

PENYEDIAAN LUKISAN STRUKTUR

OLEH Ir. NADIA BINTI JAILAN

BAHAGIAN PENDIDIKAN

CAWANGAN KEJURUTERAAN AWAM DAN STRUKTUR



• **Kandungan**

- Nota
- Perincian
 - Butiran Asas
 - Butiran Rasuk
 - Butiran Tiang
 - Butiran Papak
 - Butiran Kekuda Bumbung
 - Butiran Tangga
- Kaedah tambatan bar, pemotongan bar dan tindihan bar

NOTA

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- Nota di dalam lukisan struktur adalah sangat penting
 - Mewakili kehendak perekabentuk yang tidak dapat dinyatakan atau disampaikan di dalam bentuk lukisan
 - Nota-nota ini dapat menyokong kehendak perekabentuk selain daripada apa yang dipersembahkan di dalam bentuk lukisan.

NOTA

- Nota ini juga menjadi rujukan dan bukti kepada isu-isu yang berbangkit semasa proses pembinaan
- Setiap perkara yang dinyatakan di dalam nota-nota ini mewakili maksud dan tanggungjawab yang besar kepada perekabentuk dan pihak yang melaksanakan pembinaan.

CONTOH

All precast beams and columns shall refer to JKR Catalog (Jadual Papan Komponen Struktur BS bagi Bangunan) for reinforcement details.

SPECIAL NOTES FOR JBS

1. PRECAST PRESTRESSED HOLLOW CORE SLABS

1.1 MATERIALS

- Concrete grade of precast prestressed hollow core slabs shall not be less than grade C50.
- Concrete grade of concrete topping on precast slabs shall not be less than grade C35.
- Concrete grade of joining concrete shall be grade C35.
- Prestressing steel shall be low relaxation strands conforming to relevant BS 5896, 1980 relaxation class 2.
- For durability, the concrete cover to prestressed strands shall be at least 40mm with minimum cement content 360 kg/m³ and water cement ratio < 0.55.

1.2 DESIGN

- All precast slabs shall be designed as Class 2 member of BS 8110:1997.
- The design of precast slabs shall allow for the provision of openings for electrical, mechanical and other services ducts and drain pipes.
- The precast slabs shall be designed for a fire-resistant of two hours with 40mm cover.
- The initial camber and final deflection of precast units shall not exceed the allowable limits specified in BS 8110:1995.

1.3 INSTALLATION OF HOLLOW CORE SLABS

Hollow Core Slabs shall be hoisted with a lifting beam top-lift clamps and accessory safety chains or belts of sufficient capacity to minimise handling damages. Hollow Core Slabs shall be checked during installation.

1.4 JOINTING

Hollow Core Slabs shall be jointed with non shrink grout and joints provided with reinforcement bars if shown in the drawing. Joint grooves shall be dampened before filling the joint grooves with concrete which shall be compacted by 25mm immersion type vibrator. Compaction of joint concrete shall be through and accomplished by dragging vibrator along joint groove. The underside of joint groove shall be brushed clean within an hour after jointing operation to form a neat drip-free V-groove.

1.5 DRAINAGE HOLES

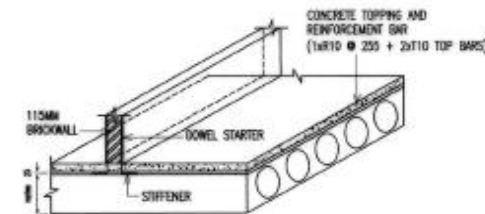
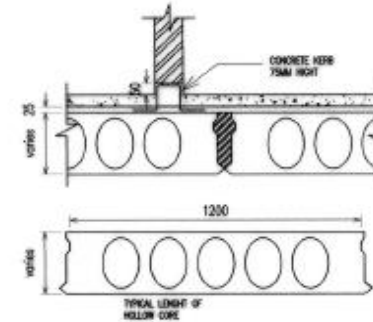
A series of 10mm dia drainage holes are to be drilled at both ends of floor slab soffit to drain off any water which may have collected in slab and to be kept open by the contractor during the construction period. Where painting, plastering or application of special finishes is required, the drainage holes shall be filled with cementitious fillers. The filling operation shall be done by the contractor. However drainage holes are not required for hollow core slabs at ground floor areas.

1.6 OPENINGS

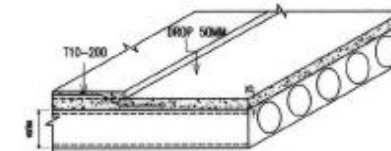
Opening exceeding 200mm in dia (or square) in hollow-core slabs for joint connections or M&E installation should be performed in green concrete at the factory provided that advance notice is given before production. Openings not made in factory shall be made by the contractor at site by hocking or by diamond-tipped coring drill under the Engineer's supervision. After firing installation (or reinforcement) all openings and recesses shall be filled with Grade 35 concrete. Circular voids affected by the opening shall be sealed with light fl synthetic caps. Works for large opening shall be undertaken by Contractor in strict compliance with precasters instruction and the construction detail shall be approved by the Engineer. All work related to the making good of the openings shall be carried out by the Contractor.

1.7 FINISHES

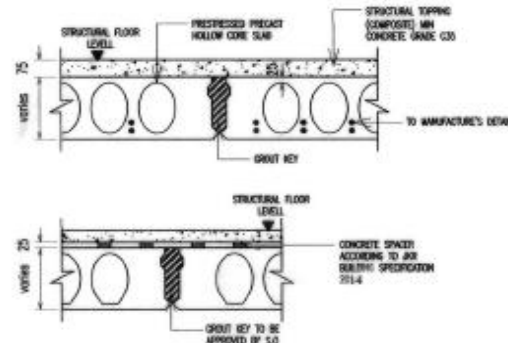
- Or, dirty, loose mortar and etc. shall be removed prior to application of topping and surface shall be dampened (so standing water) 1-2 hour before laying topping concrete. No ponding of water is allowed. Laying of topping shall be done orderly in strip formation to achieve correct level and avoid cold joints. Puker vibrator shall be used to vibrate the topping. The vibrator shall be dragged along the surface of fresh concrete at intervals not exceeding 200mm. Retarding and super plasticizing admixture is to be added into the mix. Topping concrete shall be cured for at least 3 days to avoid plastic crack and to reduce shrinkage crack.
- Concrete topping to be completed before laying any brickwork to ensure water tightness. External Top Surface of slab to be waterproofed prior to laying of surface finish.



