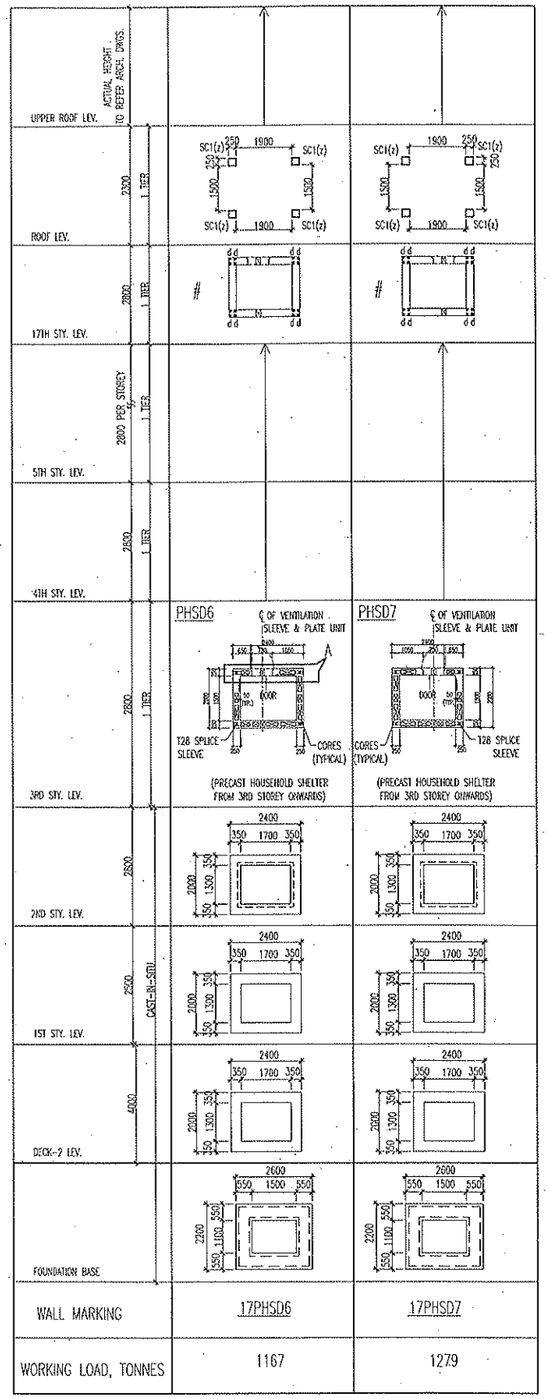
CASE STUDY 5

PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLOCK OF 10/12/14/17-STOREY (TOTAL: 1312 UNITS) WITH 3 BLOCKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS

CD SHELTER STRUCTURAL PLANS



FLOOR LEVELS		REINFORCEMENT	CASE	REINFORCEMENT	CASE
ROOF LEV.		*		*	
17TH	2800	2xD10 4T16@d EACH STUMP AS SHOWN *dowel@d		2xD10 4T16@d EACH STUMP AS SHOWN *dowel@d	
6TH STY. LEV.	2500 PER STOREY				
5TH STY. LEV.	2800	2XD10	—	2XD10	—
4TH STY. LEV.	2800				
3RD STY. LEV.	2800	2XD13		2XD13	
2ND STY. LEV.	2500	2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
1ST STY. LEV.	2800	2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
DECK-2 LEV.	2800	2XT20-100(V) 2XT13-100(H)	OIS1	2XT20-100(V) 2XT13-100(H)	OIS1
FOUNDATION BASE		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
WALL MARKING		17PHSD6		17PHSD7	

HOUSEHOLD SHELTER PLAN & DETAIL (BLOCK 679A)

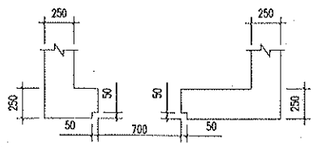
CONCRETE GRADE C40

NOTES: (UNLESS OTHERWISE STATED)

1. HS DENOTES HOUSEHOLD SHELTER.
2. PHS DENOTES PRECAST HOUSEHOLD SHELTER TO REFER TO SEPARATE DRAWINGS
3. REFER TO PILE CAP DRAWINGS FOR PILE CAP DETAILS.
4. STUMP COLUMN LOCATION AS/TRAKING PLAN.
5. FOUNDATION BASE LEVEL TO BE REFERRED TO THE INDIVIDUAL PILECAP LEVEL.
6. ALL HOUSEHOLD STANDARD DETAILS REFER TO DRG. NO: 10044/S10/545 ~ 557.

LEGEND :-

* FOR STUMP REINFORCEMENT REFER TO (BLOCK 679A) ROOF STOREY TOP & BOTTOM REINFORCEMENT PLAN.



TYPICAL OPENING DETAIL-A
SCALE 1:25

AMENDMENT		DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
A	REVISE AS PER LATEST ARCH. DWGS.	180112	HHY	HWC	AT	YCC

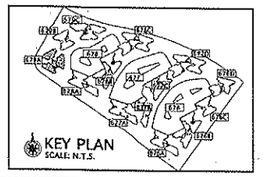
REFERENCE

001 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



STANDARD CERTIFICATION FOR CIVIL DEFENCE SHELTER PLANS

I, YEO CHOON CHONG, hereby submit the detailed civil defence shelter plans (and design calculations) prepared by me and certify that :-

(a) the preparation of these civil defence shelter plans are in accordance with the Building Control Regulations ; and

(b) the civil defence shelter plans works shown on these plans are designed in accordance with the shelter technical requirements.

2. Total number of civil defence shelter plans submitted : 34
and total number of pages of design calculations : 2067

PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

QUALIFIED PERSONS' SIGNATURE AND STAMP — 07-03-12 DATE

OWNER :

HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-01059-CS-415 | REVISION :
PRECINT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE : PUNGGOL EAST CONTRACT 40

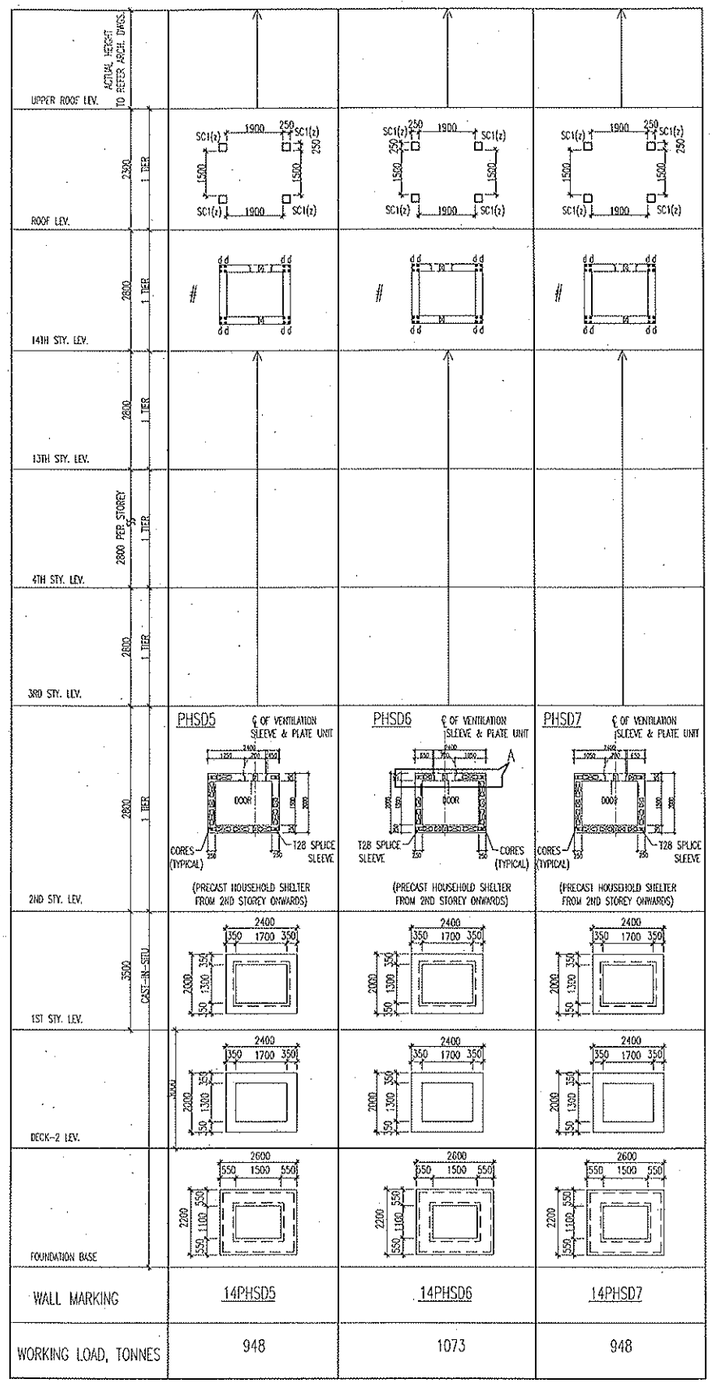
DRAWING TITLE :
(BLOCK 679A)
HOUSEHOLD SHELTER PLAN & DETAIL

SCALE : 1:75 | DATE: JUNE 2011
DRAWN BY: KRS | CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 150471
Tel: 6273 5622 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

DRAWING NO. : 10044/679A/HS-01 | REVISION: A
DESIGN ENGINEER :

THE OWNERSHIP OF THE COPYRIGHT IN THIS DRAWING IS RETAINED BY KTP CONSULTANTS WHOSE CONSENT MUST BE SOUGHT BEFORE ANY USE OR REPRODUCTION OF THE DRAWING OR ANY PART THEREOF CAN BE MADE.



FLOORS LEVEL		REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE
ROOF LEV.		*		*		*	
14TH	2800	2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)		2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)		2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)	
13TH STY. LEV.	2800 PER STOREY						
5TH STY. LEV.	2800	2XD10	—	2XD10	—	2XD10	—
4TH STY. LEV.	2800						
3RD STY. LEV.	2800						
2ND STY. LEV.	2800	2XD13		2XD13		2XD13	
1ST STY. LEV.	3500	2XT20-100(V) 2XT13-100(H)	CIS1	2XT20-100(V) 2XT13-100(H)	CIS1	2XT20-100(V) 2XT13-100(H)	CIS1
DECK-2 LEV.	3000	2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
FOUNDATION BASE		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
WALL MARKING		14PHSD5		14PHSD6		14PHSD7	

HOUSEHOLD SHELTER PLAN & DETAIL (BLOCK 679B)

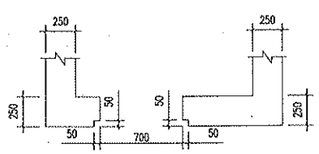
CONCRETE GRADE C40

NOTES: (UNLESS OTHERWISE STATED)

1. HS DENOTES HOUSEHOLD SHELTER.
2. PHS DENOTES PRECAST HOUSEHOLD SHELTER TO REFER TO SEPARATE DRAWINGS
3. REFER TO PILE CAP DRAWINGS FOR PILE CAP DETAILS.
4. STUMP COLUMN LOCATION AS/FRAMING PLAN.
5. FOUNDATION BASE LEVEL TO BE REFERRED TO THE INDIVIDUAL PILECAP LEVEL.
6. ALL HOUSHOLD STANDARD DETAILS REFER TO DRG. NO: 10044/STD/545 ~ 557.

LEGEND :-

* FOR STUMP REINFORCEMENT REFER TO (BLOCK 678A) ROOF STOREY TOP & BOTTOM REINFORCEMENT PLAN.



TYPICAL OPENING DETAIL-A

SCALE 1:25

AMENDMENT		DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
A	REVISE AS PER LATEST ARCH. DWGS.	180112	NHY	NWC	AT	YCC

REFERENCE

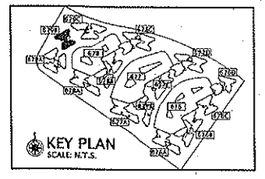
002 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02

Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :

HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-416 | REVISION :

PRECINCT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :

PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
(BLOCK 679B)
HOUSEHOLD SHELTER PLAN & DETAIL

SCALE : 1:100 | DATE: JUNE 2011

DRAWN BY: KRS | CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-16
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

DRAWING NO. : 10044/679B/HS-01 | REVISION: A

DESIGN ENGINEER :

THE OWNERSHIP OF THE COPYRIGHT IN THIS DRAWING IS RETAINED BY KTP CONSULTANTS WHOSE CONSENT MUST BE SOUGHT BEFORE ANY USE OR REPRODUCTION OF THE DRAWING OR ANY PART THEREOF CAN BE MADE.

ACTUAL HEIGHT TO REFER ARCH. DWGS.					
UPPER ROOF LEV.					
2300 1 TIER	ROOF LEV.	SC1(z) 250 1900 SC1(z) 250 1500 1500 SC1(z) 1900 SC1(z)	SC1(z) 250 1900 SC1(z) 250 1500 1500 SC1(z) 1900 SC1(z)	SC1(z) 250 1900 SC1(z) 250 1500 1500 SC1(z) 1900 SC1(z)	SC1(z) 1900 250 SC1(z) 250 1500 1500 SC1(z) 1900 SC1(z)	——
2800 1 TIER	12TH STY. LEV.	# dd dd	# dd dd	# dd dd	# dd dd	
2800 1 TIER	11TH STY. LEV.					
2800 PER STOREY 1 TIER	3RD STY. LEV.					
2800 1 TIER	2ND STY. LEV.	PHSD4 ℄ OF VENTILATION SLEEVE & PLATE UNIT 2400 450 250 1350 DOOR T28 SPLICE SLEEVE CORES (TYPICAL)	PHSD5 ℄ OF VENTILATION SLEEVE & PLATE UNIT 1800 250 1050 DOOR CORES (TYPICAL) T28 SPLICE SLEEVE	PHSD6 ℄ OF VENTILATION SLEEVE & PLATE UNIT 2400 450 250 1350 A DOOR T28 SPLICE SLEEVE CORES (TYPICAL) (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)	PHSD7 ℄ OF VENTILATION SLEEVE & PLATE UNIT 2400 1050 250 1050 DOOR CORES (TYPICAL) T28 SPLICE SLEEVE (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)	PHSD6 ℄ OF VENTILATION SLEEVE & PLATE UNIT 2400 450 250 1350 A DOOR T28 SPLICE SLEEVE CORES (TYPICAL) (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)
3500	1ST STY. LEV.	2400 350 1700 350 2000 350 1300 350	2400 350 1700 350 2000 350 1300 350	2400 350 1700 350 2000 350 1300 350	2400 350 1700 350 2000 350 1300 350	2400 350 1700 350 2000 350 1300 350
3000	DECK-2 LEV.	2400 350 1700 350 2000 350 1300 350	2400 350 1700 350 2000 350 1300 350	2400 350 1700 350 2000 350 1300 350	2400 350 1700 350 2000 350 1300 350	A 2400 350 1700 350 2000 350 1300 350
3000 CAST-IN-SITU	DECK-1 LEV.	——	——	——	——	2400 350 1700 350 2000 350 1300 350
	FOUNDATION BASE	2600 550 1500 550 2200 350 1100 350	2600 550 1500 550 2200 350 1100 350	2600 550 1500 550 2200 350 1100 350	2600 550 1500 550 2200 350 1100 350	2600 550 1500 550 2200 350 1100 350
WALL MARKING		12PHSD4	12PHSD5	12PHSD6	12PHSD7	12PHSD6A
WORKING LOAD, TONNES		802	802	802	783	802

HOUSEHOLD SHELTER PLAN & DETAIL (BLOCK 679C)

FLOORS LEVEL		REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE
ROOF LEV.		*		*		——	
12TH	2800	2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)		2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)			
6TH STY. LEV.	2800 PER STOREY	2XD10	——	2XD10 A	——	2XD10	——
5TH STY. LEV.	2800						
4TH STY. LEV.	2800						
3RD STY. LEV.	2800						
2ND STY. LEV.	2800	2XD13		2XD13		2XD13	
1ST STY. LEV.	3500	2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
DECK-2 LEV.	3000	2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
DECK-1 LEV.	3000	——	CIS1	——	CIS1	2XT20-100(V) 2XT13-100(H)	CIS1
FOUNDATION BASE		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)			
WALL MARKING		12PHSD6		12PHSD7		12PHSD6A	

FLOORS LEVEL		REINFORCEMENT	CASE	REINFORCEMENT	CASE
ROOF LEV.		*		*	
12TH	2800	2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)		2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)	
6TH STY. LEV.	2800 PER STOREY	2XD10	——	2XD10	——
5TH STY. LEV.	2800				
4TH STY. LEV.	2800				
3RD STY. LEV.	2800				
2ND STY. LEV.	2800	2XD13		2XD13	
1ST STY. LEV.	3500	2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
DECK-2 LEV.	3000	2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
DECK-1 LEV.	3000	——	CIS1	——	CIS1
FOUNDATION BASE		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
WALL MARKING		12PHSD4		12PHSD5	

CONCRETE GRADE C40

NOTES: (UNLESS OTHERWISE STATED)

1. HS DENOTES HOUSEHOLD SHELTER.
2. PHS DENOTES PRECAST HOUSEHOLD SHELTER TO REFER TO SEPARATE DRAWINGS
3. REFER TO PILE CAP DRAWINGS FOR PILE CAP DETAILS.
4. STUMP COLUMN LOCATION AS/FRAMING PLAN.
5. FOUNDATION BASE LEVEL TO BE REFERRED TO THE INDIVIDUAL PILECAP LEVEL.
6. ALL HOUSEHOLD STANDARD DETAILS REFER TO DRG. NO: 10944/STD/545 ~ 557.

A

LEGEND :-

* FOR STUMP REINFORCEMENT REFER TO (BLOCK 678A) ROOF STOREY TOP & BOTTOM REINFORCEMENT PLAN.

A

250 250 50 50 50 700 50 250 250

A

TYPICAL OPENING DETAIL-A

SCALE 1:25

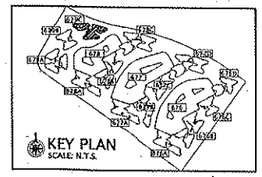
003 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02

Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

OWNER :

HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh Singapore 310480

DRAWING NO. : HB-DL-D1058-CS-417 | REVISION :

PRECINT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :

PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE : PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
(BLOCK 679C)
HOUSEHOLD SHELTER PLAN & DETAIL

SCALE : 1:75 | DATE: JUNE 2011

DRAWN BY: KRS | CHECKED BY:

AMENDMENT		DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
A	REVISE AS PER LATEST ARCH. DWGS.	180112	NHY	NWC	AT	YCC

REFERENCE

XTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: klpcon@pacific.net.sg

DRAWING NO. : 10944/679C/HS-01 | REVISION: A

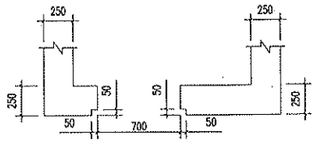
DESIGN ENGINEER :

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	ACTUAL HEIGHT TO REFER ARCH. DWGS.						
UPPER ROOF LEV.							
ROOF LEV.	2300	1 TIER					
17TH STY. LEV.	2800	1 TIER					
16TH STY. LEV.	2800	1 TIER					
4TH STY. LEV.	2800 PER STOREY	12 TIER					
3RD STY. LEV.	2800	1 TIER	PHSD6 ℄ OF VENTILATION SLEEVE & PLATE UNIT (PRECAST HOUSEHOLD SHELTER FROM 3RD STOREY ONWARDS)	PHSD7 ℄ OF VENTILATION SLEEVE & PLATE UNIT (PRECAST HOUSEHOLD SHELTER FROM 3RD STOREY ONWARDS)			
2ND STY. LEV.	2850/2800	1 TIER	(CAST-IN-SITU)	(CAST-IN-SITU)	PHSD7 ℄ OF VENTILATION SLEEVE & PLATE UNIT (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)	PHSD6 ℄ OF VENTILATION SLEEVE & PLATE UNIT (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)	PHSD7 ℄ OF VENTILATION SLEEVE & PLATE UNIT (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)
1ST STY. LEV.	3450/3500	CAST-IN-SITU					
DECK-2 LEV.	3000						
DECK-1 LEV.	3000						
FOUNDATION BASE							
WALL MARKING			17PHSD6	17PHSD7	17PHSD7A	17PHSD6A	17PHSD7B
WORKING LOAD, TONNES			1222	1229	1229	1222	1229

HOUSEHOLD SHELTER PLAN & DETAIL (BLOCK 678A)

FLOORS LEVEL	REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE
ROOF LEV.	—		—		—		—		—	
17TH					2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)		2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)		2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)	
13TH STY. LEV.	2xD10	—	2xD10	—	2xD10	—	2xD10	—	2xD10	—
5TH STY. LEV.										
4TH STY. LEV.	2xD13		2xD13		2xD13		2xD13		2xD13	
3RD STY. LEV.	2XT20-100(V) 2XT10-100(H)		2XT20-100(V) 2XT10-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
2ND STY. LEV.	2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
1ST STY. LEV.	2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		—		2XT20-100(V) 2XT13-100(H)	
DECK-2 LEV.	2XT20-100(V) 2XT13-100(H)	CIS1	2XT20-100(V) 2XT13-100(H)	CIS1	2XT20-100(V) 2XT13-100(H)	CIS1	2XT20-100(V) 2XT13-100(H)	CIS1	2XT20-100(V) 2XT13-100(H)	CIS1
DECK-1 LEV.	2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)		2XT20-100(V) 2XT13-100(H)	
FOUNDATION BASE										
WALL MARKING	17PHSD6		17PHSD7		17PHSD7A		17PHSD6A		17PHSD7B	



TYPICAL OPENING DETAIL-A
SCALE 1:25

CONCRETE GRADE C40

NOTES: (UNLESS OTHERWISE STATED)
1. HS DENOTES HOUSEHOLD SHELTER.
2. PHS DENOTES PRECAST HOUSEHOLD SHELTER TO REFER TO SEPARATE DRAWINGS
3. REFER TO PILE CAP DRAWINGS FOR PILE CAP DETAILS.
4. STUMP COLUMN LOCATION AS/FRAMING PLAN.
5. FOUNDATION BASE LEVEL TO BE REFERRED TO THE INDIVIDUAL PILECAP LEVEL.
6. ALL HOUSEHOLD STANDARD DETAILS REFER TO DRG. NO: 10044/STD/545 ~ 557.

LEGEND :-
* FOR STUMP REINFORCEMENT REFER TO (BLOCK 678A) ROOF STOREY TOP & BOTTOM REINFORCEMENT PLAN.

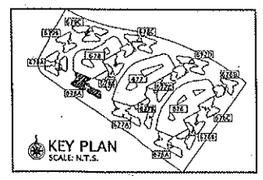
AMENDMENT		DATE	DRAWN BY	DESIGN BY	DESIGN ENGR	QP
A	REVISE AS PER LATEST ARCH. DWGS.	05/12	NRY	NYC	AT	YCC
REFERENCE						

004 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 6A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-418	REVISION :
PRECINCT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

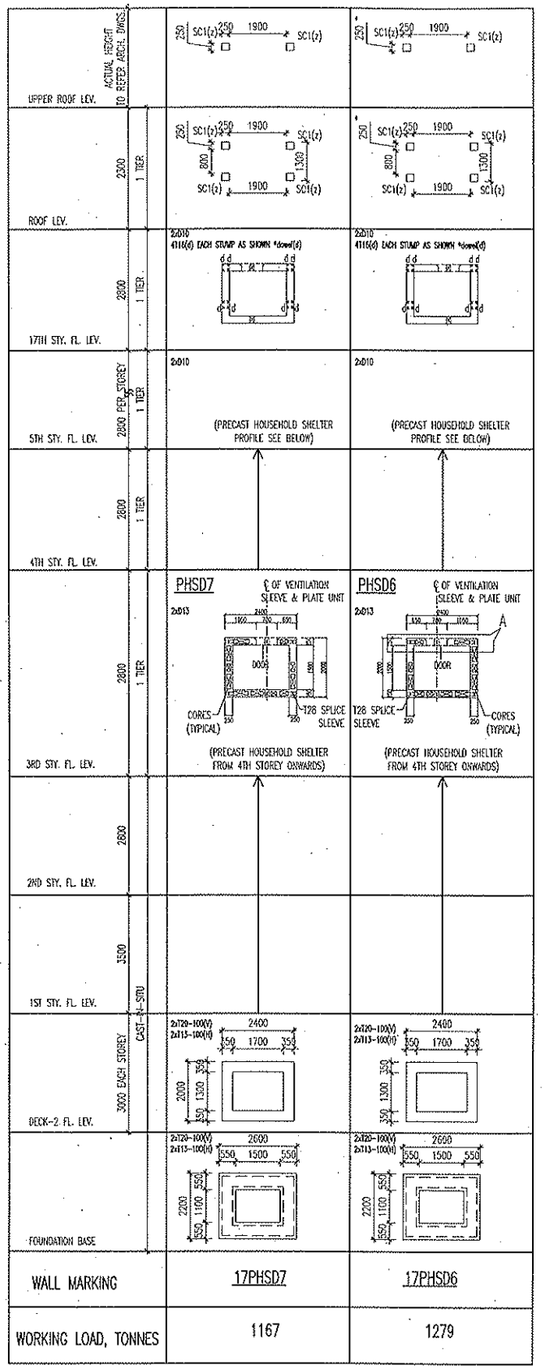
DRAWING TITLE :
(BLOCK 678A)
HOUSEHOLD SHELTER PLAN & DETAIL

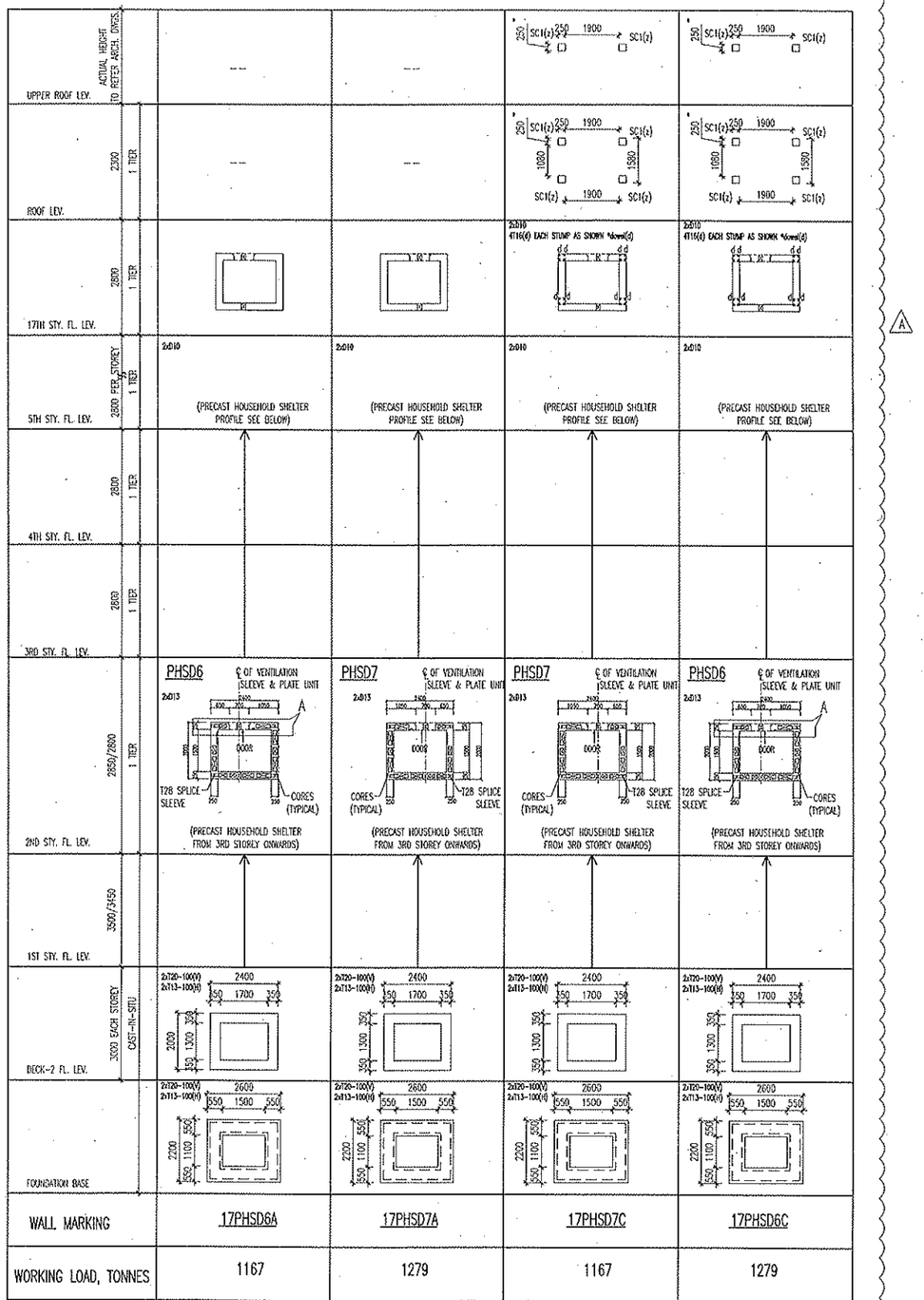
SCALE : 1:100	DATE: JUNE 2011
DRAWN BY: KRS	CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-16
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 6454
E-mail: ktpcon@pacific.net.sg

DRAWING NO. : 10044/678A/HS-01	REVISION: A
DESIGN ENGINEER :	

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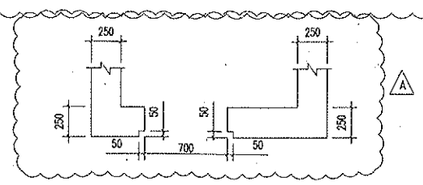
A

HOUSEHOLD SHELTER PLAN & DETAIL (BLOCK 678B)

CONCRETE GRADE C40

NOTES: (UNLESS OTHERWISE STATED) A
1. HS DENOTES HOUSEHOLD SHELTER.
2. PHS DENOTES PRECAST HOUSEHOLD SHELTER TO REFER TO SEPARATE DRAWINGS
3. REFER TO PILE CAP DRAWINGS FOR PILE CAP DETAILS.
4. STUMP COLUMN LOCATION AS/FRAMING PLAN.
5. FOUNDATION BASE LEVEL TO BE REFERRED TO THE INDIVIDUAL PILECAP LEVEL.
6. ALL HOUSEHOLD STANDARD DETAILS REFER TO DRG. NO: 10044/STD/545 ~ 557.

A
LEGEND :-
* FOR STUMP REINFORCEMENT REFER TO (BLOCK 679A) ROOF STOREY TOP & BOTTOM REINFORCEMENT PLAN.



