. crushing of the compressive zone of the concrete;
c. cracking of the in-situ concrete in the joint at the overlapping loops.

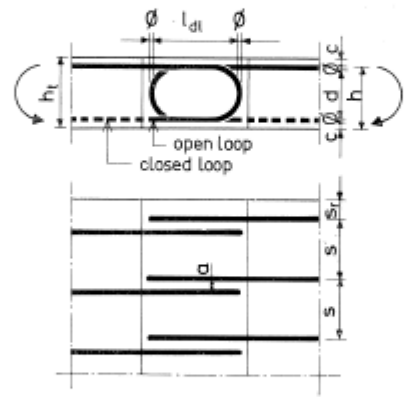
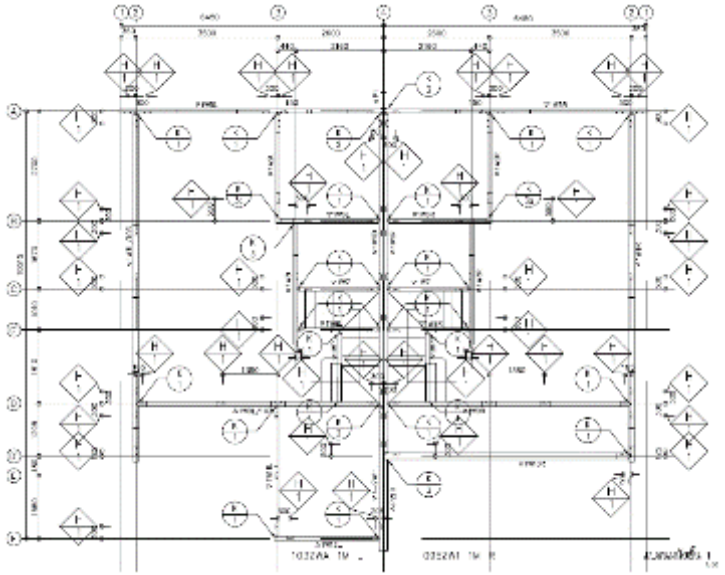


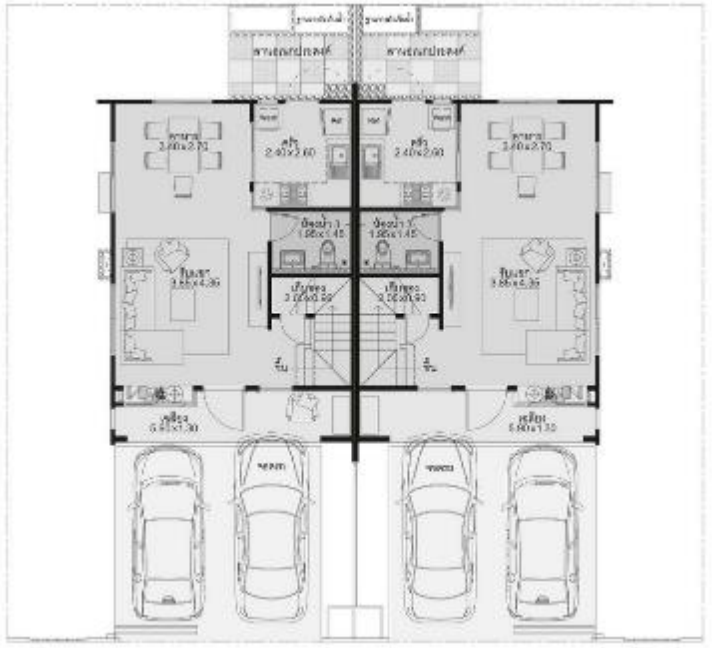
Fig. 1. The loop connection investigated (schematic).

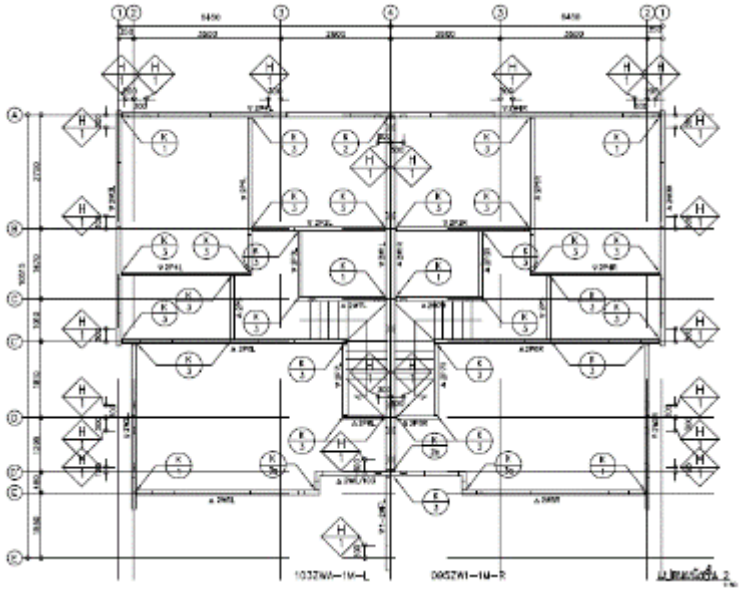
The usually methods of analysis for flexurally loaded structural members are applicable to the failure modes (a) and (b). For failure to occur in accordance with (c) a number of factors are involved, the influence of which is difficult to quantify. The following possible factors can be mentioned (see also Fig. 1):

a. the quality of the in-situ concrete in the joint;
b. the lap length l_{dl} of the loop;
c. the bar diameter ϕ;
d. the quality of the loop steel;
e. the quantity of transverse reinforcement A_{sd} in the connection;
f. the concrete cover c;
g. the distance s between two adjacent pairs of loops;