3) TYPICAL BRICKMALL STIFFENER ON HOLLOW CORE SLAB



4) TYPICAL DROP AT HOLLOW CORE NOT MORE THAN 50MM DROP



1) TYPICAL FLOOR DETAIL

Thickness (mm)	SW+75mm topping (kN/m ²)	Max. span (mm)	Unfactored Max. loading (kN/m ²)	SLS Max moment (kNm)	SLS Max shear (kN)	Max. Deflection (mm)
265	3.2	9600	10.50	145.15	60.48	38.4
200/205	2.7	7500	8.5	71.72	38.25	30

TABLE 1

1) For Design purposes, Loading = Self Weight + Imposed Live load + Super Imposed dead load + Partition / Brickwork



JABATAN KERJA RAYA MALAYSIA

BANGUNAN STRUKTUR PEGAWAI
KAWASAN KAWASAN ANAK DAN STRUKTUR
BU PAMAY JKR MALAYSIA
TINGKAT 10, BLOK S,
NO. 6, JALAN SULTAN SALAHUDIN,
50480 KUALA LUMPUR
(No. TEL: 62-26188170)

PERAWAI KAWASAN :

P. HAJARUN DINI KAWASAN :

KAWASAN PENGALING KAWASAN KAWASAN :

P. HAJARUN DINI KAWASAN :

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NOTA AM

1. KECUALI DINYATAKAN SEMUA REKABENTUK KONKRIT TETULANG DAN PERINCIAN ADALAH MENGIKUT KEHENDAK BS8110:1997.

Kod amalan yang dirujuk untuk kerja rekabentuk konkrit tetulang dan perincian

2. SEMUA LUKISAN KONKRIT TETULANG HENDAKLAH DIBACA BESERTA DENGAN LUKISAN ARKITEK YANG BERKENAAN.

Lukisan struktur perlu dibaca bersama lukisan arkitek

3. SEBELUM KERJA-KERJA KONKRIT DIMULAKAN, LUKISAN INI PERLU DISEMAK DENGAN LUKISAN M & E, BERKENAAN KEPERLUAN BUKAAN UNTUK PAIP DAN SEUMPAMANYA. SEBARANG PERCANGGAHAN HENDAKLAH DISELARASKAN DENGAN JURUTERA M & E.

Lukisan struktur perlu disemak dengan lukisan mekanikal dan elektrik

NOTA AM

4. SEMUA KERJA-KERJA KONKRIT HENDAKLAH MENURUT PIAWAI JKR 'SPECIFICATION FOR BUILDING WORKS 2014' : JKR 20800-0183-14.

Rujukan spesifikasi

5. SEMUA KONKRIT YANG DIGUNAKAN HENDAKLAH DARI C30/37 KECUALI DINYATAKAN BERLAINAN, DENGAN SAIZ MAKSIMUM BATU BAUR 20mm. KEKUATAN MINIMUM KIUB KONKRIT PADA UMUR 28 HARI HENDAKLAH DIRUJUK PADA JADUAL 8A: 'SPECIFICATION FOR BUILDING WORKS 2014'. KANDUNGAN MINIMUM SIMEN HENDAKLAH 300kg/m³. DAN KANDUNGAN MAKSIMUM NISBAH AIR-SIMEN IALAH 0.55.

Gred konkrit, kekuatan minima kiub konkrit, kandungan minima simen dan kandungan maksima nisbah air-simen

NOTA AM

6. JIKA TIDAK DINYATAKAN, TEBAL NOMINAL PENUTUP KONKRIT PADA TETULANG HENDAKLAH:—

- a) 50mm UNTUK ASAS
- b) 40mm UNTUK RASUK TINGKAT BAWAH DAN TIANG
- c) 25mm UNTUK RASUK DAN DINDING
- d) 25mm UNTUK PAPAK



Ketebalan penutup
konkrit

7. KECUALI DINYATAKAN, KEKUATAN ALAH TETULANG KELULI ADALAH SEPERTI BERIKUT:—

- a) KELULI SEDERHANA 250N/mm^2
- b) KELULI ALAH TINGGI 460N/mm^2
- c) FABRIK KELULI 485N/mm^2

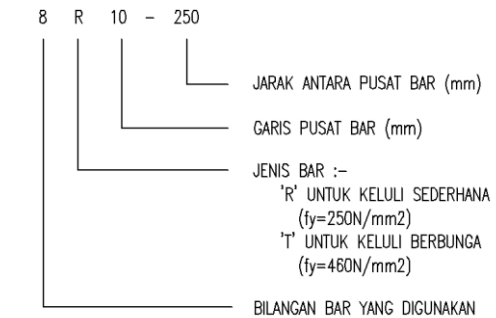


Kekuatan alah
tetulang keluli

NOTA AM

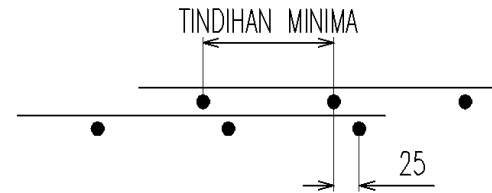
Petunjuk

19. PETUNJUK :-



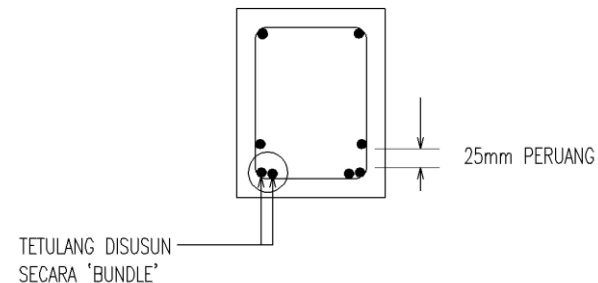
(T.I.S) - TIDAK IKUT SEKIL
(A & B) - ATAS DAN BAWAH
K.T - KONKRIT TETULANG
A/P - ANTARA PUSAT

20.



Tindihan

22. JARAK PERUANG ANTARA BAR YANG BERLAPIS ADALAH 25mm.
BUTIRAN TIPIKAL TETULANG DISUSUN SECARA 'BUNDLE'

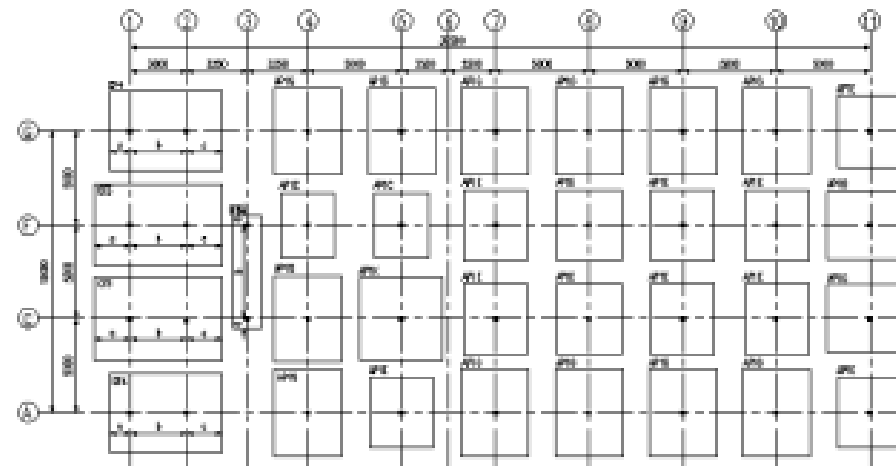


Peruang antara bar dan susunan bundle

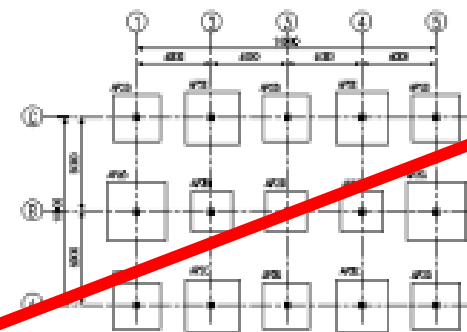
Contoh nota-nata lain

NOTA:-

1. LUKISAN INI HENDAKLAH DIBACA BERSAMA-SAMA DENGAN LUKISAN PIAWAI ASAS PENAPAK, ASAS PENAPAK KONKRIT TETULANG TUNGGAL DENGAN TEKANAN GALAS PELBAGAI,
No. Lukisan : JKR.CKASJ (BSPPT)(AP-T)/EP/01(02)
DAN No. Lukisan: JKR.CKASJ (BSPPT)(AP-T)/EP/02(02)
2. LUKISAN INI HENDAKLAH DIBACA BERSAMA-SAMA DENGAN LUKISAN PELAN TIPIKAL ASAS PENAPAK KERATAN A-A & JENIS PENAPAK
No. Lukisan:
JKR(CKASJ)P-T20-T23/11/14/PEL11/093-096/
CH/AP-RC/01[13]A