A
TYPICAL OPENING DETAIL-A
SCALE 1:25

AMENDMENT		DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
A	REVISED AS PER LATEST ARCH. DWGS	16.01.12	LMQ	HWC	KBY	YCC

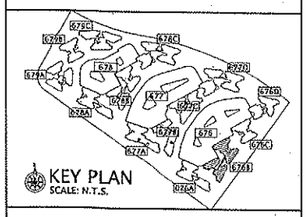
REFERENCE

005 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-01059-CS-419 | REVISION :
PRECINCT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

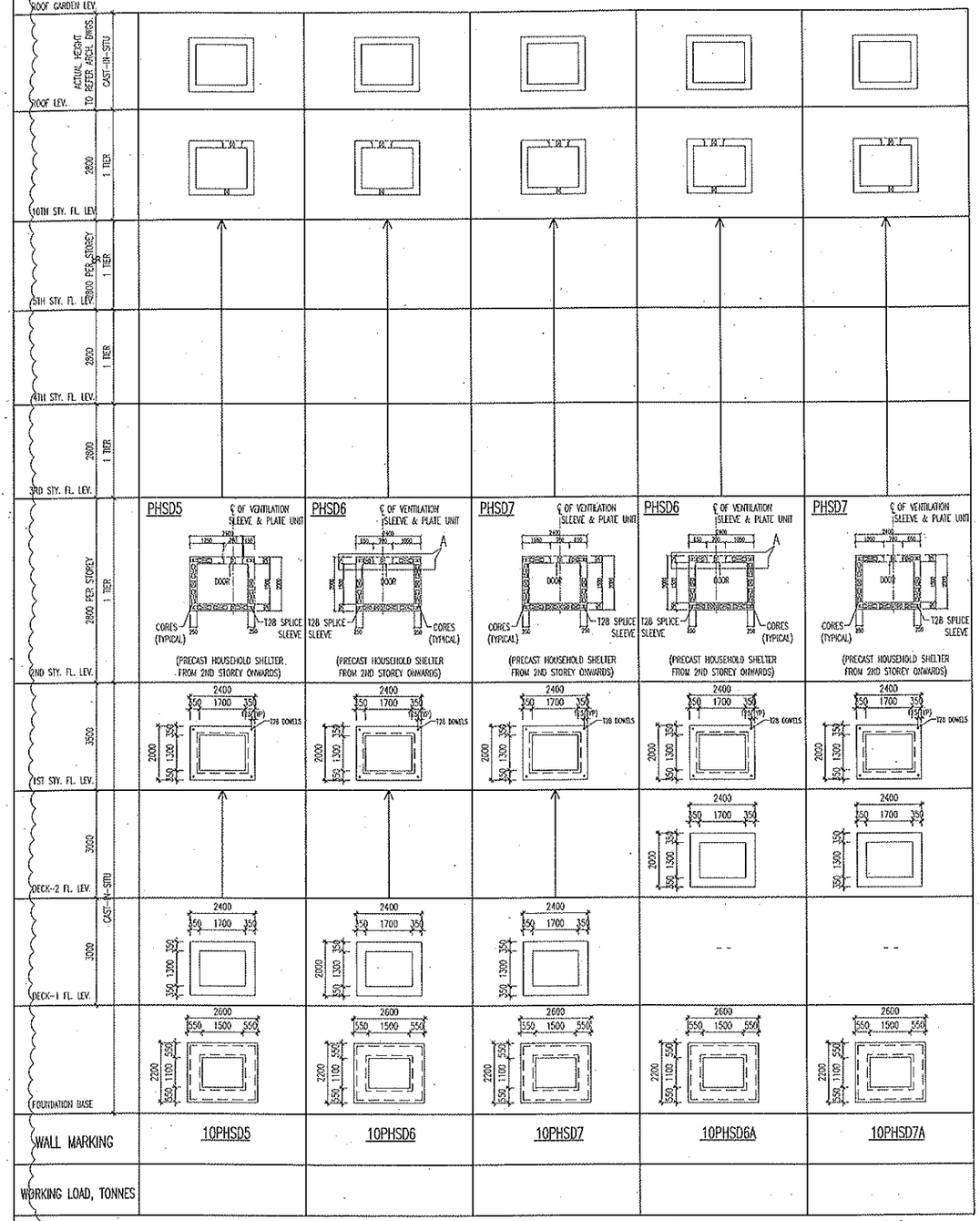
DRAWING TITLE :
(BLOCK 678B)
HOUSEHOLD SHELTER PLAN & DETAIL

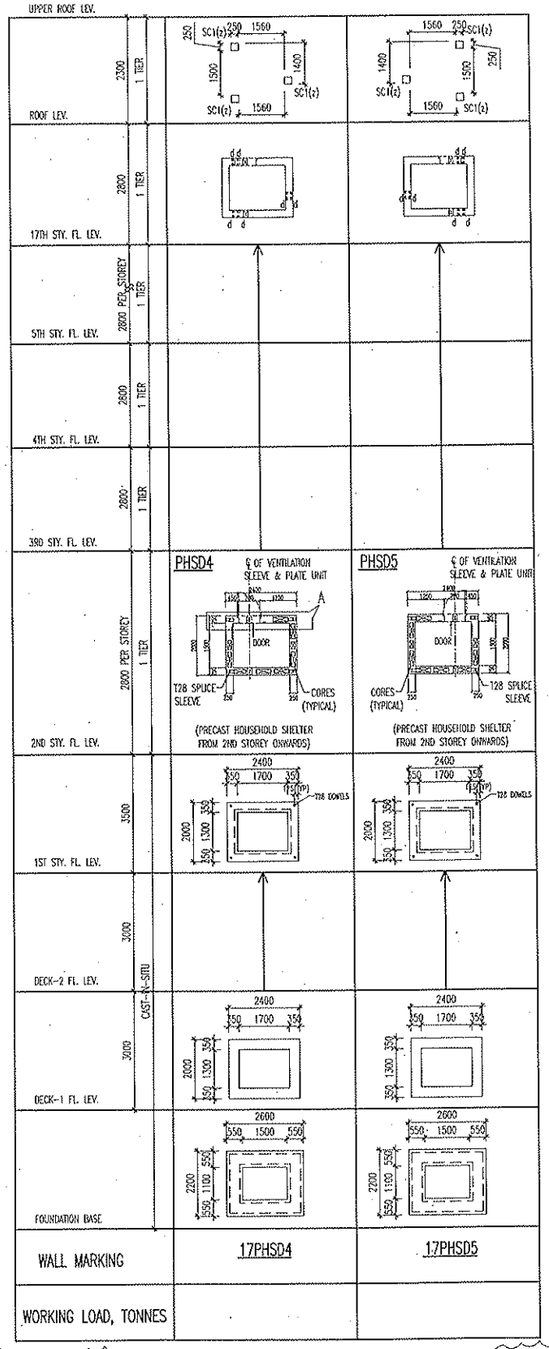
SCALE : 1:75 | DATE: JUNE 2011
DRAWN BY: KRS | CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: ktpcos@pacific.net.sg

DRAWING NO. : 10044/678B/HS-01 | REVISION: A
DESIGN ENGINEER :

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FLOOR LEVELS	REINFORCEMENT	CASE
ROOF LEV.	2XD10	
10TH 2850		
6TH STY. FL. LEV. 2800 (6 STOREY)		
5TH STY. FL. LEV. 2800	2XD10	—
4TH STY. FL. LEV. 2800		
3RD STY. FL. LEV. 2800	2XD13	
2ND STY. FL. LEV. 2800	2XT20-100(V) 2XT13-100(H)	
1ST STY. FL. LEV. 3500	2XT20-100(V) 2XT13-100(H)	
DECK-2 FL. LEV. 3000		
DECK-1 FL. LEV. 3000	2XT20-100(V) 2XT13-100(H)	CIS1
FOUNDATION BASE	2XT20-100(V) 2XT13-100(H)	
WALL MARKING	14PHSD5 14PHSD6 14PHSD7 14PHSD6A 14PHSD7A	

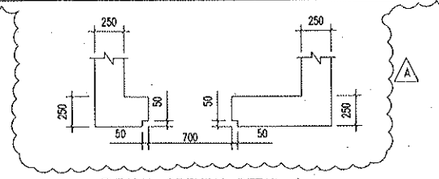
FLOOR LEVELS	REINFORCEMENT	CASE
ROOF LEV.		
17TH 2800	2xD10 4T16(d) EACH STUMP AS SHOWN *Covered(d)	
6TH STY. FL. LEV. 2800 (6 STOREY)		
5TH STY. FL. LEV. 2800	2XD10	—
4TH STY. FL. LEV. 2800		
3RD STY. FL. LEV. 2800	2XD13	
2ND STY. FL. LEV. 2800	2XT20-100(V) 2XT13-100(H)	
1ST STY. FL. LEV. 3500	2XT20-100(V) 2XT13-100(H)	
DECK-2 FL. LEV. 3000		
DECK-1 FL. LEV. 3000	2XT20-100(V) 2XT13-100(H)	CIS1
FOUNDATION BASE		
WALL MARKING	17PHSD4 17PHSD5	

HOUSEHOLD SHELTER PLAN & DETAIL (BLOCK 678C)

CONCRETE GRADE C40

NOTES: (UNLESS OTHERWISE STATED)
1. HS DENOTES HOUSEHOLD SHELTER.
2. PHS DENOTES PRECAST HOUSEHOLD SHELTER TO REFER TO SEPARATE DRAWINGS
3. REFER TO PILE CAP DRAWINGS FOR PILE CAP DETAILS.
4. STUMP COLUMN LOCATION AS/STRAING PLAN.
5. FOUNDATION BASE LEVEL TO BE REFERRED TO THE INDIVIDUAL PILECAP LEVEL.
6. ALL HOUSEHOLD STANDARD DETAILS REFER TO DRG. NO. 10044/STD/545 ~ 557.

LEGEND :-
* FOR STUMP REINFORCEMENT REFER TO (BLOCK 679A) ROOF STOREY TOP & BOTTOM REINFORCEMENT PLAN.



TYPICAL OPENING DETAIL-A
SCALE 1:25

AMENDMENT		DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
A	REVISED AS PER LATEST ARCH. DWGS	160112	LMQ	WYC	KBY	YCC

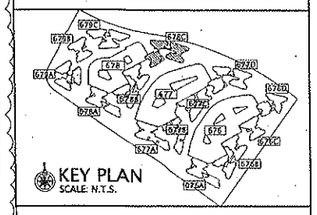
REFERENCE

006 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh Singapore 310480

DRAWING NO. : HB-DL-01059-CS-420	REVISION :
PRECINT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

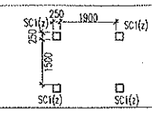
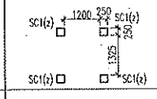
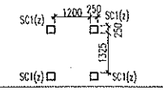
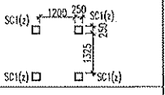
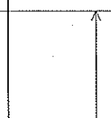
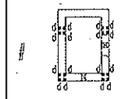
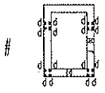
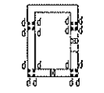
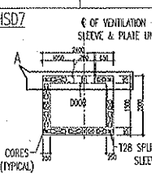
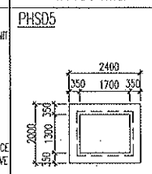
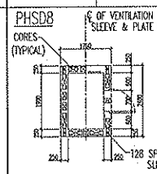
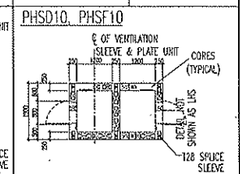
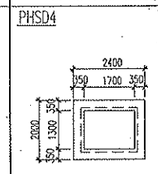
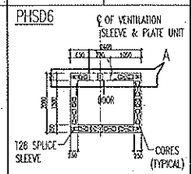
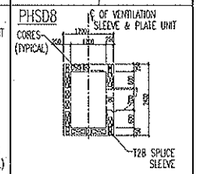
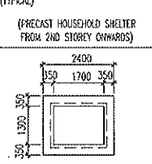
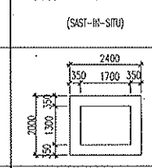
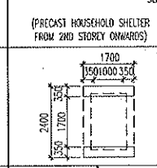
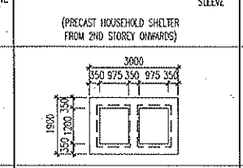
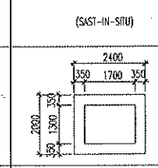
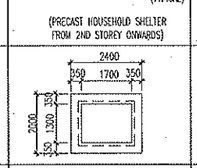
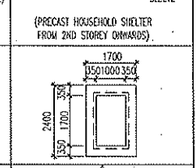
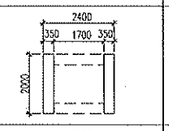
DRAWING TITLE :
(BLOCK 678C)
HOUSEHOLD SHELTER PLAN & DETAIL

SCALE : 1:75	DATE: JUNE 2011
DRAWN BY: KRS	CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18 E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: kpcon@pacific.net.sg

DRAWING NO. : 10044/678C/HS-01	REVISION: A
DESIGN ENGINEER :	

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ACTUAL HEIGHT (TO REFER ARCH. DWGS)								
UPPER ROOF LEV.		—	—	—	—	—	—	—
ROOF LEV.	2300 1 TIER		—		—	—		
17TH STY. LEV.	2800 1 TIER							
16TH STY. LEV.	2800 1 TIER							
3RD STY. LEV.	2800 PER STOREY 1 TIER							
2ND STY. LEV.	2800/2850 1 TIER	PHSD7  (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)	PHSD5  (CAST-IN-SITU)	PHSD8  (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)	PHSD10, PHSF10  (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)	PHSD4  (CAST-IN-SITU)	PHSD6  (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)	PHSD8  (PRECAST HOUSEHOLD SHELTER FROM 2ND STOREY ONWARDS)
1ST STY. LEV.	3500/3450 CAST-IN-SITU							
DECK-2 LEV.	3000						—	—
DECK-1 LEV.	3000						—	—
FOUNDATION BASE								
WALL MARKING		17PHSD7A	17PHSD5	17PHSD8	17PHSD10, 17PHSF10	17PHSD4	17PHSD6A	17PHSD8A
WORKING LOAD, TONNES		1158	1158	922	1152	1080	1080	922

FLOOR LEVELS		REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE
ROOF LEV.		*		—		*	
17TH	2800	2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)				2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)	
16TH STY. LEV.	2800						
5TH STY. LEV.	2800 PER STOREY	2xD10	—	2xD10	—	2xD10	—
4TH STY. LEV.	2800						
3RD STY. LEV.	2800			2xD13			
2ND STY. LEV.	2800	2xD13 T20 CORE CAGE		2xT20-100(V) 2xT13-100(H)		2xD13 T25 CORE CAGE	
1ST STY. LEV.	3500	2xT20-100(V) 2xT13-100(H)		2xT20-100(V) 2xT13-100(H)		2xT20-100(V) 2xT10-100(H)	CIS1
DECK-2 LEV.	3000	2xT20-100(V) 2xT13-100(H)		2xT20-100(V) 2xT13-100(H)		2xT20-100(V) 2xT10-100(H)	CIS6c
DECK-1 LEV.	3000	2xT20-100(V) 2xT13-100(H)	CIS1	2xT20-100(V) 2xT13-100(H)	CIS1	2xT20-100(V) 2xT10-100(H)	CIS6c
FOUNDATION BASE		2xT20-100(V) 2xT13-100(H)		2xT20-100(V) 2xT13-100(H)		2xT20-100(V) 2xT10-100(H)	
WALL MARKING		17PHSD7A		17PHSD5		17PHS8	

FLOOR LEVELS		REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE
ROOF LEV.		—		—		*		*	
17TH	2800					2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)		—	
16TH STY. LEV.	2800							—	
5TH STY. LEV.	2800 PER STOREY	2xD10	—	2xD10	—	2xD10	—	2xD10	—
4TH STY. LEV.	2800								
3RD STY. LEV.	2800			2xD13					
2ND STY. LEV.	2800	2xD13		2xT20-100(V) 2xT10-100(H)		2xD13		2xD13	
1ST STY. LEV.	3500	2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)	
DECK-2 LEV.	3000	2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)		—		2xT20-100(V) 2xT10-100(H)	
DECK-1 LEV.	3000	2xT20-100(V) 2xT10-100(H)	CIS6d	2xT20-100(V) 2xT10-100(H)	CIS1	2xT20-100(V) 2xT10-100(H)	CIS1	—	CIS1
FOUNDATION BASE		2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)		—		2xT20-100(V) 2xT10-100(H)	
WALL MARKING		17PHSD10,17PHSF10		17PHSD4		17PHSD6A		17PHSD8A	

HOUSEHOLD SHELTER REINFORCEMENT DETAIL (BLOCK 677A)

HOUSEHOLD SHELTER PLAN (BLOCK 677A)

CONCRETE GRADE C40

NOTES: (UNLESS OTHERWISE STATED)

1. HS DENOTES HOUSEHOLD SHELTER.
2. PHS DENOTES PRECAST HOUSEHOLD SHELTER TO REFER TO SEPARATE DRAWINGS
3. REFER TO PILE CAP DRAWINGS FOR PILE CAP DETAILS.
4. STUMP COLUMN LOCATION AS/FRAMING PLAN.
5. FOUNDATION BASE LEVEL TO BE REFERRED TO THE INDIVIDUAL PILECAP LEVEL.
6. ALL HOUSHOLD STANDARD DETAILS REFER TO DRG. NO: 10044/STD/645 ~ 657.

LEGEND :-

* FOR STUMP REINFORCEMENT REFER TO (BLOCK 679A) ROOF STOREY TOP & BOTTOM REINFORCEMENT PLAN.

TYPICAL OPENING DETAIL-A
SCALE 1:25

AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
A REVISE AS PER LATEST ARCH. DWGS.	180512	HKY	HMC	AT	YC

REFERENCE

007 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh Singapore 310480

DRAWING NO. :	HB-DL-D1059-CS-421	REVISION :
PRECINT NAME :	WATERWAY BROOKS	BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO :	MUKIM NO. :
02364K	21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

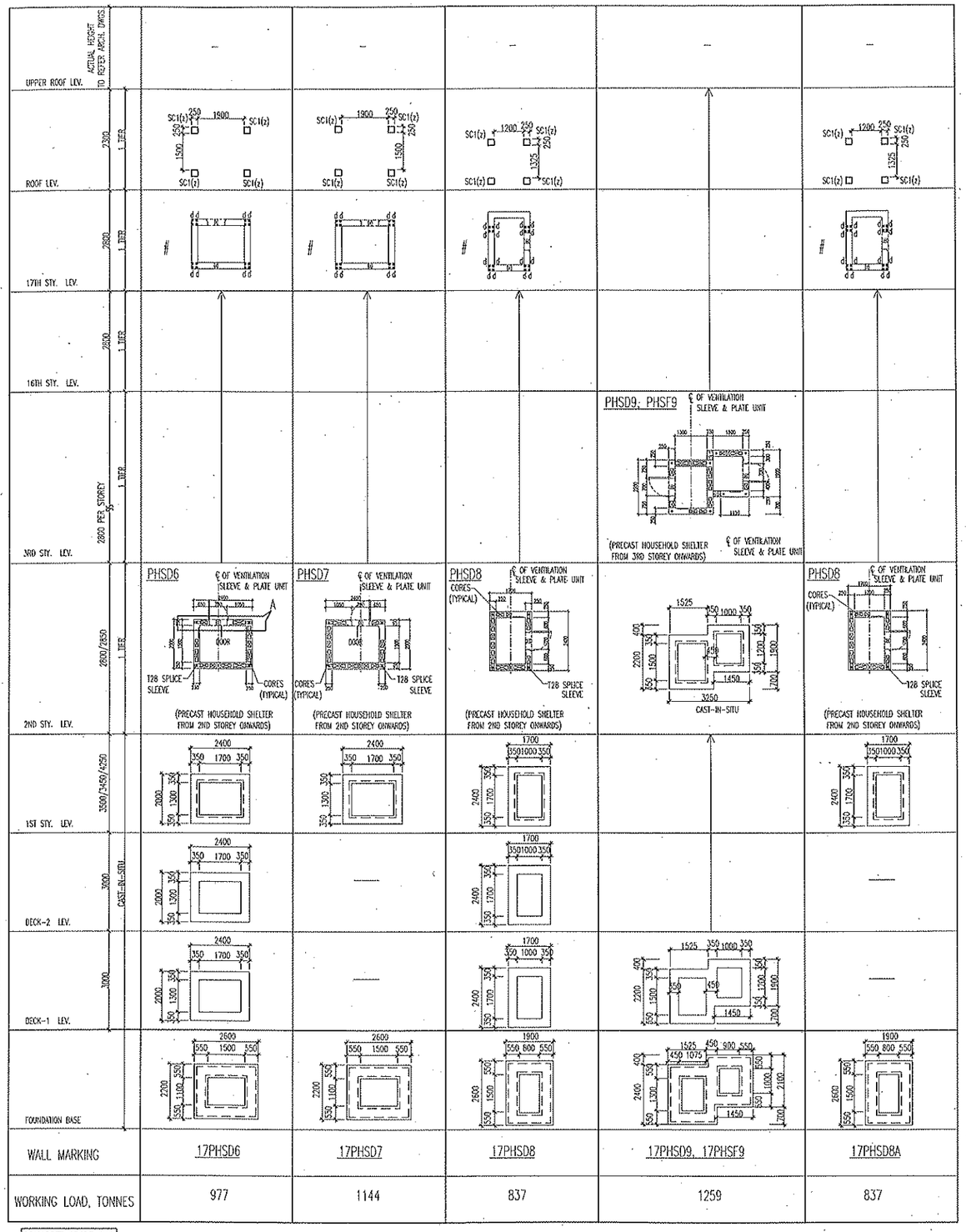
DRAWING TITLE :
(BLOCK 677A)
HOUSEHOLD SHELTER PLAN & DETAIL

SCALE :	1:100	DATE:	JUNE 2011
DRAWN BY:	ATH	CHECKED BY:	

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18 E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

DRAWING NO. :	10044/677A/HS-01	REVISION:	A
DESIGN ENGINEER :			

THE OWNERSHIP OF THE COPYRIGHT IN THIS DRAWING IS RETAINED BY KTP CONSULTANTS WHOSE CONSENT MUST BE SOUGHT BEFORE ANY USE OR REPRODUCTION OF THE DRAWING OR ANY PART THEREOF CAN BE MADE.



FLOOR LEVELS		REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE	REINFORCEMENT	CASE
ROOF LEV.		*		*		*		—		*	
17TH	2820	2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)		2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)		2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)				2xD10 4T16(d) EACH STUMP AS SHOWN *dowel(d)	
16TH STY. LEV.	2800										
5TH STY. LEV.	2800 PER STOREY	2xD10	—	2xD10	—	2xD10	—	2xD10	—	2xD10	—
4TH STY. LEV.	2800										
3RD STY. LEV.	2800							2xD13			
2ND STY. LEV.	2800	2xD13		2xD13		2xD13		2xT20-100(V) 2xT10-100(H)	C6e	2xD13	
1ST STY. LEV.	3500	2xT20-100(V) 2xT13-100(H)	C6	2xT20-100(V) 2xT10-100(H)	C6	2xT20-100(V) 2xT10-100(H)	C6	2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)	C6
DECK-2 LEV.	3000	2xT20-100(V) 2xT13-100(H)		—		2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)		—	
DECK-1 LEV.	3000	2xT20-100(V) 2xT13-100(H)		—		2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)		—	
FOUNDATION BASE		2xT20-100(V) 2xT13-100(H)		2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)		2xT20-100(V) 2xT10-100(H)	
WALL MARKING		17PHSD6		17PHSD7		17PHSD8		17PHSD9,17PHSF9		17PHSD8A	

CONCRETE GRADE C40

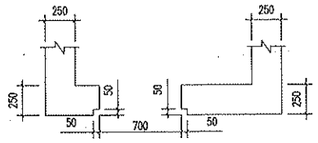
NOTES: (UNLESS OTHERWISE STATED)

1. HS DENOTES HOUSEHOLD SHELTER.
2. PHS DENOTES PRECAST HOUSEHOLD SHELTER TO REFER TO SEPARATE DRAWINGS
3. REFER TO PILE CAP DRAWINGS FOR PILE CAP DETAILS.
4. STUMP COLUMN LOCATION AS/FRAMING PLAN.
5. FOUNDATION BASE LEVEL TO BE REFERRED TO THE INDIVIDUAL PILECAP LEVEL.
6. ALL HOUSHOLD STANDARD DETAILS REFER TO DRG. NO: 10044/STD/S45 ~ 557.

HOUSEHOLD SHELTER PLAN & DETAIL (BLOCK 677B)

LEGEND :-

* FOR STUMP REINFORCEMENT REFER TO (BLOCK 678A) ROOF STOREY TOP & BOTTOM REINFORCEMENT PLAN.



TYPICAL OPENING DETAIL-A

SCALE 1:25

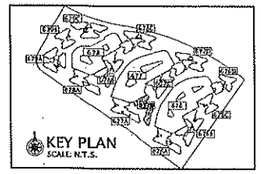
008 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02

Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :

HOUSING & DEVELOPMENT BOARD

HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-422	REVISION :
PRECINT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :

PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :

PUNGGOL EAST CONTRACT 40

DRAWING TITLE :

(BLOCK 677B)
HOUSEHOLD SHELTER PLAN & DETAIL

SCALE : 1:100	DATE: JUNE 2011
DRAWN BY: ATH	CHECKED BY:

AMENDMENT		DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
A	REVISE AS PER LATEST ARCH. DWGS.	280112	MAY	MWC	AT	YCC

REFERENCE

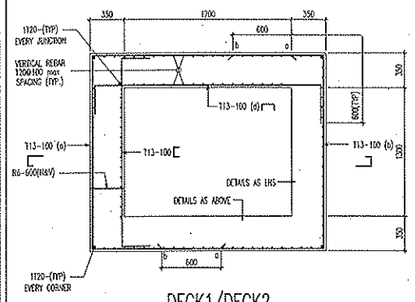
KIP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: kipcon@pacific.net.sg

DRAWING NO. : 10044/677B/HS-01	REVISION: A
DESIGN ENGINEER :	

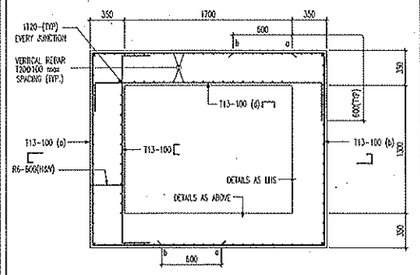
THE OWNERSHIP OF THE COPYRIGHT IN THIS DRAWING IS RETAINED BY KIP CONSULTANTS WHOSE CONSENT MUST BE SOUGHT BEFORE ANY USE OR REPRODUCTION OF THE DRAWING OR ANY PART THEREOF CAN BE MADE.

CAST-IN-SITU HOUSEHOLD SHELTER WALLS

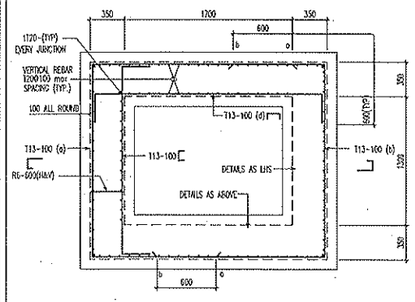
CASE CIS1 – USING REBAR
(MIN REINFORCEMENT AND MAX ALLOWABLE SPACING)



DECK1/DECK2

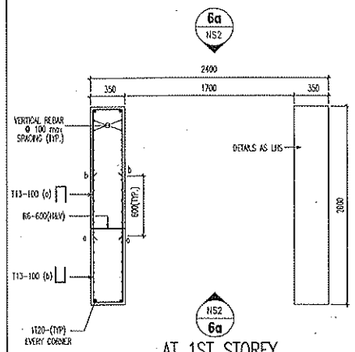


DECK1/DECK2
APPLICABLE AS PER FRAMING PLAN

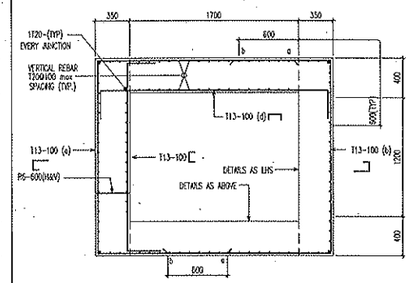


AT FOUNDATION

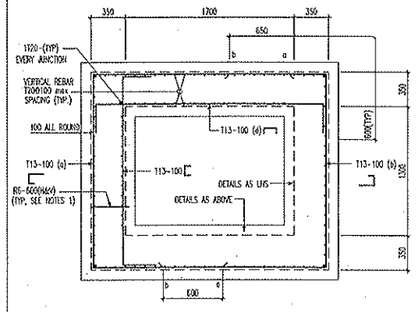
CASE CIS6a – USING REBAR
(MIN REINFORCEMENT AND MAX ALLOWABLE SPACING)



AT 1ST STOREY

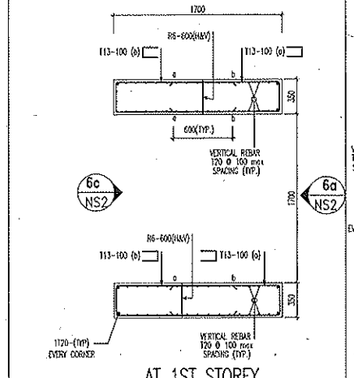


DECK1/DECK2
APPLICABLE AS PER FRAMING PLAN

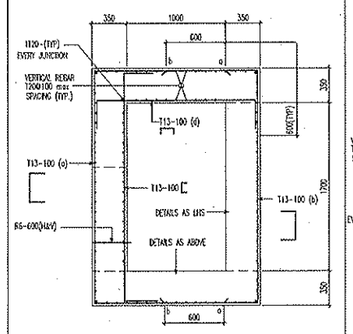


AT FOUNDATION

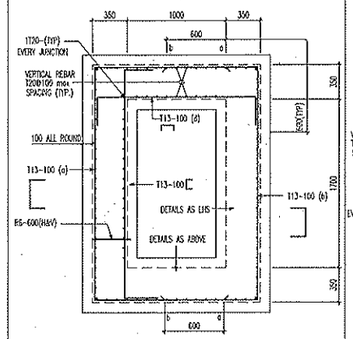
CASE CIS6c – USING REBAR
(MIN REINFORCEMENT AND MAX ALLOWABLE SPACING)



AT 1ST STOREY

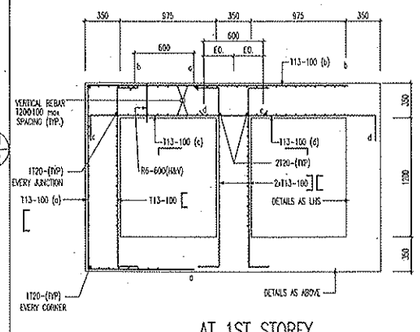


DECK1/DECK2
APPLICABLE AS PER FRAMING PLAN

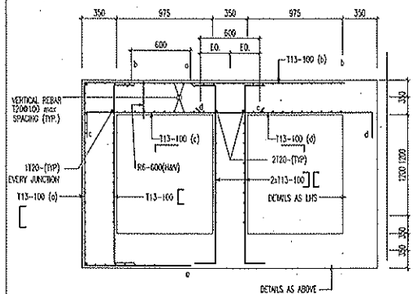


AT FOUNDATION

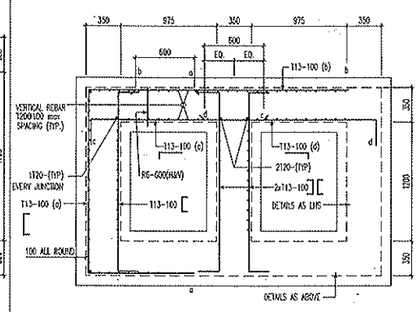
CASE CIS6d – USING REBAR
(MIN REINFORCEMENT AND MAX ALLOWABLE SPACING)