Semi-Detached House







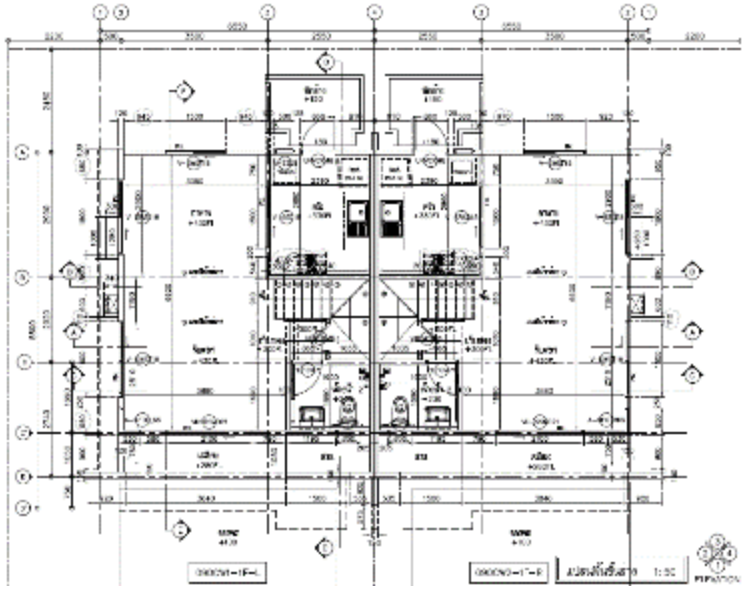
Information

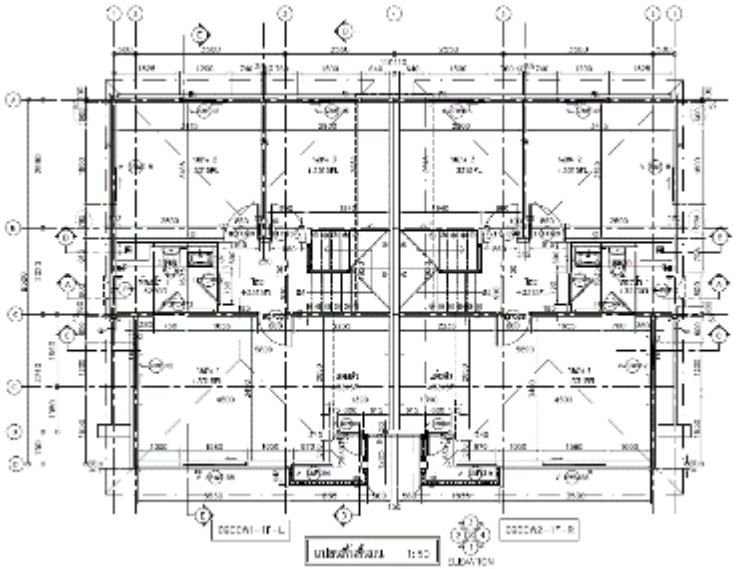
Utility Area	135	sq.m.
Parking	2	cars
Bathroom	3	room (s)
Bedroom	3	room (s)

Structural System

Prestressed Concrete Pile (Safe Load 20 – 30 tons / pile)	16	sq.m.
Precast & CIP GB	-	
Precast Wall	7. 5– 12.0 (thk.)	cm.
Precast Plank (1st FL.) & Precast Full Slab (2nd FL.)	10.0 – 18.0 (thk.)	cm.

Semi-Detached House





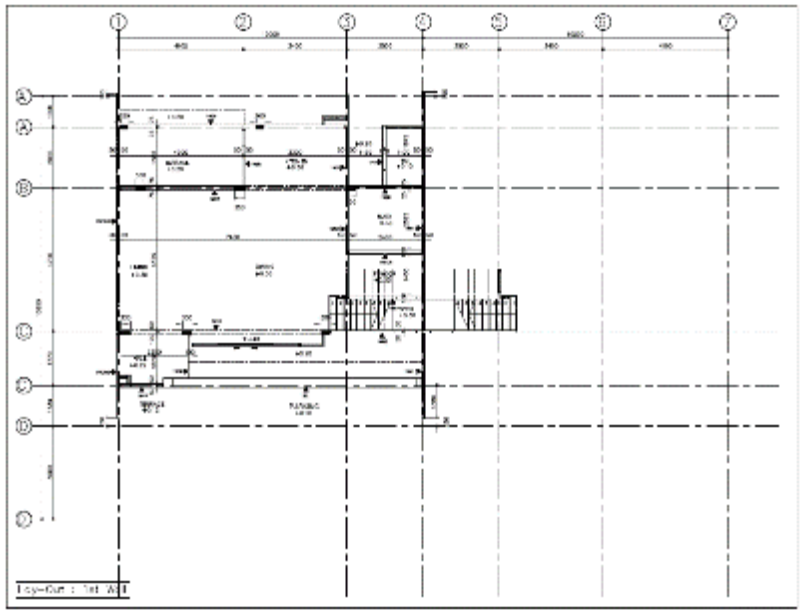
Information

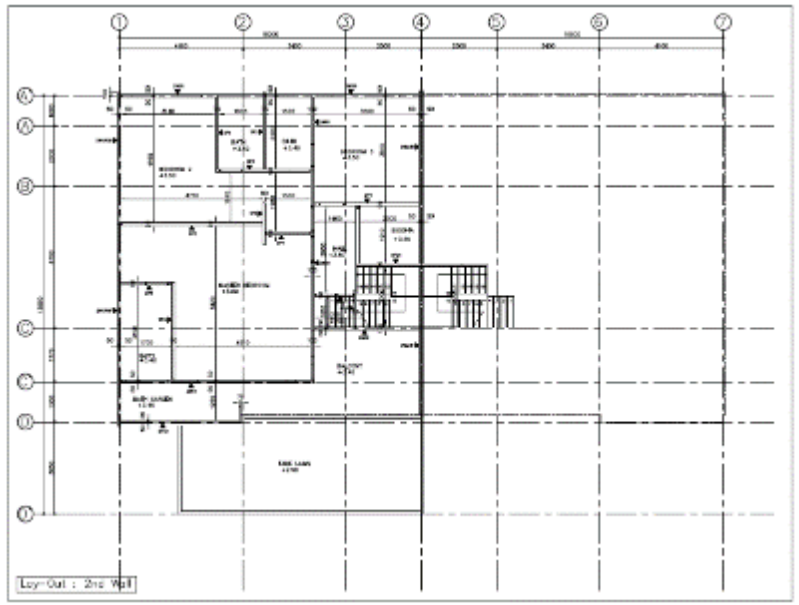
Utility Area	133	sq.m.
Parking	2	cars
Bathroom	2	room (s)
Bedroom	3	room (s)

Structural System

Prestressed Concrete Pile (Safe Load 20 – 30 tons / pile)	15	sq.m.
Precast & CIP GB	-	
Precast Wall	7. 5– 12.0 (thk.)	cm.
Precast Plank (1st FL.) & Precast Full Slab (2nd FL.)	10.0 – 18.0 (thk.)	cm.