PELAN AJAS PND
KEMANGAN "POST HARVEST" SAYUR-SAYURAN
KEMANGAN GADIS : 1998/99



PLEASE PRINT NAME AND ADDRESS
 NAME: _____
 ADDRESS: _____
 PHONE: _____

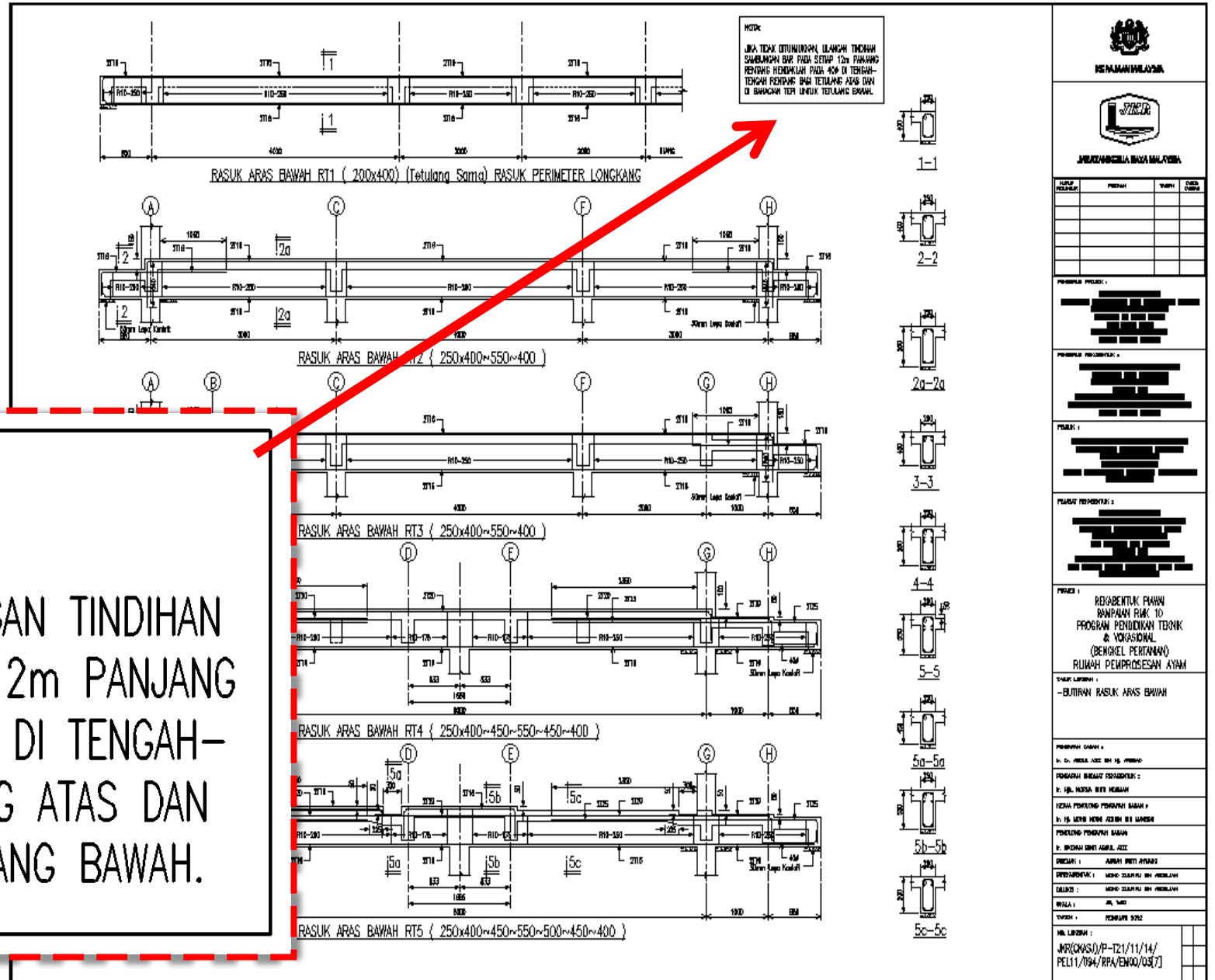
1. LINDEN IN HEMISPHERAL SPACE: BERNARD-DAVE GORDON
LINDEN: NAME AND PHONE, AND PHONE NUMBER IN
TULSA: NUMBER (PHONE) NUMBER (AREA), PHONE,
No. Linden: 400-2000 (505) 4-1100/1000
OWN No. Linden: 400-2000 (505) 4-1100/1000
2. LINDEN IN HEMISPHERAL SPACE: BERNARD-DAVE GORDON
LINDEN: NAME AND PHONE, AND PHONE NUMBER IN
TULSA: NUMBER (PHONE) NUMBER (AREA), PHONE,
No. Linden: 400-2000 (505) 4-1100/1000
OWN No. Linden: 400-2000 (505) 4-1100/1000

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Contoh nota-nata lain

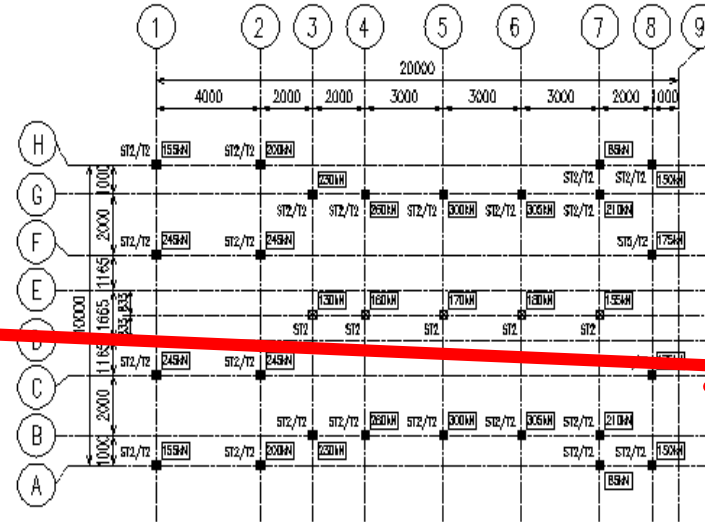
NOTA:

JIKA TIDAK DITUNJUKKAN, ULANGAN TINDIHAN
SAMBUNGAN BAR PADA SETIAP 12m PANJANG
RENTANG HENDAKLAH PADA 40Ø DI TENGAH-
TENGAH RENTANG BAGI TETULANG ATAS DAN
DI BAHAGIAN TEPI UNTUK TETULANG BAWAH.