AT 1ST STOREY

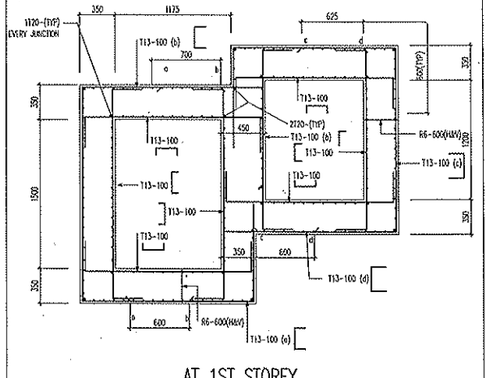


DECK1/DECK2
APPLICABLE AS PER FRAMING PLAN

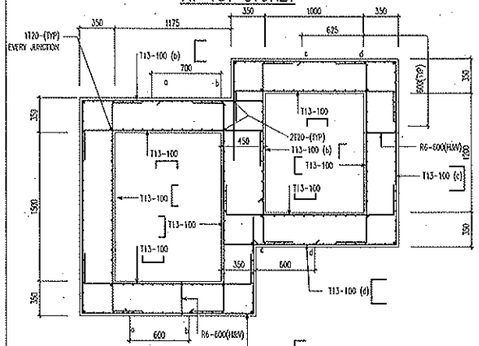


AT FOUNDATION

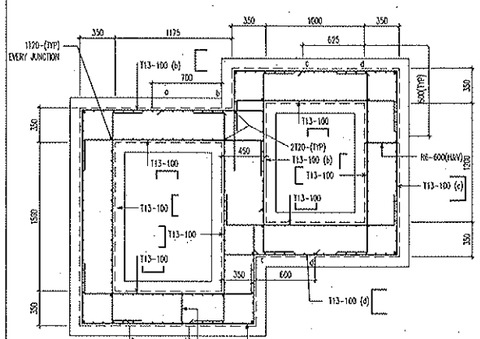
CASE CIS6e – USING REBAR
(MIN REINFORCEMENT AND MAX ALLOWABLE SPACING)



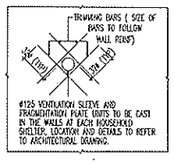
AT 1ST STOREY



DECK1/DECK2
APPLICABLE AS PER FRAMING PLAN



AT FOUNDATION



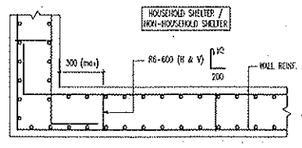
TYPICAL DETAILS SHOWING TRIMMING BARS FOR OPENING AT HOUSEHOLD SHELTER WALL

NOTES:

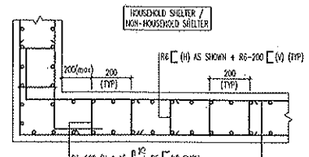
1. FOR DETAILS ON PLACING OF R6-100(H & V)'s LINKS AND ADDITIONAL LINKS SEE TYPICAL DETAILS OF LINK AT WALL
2. POSITION/ORIENTATION OF 1000x1900 OPENING TO REFER TO CONTRACT DRAWING.
3. HOUSEHOLD SHELTER WALL ARE PRECAST AT 2ND STY ONWARDS FOR DETAILS TO REFER TO PRECAST HOUSEHOLD SHELTER WALL.
4. DETAIL OF MESH X AND Z SEE CAST IN-SITU HOUSEHOLD SHELTER WALL – PART 1 (SPECIAL MESH – FULLY FABRICATED DETAILS)

TYPICAL DETAILS OF LINKS AT HS WALLS

USING MESH & T13 REBAR



USING T16 & T20 REBAR



PLAN OF HOUSEHOLD SHELTER WALL

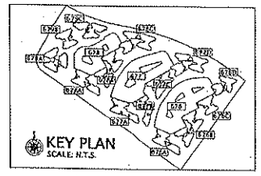
015 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02

Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-428 | REVISION : --

PRECINCT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
NON-HOUSEHOLD SHELTER WALL DETAILS-1

SCALE : 1:30 | DATE: JAN 2011

DRAWN BY: HNY | CHECKED BY:

AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	DP
NEW DRAWING	250112	HNY	NYC	AT	YCC

REFERENCE

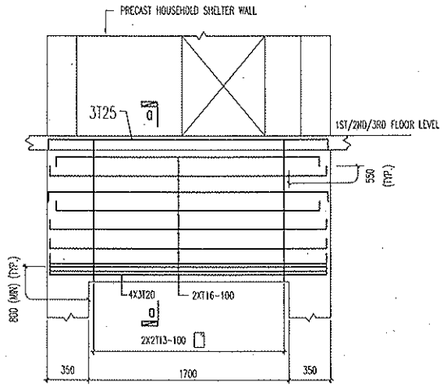
KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3781 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

DRAWING NO. : 10044/COM/HS1 | REVISION: --

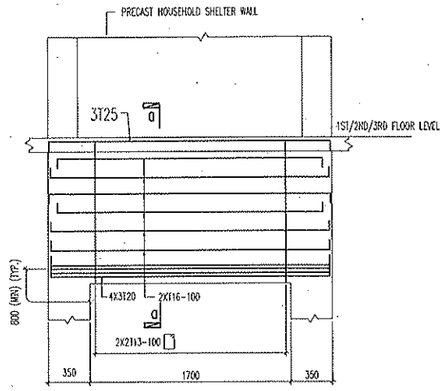
DESIGN ENGINEER :

THE OWNERSHIP OF THE COPYRIGHT IN THIS DRAWING IS RETAINED BY KTP CONSULTANTS WHOSE CONSENT MUST BE SOUGHT BEFORE ANY USE OR REPRODUCTION OF THE DRAWING OR ANY PART THEREOF CAN BE MADE.

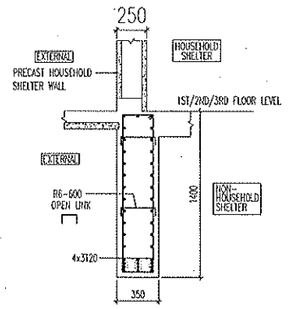
VIEW 6a & 6c WITH DOOR OPENING DIRECTLY ABOVE



VIEW 6a

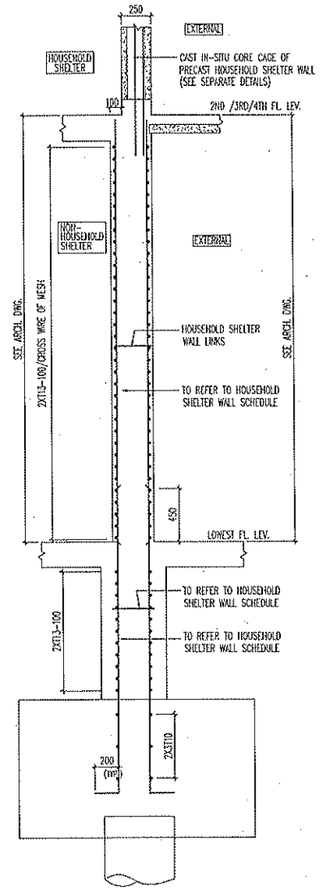


VIEW 6c



D--D

SECTION 3a-3a



3a--3a

NOTES:

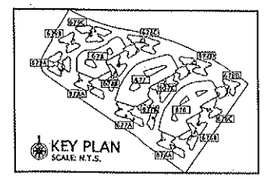
1. DETAILS NOT SHOWN TO REFER TO HOUSEHOLD SHELTER WALL DETAILS PART 1.
2. DETAILS ON PLACING OF R6-600 (H & V) LINKS AND ADDITIONAL LINKS, NOT SHOWN TO REFER TO STANDARD STRUCTURAL DRAWINGS.
3. POSITION OF VENTILATION SLEEVE & PLATE UNIT TO CONFIRM WITH ARCH. DWG.
4. CORE SIZE IS INDICATIVE ONLY. ACTUAL CORE SIZE TO BE CONFIRMED WITH THE TE&M PRECASTER WHO SUPPLY THE PRECAST HOUSEHOLD SHELTER WALL.
5. NO DIFFERENT MARKING FOR HANDED CASES.
6. TO ENSURE THAT AFTER LAPPING OF MSEHES ALL VERTICAL REINFORCEMENT ARE SPACED AT 100 max AS SHOWN.
7. OTHER DETAILS NOT SHOWN TO REFER TO STANDARD STRUCTURAL DRAWINGS.

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02

Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :

HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-430	REVISION : -
PRECINCT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :

PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
NON-HOUSEHOLD SHELTER WALL DETAILS-2

SCALE : 1:25	DATE: JAN 2011
DRAWN BY: MAR	CHECKED BY:

AMENDMENT	DATE	DRAWN BY	DIGGED BY	DESIGN ENGR	QP
NEW DRAWING	250112	HAY	NWC	AT	YCC

REFERENCE

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3101 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

DRAWING NO. : 10044/CON/HS2 | REVISION: -

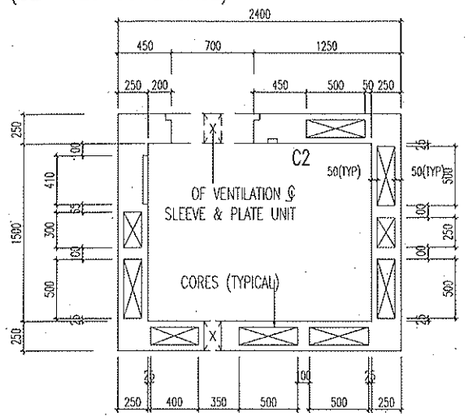
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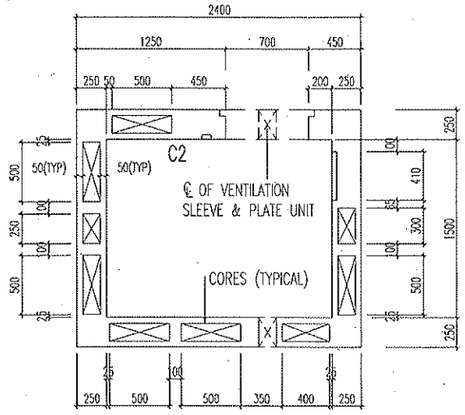
FOR PRECAST HOUSEHOLD SHELTER WALL PLANS SHOWING ARRANGEMENT OF CORES

ALL CORE CAGES LAYOUT TO BE REFERRED TO DRG NO: 10044/STD/551 & 552.

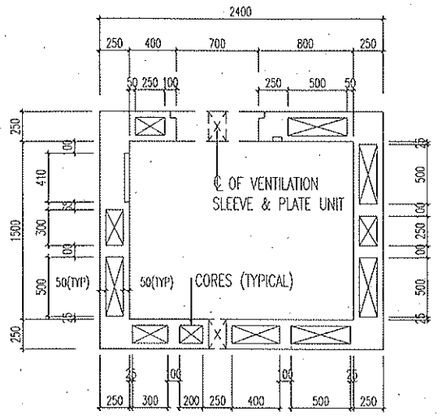
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(TYPICAL C1 = T20 CORE CAGE)
(C2= T25 CORE CAGE)



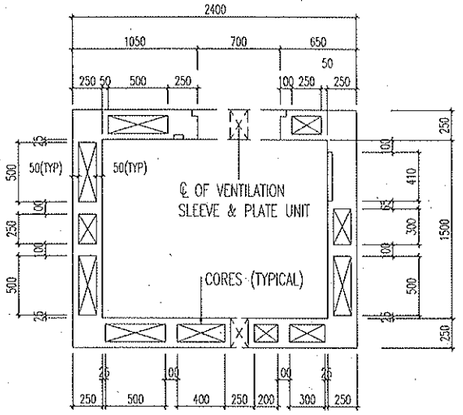
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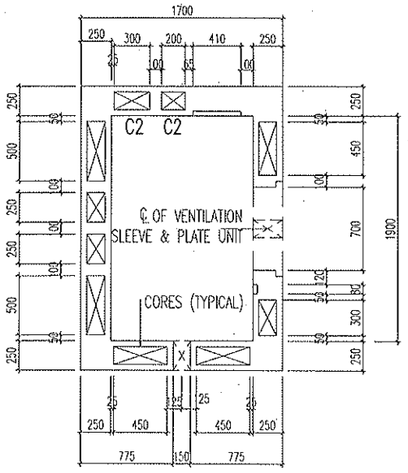
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TYPE PHSD7: 1500x1900
(TYPICAL C1 = T20 CORE CAGE)

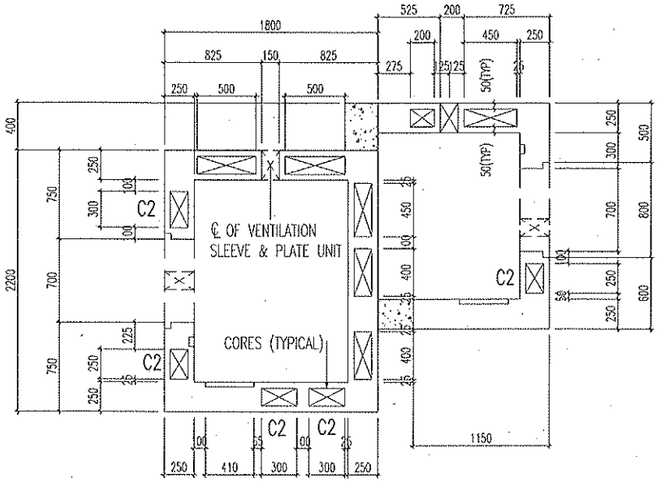


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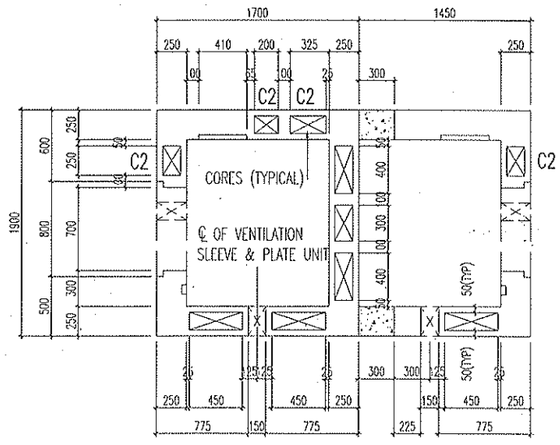
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(C2= T25 CORE CAGE)

TYPE PHSF9: 1200x1400
(TYPICAL C1 = T20 CORE CAGE)
(C2= T25 CORE CAGE)



TYPE PHSD10: 1200x1400
(TYPICAL C1= T20 CORE CAGE)
(C2= T28 CORE CAGE)

TYPE PHSF10: 1200x1400
(TYPICAL C1= T20 CORE CAGE)
(C2= T28 CORE CAGE)



TYPICAL STOREY TO ROOF

NOTES:

AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
NEW DRAWING					
REFERENCE					

017 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh Singapore 310480

DRAWING NO. : HB-D10128-CS-431 | REVISION :
PRECINT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

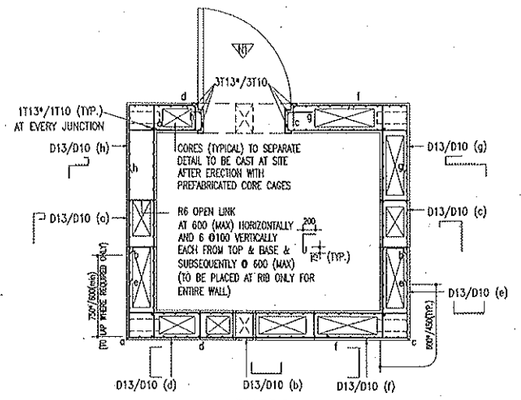
DRAWING TITLE :
HOUSEHOLD SHELTER WALL DETAILS - 1

SCALE : 1:25 | DATE: FEB 2012
DRAWN BY: LMO | CHECKED BY: SUN MIN

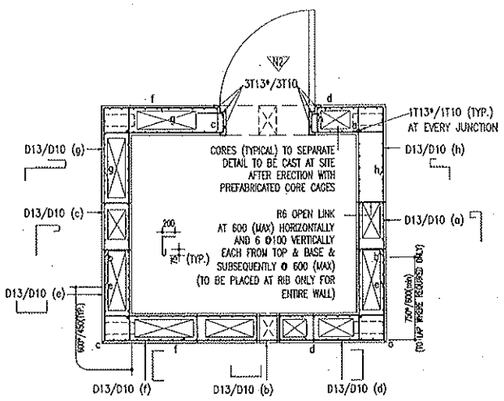
KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

DRAWING NO. : 10044/CC04/HS1 | REVISION: -
DESIGN ENGINEER :

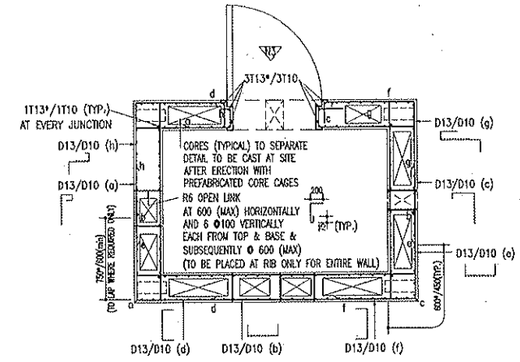
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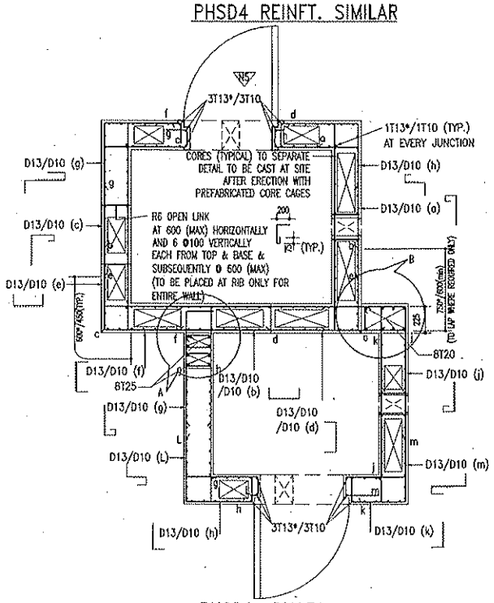
PHSD6
PHSD4 REINFT. SIMILAR



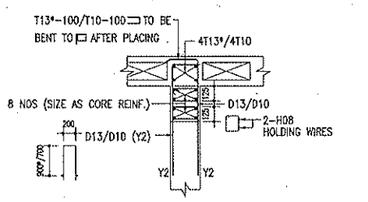
PHSD7
PHSD5 REINFT. SIMILAR



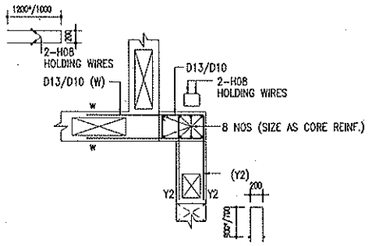
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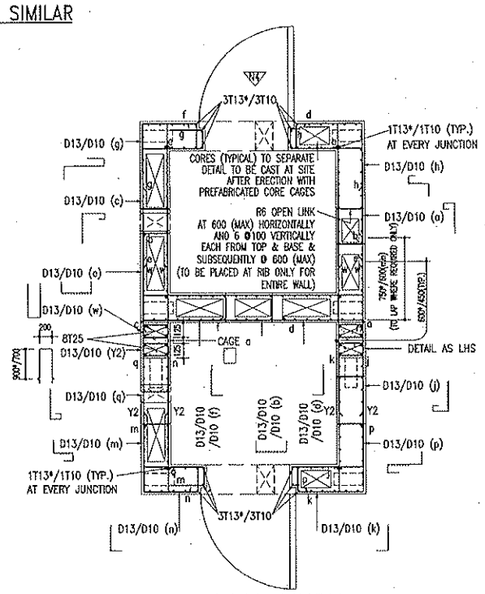
PHSD9, PHSF9



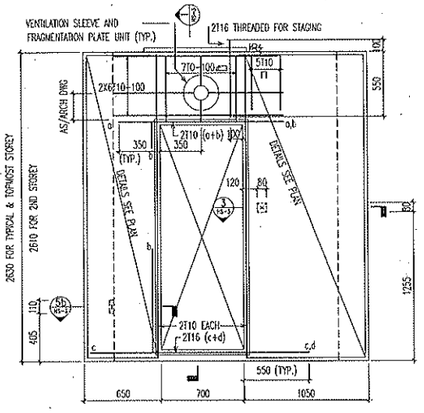
DETAIL A



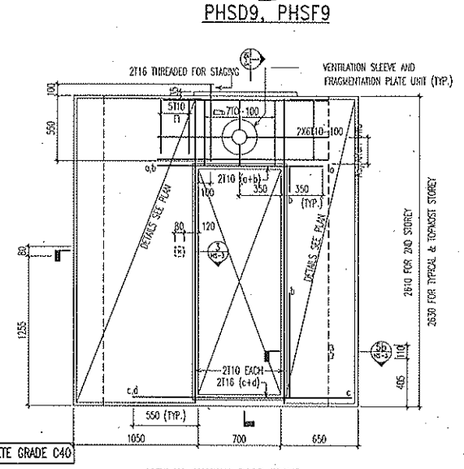
DETAIL B



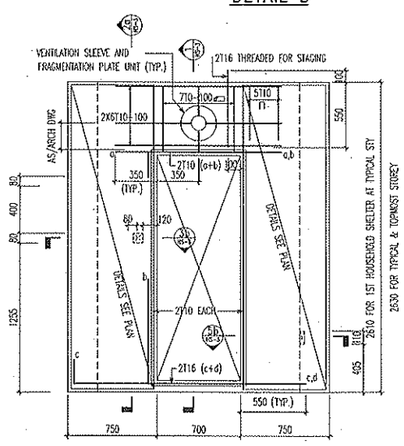
PHSD10, PHSF10



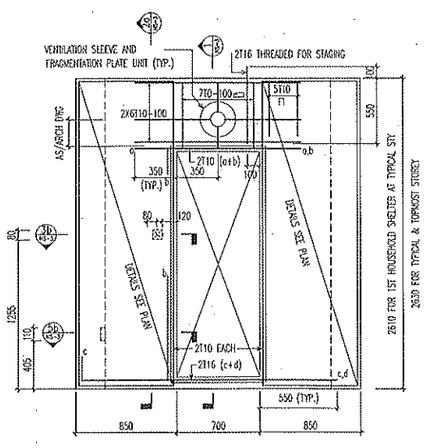
VIEW N1 SHOWING DOOR FRAME



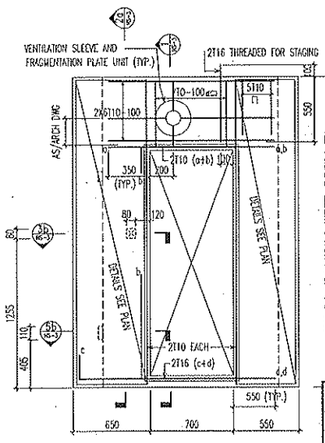
VIEW N2 SHOWING DOOR FRAME



VIEW N3 SHOWING DOOR FRAME



VIEW N4 SHOWING DOOR FRAME



VIEW N5 SHOWING DOOR FRAME

NOTES: (UNLESS OTHERWISE STATED)

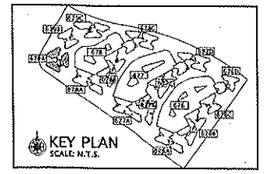
1. ALL DIMENSIONS AT DOOR OPENING TO CONFIRMED WITH APPROVED BLAST DOOR DETAILS.
2. DIRECTION OF DOOR OPENING TO BE CONFIRM WITH ARCH. DWG. PRIOR TO PRODUCTION
3. POSITION OF SLEEVES, ELECTRICAL SERVICES AND DIRECTION OF DOOR OPENING TO BE CONFIRMED WITH ARCH. AND ELECTRICAL DWG.PRIOR TO PRODUCTION
4. ACTUAL SIZES AND POSITION OF VENTILATION SLEEVE & PLATE UNIT TO REFER TO INDIVIDUAL CONTRACT.
5. TO ENSURE THAT AFTER LAPPING OF MESHES ALL VERTICAL REINFORCEMENT ARE SPACED AT 100 max AS SHOWN

018 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-432 | REVISION : -
PRECINCT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
HOUSEHOLD SHELTER WALL DETAILS - 2

SCALE : 1:25 | DATE: JAN 2011
DRAWN BY: NNY | CHECKED BY:

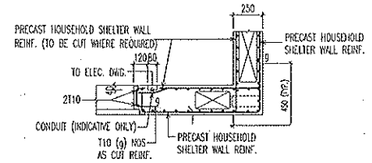
AMENDMENT	DATE	DRAWN BY	CHKED BY	DESIGN ENGR	QP
NEW DRAWING	250112	NNY	NWC	AT	YCC

REFERENCE

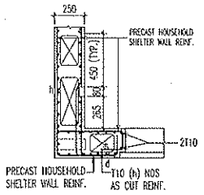
KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3781 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5602 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

DRAWING NO. : 10064/COM/HS2 | REVISION: -
DESIGN ENGINEER :

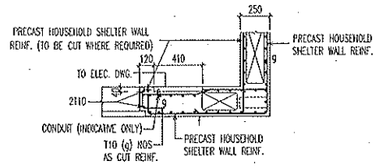
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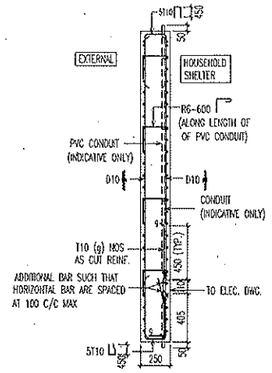
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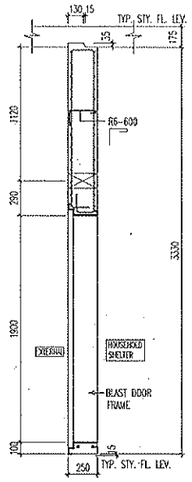
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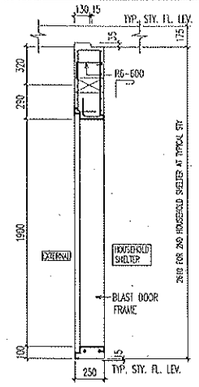


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1-1

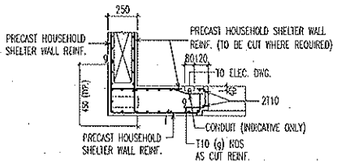
AT 1ST STOREY



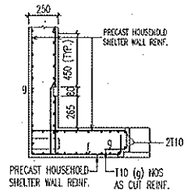
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AT 2ND STOREY

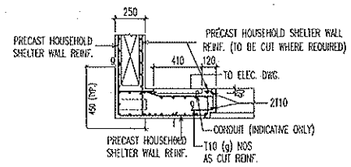
1ST PRECAST HOUSEHOLD SHELTER



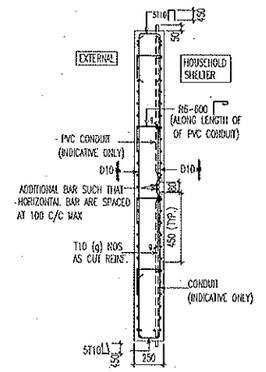
3a – 3a



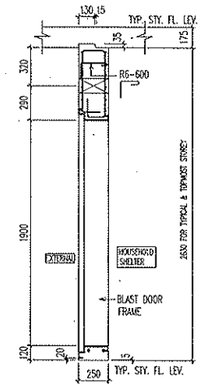
4a – 4a



5a – 5a



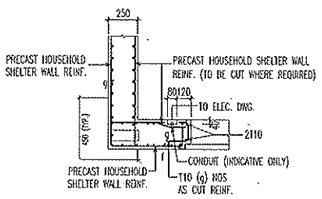
2a – 2a



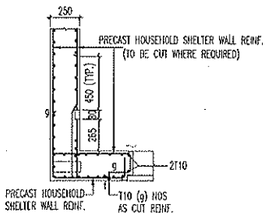
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AT TYPICAL STOREY

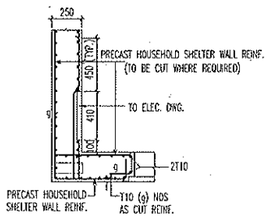
SUBSEQENT PRECAST HOUSEHOLD SHELTER



3b – 3b



4b – 4b



5b – 5b

CONCRETE GRADE C40

NOTES: (UNLESS OTHERWISE STATED)

1. ALL DIMENSIONS AT DOOR OPENING TO CONFIRMED WITH APPROVED BLAST DOOR DETAILS.
2. DIRECTION OF DOOR OPENING TO BE CONFIRM WITH ARCH. DWG. PRIOR TO PRODUCTION
3. POSITION OF SLEEVES, ELECTRICAL SERVICES AND DIRECTION OF DOOR OPENING TO BE CONFIRMED WITH ARCH. AND ELECTRICAL DWG PRIOR TO PRODUCTION
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5. TO ENSURE THAT AFTER LAPPING OF MESHES ALL VERTICAL REINFORCEMENT ARE SPACED AT 100 max AS SHOWN

AMENDMENT	DATE	DRAWN BY	DECKED BY	DESIGN ENGR	QP
NEW DRAWING	250112	NNY	NWC	AT	YCC

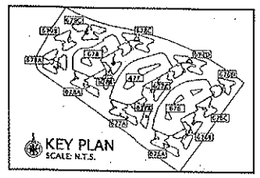
REFERENCE

019 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011-- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :

HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-433 | REVISION : –

PRECINT NAME : WATERWAY BROOKS | DTO

PROJECT TITLE :

PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :

PUNGGOL EAST CONTRACT 40

DRAWING TITLE :

HOUSEHOLD SHELTER WALL DETAILS-3

SCALE : 1:25 | DATE: JAN 2011

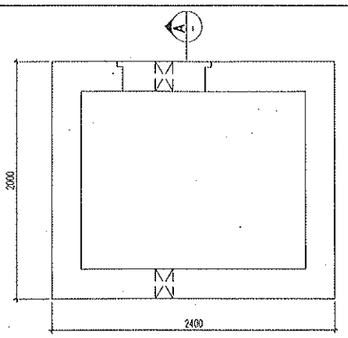
DRAWN BY: NNY | CHECKED BY:

KIP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: kipcon@pacific.net.sg

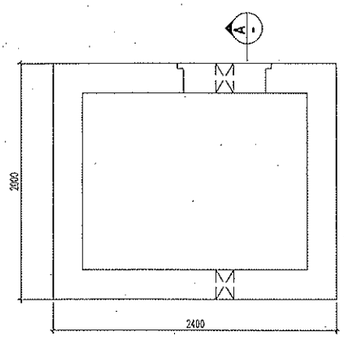
DRAWING NO. : 10044/CON/HS3 | REVISION: –