Townhouse 10 m. width





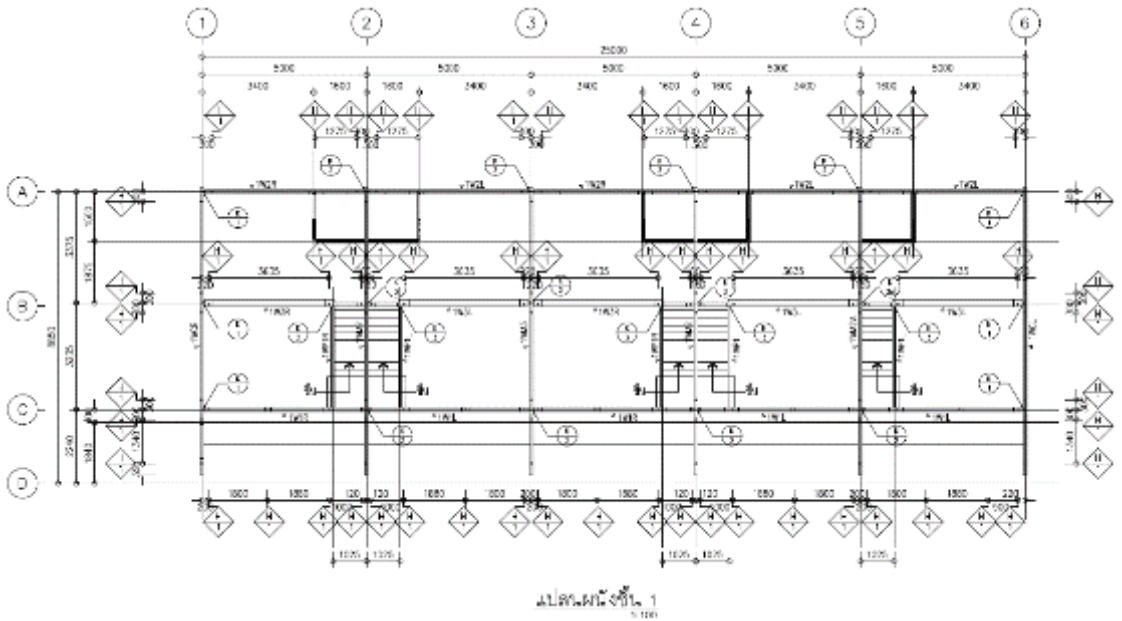
Information

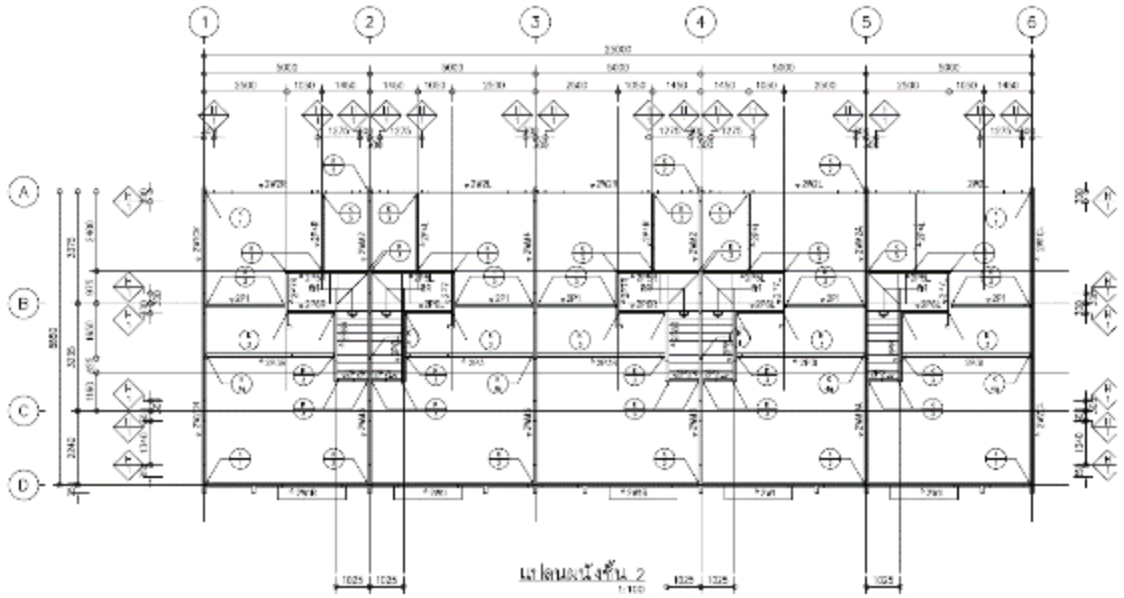
Utility Area	225	sq.m.
Parking	3	cars
Bathroom	4	room (s)
Bedroom	3	room (s)
Maid Room	1	room (s)

Structural System

Prestressed Concrete Pile (Safe Load 20 – 30 tons / pile)	-	
Precast & CIP GB	-	
Precast Wall	7. 5– 15.0 (thk.)	cm.
Precast Plank (1st FL.) & Precast Full Slab (2nd FL.)	10.0 – 18.0 (thk.)	cm.