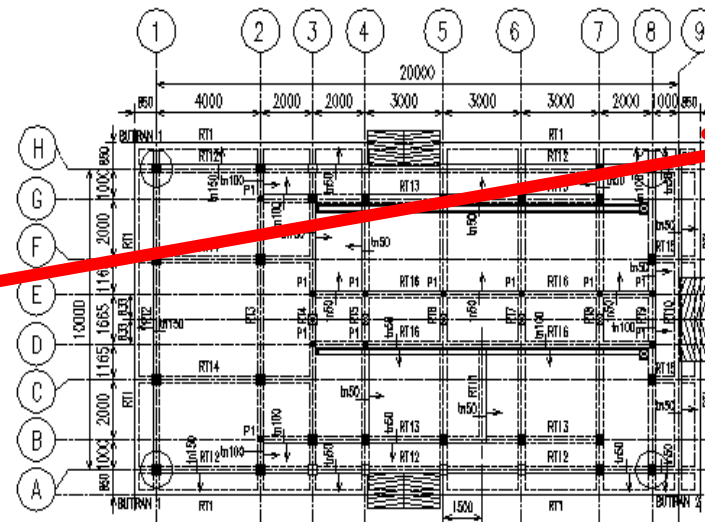


TIANG;
T2 300x300
PANGKAL TIANG;
ST2 300x300
ST5 350x350

RT1 200x400
RT2 250x400~550~400
RT3 250x400~550~400
RT4 250x400~450~550~450~400
RT5 250x400~450~550~500~450~400
RT6 250x400~450~500~550~500~450~400
RT7 250x400~450~550~500~450~400
RT8 250x400~450~550~500~450~400
RT9 250x400~450~750~550~500~750~500~400
RT10 250x400
RT11 200x400
RT12 250x400 (Tetulang Sama)
RT13 250x400 (Tetulang Sama)
RT14 250x400 (Tetulang Sama)
RT15 250x450~400 (Tetulang Sama)
RT16 250x400 (Tetulang Sama)



PELAN BEBAN KHIDMAT TIANG



PELAN RASUK ARAS BAWAH

TWHS;
T2 300x300
PAWICAL TW
ST2 300x300
ST5 350x350

RSX3K :

RT1	200+400
RT2	250+400+550+400
RT3	250+400+400+400
RT4	250+400+450+650+450+400
RT5	250+400+450+650+500+450+400
RT6	250+400+450+400+400+500+400+400
RT7	250+400+450+650+500+450+400
RT8	250+400+450+650+400+450+400
RT9	250+400+450+750+550+600+750+600+400
RT10	250+400
RT11	200+400
RT12	250+400 (Tubuh Sama)
RT13	200+400 (Tubuh Sama)
RT14	250+400 (Tubuh Sama)
RT15	200+400+400 (Tubuh Sama)
RT16	250+400 (Tubuh Sama)

NOTA :-

1. LUMSIAN INI HENDAKLAH DIWAJIBKAN SAMA DENGAN LUMSIAN ARIAL TANG, BUTIRAN TITIK TANG & TANG PESELUH JKR(CKASJP-120-123/11/14/PEL11/1993-086/EN/016)
2. BUNAN TANG BERSAIZ 300x300 PADA GRU 4/3,4,5 & 6 DAN GRU 6/3,4,5 & 6 ADALAH MERUPAKAN "FALSE COLUMN" YANG TIDAK MENAWANGKAN BEBAN STRUKTUR, PLAIN BULAN DARI ARSITEK.

[illegible]

PERINCIAN BUTIRAN

- Merupakan lukisan struktur yang sangat penting
- Menampilkan butiran-butiran terperinci terhadap sesuatu struktur yang mewakili kehendak perekabentuk untuk dipenuhi oleh pihak pelaksana semasa proses pembinaan.

Secara asasnya lukisan perincian butiran menunjukkan perkara seperti berikut:

- kedudukan tetulang utama
- tetulang ricih
- saiz dan jenis tetulang
- tempat dan jarak pemotongan serta tambatan tetulang
- dimensi struktur bagi struktur seperti tiang, rasuk, tangga, papak, dan pelbagai struktur di dalam sesebuah bangunan.



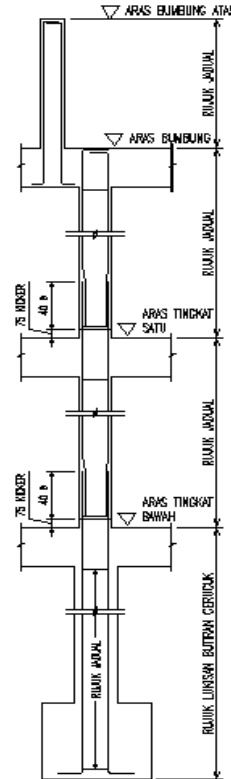
PERINCIAN BUTIRAN

- Berdasarkan amalan terbaik yang dipraktikkan di peringkat jabatan, diantara perincian butiran yang gunakan adalah:
 - Butiran asas (Penapak, Cerucuk..)
 - Butiran jadual tiang
 - Butiran rasuk aras bawah
 - Butiran rasuk aras satu, dua,tiga..(atau Tipikal)
 - Butiran rasuk aras bumbung
 - Butiran papak aras bawah
 - Butiran papak aras satu, dua,tiga..(atau Tipikal)
 - Butiran papak aras bumbung
 - Butiran kekuda bumbung



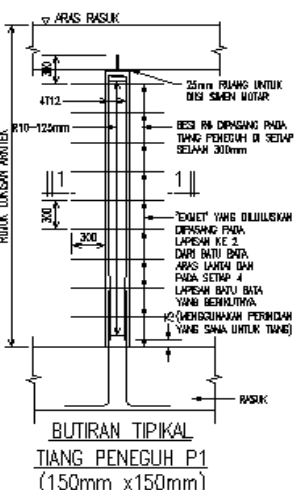
Contoh Butiran: Butiran Jadual Tiang

JENIS TIANG	T1	T1A	T1B	T2	T3	T3A	T3B	T4	T5
APAS BUNBUNG KE APAS BUNBUNG ATAS									
TINGGI (m)							1.39		
TETULANG UTAMA							4T16		
PENGKAT							2R10-200		
APAS SATU KE APAS BUNBUNG									
TINGGI (m)	3.8	3.9		3.8	3.8	3.8			3.9
TETULANG UTAMA	8T16	4T16		8T20	4T16	4T20			8T16
PENGKAT	2R10-175	2R10-175		2R10-175	2R10-175	2R10-175			2R10-125
APAS BAWAH KE APAS SATU									
TINGGI (m)	4.35	4.35		4.35	4.35	4.35		4.35	4.35
TETULANG UTAMA	8T16	4T16		8T20	4T16	4T20		12T16	10T16
PENGKAT	2R10-175	2R10-175		2R10-175	2R10-175	2R10-175		3R10-175	2R10-125
TETAPI CERBUK KE APAS BAWAH									
TINGGI min (m)	1.5	1.5	1.5	1.5	1.5	1.5		1.5	1.5
TETULANG UTAMA	8T16	4T16	8T16	8T20	4T16	4T20		12T16	10T16
PENGKAT	2R10-175	2R10-175	2R10-175	2R10-175	2R10-175	2R10-175		3R10-175	2R10-125

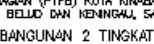
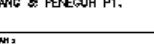
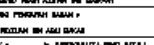
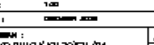


BUTIRAN TIPIKAL TIANG T1 - T5
(TIKAL MENURUT SKALA)