DESIGN ENGINEER :

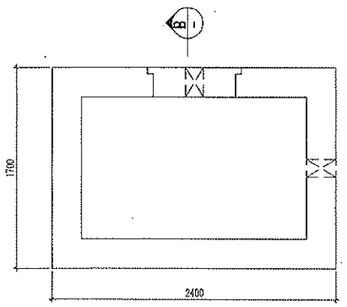
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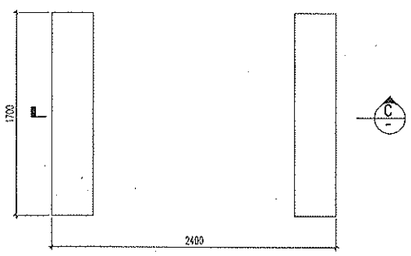
17PHSD6, 12PHSD6, 12PHSD6A, 14PHSD6,
17PHSD6A, 17PHSD6B, 14PHSD6A,



17PHSD7, 12PHSD7, 14PHSD7,
17PHSD7A,17PHSD7B, 14PHSD7A,



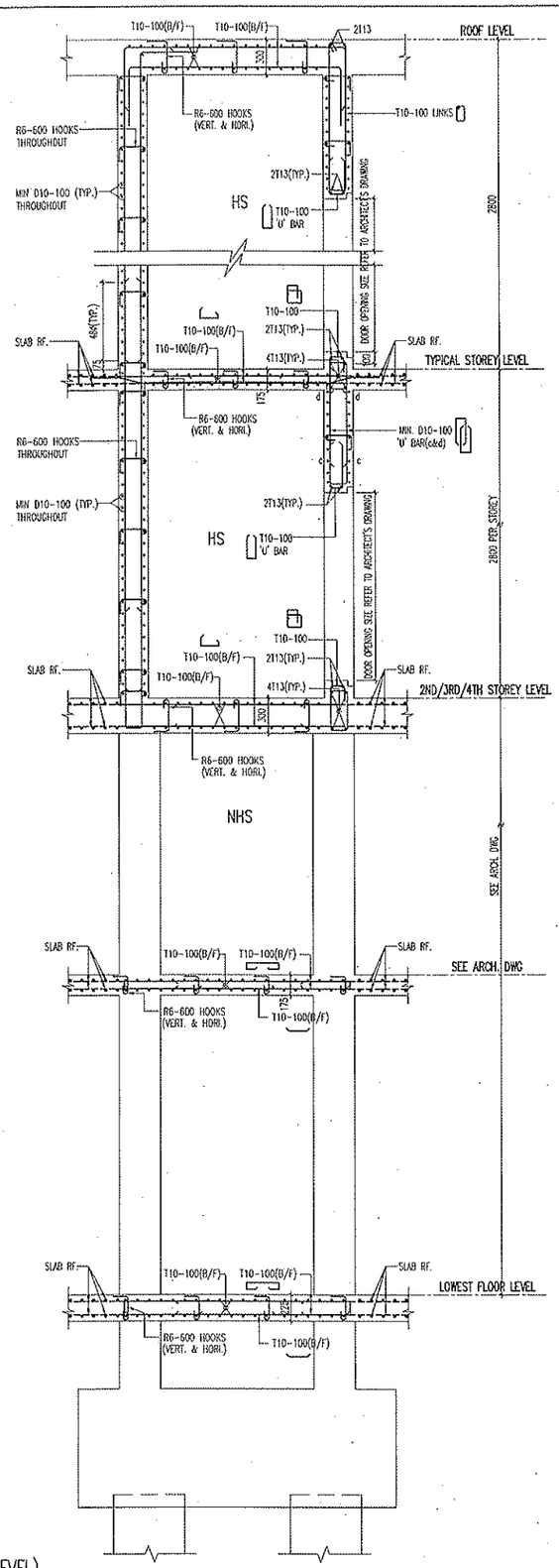
17PHSD8, 17PHSD8A,



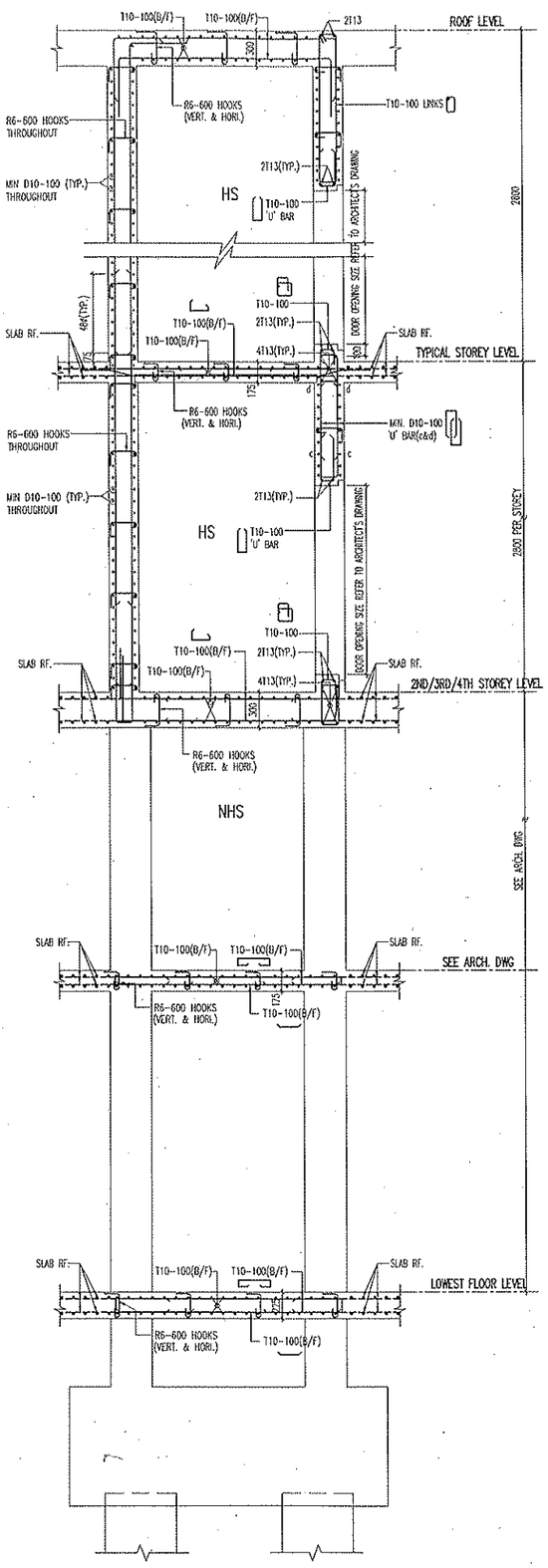
17PHSD7 FOR BLK 677A (AT 1ST STOREY LEVEL),
17PHSD7 FOR BLK 676A (AT 2ND & 3RD STOREY LEVEL),
D6A & 17PHSD7A FOR BLK 676A (AT 2ND & 3RD STOREY LEVEL)

CONCRETE GRADE C40

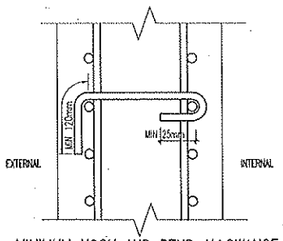
NOTES: (UNLESS OTHERWISE STATED)
1. WALL REINFORCEMENT REFER TO DRAWING FOR HOUSEHOLD SHELTER SCHEDULE
2. TENSION LAP LENGTH AND TENSION ANCHORAGE LENGTH TO BE 37 TIMES THE DIAMETER OF REINFORCEMENT



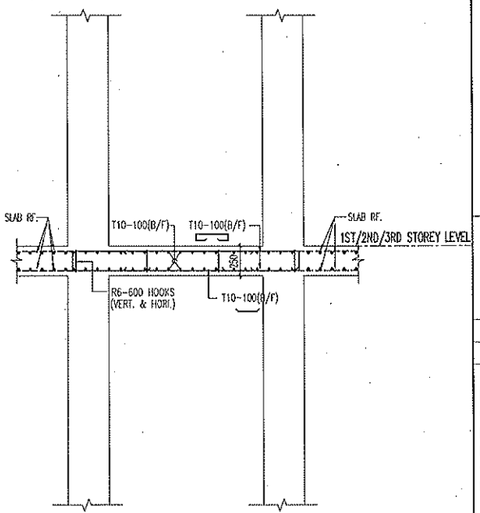
SECTION A-A



SECTION B-B



MINIMUM HOOK AND BEND ALLOWANCE
FOR SHEAR LINKS



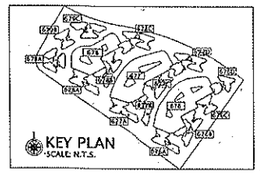
SECTION C-C

020 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-434 | REVISION : -
PRECINCT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
HOUSEHOLD SHELTER WALL DETAILS ~ 4

SCALE : 1:25 | DATE: JAN 2011
DRAWN BY: MAR | CHECKED BY:

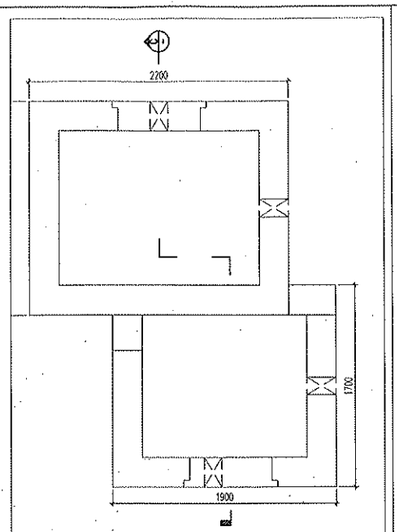
AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
NEW DRAWING	25012	NHY	HWC	AT	YCC

REFERENCE

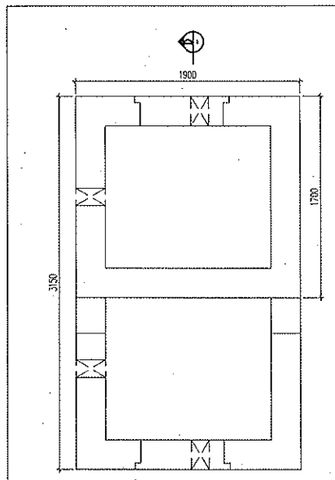
KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-15
E-Centre @ Redhill Singapore 159471
Tel: 6273 5022 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

DRAWING NO. : 10044/COM/HS4 | REVISION: -
DESIGN ENGINEER :

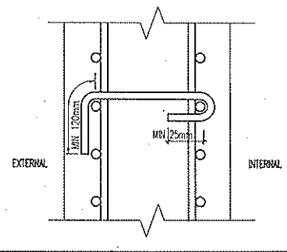
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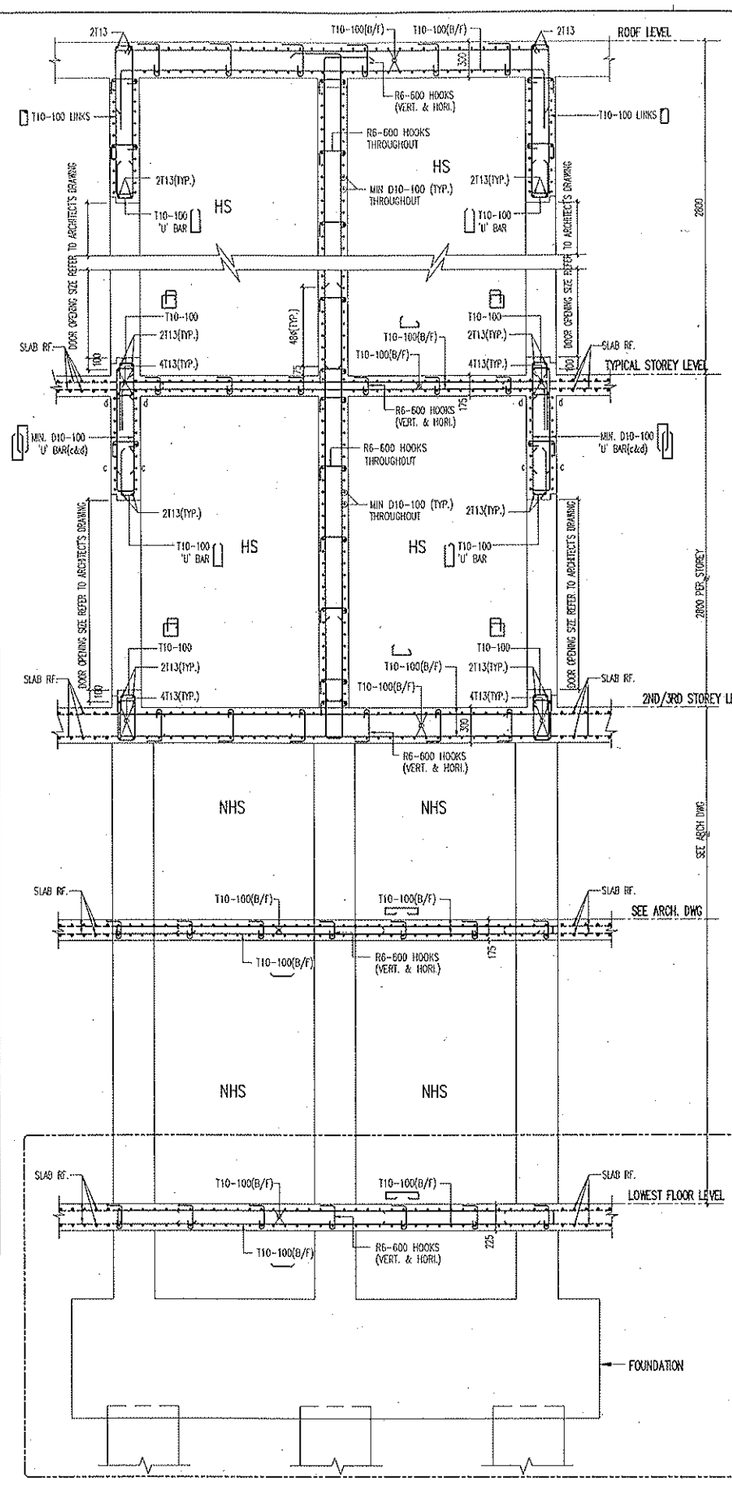
17PHSD9, 17PHSF9.



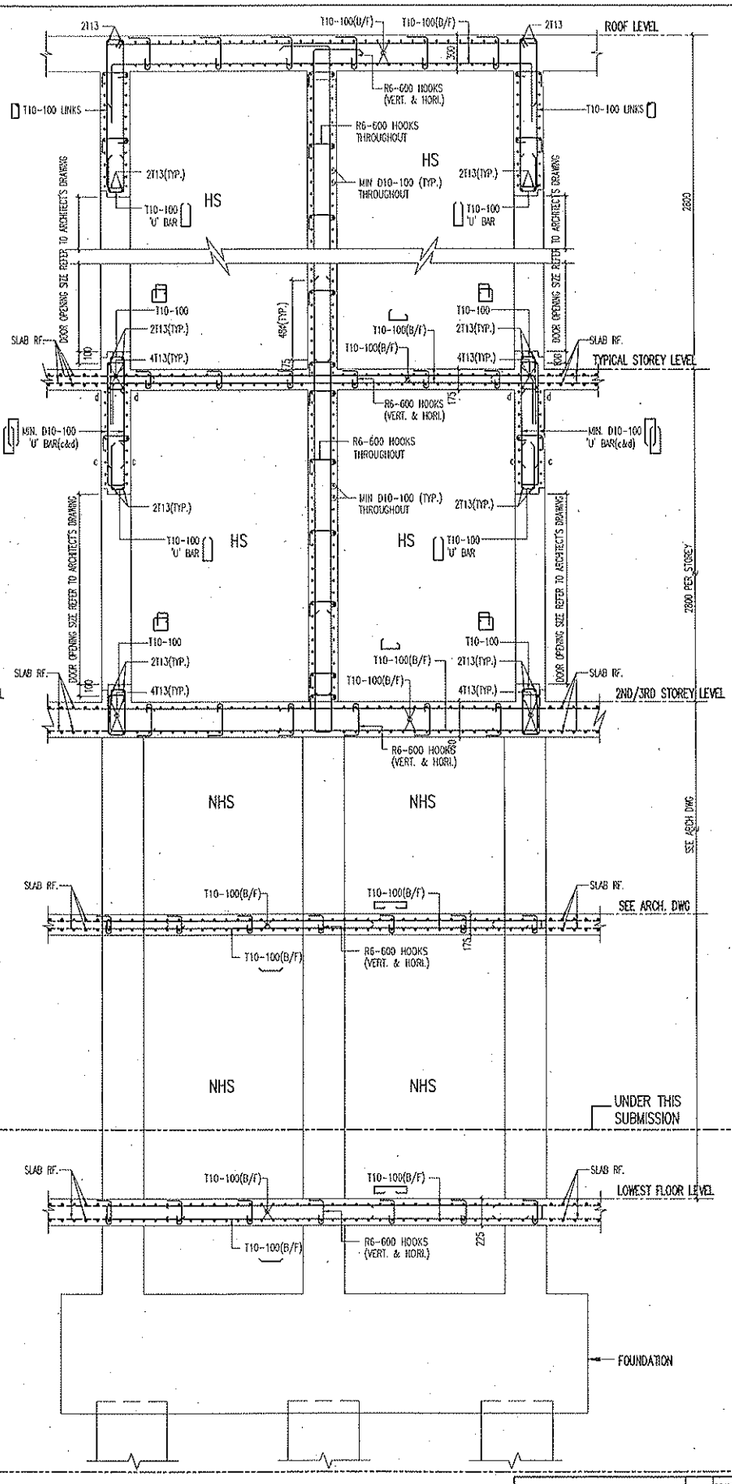
17PHSD10, 17PHSF10.



MINIMUM HOOK AND BEND ALLOWANCE FOR SHEAR LINKS



SECTION C-C



SECTION D-D

CONCRETE GRADE C40

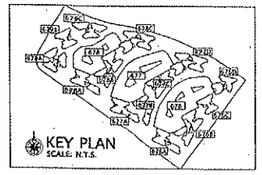
NOTES: (UNLESS OTHERWISE STATED)
1. WALL REINFORCEMENT REFER TO DRAWING FOR HOUSEHOLD SHELTER SCHEDULE
2. TENSION LAP LENGTH AND TENSION ANCHORAGE LENGTH TO BE 37 TIMES THE DIAMETER OF REINFORCEMENT

021 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control



PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-01059-CS-435 | REVISION : -
PRECINT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
HOUSEHOLD SHELTER WALL DETAILS-5

SCALE : 1:25 | DATE: JAN 2011
DRAWN BY: MAR | CHECKED BY:

AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
NEW DRAWING	250112	NNY	NWC	AT	YCC

REFERENCE

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

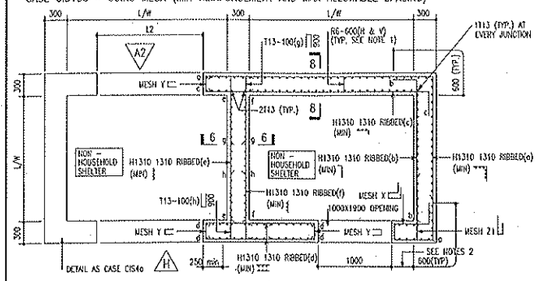
DRAWING NO. : 10044/COM/HS-5 | REVISION: -
DESIGN ENGINEER :

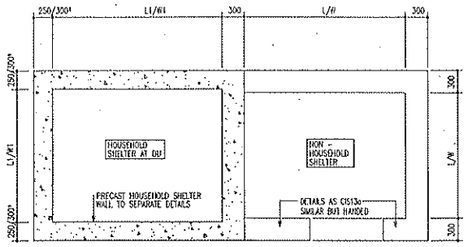
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CAST IN-SITU HOUSEHOLD SHELTER WALL

AT FOUNDATION, 1ST STOREY PA & VOID LEVEL - B (SCALE 1:40)

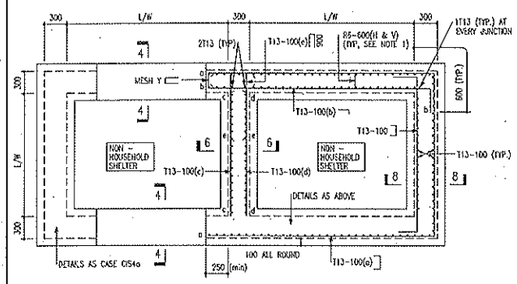
CASE CIS13a - USING MESH (MIN REINFORCEMENT AND MAX ALLOWABLE SPACING)





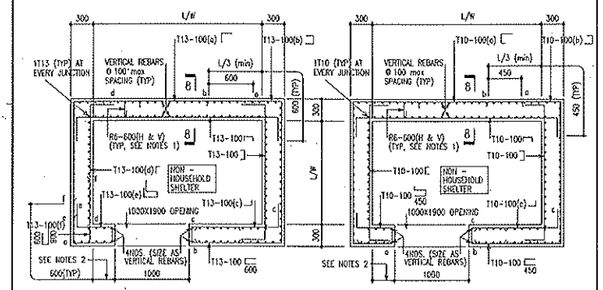
AT 1ST STOREY PA (WITH DU ABOVE) & PA (WITH VOID LEVEL ABOVE)

AT 2ND STOREY DU & 2ND STOREY VOID LEVEL
AT 3RD/TYP. STOREY DU & 3RD/TYP. STY. VOID LEVEL



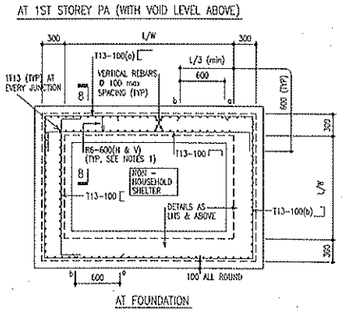
AT FOUNDATION

CASE CIS10 - USING REBAR (MIN REINFORCEMENT AND MAX ALLOWABLE SP



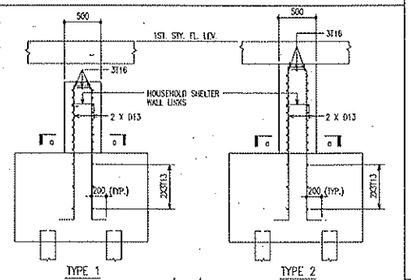
AT 1ST STOREY PA (WITH VOID LEVEL ABOVE)

AT 2ND/TYP STOREY VOID LEVEL



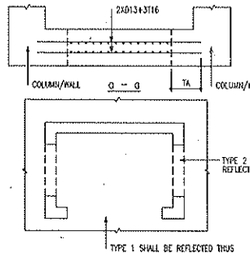
AT FOUNDATION

SECTIONS 3 - 3 TO 5 - 5 (SCALE 1:40, 1:20)

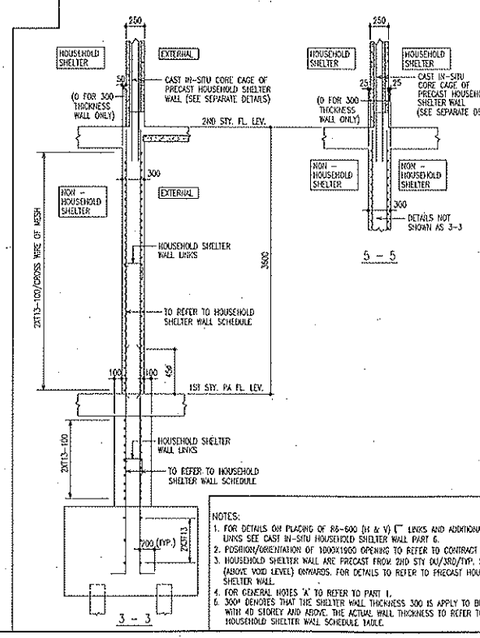


4 - 4

(APPLICATION OF TYPE 1 OR 2 SHALL REFER 1ST STOREY FLOOR PLAN)

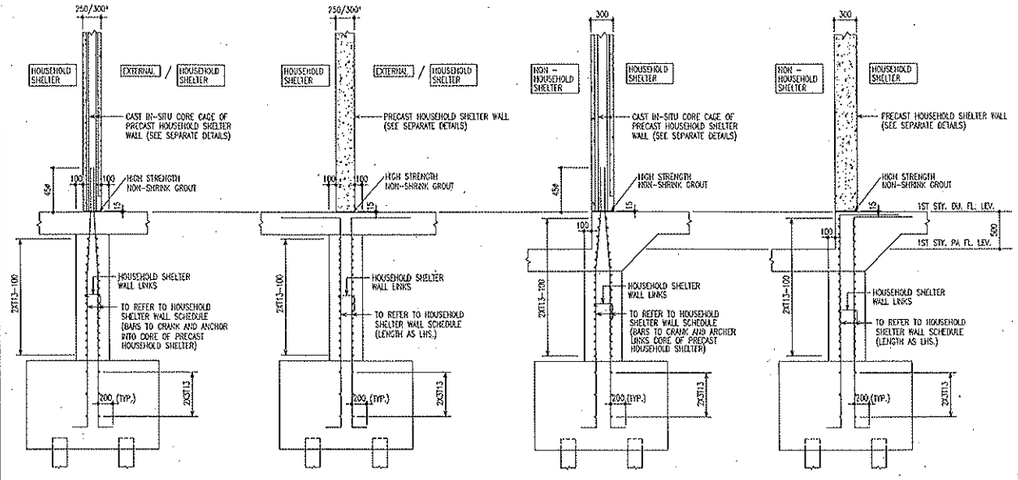


PART REFERENCE 1ST STOREY FLOOR PLAN



NOTES:
1. FOR DETAILS ON PLACING OF R6-600 (H & V) [" LINKS AND ADDITIONAL [LINKS SEE CAST IN-SITU HOUSEHOLD SHELTER WALL PART 6.
2. POSITION/ORIENTATION OF 1000X1900 OPENING TO REFER TO CONTRACT DWG.
3. HOUSEHOLD SHELTER WALL ARE PRECAST FROM 2ND STY DU/3RD/TYP. STY DU (ABOVE VOID LEVEL) ONWARDS. FOR DETAILS TO REFER TO PRECAST HOUSEHOLD SHELTER WALL.
4. FOR GENERAL NOTES 'A' TO REFER TO PART 1.
5. 300# DENOTES THAT THE SHELTER WALL THICKNESS 300 IS APPLY TO BUILDING WITH 4F STOREY AND ABOVE. THE ACTUAL WALL THICKNESS TO REFER TO HOUSEHOLD SHELTER WALL SCHEDULE TABLE.

SECTIONS 1 - 1 AND 2 - 2 (SCALE 1:40)



ACROSS CORE OF PRECAST HOUSEHOLD SHELTER

ACROSS CORNER/BLAST DOOR OF PRECAST HOUSEHOLD SHELTER

ACROSS CORE OF PRECAST HOUSEHOLD SHELTER

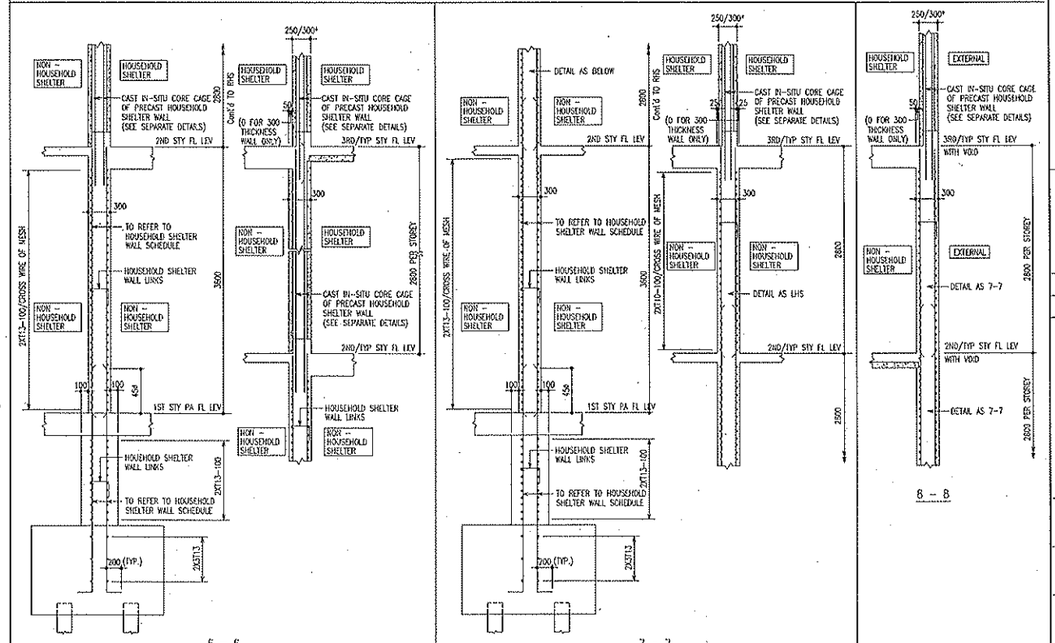
ACROSS CORNER OF PRECAST HOUSEHOLD SHELTER

1 - 1

2 - 2

CONTRACTOR SHALL USE A RIGID TEMPLATE FOR SETTING AND FIXING THE POSITION OF DOWELS FOR THE 1ST STOREY (DU) PRECAST HOUSEHOLD SHELTER. MIN. NUMBER OF DOWEL BARS MUST MATCH THE NO. OF BARS IN CORE OF PRECAST HOUSEHOLD SHELTER.