Townhouse 5.0 m. width





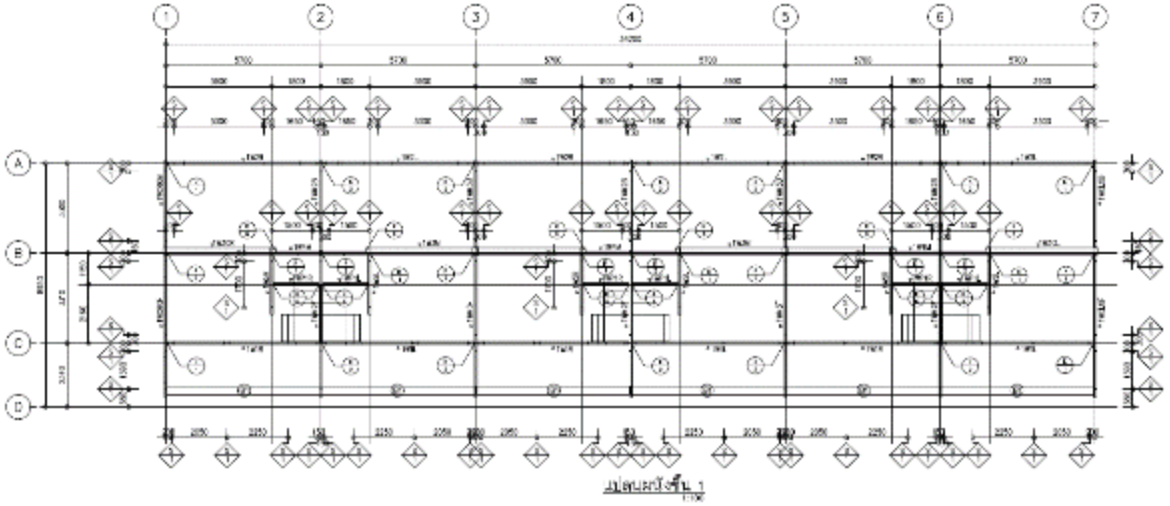
Information

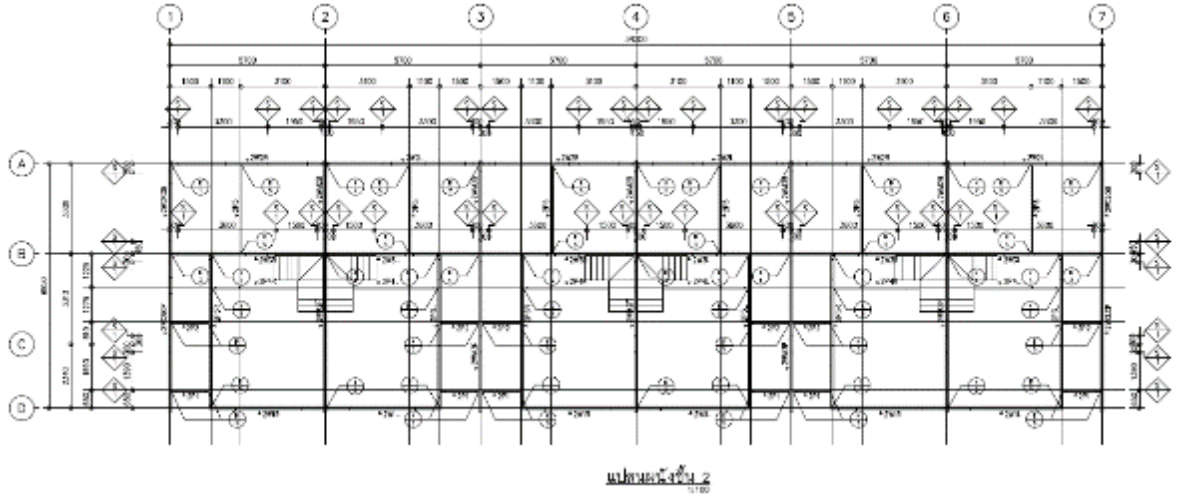
Utility Area	89	sq.m.
Parking	1	cars
Bathroom	3	room (s)
Bedroom	2	room (s)

Structural System

Prestressed Concrete Pile (Safe Load 20 – 30 tons / pile)	-	
Precast & CIP GB	-	
Precast Wall	7. 5– 12.0 (thk.)	cm.
Precast Plank (1st FL.) & Precast Full Slab (2nd FL.)	10.0 – 18.0 (thk.)	cm.

Townhouse 5.7 m. width





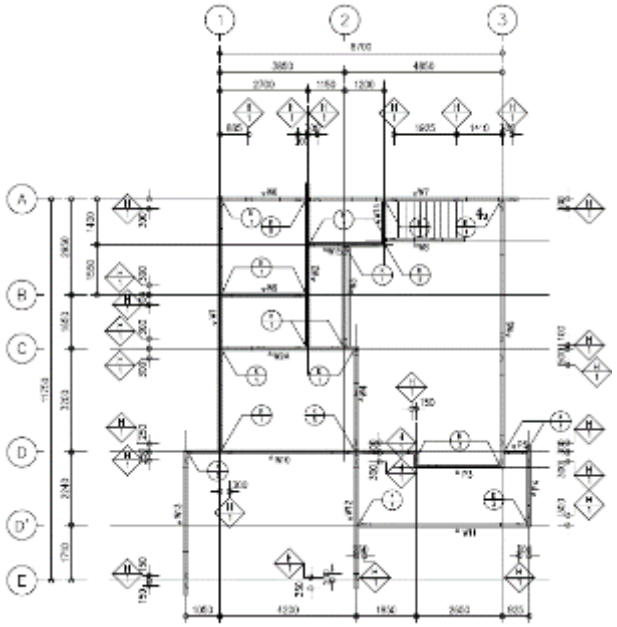
Information

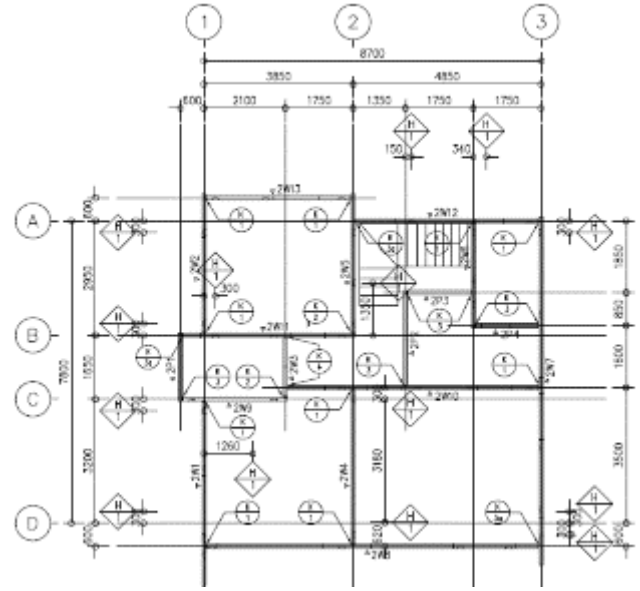
Utility Area	122	sq.m.
Parking	2	cars
Bathroom	3	room (s)
Bedroom	3	room (s)