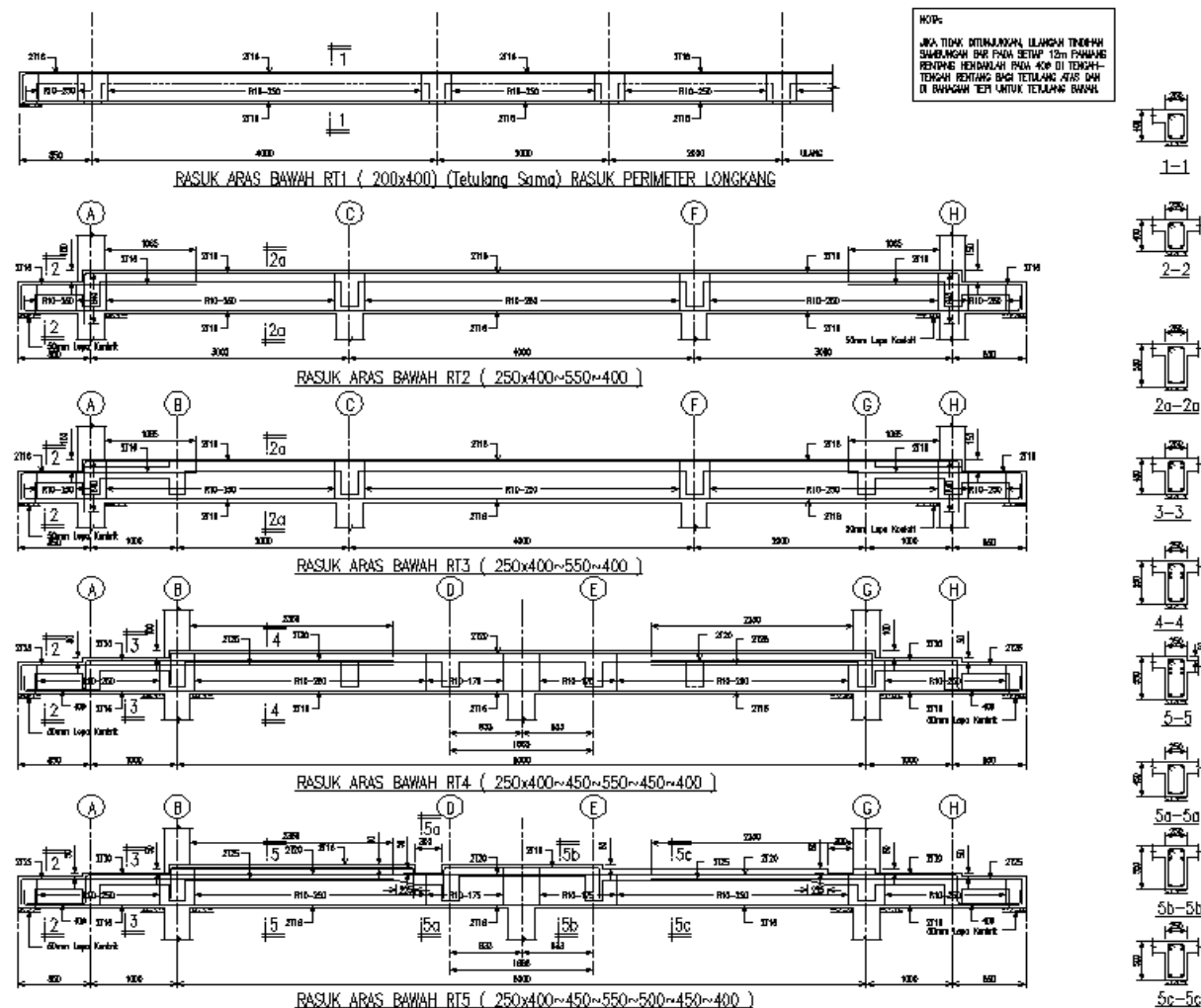
NOTA :
SILA RUMUK PELAN BEBAN KHIDMAT TIANG BAWA
MENENTUKAN KEDUDUKAN TIANG YANG DINAMAKAN
SEPERTI T1,T1A,T1B,T2,T3,T3A,T3B,T4,T5



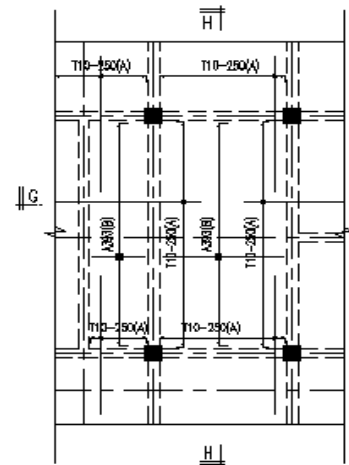
**BUTIRAN TIPIKAL
TIANG PENEGUH P1
(150mm x150mm)**

 KEHAKIMAN MALAYSIA			
 KEHAKIMAN MALAYSIA			
NO.	NAMA	TARIKH	JENIS
A	DETAILED	2024	2024
REKOD PROJEK 			
REKOD REKOD 			
REKOD 			
REKOD REKOD 			
REKOD 			
REKOD 			
REKOD 			
REKOD 			
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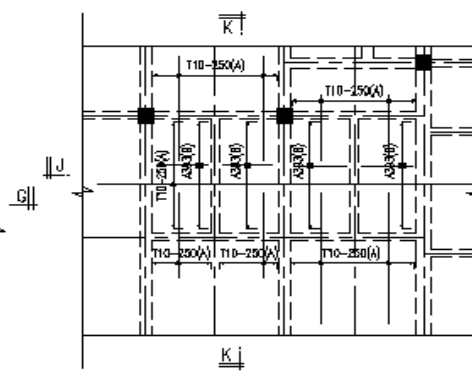
Contoh Butiran: Butiran Rasuk

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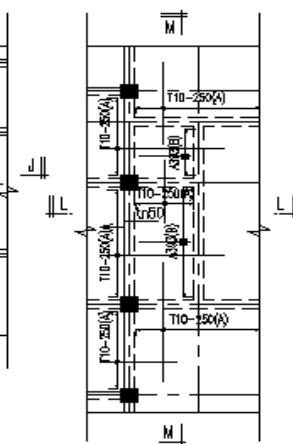
Contoh Butiran: Butiran Papak