SECTIONS 6 - 6 TO 8 - 8 (SCALE 1:40)



6 - 6

7 - 7

8 - 8

PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

022 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02

Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

OWNER :

HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-01059-CS-S45 | REVISION :

PRECINT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :

PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :

PUNGGOL EAST CONTRACT 40

DRAWING TITLE :

CAST IN-SITU HOUSEHOLD SHELTER

PART 5

SCALE : 1:100 | DATE:

DRAWN BY: | CHECKED BY:

AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP

REFERENCE

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-16
E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

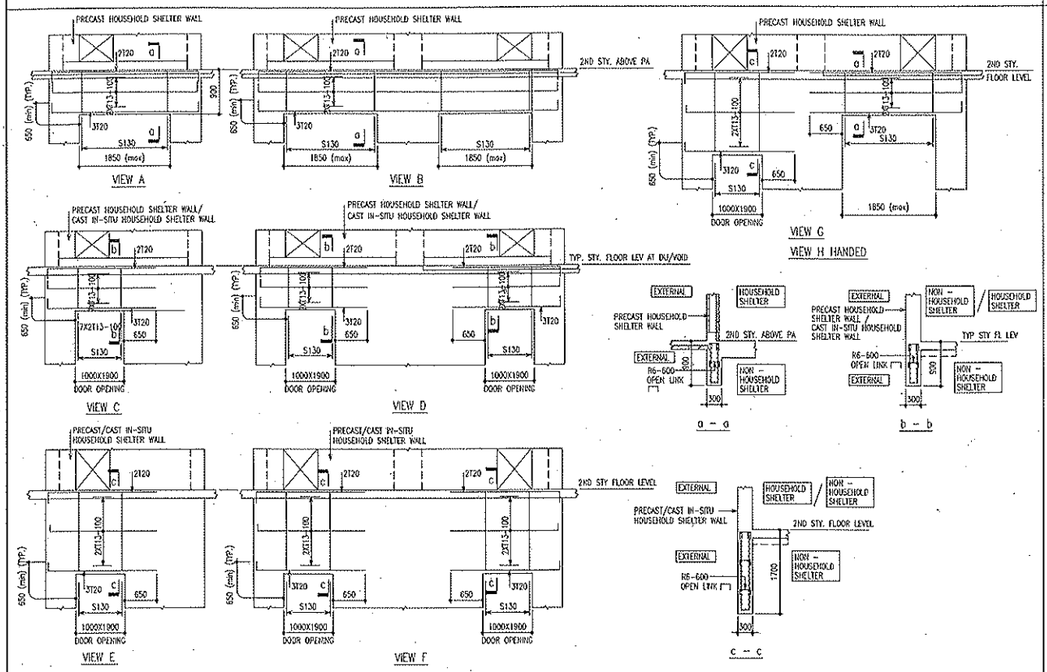
DRAWING NO. : 10044/S10/S45 | REVISION:

DESIGN ENGINEER :

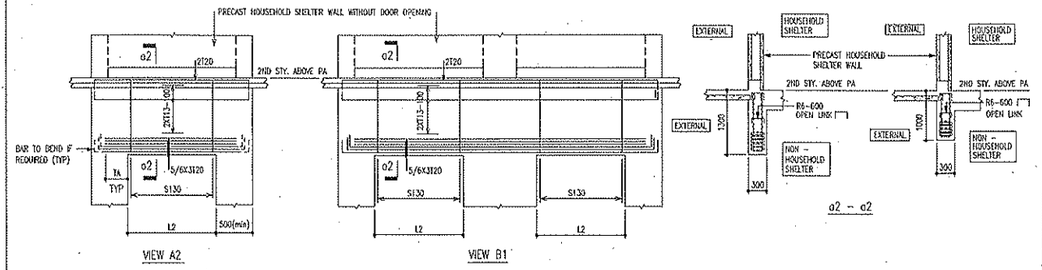
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CAST IN-SITU HOUSEHOLD SHELTER WALL

VIEW A TO H WITH DOOR OPENING DIRECTLY ABOVE (SCALE 1:50)



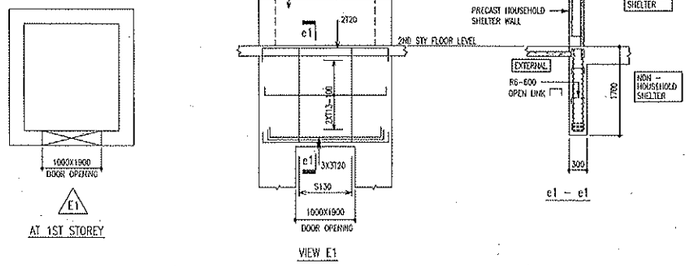
VIEW A2 & B1 WITHOUT DOOR OPENING ABOVE (SCALE 1:50)



FOR VIEW A2 / B1		
Beam clear span (L2)	Beam size	Bottom reinf
1200 < L2 ≤ 1500	300 X 1300	18T20
1000 < L2 ≤ 1200	300 X 1000	15T20

NOTE:
THE ABOVE BEAMS DETAILS ARE ONLY APPLICABLE FOR BUILDING OF NOT MORE THAN 30 STOREY HIGH.

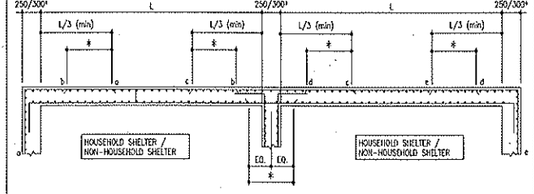
VIEW C1 & E1 WITHOUT DOOR OPENING ABOVE (SCALE 1:50, 1:50)



NOTE:
THE ABOVE BEAMS DETAILS ARE ONLY APPLICABLE FOR BUILDING OF NOT MORE THAN 30 STOREY HIGH.

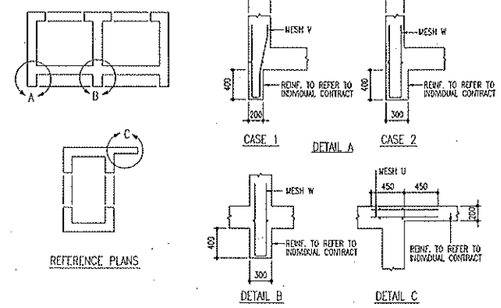
NOTES:
1. DETAIL OF MESH U TO W SEE CAST IN-SITU HOUSEHOLD SHELTER WALL - PART 1 (SPECIAL MESH - FULLY FABRICATED DETAILS).
2. * DENOTES TYPICAL LAP LOCATION FOR THE FOLLOWING LAP LENGTH :
   a) 600/750 FOR D10/H1310 1310 WITHOUT CROSS WIRE
   b) 400 FOR D10/H1310 1310 WITH CROSS WIRE
   c) 450 FOR USING REBAR
3. DIMENSION 'L' TO REFER TO INDIVIDUAL FLOOR PLAN.
4. FOR LOCATION OF VIEW A TO VIEW H TO REFER TO PART 1 TO PART 5.
5. FOR LOCATION OF VIEW A2 TO REFER TO PART 1 TO PART 5.
6. FOR LOVATION OF VIEW B1 TO REFER TO PART 3.

PLAN SHOWING ALTERNATIVE LAPPING DETAILS FOR WELDED STEEL FABRIC BETWEEN WALLS



NOTE: 300* DENOTES THAT THE SHELTER WALL THICKNESS 300 IS APPLY TO BUILDING WITH 40 STOREY AND ABOVE. THE ACTUAL WALL THICKNESS TO REFER TO HOUSEHOLD SHELTER WALL SCHEDULE TABLE.

CONNECTION DETAILS OF STRUCTURE ELEMENTS ADJACENT TO CAST IN-SITU HOUSEHOLD SHELTER WALL



AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	OP

REFERENCE

023 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011-CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-546	REVISION :
PRECINT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
CAST IN-SITU HOUSEHOLD SHELTER
PART 6

SCALE : 1:100	DATE:
DRAWN BY:	CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5822 Fax: 6273 8454
E-mail: klpcon@pacific.net.sg

DRAWING NO. : 10044/S10/546	REVISION:
DESIGN ENGINEER :	

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PRECAST HOUSEHOLD SHELTER WALL

024 sheet of 034

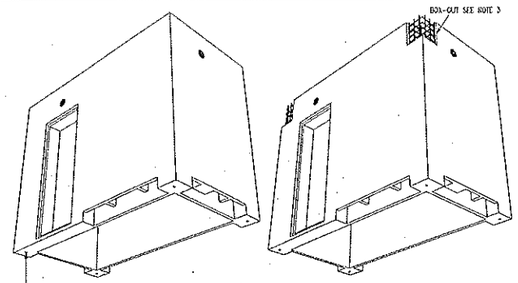
BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02

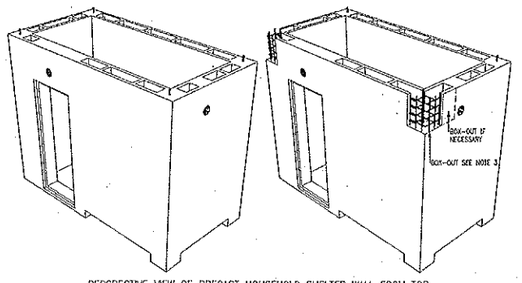
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

1ST PRECAST HOUSEHOLD SHELTER WALL ABOVE PA, 2ND/TYPICAL VOID LEVELS 1ST STOREY (DU) PRECAST HOUSEHOLD SHELTER WALL



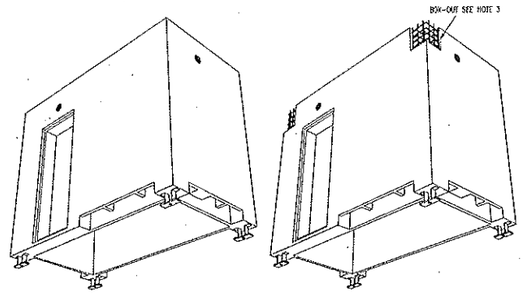
PERSPECTIVE VIEW OF PRECAST HOUSEHOLD SHELTER WALL FROM BOTTOM



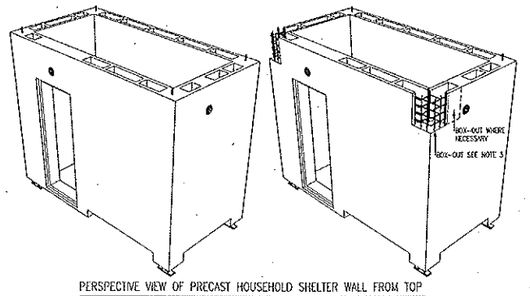
PERSPECTIVE VIEW OF PRECAST HOUSEHOLD SHELTER WALL FROM TOP

1. BOX-OUT SHOWN INDICATIVE ONLY. TO PROVIDE BOX-OUT AT ANY CORNER THAT REQUIRE TO SUPPORT BEAM ONLY.

SUBSEQUENT PRECAST HOUSEHOLD SHELTER WALL

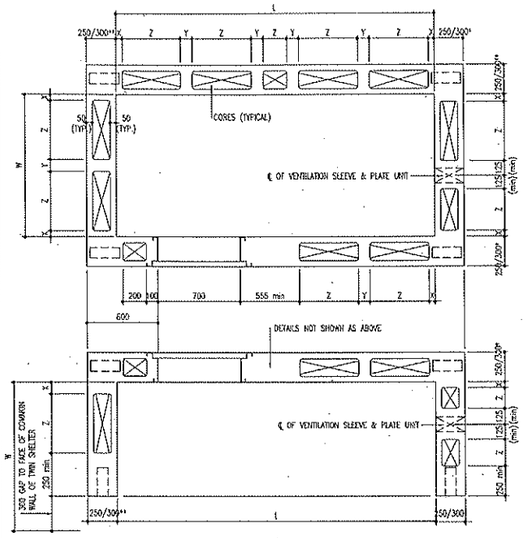


PERSPECTIVE VIEW OF PRECAST HOUSEHOLD SHELTER WALL FROM BOTTOM

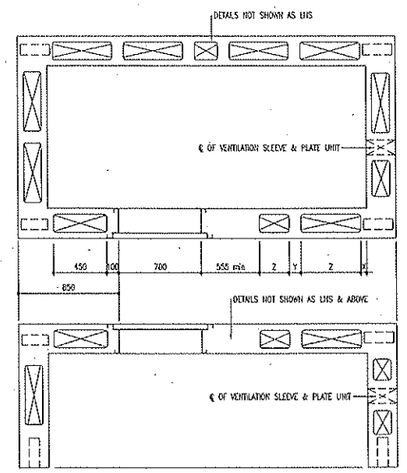


PERSPECTIVE VIEW OF PRECAST HOUSEHOLD SHELTER WALL FROM TOP

PLANS SHOWING GUIDELINES ON ARRANGEMENT OF CORES FOR NON-STANDARD PRECAST HOUSEHOLD SHELTER WALL - 1



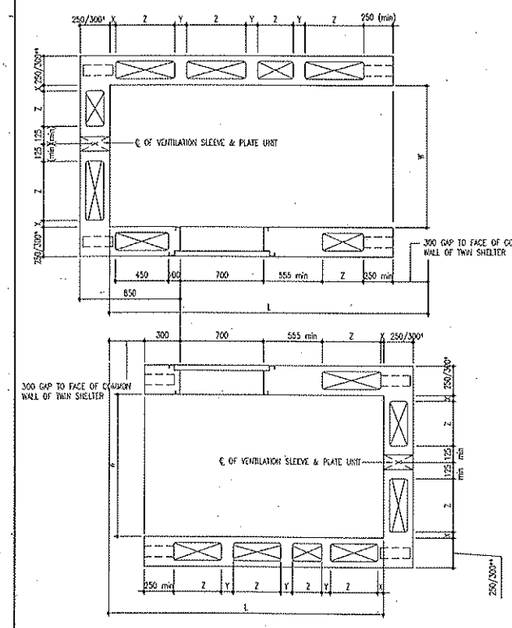
FOR CASES WHERE DOOR IS AT 600 FROM EXTERNAL EDGE OF WALL



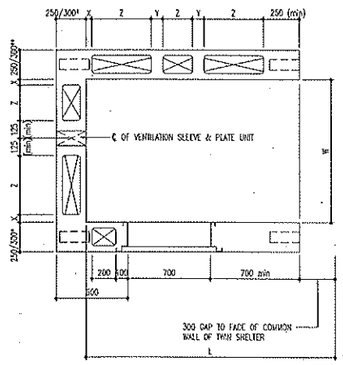
FOR CASES WHERE DOOR IS AT 850 FROM EXTERNAL EDGE OF WALL

PLANS SHOWING GUIDELINES ON ARRANGEMENT OF CORES FOR NON-STANDARD PRECAST HOUSEHOLD SHELTER WALL - 2 (SCALE 1:25)

CASES WHERE DOOR IS AT 850 FROM EXTERNAL EDGE OF WALL



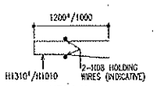
CASES WHERE DOOR IS AT 600 FROM EXTERNAL EDGE OF WALL



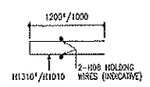
NOTES:
1. THE DIMENSIONS OF THE HOUSEHOLD SHELTER SHALL COMPLY WITH THE TECHNICAL REQUIREMENTS FOR HOUSEHOLD SHELTER.
2. MINIMUM DIMENSION SHALL BE 1200mm.
3. MAXIMUM DIMENSION SHALL BE 3700mm.
4. MAXIMUM PERMISSIBLE DEVIATION SHALL BE 'L'(LENGTH) AND/OR 'W'(WIDTH) ±400mm.
5. RIB THICKNESS SHALL BE 100mm.
6. THE FOLLOWING ARE DIMENSION FOR X, Y, Z : 25 < X < 100, Y = 100 AND Z = 500 (IF POSSIBLE USE Z = 200/250/300/400/450).
7. WHERE POSSIBLE TO ARRANGE THE CORES SYMMETRICALLY TO CATER FOR MANNED CASES.
8. ACTUAL SIZE TO REFER TO INDIVIDUAL CONTRACT.
9. ALL DIAMETER OF REINFORCEMENT SPECIFIED HEREINAFTER SHALL REFER TO MINIMUM BAR DIAMETER TO BE USED IN THE HOUSEHOLD SHELTER. ALL SPACING OF REINFORCEMENT SPECIFIED HEREINAFTER SHALL REFER TO MAXIMUM SPACING OF REINFORCEMENT IN BOTH DIRECTIONS. OTHERWISE HEAVIER REINFORCEMENT AS SHOWN IN THE INDIVIDUAL CONTRACT DRAWING SHALL BE USED.

SPECIAL MESH (SCALE 1:40)

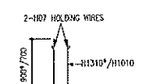
FULLY FABRICATED DETAILS



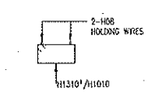
MESH V



MESH W

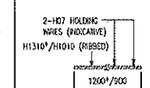


MESH Y2

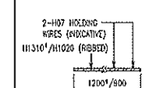


CAGE o

DOWEL MESH DETAILS



DOWEL MESH f



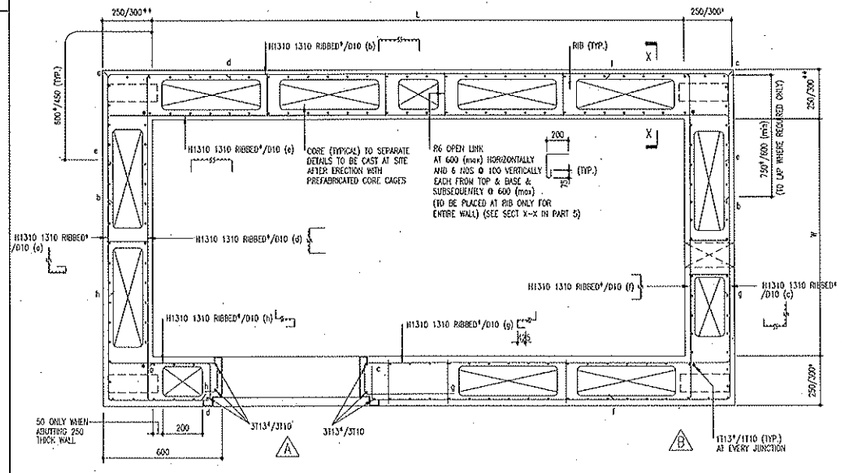
DOWEL MESH g



DOWEL MESH h

NOTE:
UNLESS OTHERWISE INDICATED TO SEE INDIVIDUAL DETAILS FOR APPLICATION OF ABOVE MESHES TO DETERMINE HOLDING WIRE POSITION.

SECTIONAL PLAN SHOWING TYPE AND ARRANGEMENT OF MIN REINFORCEMENT AND MAX ALLOWABLE SPACING IN PRECAST HOUSEHOLD SHELTER WALL - 1



FOR CASE WHERE DOOR IS 600 FROM EXTERNAL EDGE OF WALL

NOTE :
1. DIMENSION 'L' & 'W' TO REFER TO INDIVIDUAL CONTRACT.
2. REINFORCEMENT AND DIMENSION MARKED WITH SUFFIX # ARE FOR 1ST STOREY ONLY.
3. ** DENOTES ONLY 1 FACE OF THE HOUSEHOLD SHELTER WALL CAN BE 300mm.
4. ACTUAL SIZES AND POSITION OF VENTILATION SLEEVE & PLATE UNIT TO REFER TO INDIVIDUAL CONTRACT.
5. TO ENSURE THAT AFTER LAPPING OF MESHES ALL VERTICAL REINFORCEMENT ARE SPACED AT 100 max AS SHOWN.
6. 300# DENOTES THAT THE SHELTER WALL THICKNESS 300 IS APPLY TO BUILDING WITH 40 STOREY AND ABOVE. THE ACTUAL WALL THICKNESS TO REFER TO HOUSEHOLD SHELTER WALL SCHEDULE TABLE.

AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	OP

REFERENCE

PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :

HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-547	REVISION :
PRECINCT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :

PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
PRECAST HOUSEHOLD SHELTER WALL
PART 1

SCALE : 1:100	DATE:
DRAWN BY:	CHECKED BY:

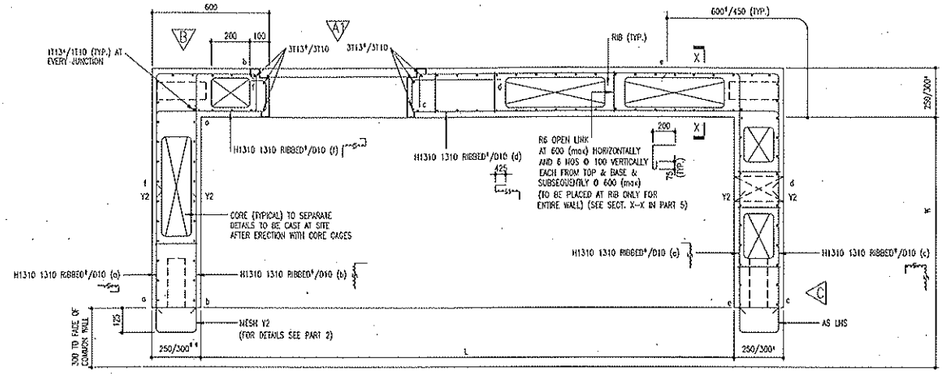
KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 6822 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

DRAWING NO. : 10044/STD/547	REVISION:
DESIGN ENGINEER :	

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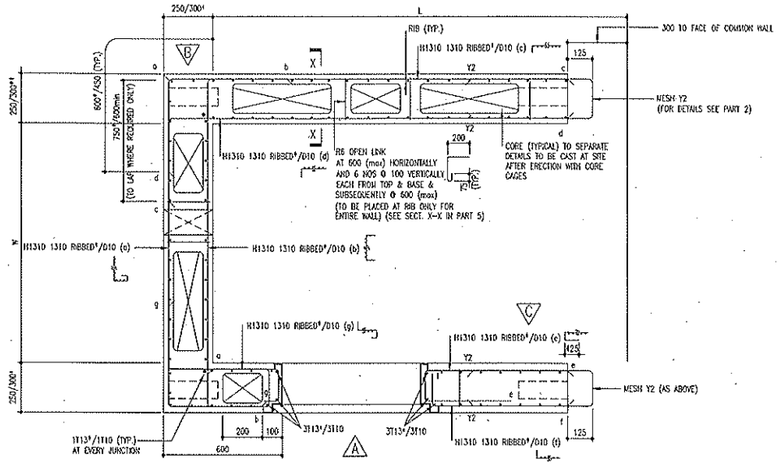
PRECAST HOUSEHOLD SHELTER WALL

SECTIONAL PLAN SHOWING TYPE AND ARRANGEMENT OF MIN REINFORCEMENT AND MAX ALLOWABLE SPACING IN PRECAST HOUSEHOLD SHELTER WALL – 2



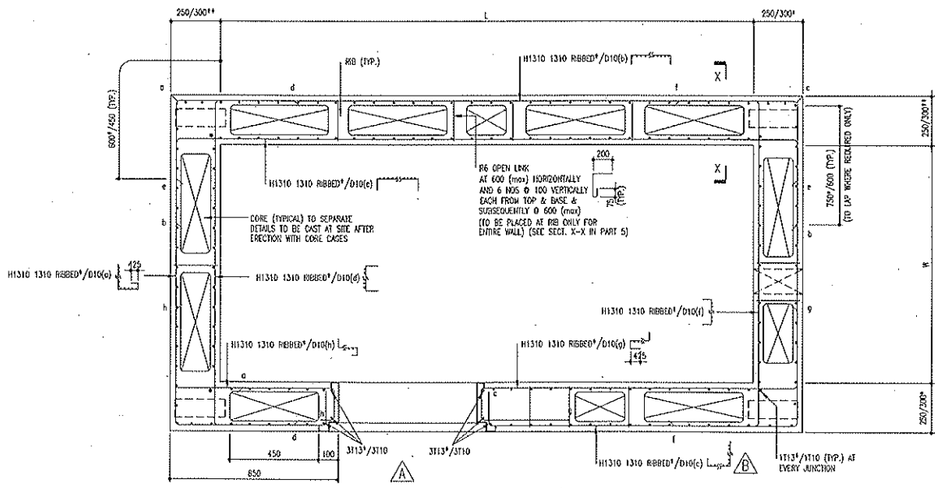
FOR CASE WHERE DOOR IS 600 FROM EXTERNAL EDGE OF WALL

SECTIONAL PLAN SHOWING TYPE AND ARRANGEMENT OF MIN REINFORCEMENT AND MAX ALLOWABLE SPACING IN PRECAST HOUSEHOLD SHELTER WALL – 3



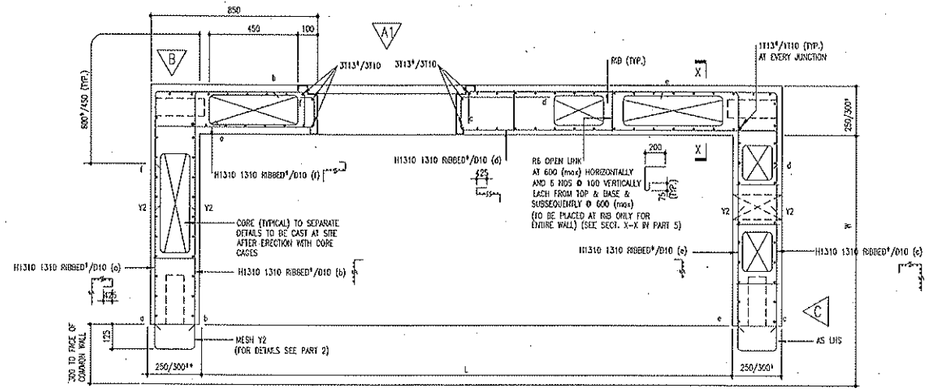
FOR CASE WHERE DOOR IS 600 FROM EXTERNAL EDGE OF WALL

SECTIONAL PLAN SHOWING TYPE AND ARRANGEMENT OF MIN REINFORCEMENT AND MAX ALLOWABLE SPACING IN PRECAST HOUSEHOLD SHELTER WALL – 4



FOR CASE WHERE DOOR IS 850 FROM EXTERNAL EDGE OF WALL

SECTIONAL PLAN SHOWING TYPE AND ARRANGEMENT OF MIN REINFORCEMENT AND MAX ALLOWABLE SPACING IN PRECAST HOUSEHOLD SHELTER WALL – 5



FOR CASE WHERE DOOR IS 850 FROM EXTERNAL EDGE OF WALL.

NOTE :
1. DIMENSION 'L' & 'W' TO REFER TO INDIVIDUAL CONTRACT.
2. REINFORCEMENT AND DIMENSION MARKED WITH SUFFIX ⁴ ARE FOR 1ST STOREY ONLY.
3. ** DENOTES ONLY 1 FACE OF THE HOUSEHOLD SHELTER WALL CAN BE 300mm.
4. ACTUAL SIZES AND POSITION OF VENTILATION SLEEVE & PLATE UNIT TO REFER TO INDIVIDUAL CONTRACT.
5. TO ENSURE THAT AFTER LAPPING OF MESHES ALL VERTICAL REINFORCEMENT ARE SPACED AT 100 mox AS SHOWN.
6. 300⁴ DENOTES THAT THE SHELTER WALL THICKNESS 300 IS APPLY TO BUILDING WITH 40 STOREY AND ABOVE. THE ACTUAL WALL THICKNESS TO REFER TO HOUSEHOLD SHELTER WALL SCHEDULE TABLE.

NOTES:
1. THE DIMENSIONS OF THE HOUSEHOLD SHELTER SHALL COMPLY WITH THE TECHNICAL REQUIREMENTS FOR HOUSEHOLD SHELTER.
2. MINIMUM DIMENSION SHALL BE 1200mm.
3. MAXIMUM DIMENSION SHALL BE 3700mm.
4. MAXIMUM PERMISSIBLE DEVIATION SHALL BE 'L'(LENGTH) AND/OR 'W'(WIDTH) ±400mm.
5. RIB THICKNESS SHALL BE 100mm.
6. ALL DIAMETER OF REINFORCEMENT SPECIFIED HEREINAFTER SHALL REFER TO MINIMUM BAR DIAMETER TO BE USED IN THE HOUSEHOLD SHELTER. ALL SPACING OF REINFORCEMENT SPECIFIED HEREINAFTER SHALL REFER TO MAXIMUM SPACING OF REINFORCEMENT IN BOTH DIRECTIONS. OTHERWISE HEAVIER REINFORCEMENT AS SHOWN IN THE INDIVIDUAL CONTRACT DRAWING SHALL BE USED.

025 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 9 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781–00007–2011– CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

AMENDMENT	DATE	DRAWN BY	CHECKD BY	DESIGN ENGR	OP

REFERENCE

OWNER :

HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-01059-CS-548 | REVISION :

PRECINT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :

PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17–STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI–STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :

PRECAST HOUSEHOLD SHELTER WALL
PART 2

SCALE : 1:100 | DATE:

DRAWN BY: | CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05–1B
E–Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E–mail: kpcon@pacific.net.sg

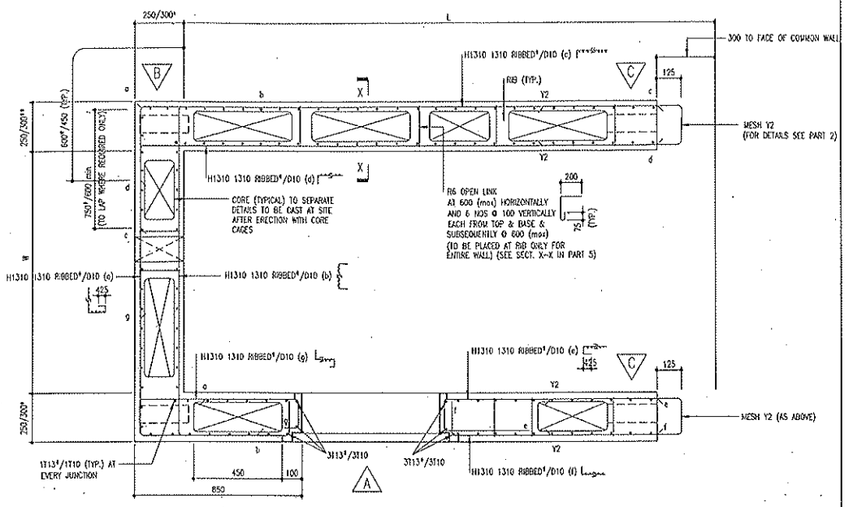
DRAWING NO. : 10044/STD/548 | REVISION:

DESIGN ENGINEER :

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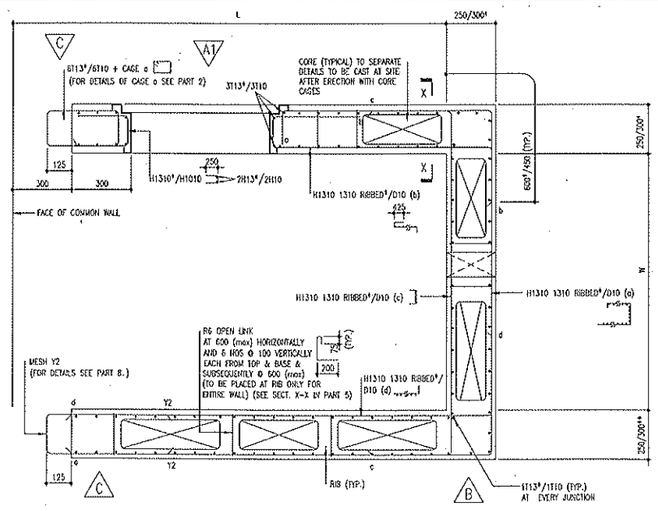
PRECAST HOUSEHOLD SHELTER WALL

SECTIONAL PLAN SHOWING TYPE AND ARRANGEMENT OF MIN REINFORCEMENT AND MAX ALLOWABLE SPACING IN PRECAST HOUSEHOLD SHELTER WALL – 6 (SCALE 1 : 15)



FOR CASE WHERE DOOR IS 850 FROM EXTERNAL EDGE OF WALL

SECTIONAL PLAN SHOWING TYPE AND ARRANGEMENT OF MIN REINFORCEMENT AND MAX ALLOWABLE SPACING IN PRECAST HOUSEHOLD SHELTER WALL – 7 (SCALE 1 : 15)



FOR CASE WHERE DOOR IS 850 FROM EXTERNAL EDGE OF WALL

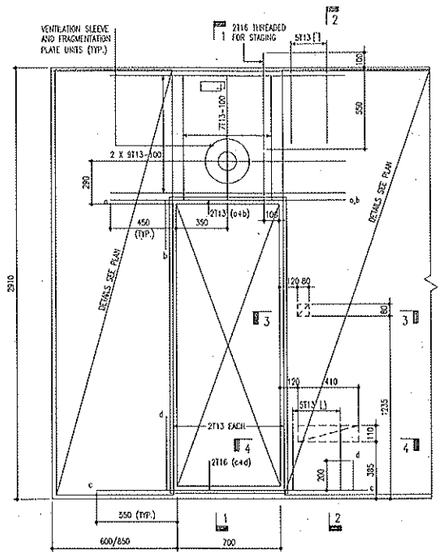
NOTE :

1. DIMENSION 'L' & 'W' TO REFER TO INDIVIDUAL CONTRACT.
2. REINFORCEMENT AND DIMENSION MARKED WITH SUFFIX * ARE FOR 1ST STOREY ONLY.
3. ** DENOTES ONLY 1 FACE OF THE HOUSEHOLD SHELTER WALL CAN BE 300mm.
4. ACTUAL SIZES AND POSITION OF VENTILATION SLEEVE & PLATE UNIT TO REFER TO INDIVIDUAL CONTRACT.
5. TO ENSURE THAT AFTER LAPPING OF MESHES ALL VERITICAL REINFORCEMENT ARE SPACED AT 100 max AS SHOWN.
6. 300* DENOTES THAT THE SHELTER WALL THICKNESS 300 IS APPLY TO BUILDING WITH 40 STOREY AND ABOVE. THE ACTUAL WALL THICKNESS TO REFER TO HOUSEHOLD SHELTER WALL SCHEDULE TABLE.