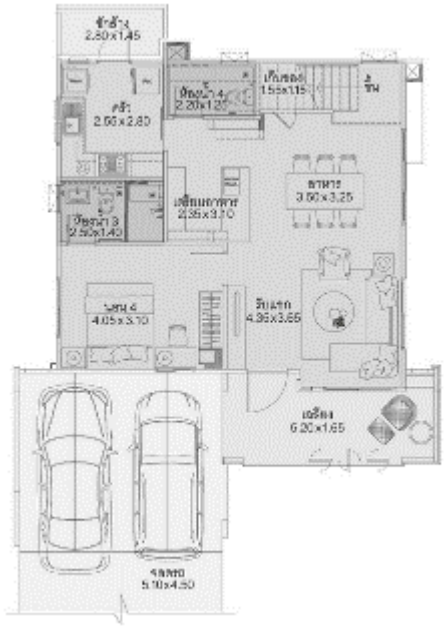
Structural System

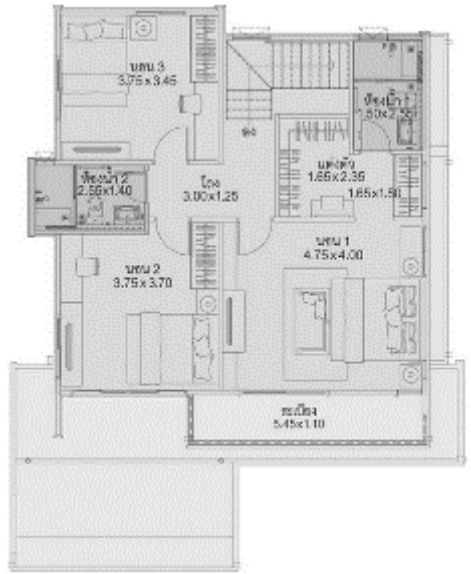
Prestressed Concrete Pile (Safe Load 20 – 30 tons / pile)	-	
Precast & CIP GB	-	
Precast Wall	7. 5– 12.0 (thk.)	cm.
Precast Plank (1st FL.) & Precast Full Slab (2nd FL.)	10.0 – 18.0 (thk.)	cm.

Detach House









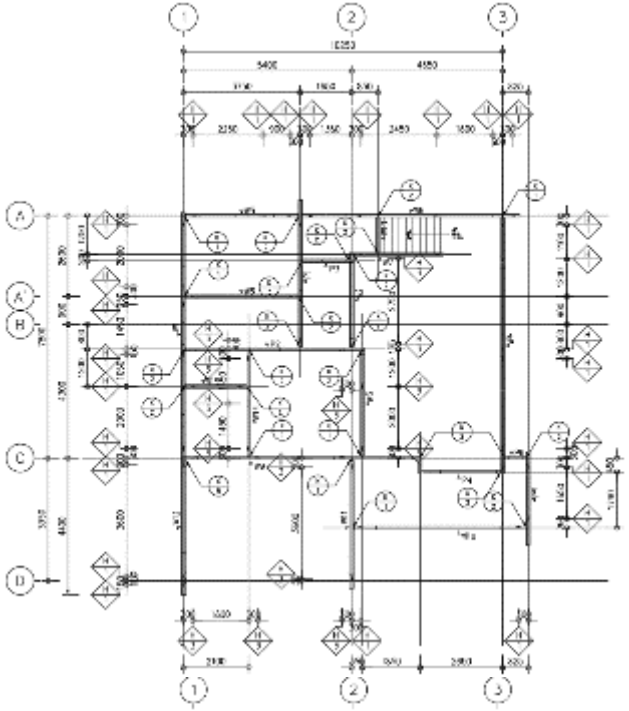
Information

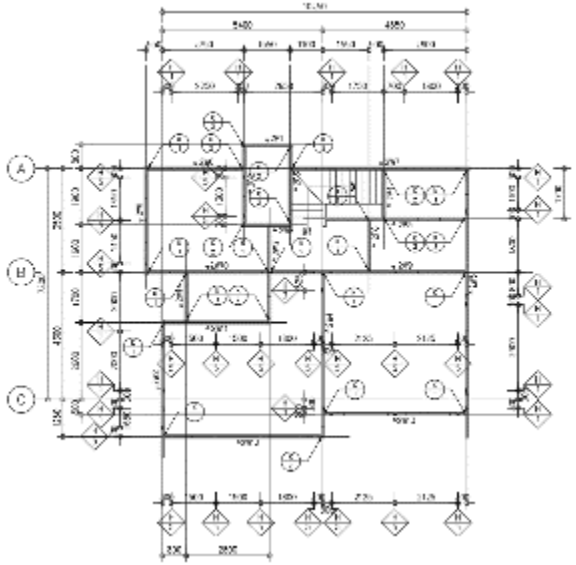
Utility Area	185	sq.m.
Parking	2	cars
Bathroom	4	room (s)
Bedroom	4	room (s)

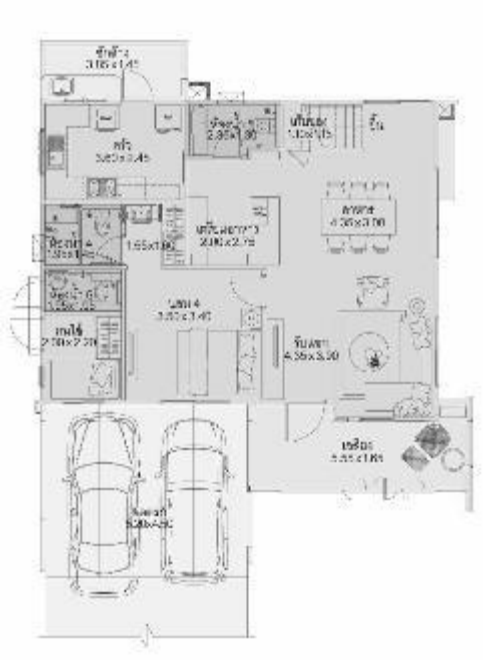
Structural System

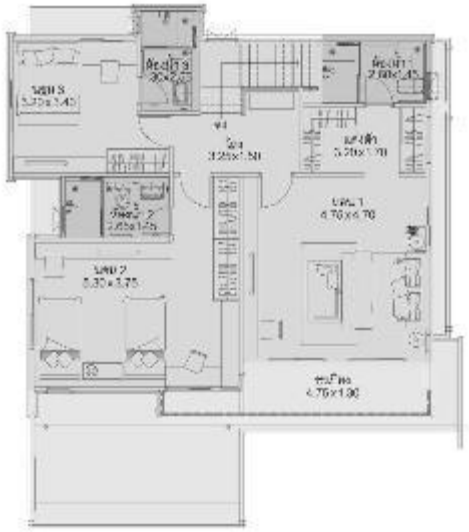
Prestressed Concrete Pile (Safe Load 20 – 30 tons / pile)	-	
Precast & CIP GB	-	
Precast Wall	7. 5– 12.0 (thk.)	cm.
Precast Plank (1st FL.) & Precast Full Slab (2nd FL.)	10.0 – 15.0 (thk.)	cm.