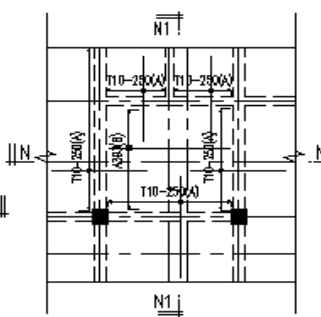
PELAN BUTIRAN PAK ARAS BAWAH S4



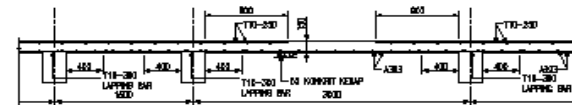
PELAN BUTIRAN PAK ARAS BAWAH S5



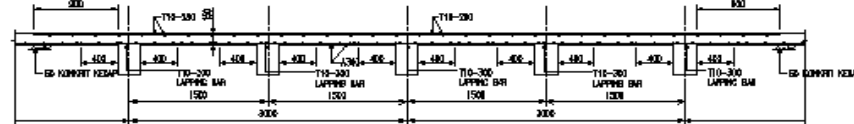
PELAN BUTIRAN PAK ARAS BAWAH S5A



PELAN BUTIRAN PAK ARAS BAWAH S6



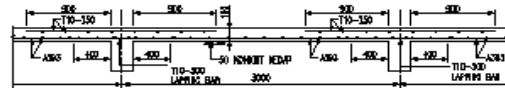
KERATAN G-G



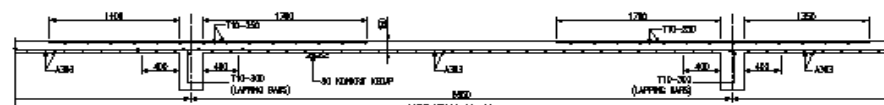
KERATAN J-J



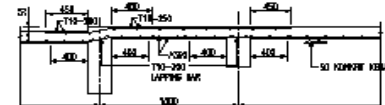
KERATAN K-K



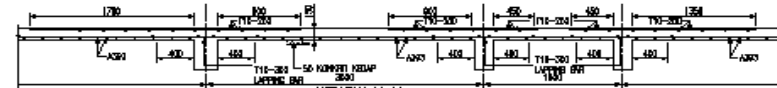
KERATAN N-N



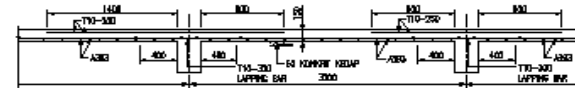
KERATAN H-H



KERATAN L-L



KERATAN M-M



KERATAN N1-N1



KEMALAMAN MALAYSIA



PELAKSANAAN TEKNIK BINA BANGUNAN

NO.	REKABUTIRAN	REKABUTIRAN	REKABUTIRAN
1			
2			
3			
4			
5			

REKABUTIRAN PAK ARAS

REKABUTIRAN PAK ARAS BAWAH S4

REKABUTIRAN PAK ARAS BAWAH S5

REKABUTIRAN PAK ARAS BAWAH S5A

REKABUTIRAN PAK ARAS BAWAH S6

REKABUTIRAN PAK ARAS BAWAH S4

REKABUTIRAN PAK ARAS BAWAH S5

REKABUTIRAN PAK ARAS BAWAH S5A

REKABUTIRAN PAK ARAS BAWAH S6

REKABUTIRAN PAK ARAS BAWAH S4

REKABUTIRAN PAK ARAS BAWAH S5

REKABUTIRAN PAK ARAS BAWAH S5A

REKABUTIRAN PAK ARAS BAWAH S6

REKABUTIRAN PAK ARAS BAWAH S4

REKABUTIRAN PAK ARAS BAWAH S5

REKABUTIRAN PAK ARAS BAWAH S5A

REKABUTIRAN PAK ARAS BAWAH S6

REKABUTIRAN PAK ARAS BAWAH S4

REKABUTIRAN PAK ARAS BAWAH S5

REKABUTIRAN PAK ARAS BAWAH S5A

REKABUTIRAN PAK ARAS BAWAH S6

REKABUTIRAN PAK ARAS BAWAH S4

REKABUTIRAN PAK ARAS BAWAH S5

REKABUTIRAN PAK ARAS BAWAH S5A

REKABUTIRAN PAK ARAS BAWAH S6

REKABUTIRAN PAK ARAS BAWAH S4

REKABUTIRAN PAK ARAS BAWAH S5

REKABUTIRAN PAK ARAS BAWAH S5A

REKABUTIRAN PAK ARAS BAWAH S6

REKABUTIRAN PAK ARAS BAWAH S4

REKABUTIRAN PAK ARAS BAWAH S5

REKABUTIRAN PAK ARAS BAWAH S5A

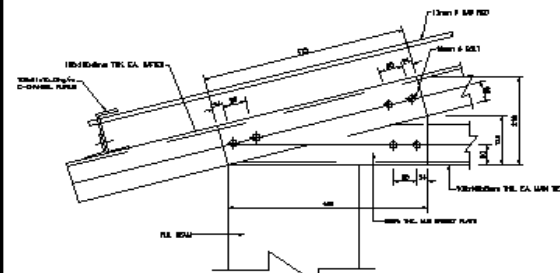
REKABUTIRAN PAK ARAS BAWAH S6

REKABUTIRAN PAK ARAS BAWAH S4

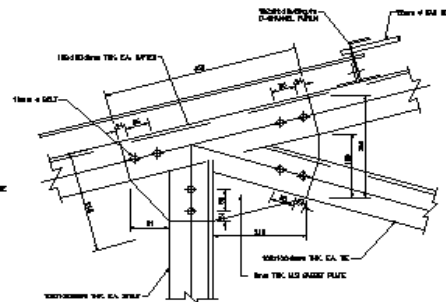
REKABUTIRAN PAK ARAS BAWAH S5

REKABUTIRAN PAK ARAS BAWAH S5A

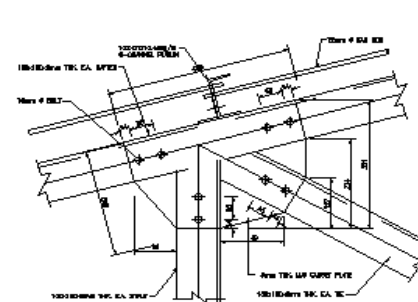
Contoh Butiran: Butiran Kekuda Bumbung



DETAIL '1'



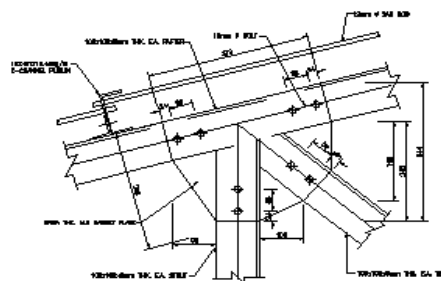
DETAIL '2'



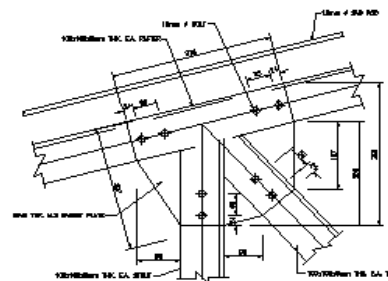
DETAIL '3'

NOTES:

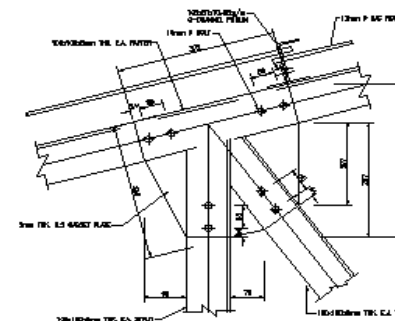
1. ALL YIELDING SHALL BE OF
STEEL FILLER FIELD ALL PAINTED
2. ALL GULCHES SHALL BE OF
TERRACE 4 U.S. BUILT COMPLETE
WITH SUE & WASHING.
3. ALL PLATE SHALL BE OF
STEEL TIRING WAYS PLATE.



DETAIL '4'