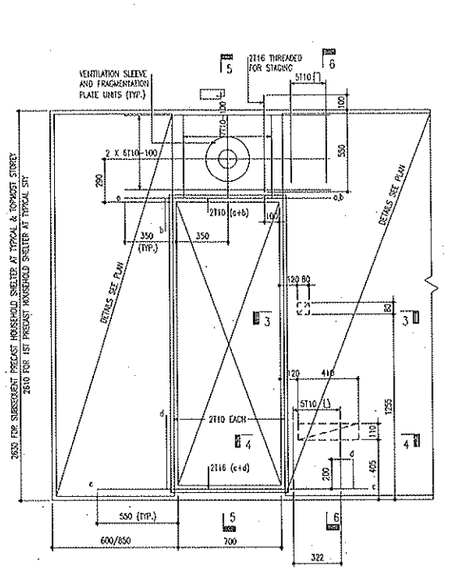
NOTES:

1. THE DIMENSIONS OF THE HOUSEHOLD SHELTER SHALL COMPLY WITH THE TECHNICAL REQUIREMENTS FOR HOUSEHOLD SHELTER.
2. MINIMUM DIMENSION SHALL BE 1200mm.
3. MAXIMUM DIMENSION SHALL BE 3700mm.
4. MAXIMUM PERMISSIBLE DEVIATION SHALL BE 'L'(LENGTH) AND/OR 'W'(WIDTH) ±450mm.
5. RIB THICKNESS SHALL BE 100mm.
6. ALL DIAMETER OF REINFORCEMENT SPECIFIED HEREINAFTER SHALL REFER TO NOMINAL BAR DIAMETER TO BE USED IN THE HOUSEHOLD SHELTER. ALL SPACING OF REINFORCEMENT SPECIFIED HEREINAFTER SHALL REFER TO MAXIMUM SPACING OF REINFORCEMENT IN BOTH DIRECTIONS, OTHERWISE HEAVIER REINFORCEMENT AS SHOWN IN THE INDIVIDUAL CONTRACT DRAWING SHALL BE USED.

VIEW A & A1 (DOOR FRAME)(SCALE 1 : 20)



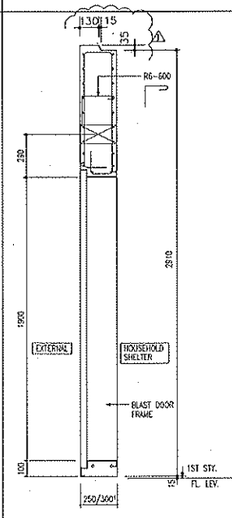
VIEW A/A1 SHOWING DOOR FRAME
AT 1ST STOREY (DU) PRECAST HOUSEHOLD SHELTER WALL
(TO BE READ HANDED FOR VIEW A1)



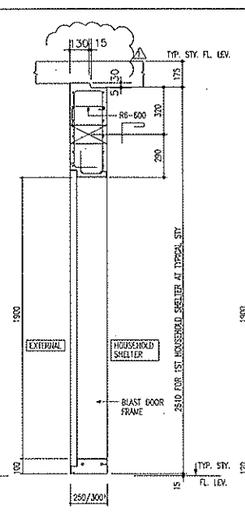
VIEW A/A1 SHOWING DOOR FRAME
AT 1ST/SUBSEQUENT PRECAST HOUSEHOLD SHELTER WALL
(TO BE READ HANDED FOR VIEW A1)

NOTES:
1. ALL DIMENSIONS AT DOOR OPENING TO CONFIRM WITH APPROVED BLAST DOOR DETAILS.
2. DIRECTION OF DOOR OPENINGS TO BE CONFIRMED WITH ARCH. DWG. PRIOR TO PRODUCTION.
3. POSITION OF SLEEVES, ELECTRICAL SERVICES AND DIRECTION OF DOOR OPENINGSTO BE CONFIRMED WITH ARCH. AND ELECTRICAL DWG. PRIOR TO PRODUCTION.

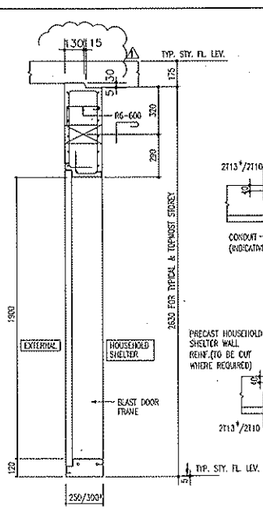
SECTION 1 – 1 TO 6 – 6



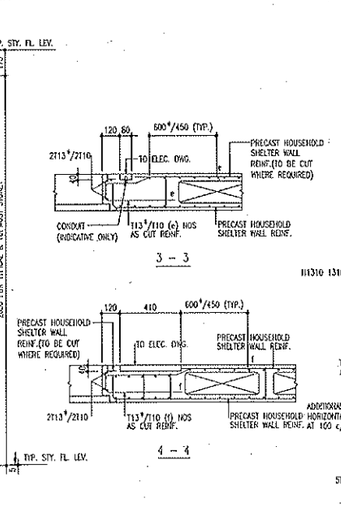
1 – 1
AT 1ST STOREY (DU)

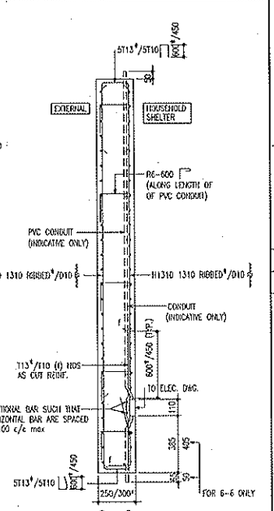


5 – 5
AT TYPICAL STOREY
1ST PRECAST HOUSEHOLD SHELTER



5 – 5
AT TYPICAL STOREY
SUBSEQUENT PRECAST HOUSEHOLD SHELTER





AMENDMENT		DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
A	1) SHEAR KEY UPDATED IN SECTS.	20.2.12	JEH	SM	CE	YCC

REFERENCE

026 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781–00007–2011– CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

OWNER :

HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB–DL–D1059–CS–549	REVISION :
PRECINCT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :

PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17–STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI–STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
PRECAST HOUSEHOLD SHELTER WALL
PART 3

SCALE : 1:100	DATE:
DRAWN BY:	CHECKED BY:

KIP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05–18
E–Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E–mail: kipcon@pacific.net.sg

DRAWING NO. : 10044/STD/549	REVISION: A
DESIGN ENGINEER :	

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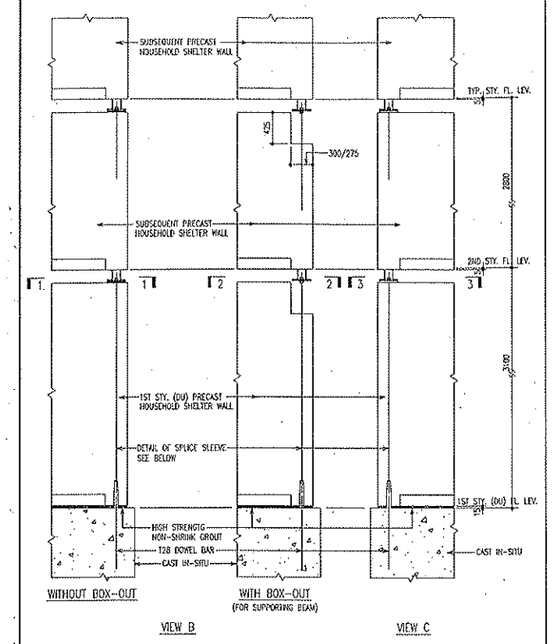
PRECAST HOUSEHOLD SHELTER WALL

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

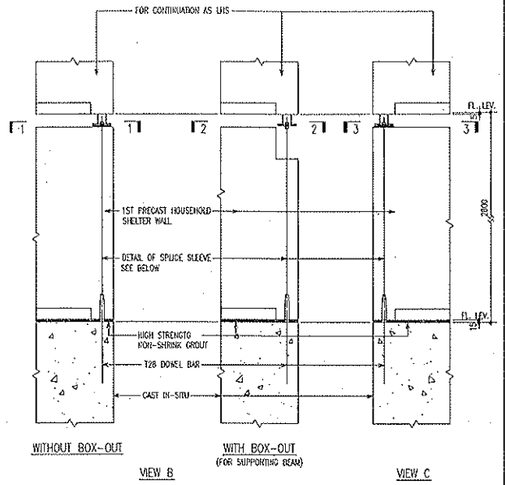
Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

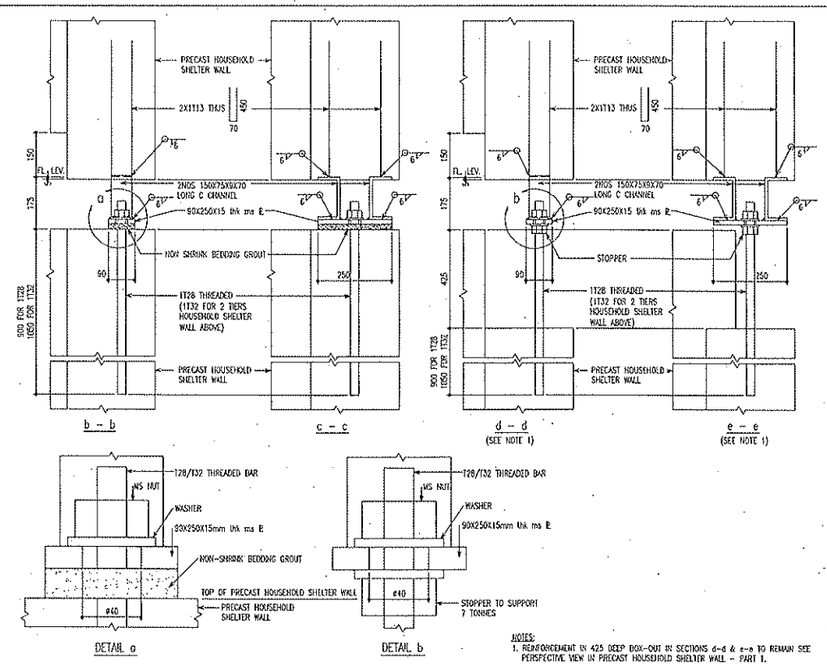
VIEW B & C FOR CASE WITH 1ST STOREY DU (SCALE 1 : 40)



VIEW B & C FOR CASE WITH 1ST STOREY PA & 2ND / TYPICAL STOREY VOID LEVELS (SCALE 1 : 40)

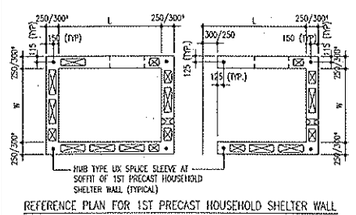


SECTION b - b TO e - e FOR VIEW B & C (SCALE 1 : 10)

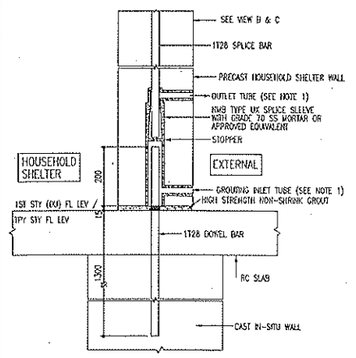


NOTES:
1. REINFORCEMENT IN 425 DEEP BOX-OUT IN SECTIONS d-d & e-e TO REMAIN SEE PERSPECTIVE VIEW IN PRECAST HOUSEHOLD SHELTER WALL - PART 1.

TYPICAL DETAILS OF SPLICE SLEEVE (SCALE 1 : 10)



REFERENCE PLAN FOR 1ST PRECAST HOUSEHOLD SHELTER WALL
(SIZE AND ARRANGEMENT OF CORES SHOWN IS INDICATIVE ONLY)

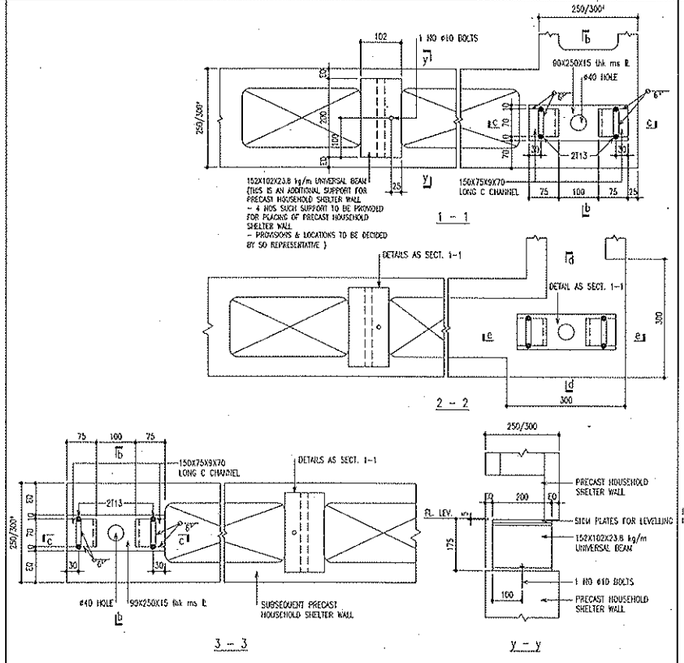


TYPICAL DETAILS OF SPLICE SLEEVE
FOR 1ST PRECAST HOUSEHOLD SHELTER WALL

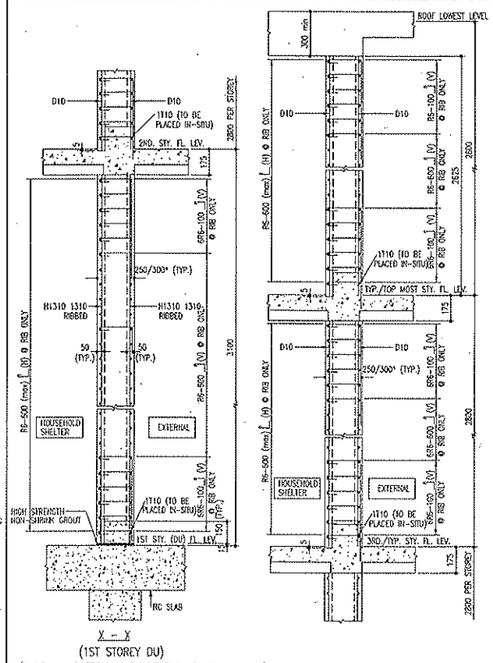
1. RUBBER STOPPERS SHALL BE USED TO PLUG THE OUTLET AND GROUTING INLET TUBES IMMEDIATELY AFTER SLEEVE HAVE BEEN FILLED WITH GROUT.

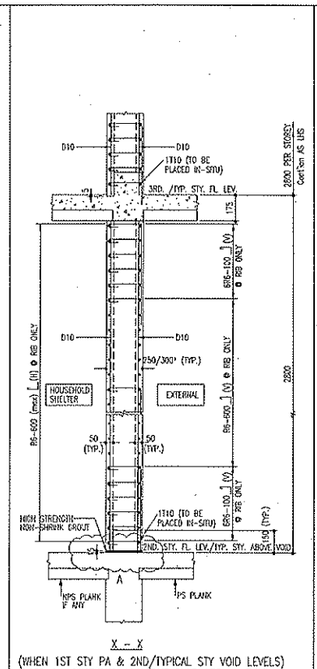
NOTES:
1. THE DIMENSIONS OF THE HOUSEHOLD SHELTER SHALL COMPLY WITH THE TECHNICAL REQUIREMENTS FOR HOUSEHOLD SHELTER.
2. MINIMUM DIMENSION SHALL BE 1200mm.
3. MAXIMUM DIMENSION SHALL BE 3700mm.
4. MAXIMUM PERMISSIBLE DEVIATION SHALL BE 'L'(LENGTH) AND/OR 'W'(WIDTH) ±400mm.
5. RIB THICKNESS SHALL BE 100mm
6. ALL DIAMETER OF REINFORCEMENT SPECIFIED HEREINAFTER SHALL REFER TO MAXIMUM BAR DIAMETER TO BE USED IN THE HOUSEHOLD SHELTER. ALL SPACING OF REINFORCEMENT SPECIFIED HEREINAFTER SHALL REFER TO MAXIMUM SPACING OF REINFORCEMENT IN BOTH DIRECTIONS. OTHERWISE HEAVIER REINFORCEMENT AS SHOWN IN THE INDIVIDUAL CONTRACT DRAWING SHALL BE USED.
7. XXXX DENOTES CAST IN-SITU STRUCTURE.
8. 300* DENOTES THAT THE SHELTER WALL THICKNESS 300 IS APPLY TO BUILDING WITH 40 STOREY AND ABOVE. THE ACTUAL WALL THICKNESS TO REFER TO HOUSEHOLD SHELTER WALL SCHEDULE TABLE.

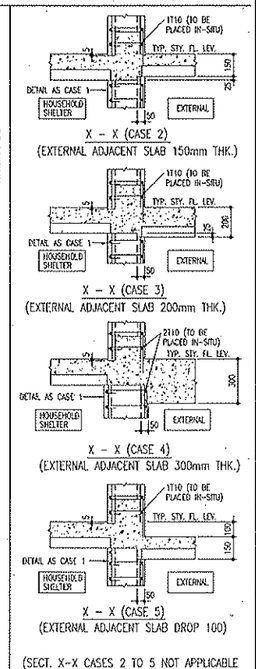
SECTION 1-1 TO 3-3 FOR VIEW B & C (SCALE 1 : 2)



SECTION ACROSS PRECAST HOUSEHOLD SHELTER WALL (SCALE 1 : 20)







(SECT. X-X CASES 2 TO 5 NOT APPLICABLE TO TOPMOST STOREY SHELTER)

AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP

REFERENCE

PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HDB-DL-D1059-CS-550	REVISION :
PRECINT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
PRECAST HOUSEHOLD SHELTER WALL
PART 4

SCALE : 1:100	DATE:
DRAWN BY:	CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-10
E-Centre @ Redhill Singapore 159471
Tel: 6273 5022 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

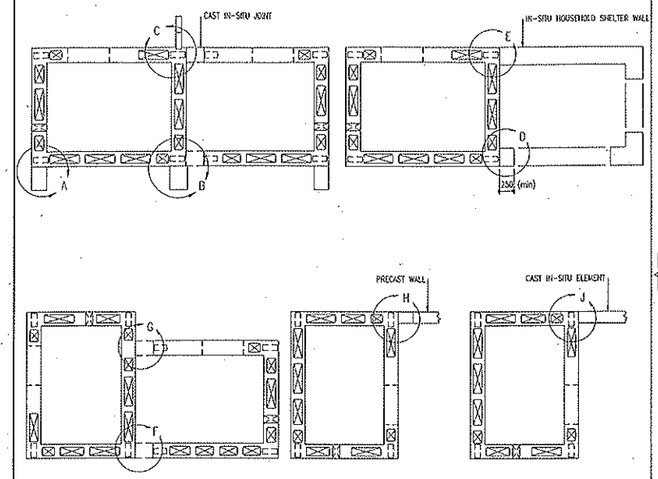
DRAWING NO. : 10044/STD/550	REVISION:
DESIGN ENGINEER :	

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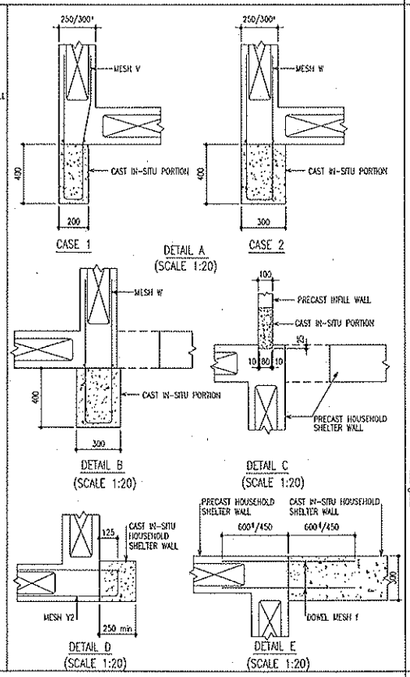
PRECAST HOUSEHOLD SHELTER WALL

PROVISION OF DOWELS AND CONNECTION DETAILS – 1

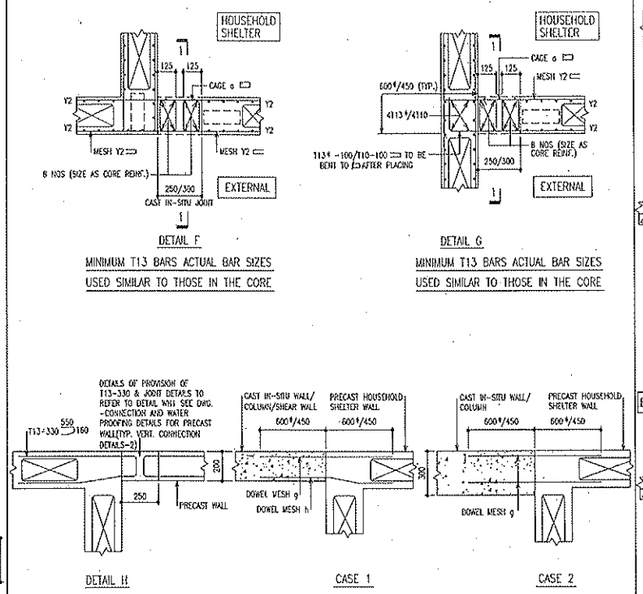
REFERENCE PLANS OF HOUSEHOLD SHELTER WALL (SCALE 1:50)



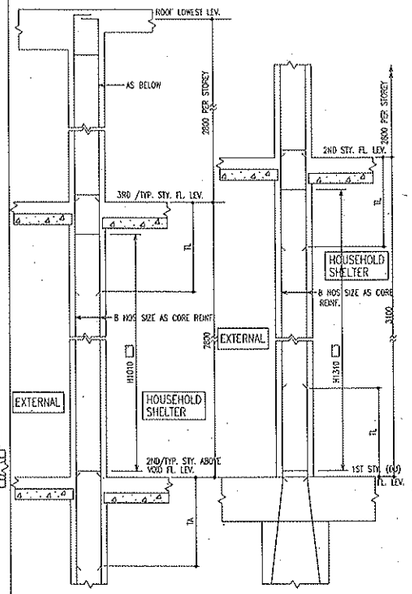
NOTES:
1. DETAIL OF CAPPING MESH Y2, DOWEL MESH f AND MESH V & W TO REFER TO PRECAST HOUSEHOLD SHELTER WALL – PART 2.
2. REINFORCEMENT AND DIMENSION MARKED WITH SUFFIX 4 ARE FOR 1ST STOREY ONLY.



PROVISION OF DOWELS AND CONNECTION DETAILS – 2 (SCALE 1:20)

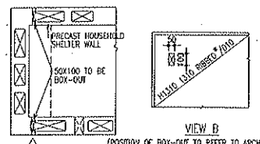


NOTES:
1. DETAIL OF CAPPING MESH Y2, DOWEL MESH g & h AND CAGE a TO REFER TO PRECAST HOUSEHOLD SHELTER WALL – PART 2.
2. REINFORCEMENT AND DIMENSION MARKED WITH SUFFIX 4 ARE FOR 1ST STOREY ONLY.

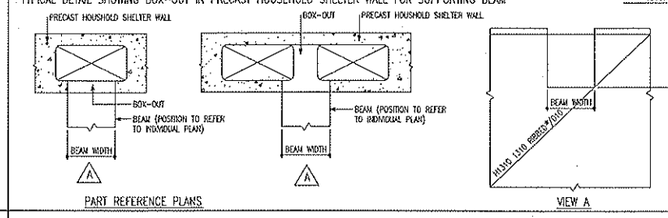


BOX – OUT, OPENING AND CONCEALED WIRING DETAILS (SCALE 1:20)

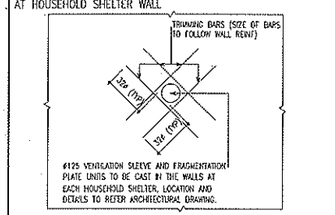
TYPICAL DETAIL SHOWING BOX-OUT IN PRECAST HOUSEHOLD SHELTER WALL FOR SS SLEEVES AT SERVICE DUCT

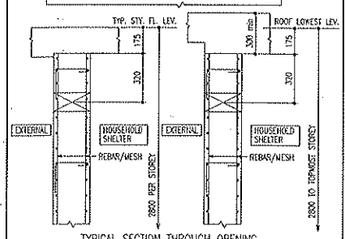


TYPICAL DETAIL SHOWING BOX-OUT IN PRECAST HOUSEHOLD SHELTER WALL FOR SUPPORTING BEAM



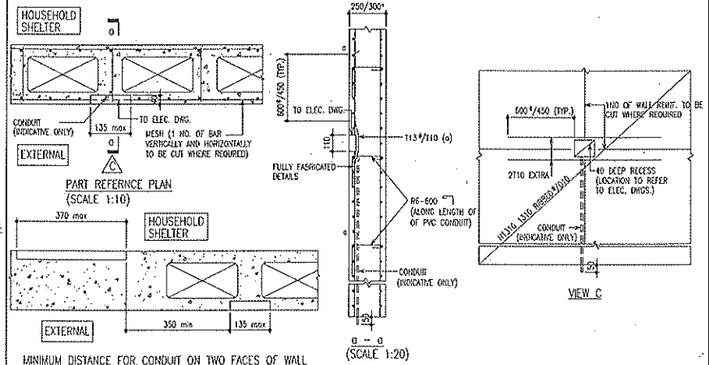
TYPICAL DETAILS SHOWING TRIMMING BARS FOR FOR OPENING AT HOUSEHOLD SHELTER WALL





TYPICAL SECTION THROUGH OPENING

TYPICAL CONCEALED WIRING DETAILS ON EXTERNAL FACE OF PRECAST HOUSEHOLD SHELTER WALL



NOTE : FOR LOCATION OF CONDUIT TO REFER ELECTRICAL DRAWING.

1. REINFORCEMENT AND DIMENSION MARKED WITH SUFFIX * ARE FOR 1ST STOREY ONLY.

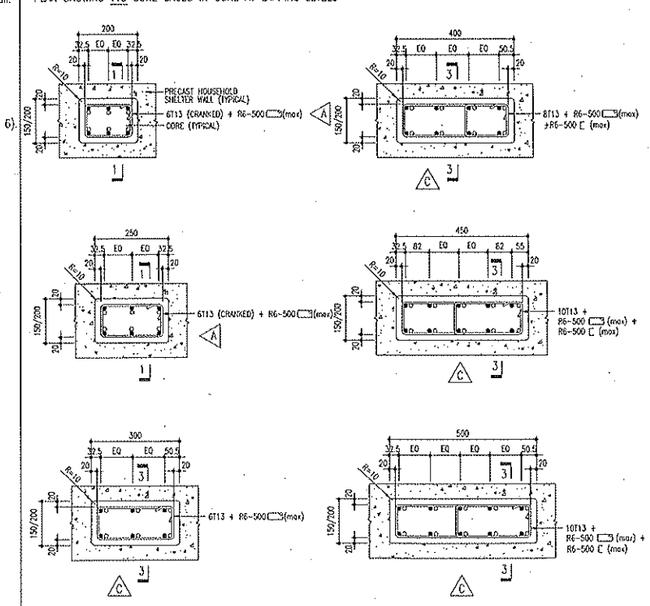
NOTES:
1. THE DIMENSIONS OF THE HOUSEHOLD SHELTER SHALL COMPLY WITH THE TECHNICAL REQUIREMENTS FOR HOUSEHOLD SHELTER.
2. MINIMUM DIMENSION SHALL BE 1290mm.
3. MAXIMUM DIMENSION SHALL BE 3700mm.
4. MAXIMUM PERMISSIBLE DEVIATION SHALL BE 'L'(LENGTH) AND/OR 'W'(WIDTH) ±400mm.
5. RIB THICKNESS SHALL BE 100mm.
6. POSITION OF VENTILATION SLEEVE & PLATE UNIT TO CONFIRM WITH ARCH. DWG.
7. CORE SIZE IS INDICATIVE ONLY. ACTUAL CORE SIZE TO BE CONFIRMED WITH THE TERM PRECASTER WHO SUPPLY THE PRECAST HOUSEHOLD SHELTER WALL.
8. W3 DIFFERENT MARKING FOR HANDED CASE.
9. 300* DENOTES THAT THE SHELTER WALL THICKNESS 300 IS APPLY TO BUILDING WITH 40 STOREY AND ABOVE. THE ACTUAL WALL THICKNESS TO REFER TO HOUSEHOLD SHELTER WALL SCHEDULE TABLE.

DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 1 (SCALE 1:10)

Specific notes for cast in-situ core formed in precast household shelter wall:

1. [ ] , [ ] & [ ] show details of cages (with cranked main bar) thus ||| at lapping level where 'o' is the cranked portion of the main bar from the upper cage.
   Please note for above cases core cages should be with straight bar for type 1, 2 & 3 (see PRECAST HOUSEHOLD SHELTER WALL–PART 6).
2. [ ] shows details of cages (with straight main bar) thus ||| at lapping level where
   [ ] denotes lower level cage &
   [ ] denotes upper level cage } or vice-versa
   There is only 1 type of cage per reinforcement type per core size for cage with straight main bar. Cages to be flipped at site during erection to achieve lapping details of same or different core cages per core size if required.
3. The core cages are to supplied with ⊐ open end links for the required cases.
4. Actual cage used will be reflected in contract drawing.
5. Cores formed in precast household shelter wall shall be cast with grade 40 concrete unless otherwise specified after erection.
6. See view A, B & C for the various types of cages
   a. To use type 1 cage for special core of first precast household shelter wall.
   b. To use type 2 cage for 1st storey (DU) precast household shelter wall.
   c. To use type 3 cage for first precast household shelter wall above PA or above 2nd/typical storey void levels.
   d. To use type 4 or 5 cages for subsequent floors.
   e. For subsequent floors to use type 5 whenever possible.