Detach House









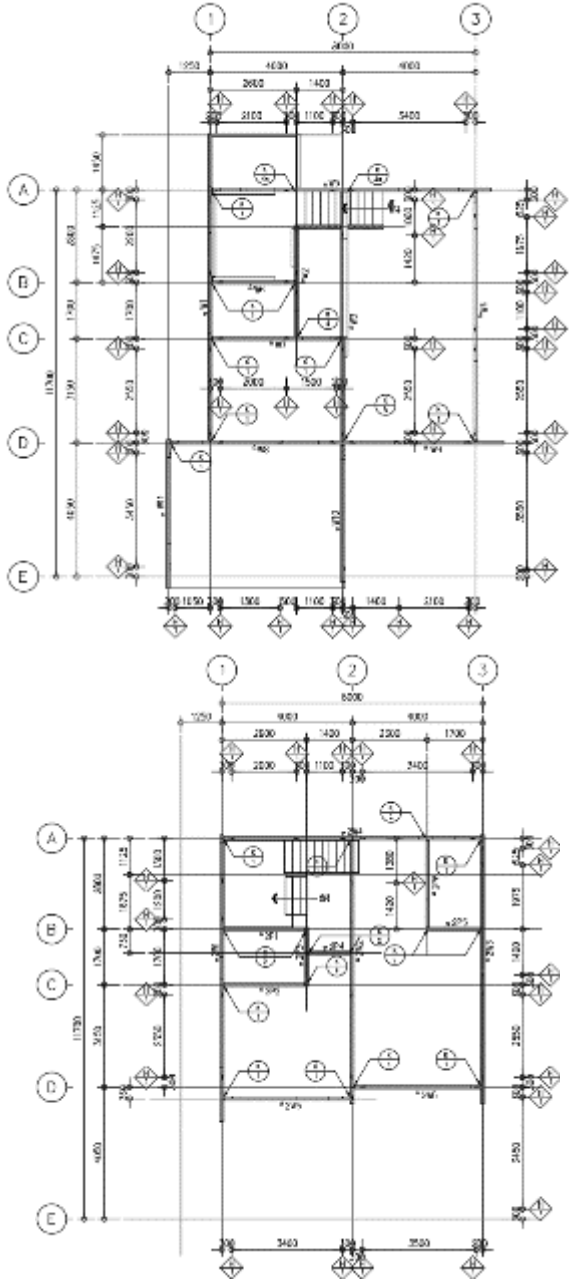
Information

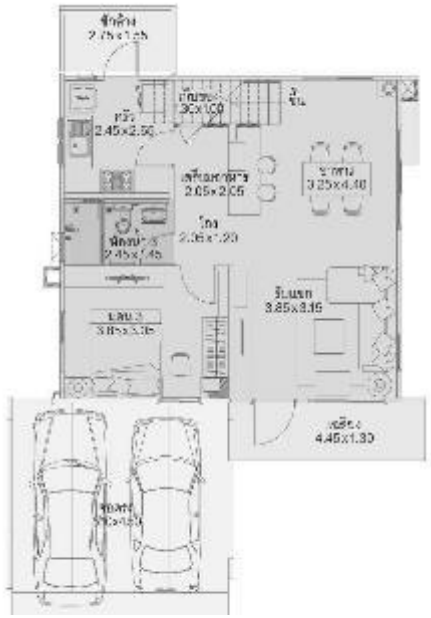
Utility Area	222	sq.m.
Parking	2	cars
Bathroom	5	room (s)
Bedroom	4	room (s)

Structural System

Prestressed Concrete Pile (Safe Load 20 – 30 tons / pile)	-	
Precast & CIP GB	-	
Precast Wall	7. 5– 12.0 (thk.)	cm.
Precast Plank (1st FL.) & Precast Full Slab (2nd FL.)	10.0 – 15.0 (thk.)	cm.

Detach House





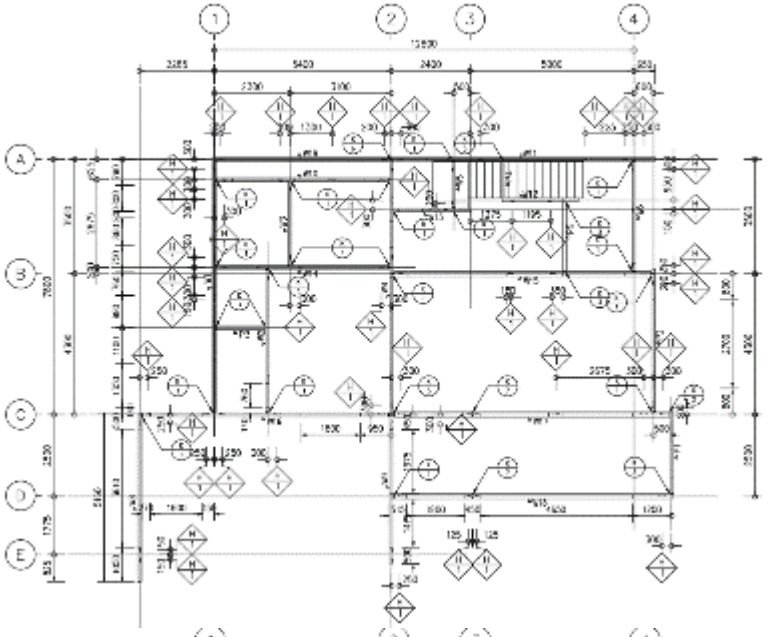
Information

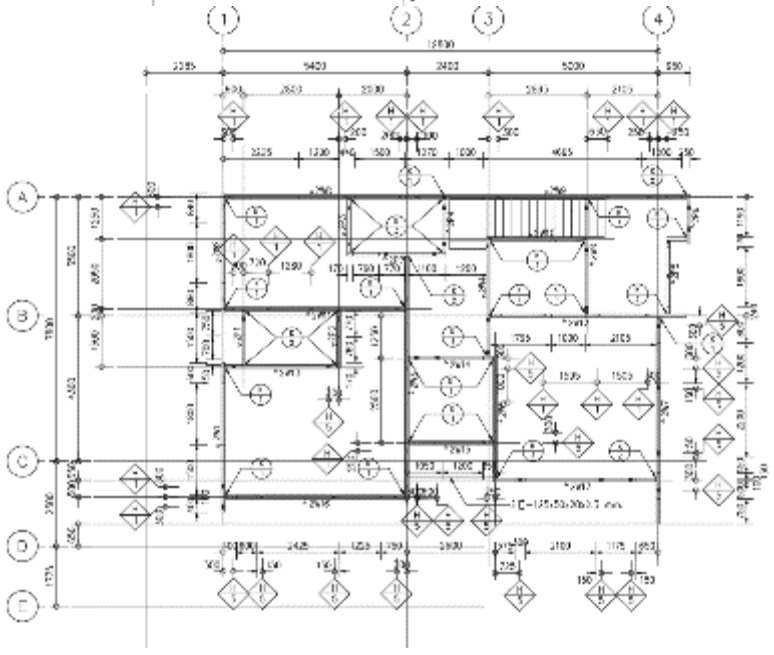
Utility Area	158	sq.m.
Parking	2	cars
Bathroom	3	room (s)
Bedroom	3	room (s)