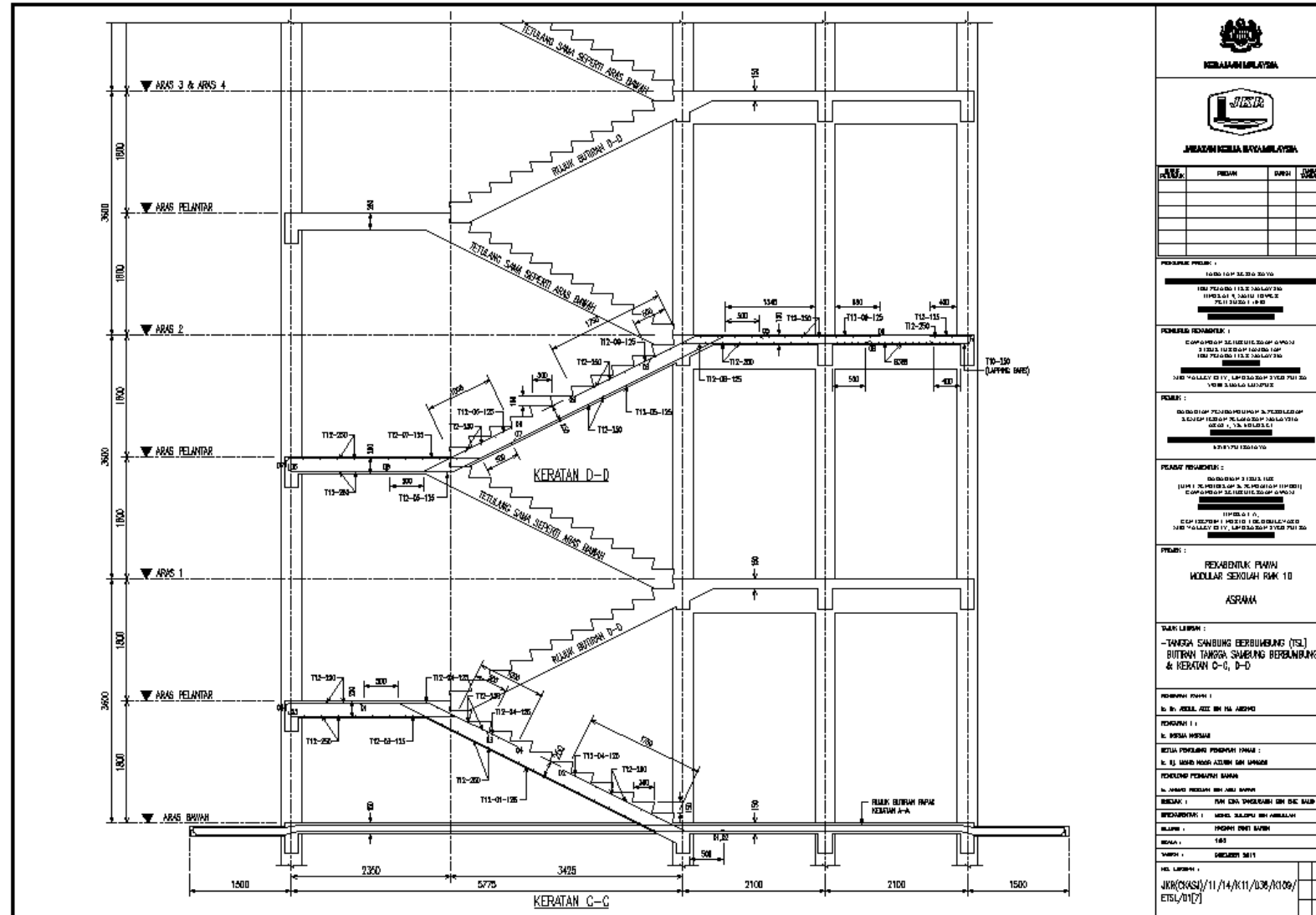
DETAIL '5'



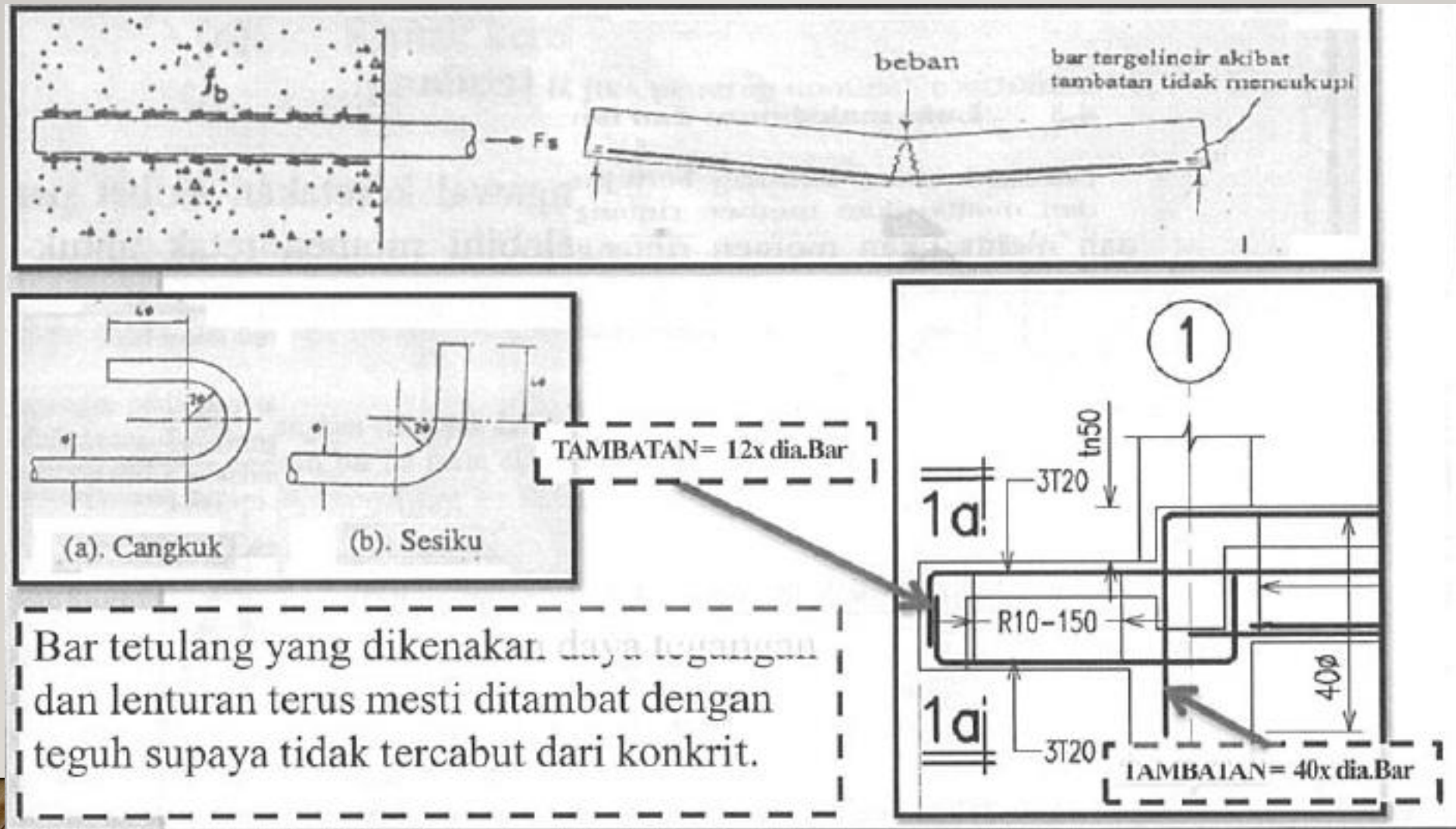
DETAIL '6'

[illegible]