PLAN SHOWING T13 CORE CAGES IN CORE AT LAPPING LEVELS



AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP
REFERENCE					

028 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh Singapore 310480

DRAWING NO. HB-DL-D1059-CS-551	REVISION :
PRECINT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
PRECAST HOUSEHOLD SHELTER WALL
PART 5

SCALE : 1:100	DATE:
DRAWN BY:	CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18 E-Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

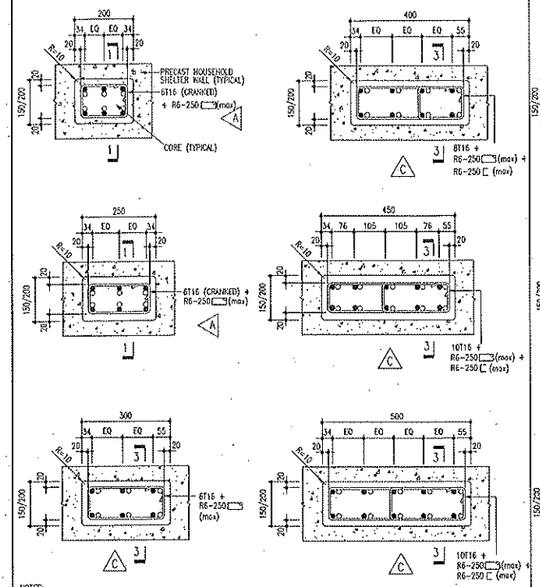
DRAWING NO. : 10044/S1D/551	REVISION:
DESIGN ENGINEER :	

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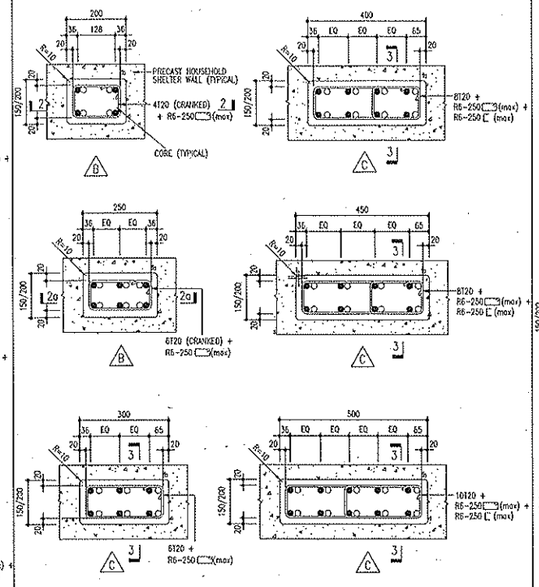
PRECAST HOUSEHOLD SHELTER WALL

DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 2 (SCALE 1:10)

PLANS SHOWING T16 CORE CAGES IN CORE AT LAPPING LEVELS



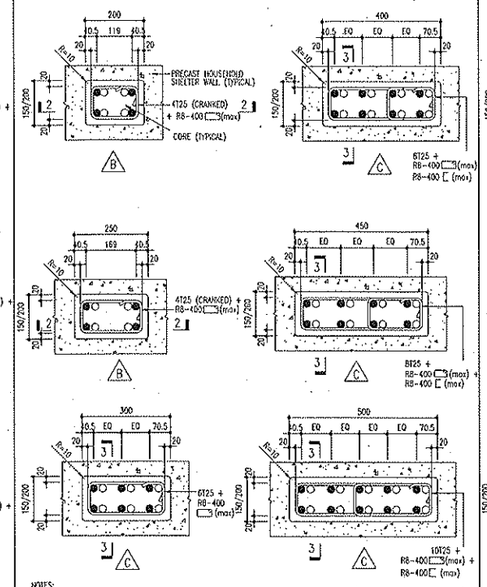
PLANS SHOWING 12O CORE CAGES IN CORE AT LAPPING LEVELS



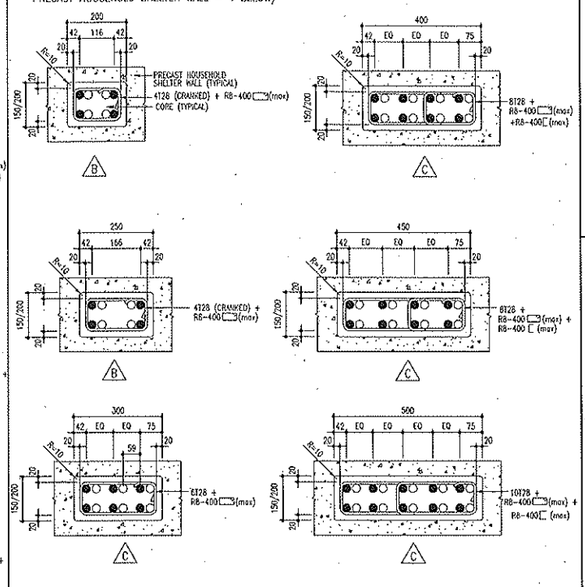
NOTES:
1. TO SEE SPECIFIC NOTES IN PRECAST HOUSEHOLD SHELTER WALL (DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 1)

DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 3 (SCALE 1:10)

PLANS SHOWING T25 CORE CAGES IN CORE AT LAPPING LEVELS



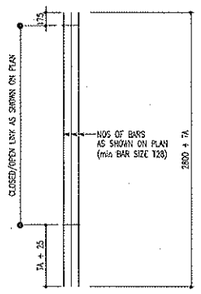
PLANS SHOWING T28 CORE CAGES IN CORE AT LAPPING LEVELS
(T28 CORE CAGES ONLY APPLICABLE TO SPECIAL CORE SEE DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 4 BELOW)



NOTES:
1. TO SEE SPECIFIC NOTES IN PRECAST HOUSEHOLD SHELTER WALL (DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 1)

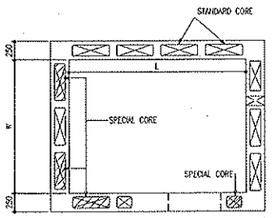
DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 4 (SCALE 1:40)

VIEW B, C SHOWING TYPE 1 CAGE FOR SPECIAL CORE OF FIRST PRECAST HOUSEHOLD SHELTER WALL



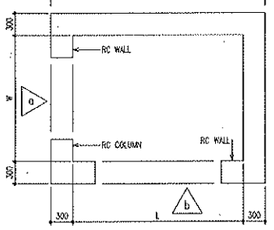
VIEW B & C

SPECIAL CORE

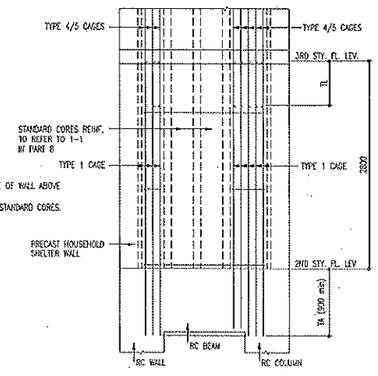


REFERENCE 2ND STOREY PLAN OF HOUSEHOLD SHELTER WALL

1. SPECIAL CORE DENOTES 1ST CORE AT 2ND STOREY FROM EDGE OF WALL ABOVE RC COLUMN & BEAM OR RC WALL & BEAM.
2. OTHER CORES FORMED IN PRECAST HOUSEHOLD SHELTER ARE STANDARD CORES.



REFERENCE 1ST STOREY PLAN OF HOUSEHOLD SHELTER WALL



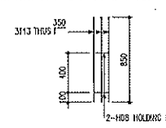
VIEW a
VIEW b SIMILAR
CORE SIZE IS INDICATIVE ONLY.

NOTES:
1. THE DIMENSIONS OF THE HOUSEHOLD SHELTER SHALL COMPLY WITH THE TECHNICAL REQUIREMENTS FOR HOUSEHOLD SHELTER.
2. MINIMUM DIMENSION SHALL BE 1200mm.
3. MAXIMUM DIMENSION SHALL BE 3700mm.
4. MAXIMUM PERMISSIBLE DEVIATION SHALL BE 'L'(LENGTH) AND/OR 'W'(WIDTH) ±400mm.
5. RIB THICKNESS SHALL BE 100mm.

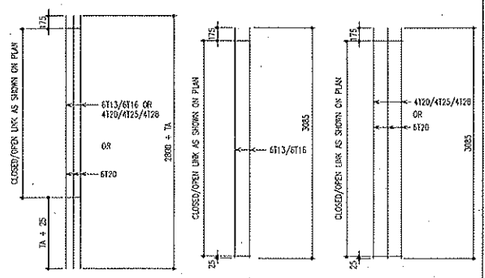
DETAILS OF CORE REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 5 (SCALE 1:40)

VIEW A & B SHOWING CAGES FOR CORES OF LENGTH 200mm & 250mm

STRAIGHT MAIN BAR CORE CAGES



CORE TERMINATION CAGE AT ROOF
(2 PIECES OF TERMINATION CAGE TO LAP WITH TYPE 4/5 CORE CAGES AT ROOF)



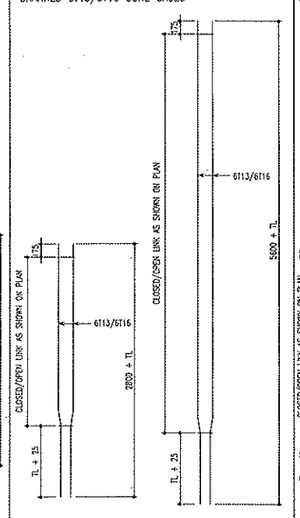
TYPE 3 CORE CAGE
(APPLICABLE TO 1ST PRECAST HOUSEHOLD SHELTER WALL ABOVE PA OR ABOVE 2ND/TYPICAL VOID LEVELS)
VIEW A & B

TYPE 2 CORE CAGE
(APPLICABLE TO 1ST STOREY (DU) PRECAST HOUSEHOLD SHELTER WALL)
VIEW A

VIEW B

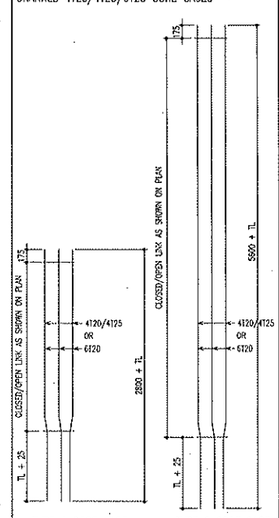
NOTES:
1. FOR JOGGLE DETAILS TO REFER TO DWG. – STANDARD COLUMN REFERENCE DETAILS (SPLICING OF REINF. FOR COLUMN–1)

CRANKED 6T13/6T16 CORE CAGES



TYPE 4 CORE CAGE
TYPE 5 CORE CAGE
(APPLICABLE TO SUBSEQUENT PRECAST HOUSEHOLD SHELTER WALL)
VIEW A

CRANKED 4T20/4T25/6T20 CORE CAGES



TYPE 4 CORE CAGE
TYPE 5 CORE CAGE
(APPLICABLE TO SUBSEQUENT PRECAST HOUSEHOLD SHELTER WALL)
VIEW B

AMENDMENT	DATE	DRAWN BY	CHKD BY	DESIGN ENGR	QP

REFERENCE

029 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781–00007–2011– CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :

HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HDB–DL–D1059–CS–552	REVISION :
PRECINCT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17–STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI–STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
PRECAST HOUSEHOLD SHELTER WALL
PART 6

SCALE : 1:100	DATE:
DRAWN BY:	CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05–18
E–Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E–mail: ktpcon@pacific.net.sg

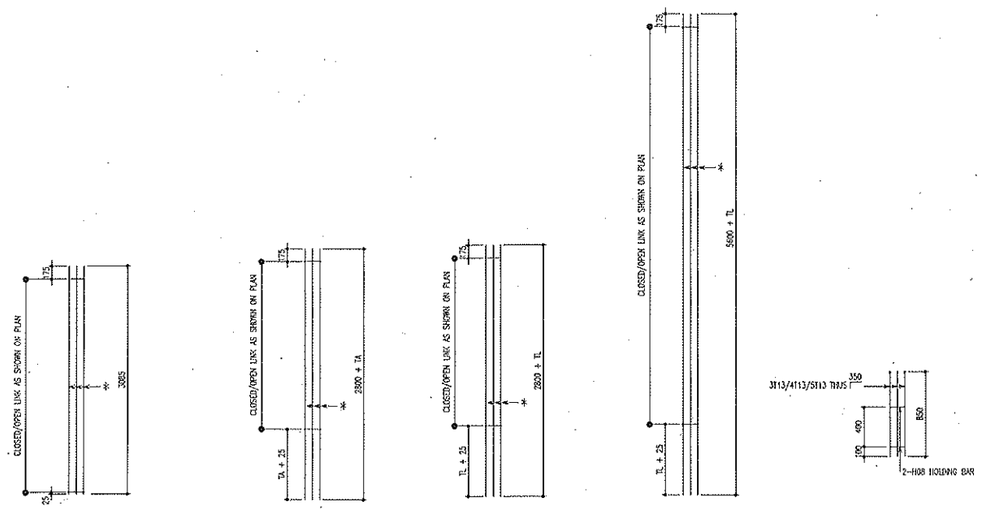
DRAWING NO. : 10044/STD/552	REVISION:
DESIGN ENGINEER :	

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PRECAST HOUSEHOLD SHELTER WALL

DETAILS OF CORE REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 6 (SCALE 1:40)

VIEW C SHOWING CAGES FOR CORES OF LENGTH 300mm, 400mm, 450mm & 500mm



TYPE 2 CORE CAGE
(APPLICABLE TO 1ST STOREY (DU) PRECAST HOUSEHOLD SHELTER WALL)

TYPE 3 CORE CAGE
(APPLICABLE TO 1ST PRECAST HOUSEHOLD SHELTER WALL ABOVE PA OR ABOVE 2ND/TYPICAL VOID LEVELS)

TYPE 4 CORE CAGE
(APPLICABLE TO SUBSEQUENT HOUSEHOLD SHELTER WALL)

TYPE 5 CORE CAGE

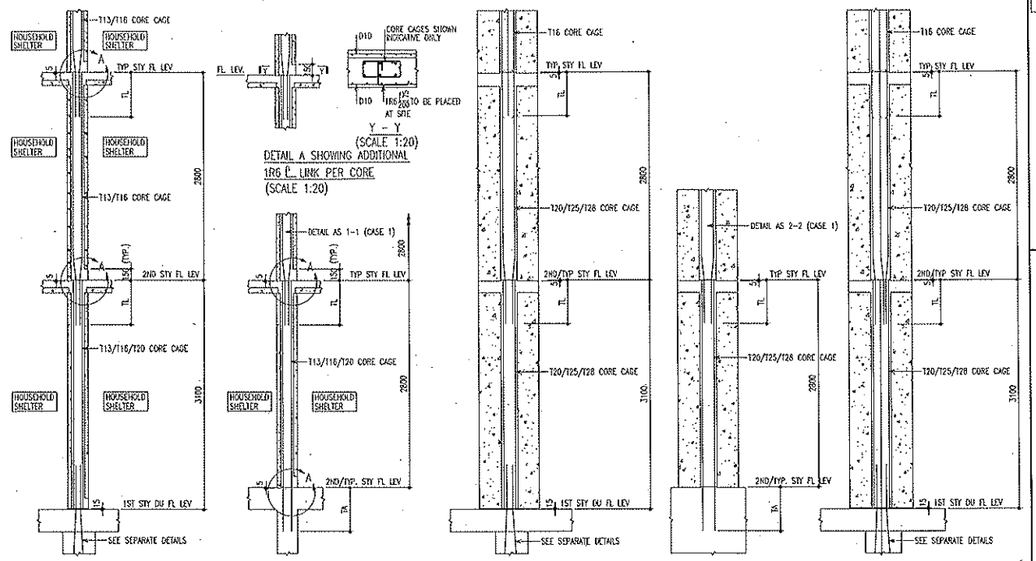
CORE TERMINATION CAGE AT ROOF
(2 PIECES OF TERMINATION CAGE TO LAP WITH TYPE 4/5 CORE CAGES AT ROOF)

NOTES:
1. * DENOTES SIZE & NOS OF BARS AS SHOWN ON PLAN.

VIEW C

DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 7 (SCALE 1:40)

SECTION ACROSS CORE (APPLICABLE TO CORE OF LENGTH 200mm & 250mm)



1 – 1 (CASE 1)

1 – 1 (CASE 2)

2 – 2 (CASE 1)

2 – 2 (CASE 2)

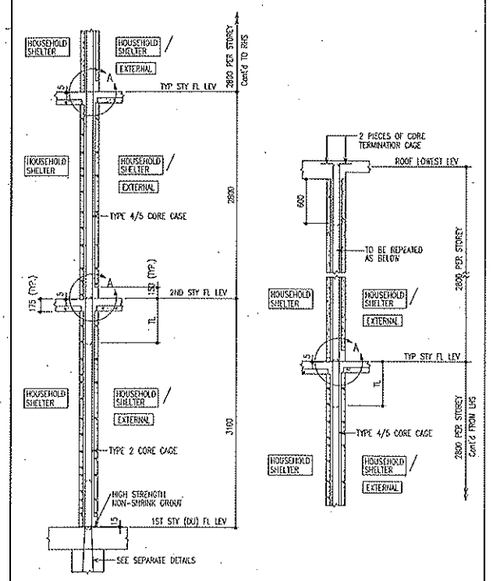
2a – 2a

SECTION 1–1, 2–2 & 2a–2a SHOWING LAPPING OF CRANKED BARS, OTHER DETAILS AND TERMINATION AT ROOF SEE SECT. 3–3

DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 8 (SCALE 1:40)

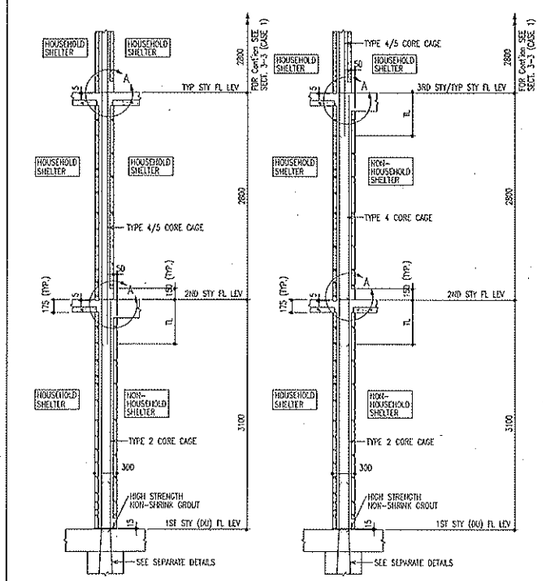
SECTION ACROSS CORE (APPLICABLE TO CORE OF LENGTH 300mm, 400mm, 450mm & 500mm)

SECTION SHOWING WALL THICKNESS WITHOUT REDUCTION FROM 1ST STY. DU



3 – 3 (CASE 1)

SECTION SHOWING WALL THICKNESS WITH REDUCTION FROM 1ST STY. DU



3 – 3 (CASE 2)

3 – 3 (CASE 3)

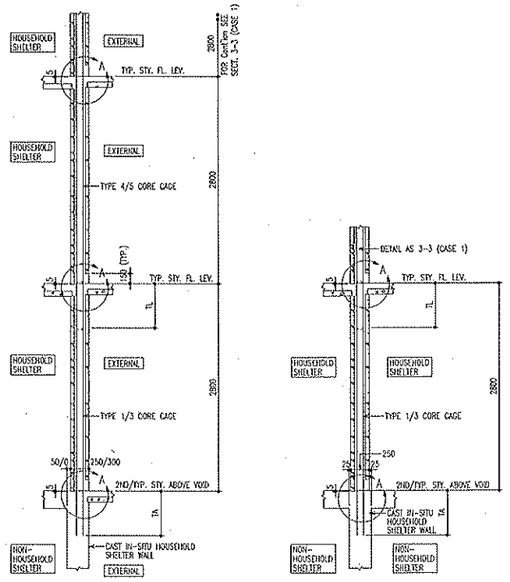
NOTES:
1. DETAIL A SEE DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 7

NOTES:
1. THE DIMENSIONS OF THE HOUSEHOLD SHELTER SHALL COMPLY WITH THE TECHNICAL REQUIREMENTS FOR HOUSEHOLD SHELTER.
2. MINIMUM DIMENSION SHALL BE 1200mm.
3. MAXIMUM DIMENSION SHALL BE 3700mm.
4. MAXIMUM PERMISSIBLE DEVIATION SHALL BE "L"(LENGTH) AND/OR "W"(WIDTH) ±400mm.
5. RIB THICKNESS SHALL BE 100mm.

DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 9 (SCALE 1:40)

SECTION ACROSS CORE (APPLICABLE TO CORE OF LENGTH 300mm, 400mm, 450mm & 500mm)

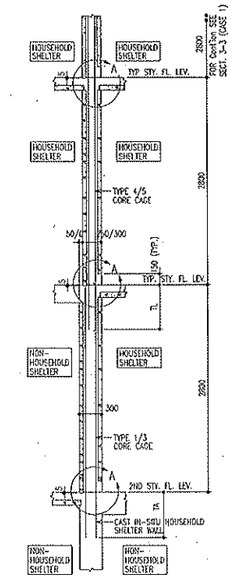
SECTION SHOWING WALL THICKNESS WITHOUT REDUCTION FROM 2ND STY.



3 – 3 (CASE 4)

3 – 3 (CASE 5)

SECTION SHOWING WALL THICKNESS WITH REDUCTION FROM 2ND STY.



3 – 3 (CASE 6)

NOTES:
1. DETAIL A SEE DETAILS OF CORES REINFORCEMENT IN PRECAST HOUSEHOLD SHELTER WALL – 7

AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	OP

REFERENCE

030 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781–00007–2011– CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh Singapore 310480

DRAWING NO. : HB–DL–D1059–CS–553 | REVISION :

PRECINT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17–STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI–STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
PRECAST HOUSEHOLD SHELTER WALL
PART 7

SCALE : 1:100 | DATE:

DRAWN BY: | CHECKED BY:

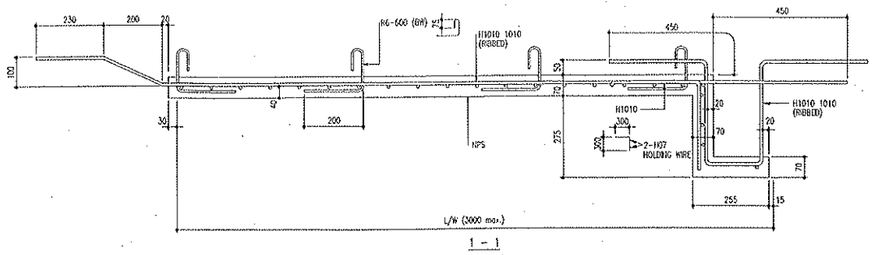
KIP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05–15
E–Centre @ Redhill Singapore 159471
Tel: 6273 5622 Fax: 6273 8454
E–mail: kipcon@pacific.net.sg

DRAWING NO. : 10044/STO/553 | REVISION:

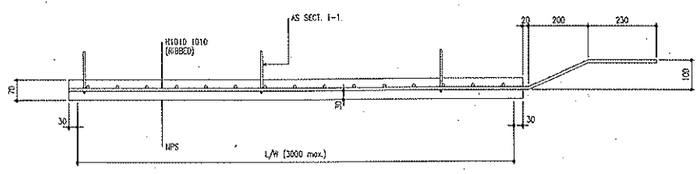
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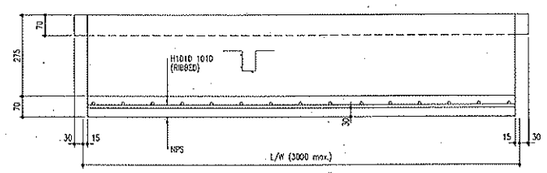
PRECAST NON-PRESTRESSED PLANKS (NPS) FOR HOUSEHOLD SHELTER (SCALE 1 : 40)



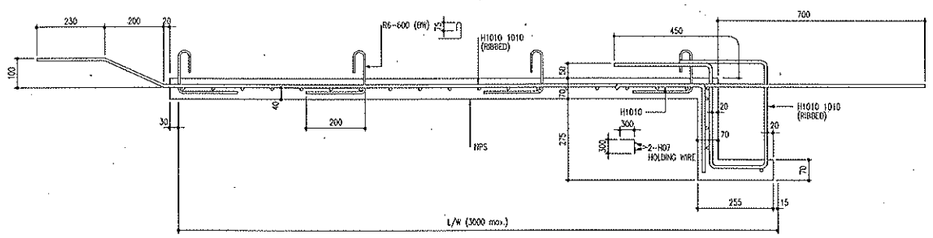
1 - 1



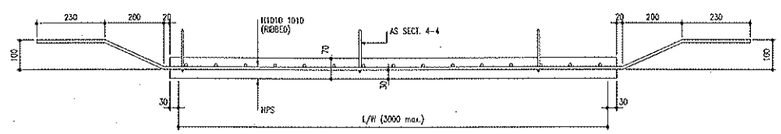
2 - 2



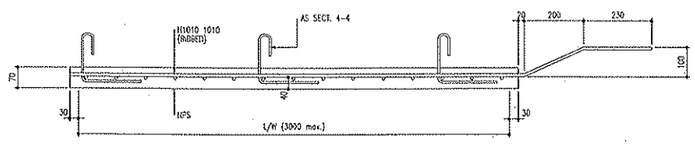
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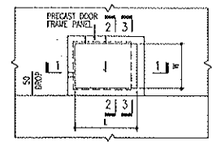
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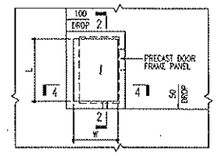


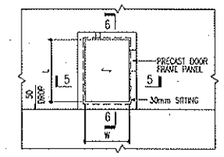
5 - 5



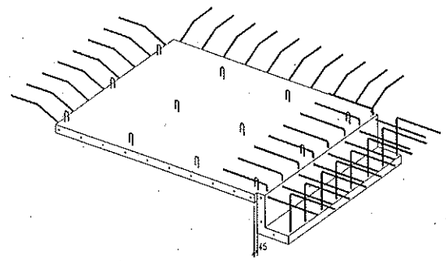
6 - 6







REFERENCE PLANS SHOWING HOUSEHOLD SHELTER



ISOMETRIC VIEW OF PRECAST NON-PRESTRESSED PLANK WITH DROP PANEL

NOTES:
1. L DENOTES CLEAR LENGTH OF HOUSEHOLD SHELTER
   W DENOTES CLEAR WIDTH OF HOUSEHOLD SHELTER
   ACTUAL DIMENSIONS TO REFER TO INDIVIDUAL HOUSEHOLD SHELTER
2. PROPPING IS NOT REQUIRED FOR NON-PRESTRESSED PLANK (NPS) FOR HOUSEHOLD SHELTER.
3. H1010 1010 SHALL BE HARD DRAWN RIBBED WIRE.

AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP

REFERENCE

031 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-D1059-CS-554	REVISION :
PRECINCT NAME : WATERWAY BROOKS	BTO

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LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
PRECAST NON-PRESTRESSED PLANKS (NPS) FOR HOUSEHOLD SHELTER

SCALE : 1:100	DATE:
DRAWN BY:	CHECKED BY:

KIP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-16
E-Centre @ Redhill Singapore 159471
Tel: 6273 5822 Fax: 6273 8454
E-mail: kipcon@pacific.net.sg

DRAWING NO. : 10044/STD/554	REVISION:
DESIGN ENGINEER :	

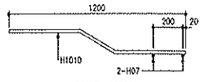
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HOUSEHOLD SHELTER SLAB

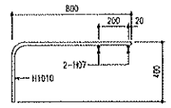
DOWEL MESH DETAILS (SCALE 1:20)

DOWEL MESH	
EFFECTIVE ADJACENT SPAN (L)	DOWEL MESH a OR b
4m < L ≤ 7m	2 X DM 4
L ≤ 4m	DM

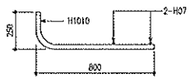
1. DOWEL MESH a TO REFER TO STANDARD SLAB DETAILS PART 1.
2. # DENOTES 2 PIECES OF DOWEL MESHES ARE USED AND TO BE PLACED SUCH THAT THE H10 ARE AT 100 SPACING.
3. TYPICAL DETAIL OF MESH AS SHOWN BELOW :



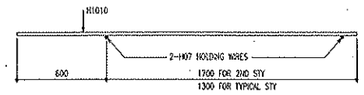
DOWEL MESH b



DOWEL MESH c



DOWEL MESH e

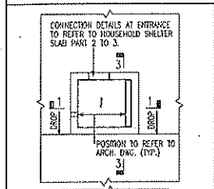


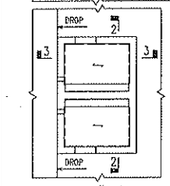
DOWEL MESH d

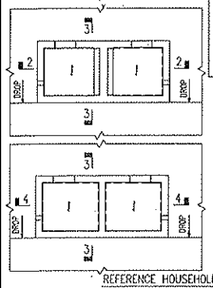
NOTE : POSITION OF H07 HOLDING WIRES ARE INDICATIVE ONLY

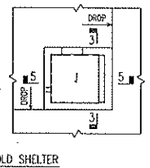
NOTES:
1. UNLESS OTHERWISE INDICATED TO SEE INDIVIDUAL DETAILS FOR APPLICATION OF ABOVE MESHES TO DETERMINE HOLDING WIRE POSITION.

2ND AND TYPICAL STOREY - 1 (SCALE 1:40)



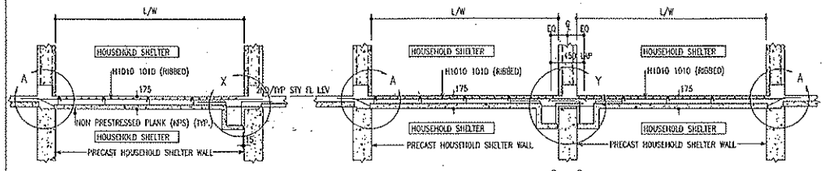


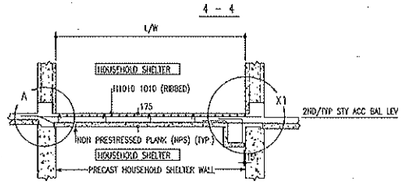




REFERENCE HOUSEHOLD SHELTER 2ND/TYPICAL STOREY SLAB PLANS
(PROFILE OF ADJACENT BEAMS NOT SHOWN)

AT 2ND STOREY ABOVE DWELLING UNIT/TYPICAL STOREY



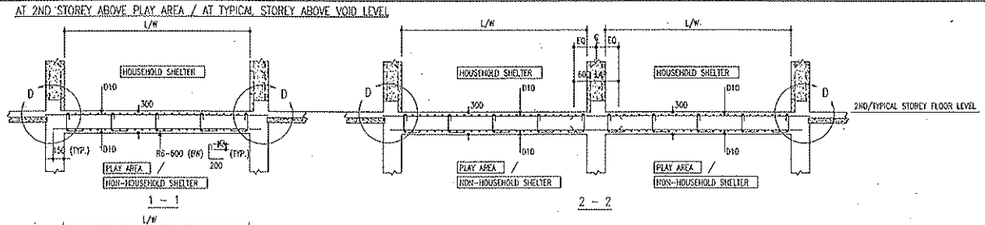


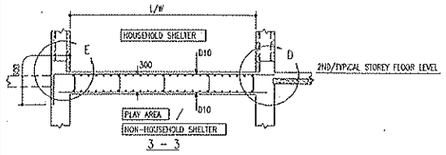
DIMENSION FOR L AND W TO REFER TO INDIVIDUAL FLOOR PLAN

NOTES:
1. H1010 1010 SHALL BE HARD DRAWN RIBBED WIRE.
2. PRECAST NON-PRESTRESSED PLANKS (NPS) SEE SEPARATE DETAIL.
3. EEEE DENOTES PRECAST STRUCTURE.
4. FOR TYPICAL JOINT DETAILS BETWEEN CAST IN-SITU CONCRETE AND THE PRECAST PRESTRESSED PLANK, SEE STANDARD SLAB DETAILS.