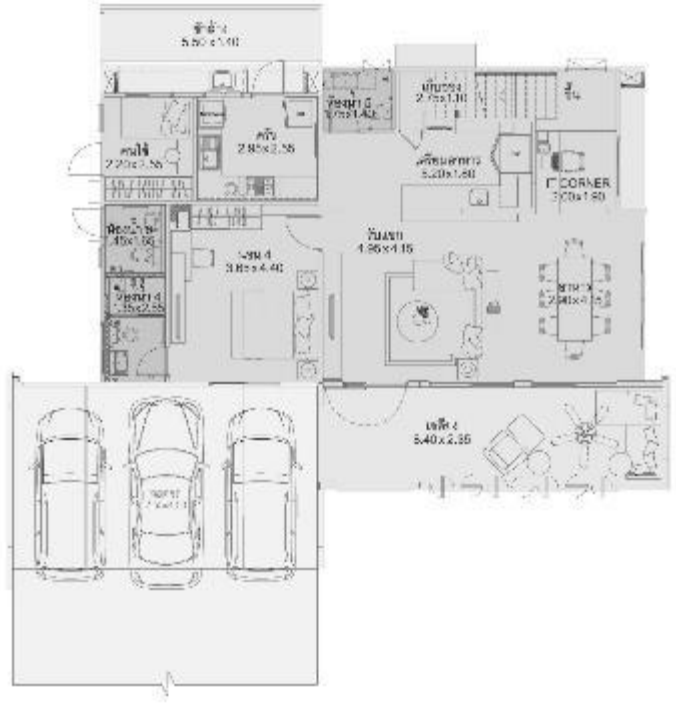
Structural System

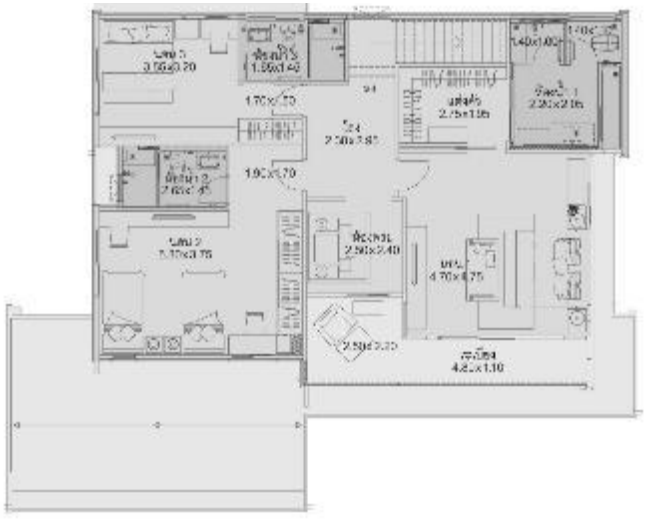
Prestressed Concrete Pile (Safe Load 20 – 30 tons / pile)	-	
Precast & CIP GB	-	
Precast Wall	7. 5– 12.0 (thk.)	cm.
Precast Plank (1st FL.) & Precast Full Slab (2nd FL.)	10.0 – 15.0 (thk.)	cm.

Detach House









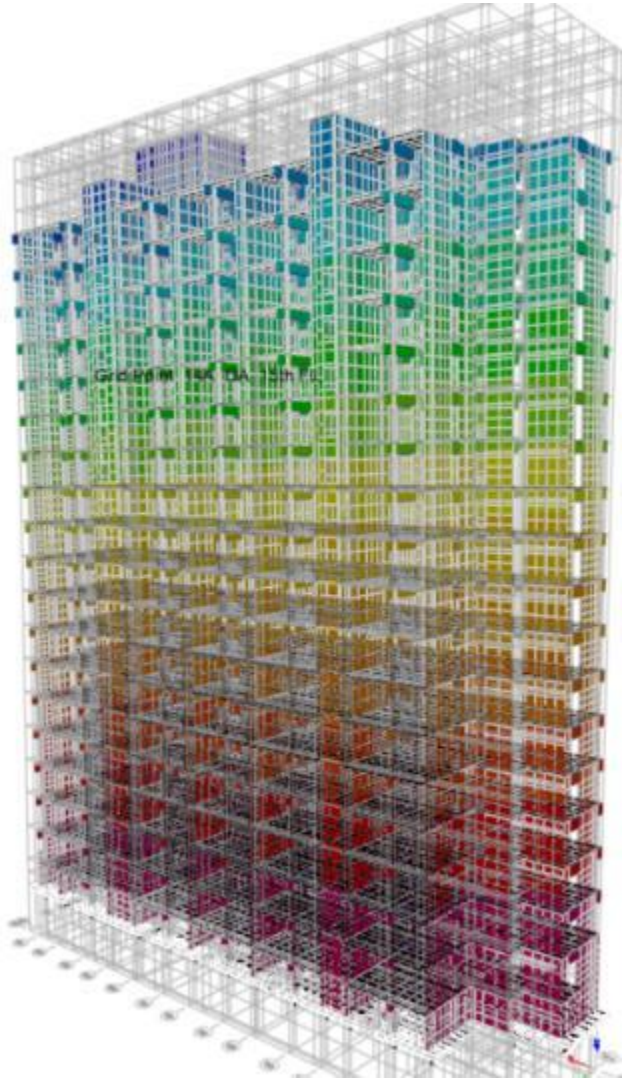
Information

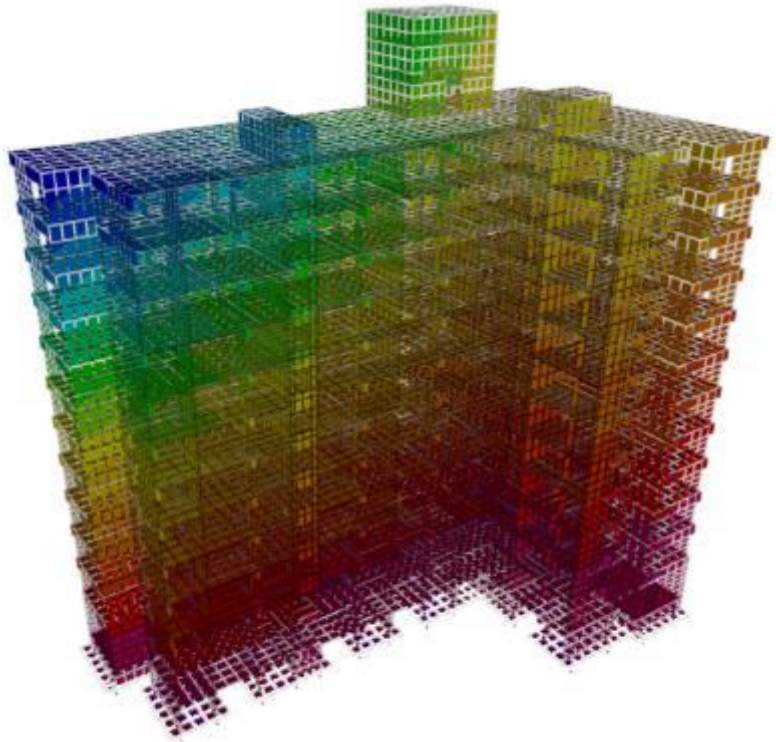
Utility Area	286	sq.m.
Parking	3	cars
Bathroom	5	room (s)
Bedroom	4	room (s)

Structural System

Prestressed Concrete Pile (Safe Load 20 – 30 tons / pile)	-	
Precast & CIP GB	-	
Precast Wall	7. 5– 12.0 (thk.)	cm.
Precast Plank (1st FL.) & Precast Full Slab (2nd FL.)	10.0 – 15.0 (thk.)	cm.

Ease Condo Rama II (phase 2)





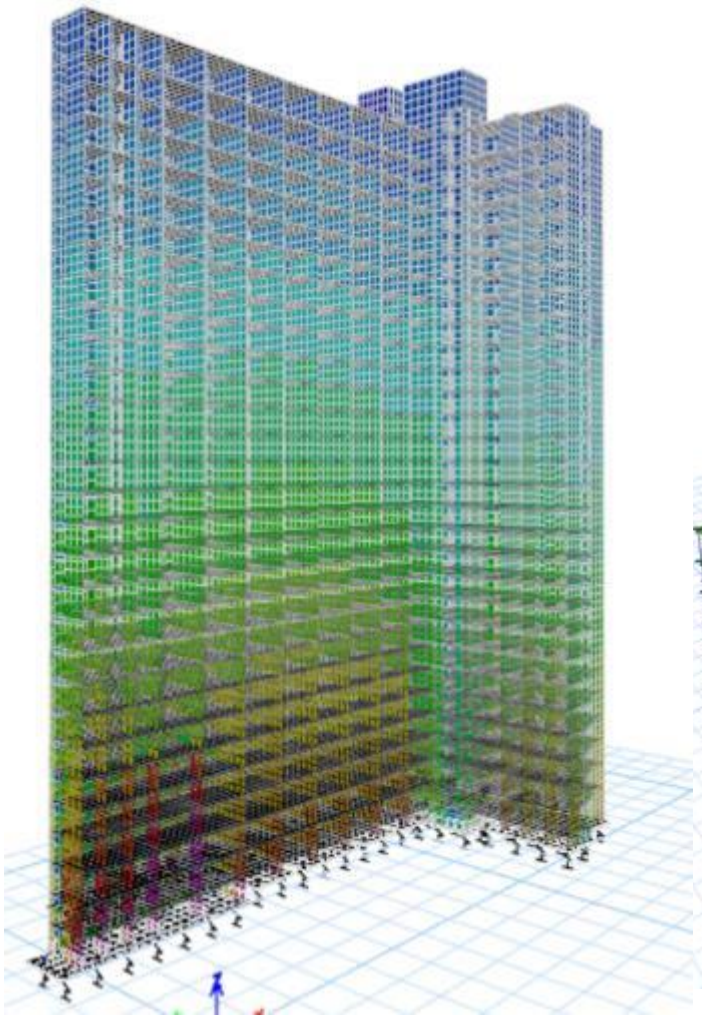
Information

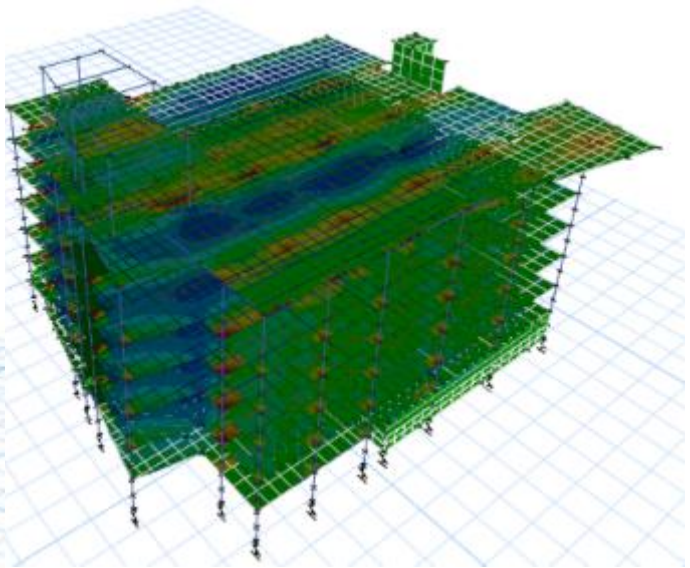
Condominium Project
A Building 18 storeys 192 units
B Building 12 storeys 137 units
Utility Area approx. 10,000 sq.m. per building

Structural System

Bored Pile – Wet Process (⌀ 0.8 – 1.0 m.)	-	
Underground Structure	Cast in-situ	
Wall System	Fully Precast Concrete Wall	12 – 25 cm. thk.
Slab System	Full Precast Slab with Pour Strip	15 – 20 cm. thk.

The Key MRT Phetkasem 48





Information

Condominium Project
Residual Building 30 storeys 639 units
Parking Building 6 storeys
Utility Area approx. 35,000 sq.m.

Structural System

Bored Pile – Wet Process (⌀ 0.8 – 1.2 m.)	-	
Underground Structure	Cast in-situ	
Parking Structure	Cast in-situ Post-tension slab	
Wall System	Fully Precast Concrete Wall	15 – 25 cm. thk.
Slab System	Full Precast Slab with Pour Strip	15 – 22 cm. thk.

Contact Us

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THANK YOU

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