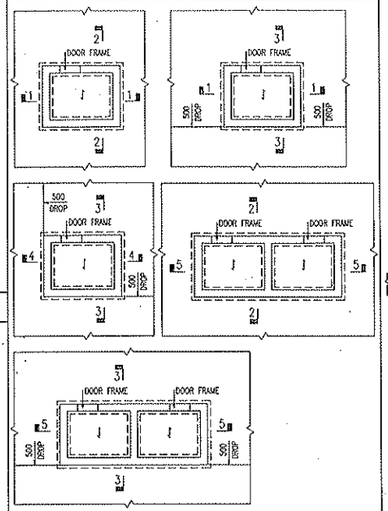
2ND AND TYPICAL STOREY - 2

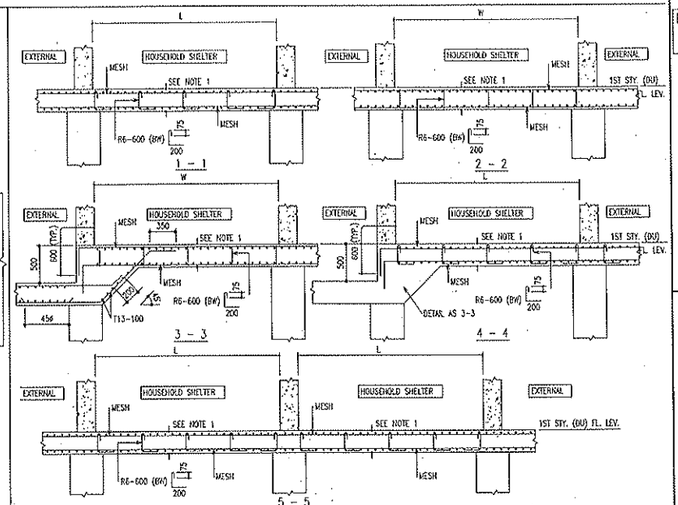
AT 2ND STOREY ABOVE PLAY AREA / AT TYPICAL STOREY ABOVE VOID LEVEL





1ST STOREY (SCALE 1:40)

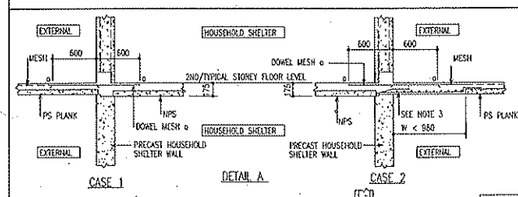


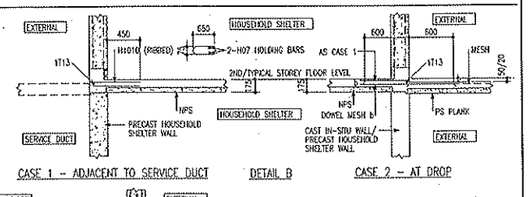


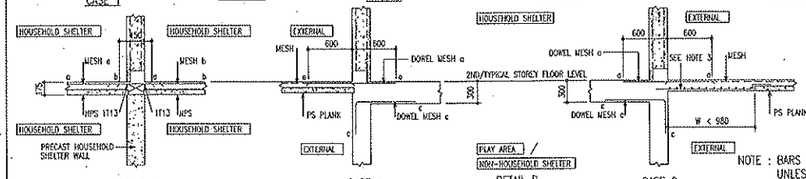
DIMENSION FOR L AND W TO REFER TO INDIVIDUAL FLOOR PLAN

NOTE: 1. THICKNESS AS 1ST STOREY FLAT SLAB OR 200mm WHICHEVER IS GREATER.
2. MESH AS 1ST STOREY FLAT SLAB OR D10 WHICHEVER IS GREATER.

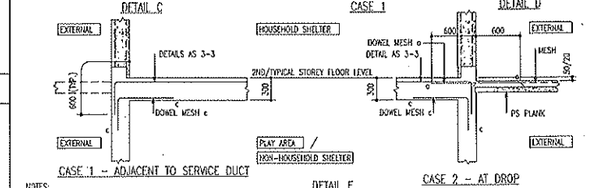
2ND AND TYPICAL STOREY - 3 (SCALE 1:40)

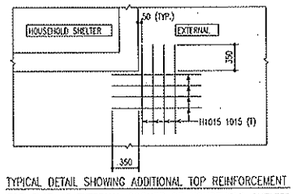






NOTE : BARS FROM PS PLANK & NPS NOT SHOWN UNLESS FOR CLARITY.

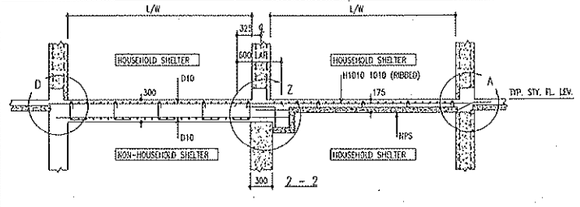




TYPICAL DETAIL SHOWING ADDITIONAL TOP REINFORCEMENT FOR SLAB AT EXTERNAL CORNER OF HOUSEHOLD SHELTER WITHOUT BEAMS IN BOTH DIRECTIONS AT THIS CORNER

NOTES:
1. PRECAST NON-PRESTRESSED PLANKS (NPS) SEE SEPARATE DETAIL.
2. EEEE DENOTES PRECAST STRUCTURE.
3. FOR TYPICAL JOINT DETAILS BETWEEN CAST IN-SITU CONCRETE AND THE PRECAST PRESTRESSED PLANK, SEE STANDARD SLAB DETAILS.

AT 2ND STOREY ABOVE PLAY AREA AND DWELLING UNIT / AT TYPICAL STOREY ABOVE VOID LEVEL AND DWELLING UNIT



NOTES:
1. H1010 1010 SHALL BE HARD DRAWN RIBBED WIRE.
2. PRECAST NON-PRESTRESSED PLANKS (NPS) SEE SEPARATE DETAIL.
3. EEEE DENOTES PRECAST STRUCTURE.
4. FOR TYPICAL JOINT DETAILS BETWEEN CAST IN-SITU CONCRETE AND THE PRECAST PRESTRESSED PLANK, SEE STANDARD SLAB DETAILS.

AMENDMENT	DATE	DRAWN BY	CHCKD BY	DESIGN ENGR	QP

REFERENCE

032 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER
CIVIL
YEO CHOON CHONG
3050
SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. : HB-DL-01059-CS-555	REVISION :
PRECINCT NAME : WATERWAY BROOKS	BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
HOUSEHOLD SHELTER SLAB
PART 1

SCALE : 1:100	DATE:
DRAWN BY:	CHECKED BY:

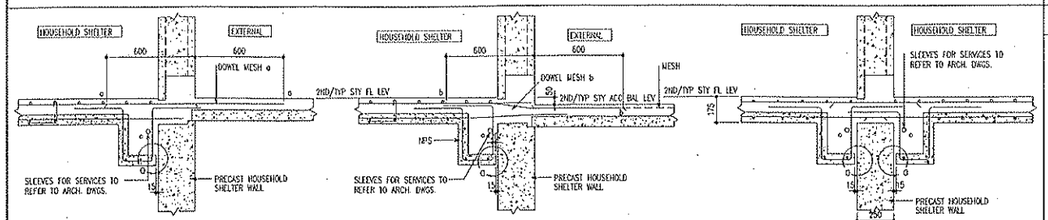
KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-10
E-Centre @ Redhill Singapore 159471
Tel: 6273 5522 Fax: 6273 8454
E-mail: ktpcon@pacific.net.sg

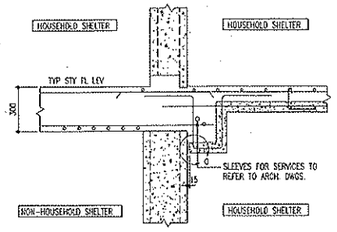
DRAWING NO. : 10044/STD/555	REVISION:
DESIGN ENGINEER :	

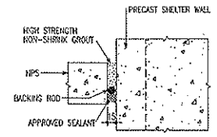
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HOUSEHOLD SHELTER SLAB

2ND AND TYPICAL STOREY – 4 (SCALE 1:40)





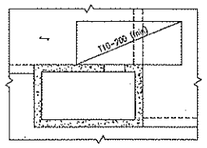


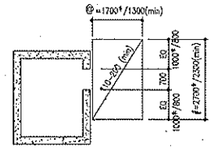
NOTES:
1. DETAIL X TO Z TO BE PROVIDED AND CONSTRUCTED IN CONJUNCTION WITH ARCH. DWGS WHEN APPLICABLE.
2. [ ] DENOTES PRECAST STRUCTURE.

NOTE : BARS FROM PS PLANK & NPS NOT SHOWN UNLESS FOR CLARITY.

2ND AND TYPICAL STOREY – 5 (SCALE 1:40)

SPECIFIC NOTE FOR SLAB DETAILING AT ENTRANCE OF HOUSEHOLD SHELTER



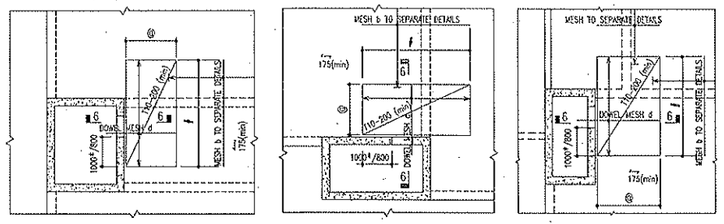


PART REFERENCE PLAN SHOWING MINIMUM LENGTH OF MESH AT ENTRANCE OF HOUSEHOLD SHELTER

NOTES:
1. DIMENSION MARKED WITH SUFFIX * ARE FOR 2ND STOREY ONLY.
2. BARS FROM PS PLANK AND NPS NOT SHOWN.
3. DETAILS OF DOWEL MESH c & d SEE HOUSEHOLD SHELTER SLAB – PART 1 (SPECIAL MESH DETAILS)
4. [ ] DENOTES PRECAST STRUCTURE.

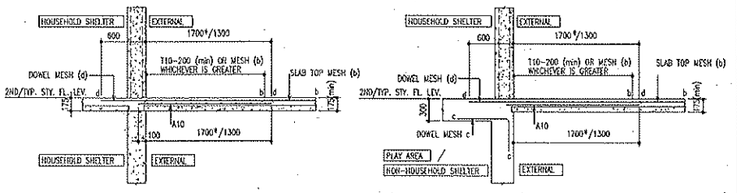
CONNECTION DETAILS OF 2ND AND TYPICAL STOREY SLAB ADJACENT TO HOUSEHOLD SHELTER AT ENTRANCE – 1

FOR ADJACENT SLAB USING PRECAST PRESTRESSED PLANK WITHOUT CAST IN-SITU CONCRETE POUR STRIP



REFERENCE PLANS SHOWING TOP REINFORCEMENT ONLY

/ DENOTE 2700*/2300 (MIN) LENGTH OR AS MESH b WHICHEVER IS LONGER & GREATER AT BOTH ENDS OF DOOR. OTHER DETAILS NOT SHOWN TO REFER TO INDIVIDUAL FLOOR PLAN



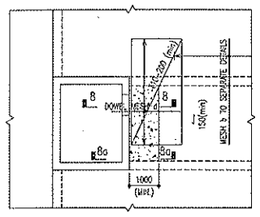
NOTE:
THE RC FLOOR SLAB IN FRONT OF THE HOUSEHOLD SHELTER DOOR; THERE SHALL BE NO CROSSING OF CONCEALED WIRING CONDUITS UNDER THE TOP REINFORCEMENT MESHES.

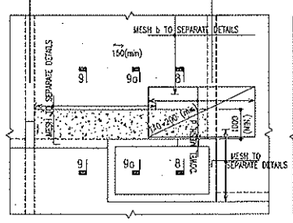
6 – 6
7 – 7 SIMILAR
(FOR LOCATION OF 7–7 SEE HOUSEHOLD SHELTER SLAB (2ND AND TYP. STOREY – 6) AT BELOW)

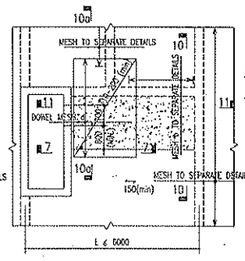
2ND AND TYPICAL STOREY – 6 (SCALE 1:40)

CONNECTION DETAILS OF 2ND AND TYPICAL STOREY SLAB ADJACENT TO HOUSEHOLD SHELTER AT ENTRANCE – 2

FOR ADJACENT SLAB USING PRECAST PRESTRESSED PLANK WITH CAST IN-SITU CONCRETE POUR STRIP





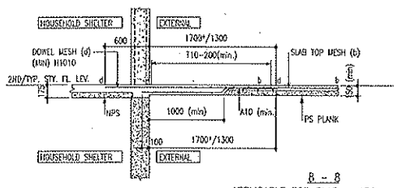


LEGEND : FOR REFERENCE PLANS ONLY (EXCLUDING HOUSEHOLD SHELTER)

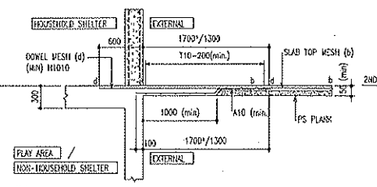
- PLANK SPANNING DIRECTION
- DENOTES PRECAST PRESTRESSED PLANK (ACTUAL DETAILS TO REFER TO INDIVIDUAL FLOOR PLAN)
- DENOTES CAST IN-SITU CONCRETE POUR STRIP

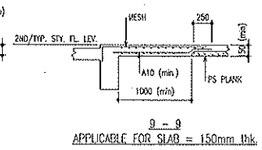
REFERENCE PLANS

PLACEMENT OF TOP REINFORCEMENT AT ENTRANCE AS REFERENCE PLANS IN HOUSEHOLD SHELTER SLAB (2ND AND TYP. STOREY –7) AT RHS
OTHER DETAILS NOT SHOWN TO REFER TO INDIVIDUAL FLOOR PLAN

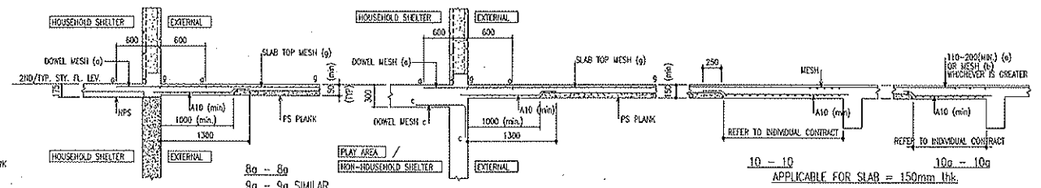


8 – 8
APPLICABLE FOR SLAB = 150mm thk.



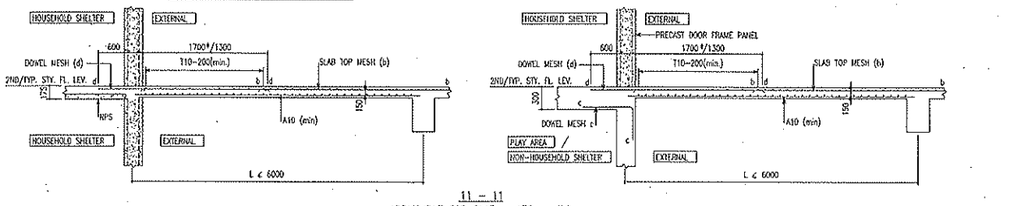


9 – 9
APPLICABLE FOR SLAB = 150mm thk.



8a – 8a
9a – 9a SIMILAR
APPLICABLE FOR SLAB = 150mm thk.

10 – 10
10a – 10a
APPLICABLE FOR SLAB = 150mm thk.



11 – 11
APPLICABLE FOR SLAB = 150mm thk.

NOTES:
1. DIMENSION MARKED WITH SUFFIX * ARE FOR 2ND STOREY ONLY.
2. BARS FROM PS PLANK AND NPS NOT SHOWN.
3. DETAILS OF DOWEL MESH a, b & c SEE HOUSEHOLD SHELTER SLAB – PART 1 (SPECIAL MESH DETAILS).

AMENDMENT	DATE	DRAWN BY	CHKD BY	DESIGN ENGR	OP

REFERENCE

033 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781–00007–2011– CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh Singapore 310480

DRAWING NO. : HB-DL-D1050-CS-556	REVISION :
PRECINT NAME : WATERWAY BROOKS	DTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K	MUKIM NO. : 21

JOB TITLE :
PUNGGOL EAST CONTRACT 40

DRAWING TITLE :
HOUSEHOLD SHELTER SLAB
PART 2

SCALE : 1:100	DATE:
DRAWN BY:	CHECKED BY:

KTP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-1B E-Centre @ Redhill Singapore 150471
Tel: 6273 5622 Fax: 6273 8454
E-mail: Mycon@pacific.net.sg

DRAWING NO. : 10044/STD/556	REVISION:
DESIGN ENGINEER :	

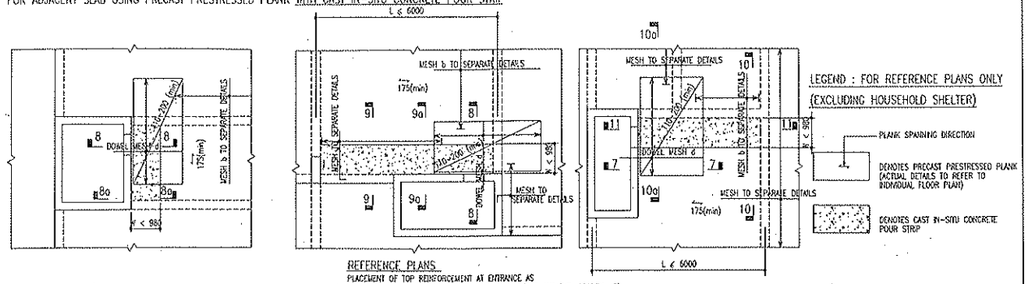
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HOUSEHOLD SHELTER SLAB

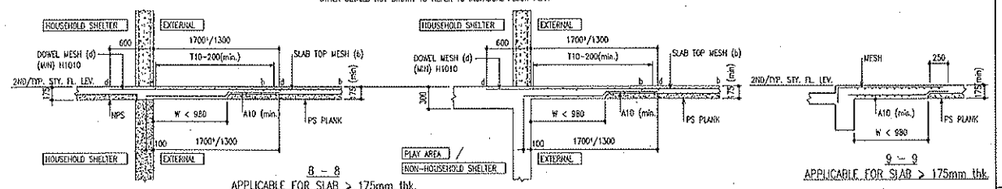
2ND AND TYPICAL STOREY - 8 (SCALE 1:40)

CONNECTION DETAILS OF 2ND AND TYPICAL STOREY SLAB ADJACENT TO HOUSEHOLD SHELTER AT ENTRANCE - 3

FOR ADJACENT SLAB USING PRECAST PRESTRESSED PLANK WITH CAST IN-SITU CONCRETE POUR STRIP

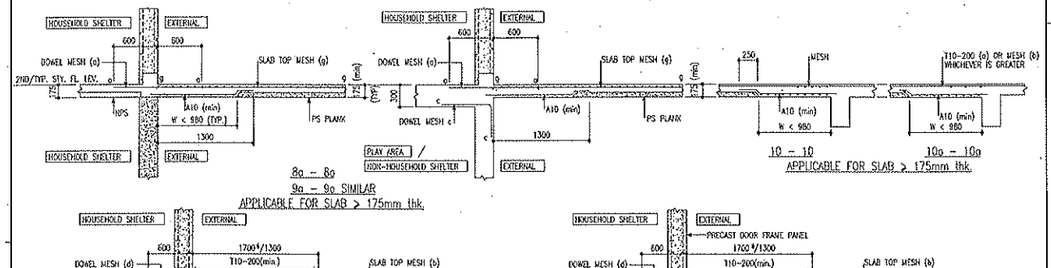


REFERENCE PLANS
PLACEMENT OF TOP REINFORCEMENT AT ENTRANCE AS REFERENCE PLANS IN HOUSEHOLD SHELTER SLAB (2ND AND TYP. STOREY -5)
OTHER DETAILS NOT SHOWN TO REFER TO INDIVIDUAL FLOOR PLAN



8 - 8
APPLICABLE FOR SLAB > 175mm thk.

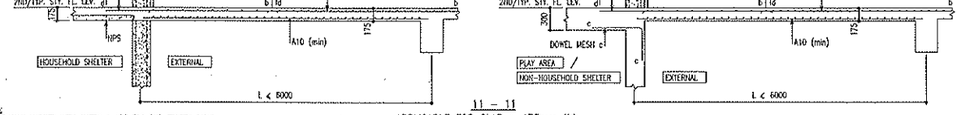
9 - 9
APPLICABLE FOR SLAB > 175mm thk.



8a - 8a
9a - 9a SIMILAR
APPLICABLE FOR SLAB > 175mm thk.

10 - 10
APPLICABLE FOR SLAB > 175mm thk.

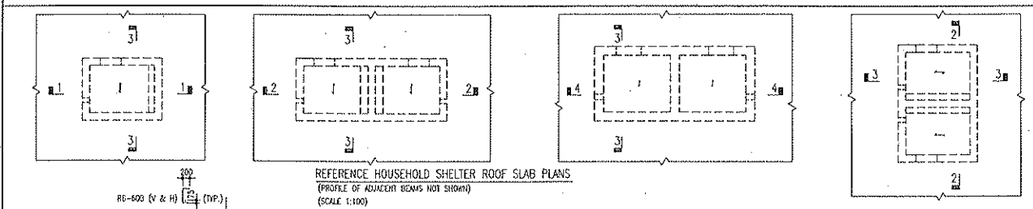
10a - 10a



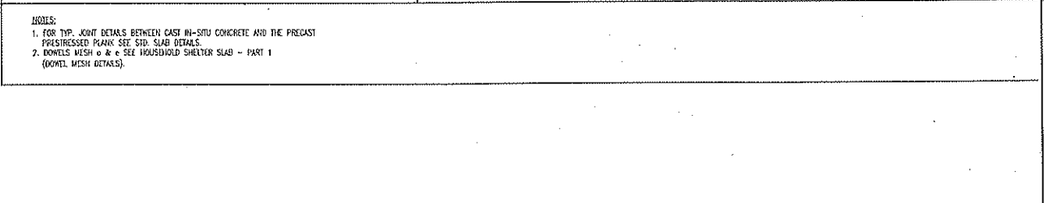
11 - 11
APPLICABLE FOR SLAB > 175mm thk.

NOTES:
1. DIMENSION MARKED WITH SUFFIX * ARE FOR 2ND STOREY ONLY.
2. BARS FROM PS PLANK AND NPS NOT SHOWN.
3. DETAILS OF DOWEL MESH a, b, c & d SEE HOUSEHOLD SHELTER SLAB - PART 1 (SPECIAL MESH DETAILS).

ROOF - 1 (SCALE 1:40)



1 - 1
2 - 2

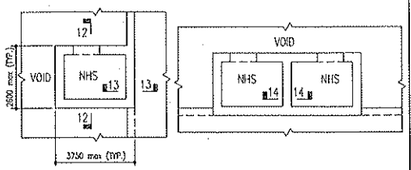


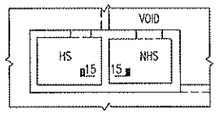
3 - 3
4 - 4

NOTES:
1. FOR TYP. JOINT DETAILS BETWEEN CAST IN-SITU CONCRETE AND THE PRECAST PRESTRESSED PLANK SEE STD. SLAB DETAILS.
2. DOWELS MESH a & c SEE HOUSEHOLD SHELTER SLAB - PART 1 (DOWEL MESH DETAILS).

2ND AND TYPICAL STOREY - 9 (SCALE 1:40)

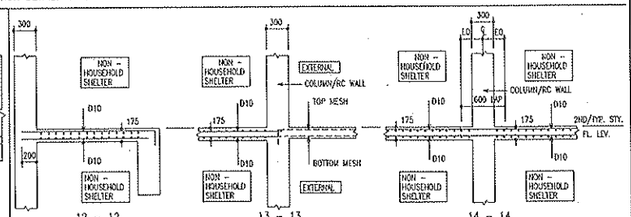
STANDARD SLAB AND CONNECTION DETAILS OF HOUSEHOLD SHELTER AT VOID LEVELS - 1





REFERENCE 2ND/TYPICAL STOREY SLAB PLANS FOR HOUSEHOLD SHELTER/NON HOUSEHOLD SHELTER (AT VOID LEVELS)
(SCALE 1:100)

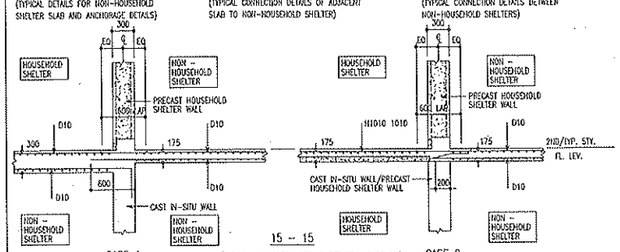
NOTE :
1. HS DENOTES HOUSEHOLD SHELTER.
2. NHS DENOTES NON-HOUSEHOLD SHELTER.
3. PROFILE OF ADJACENT BEAMS NOT SHOWN UNLESS REQUIRED FOR CLARITY.
4. COLUMN AND WALL PROFILE ARE INDICATIVE ONLY.
5. FOR ACTUAL LAYOUT, COLUMN AND WALL PROFILE TO REFER TO INDIVIDUAL FLOOR PLANS.



12 - 12
(TYPICAL DETAILS FOR NON-HOUSEHOLD SHELTER SLAB AND ANCHORAGE DETAILS)

13 - 13
(TYPICAL CONNECTION DETAILS OF ADJACENT SLAB TO NON-HOUSEHOLD SHELTER)

14 - 14
(TYPICAL CONNECTION DETAILS BETWEEN NON-HOUSEHOLD SHELTERS)

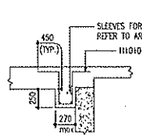


CASE 1

15 - 15
(TYPICAL CONNECTION DETAILS BETWEEN HOUSEHOLD SHELTER AND NON- HOUSEHOLD SHELTER)

CASE 2

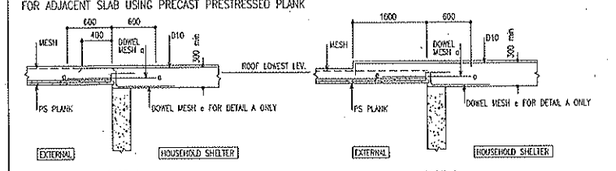
ROOF - 2 (SCALE 1:40)



(DETAIL X & Y TO BE PROVIDED AND CONSTRUCTED IN CONJUNCTION WITH ARCH. DWGS WHEN APPLICABLE)

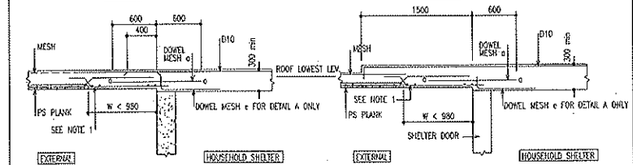
DETAIL A & B

FOR ADJACENT SLAB USING PRECAST PRESTRESSED PLANK



CASE 1

CASE 2



CASE 3

CASE 4

TYPICAL SECTION

* DOWEL MESH (e) MAY BE BENT INTO CAST IN-SITU CORES OF HOUSEHOLD SHELTER WALL

AMENDMENT	DATE	DRAWN BY	CHECKED BY	DESIGN ENGR	QP

REFERENCE

034 sheet of 034

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE BUILDING CONTROL ACT (CHAPTER 29)

Project Ref No : A781-00007-2011- CS02
Approval granted herein is with respect to civil defence shelter works only

for Commissioner of Building Control

STANDARD CERTIFICATION FOR CIVIL DEFENCE SHELTER PLANS

I, YEO CHOON CHONG, hereby submit the detailed civil defence shelter plans (and design calculations) prepared by me and certify that :-

(a) the preparation of these civil defence shelter plans are in accordance with the Building Control Regulations ; and

(b) the civil defence shelter plans works shown on these plans are designed in accordance with the shelter technical requirements.

2. Total number of civil defence shelter plans submitted : 34
and total number of pages of design calculations : 1999

PROFESSIONAL ENGINEER CIVIL YEO CHOON CHONG 3050 SINGAPORE

QUALIFIED PERSONS' SIGNATURE AND STAMP — 29-02-12 DATE

OWNER :
HOUSING & DEVELOPMENT BOARD
HDB Hub 480 Lorong 6 Toa Payoh
Singapore 310480

DRAWING NO. :HB-DL-D1058-CS-557 | REVISION :
PRECINT NAME : WATERWAY BROOKS | BTO

PROJECT TITLE :
PROPOSED PUBLIC HOUSING DEVELOPMENT COMPRISING OF 14 BLKS OF 10/12/14/17-STOREY FLATS (TOTAL:1312 UNITS) WITH 3 BLKS OF MULTI-STOREY CAR PARK WITH LANDSCAPE GARDEN, COMMUNITY FACILITIES, PRECINCT PAVILION & ESS AT PUNGGOL DRIVE (PUNGGOL PLANNING AREA)

LOT NO : 02364K | WORK NO. : 21

JOB TITLE : PUNGGOL EAST CONTRACT 40

DRAWING TITLE : HOUSEHOLD SHELTER SLAB
PART 3

SCALE : 1:100 | DATE:
DRAWN BY: | CHECKED BY:

KIP CONSULTANTS PTE. LTD.
CONSULTING CIVIL & STRUCTURAL ENGINEERS
3791 Jalan Bukit Merah #05-18
E-Centre @ Redhill Singapore 159471
Tel: 6273 5022 Fax: 6273 8454
E-mail: kipcon@pacific.net.sg

DRAWING NO. : 10044/STD/557 | REVISION:
DESIGN ENGINEER :

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