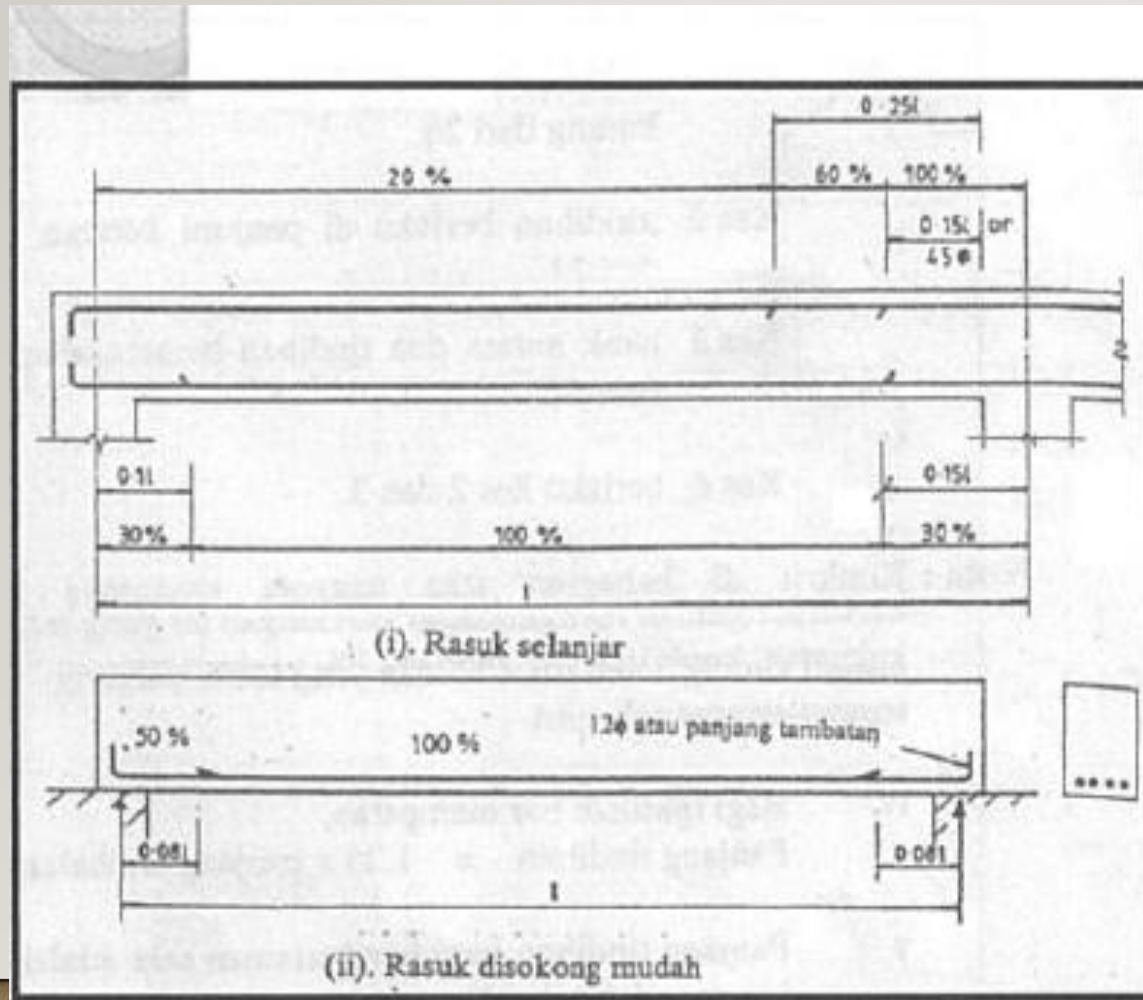
Contoh Butiran: Butiran Tangga



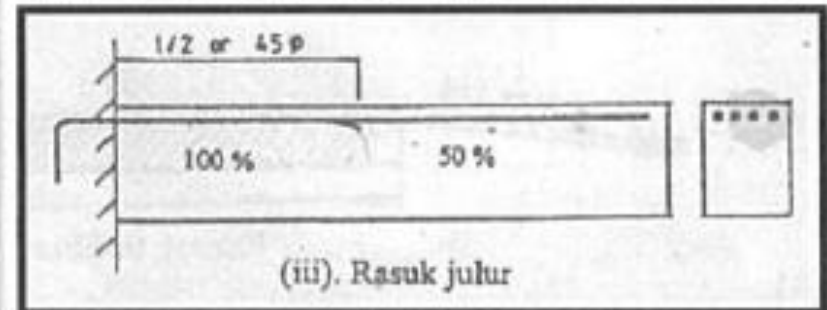
KAEDAH TAMBATAN BAR



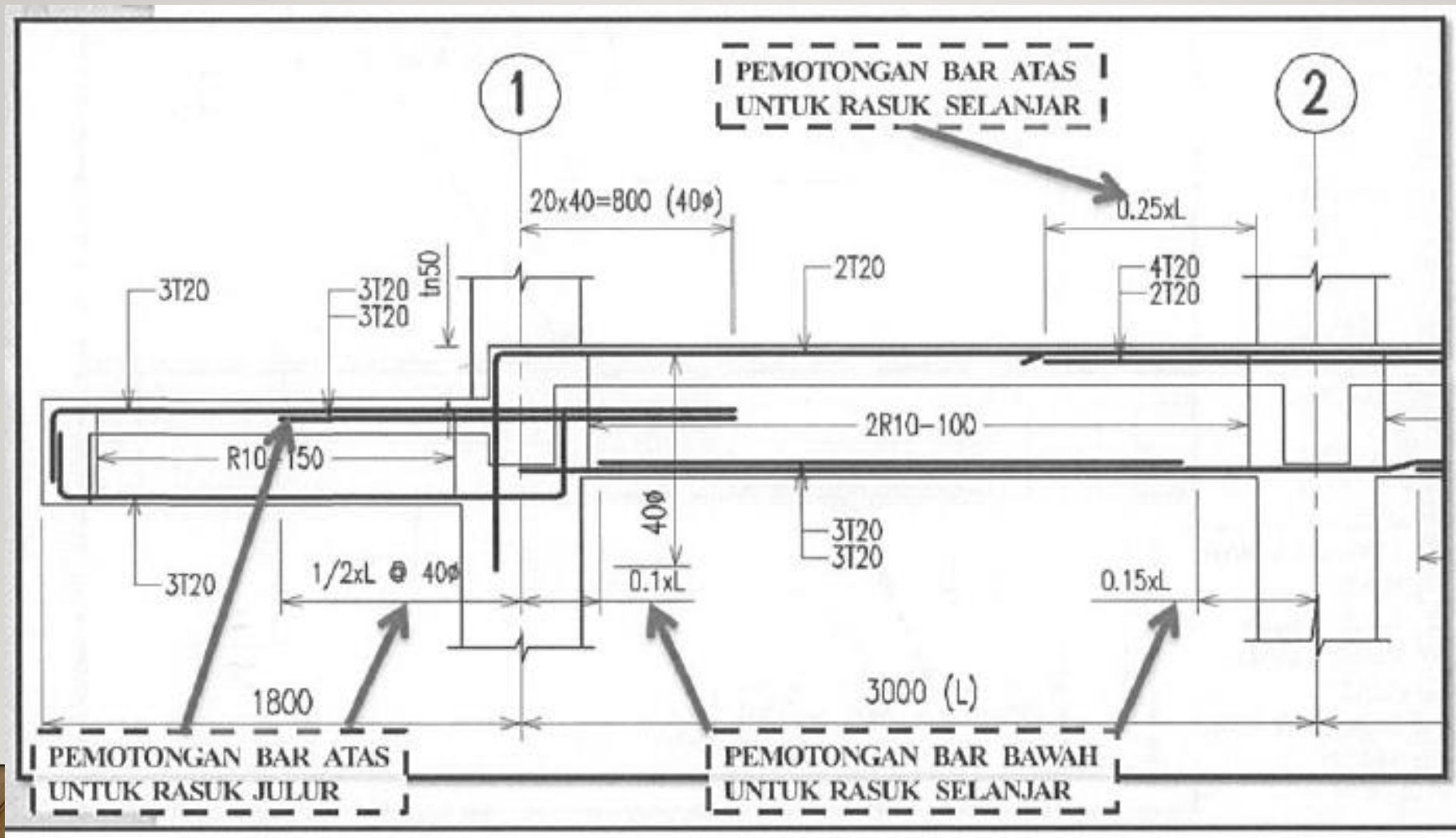
KAEDAH PEMOTONGAN BAR



- Pengurangan ketebalan tanpa menjejaskan reka bentuk
- Pembinaan lebih senang dan murah.
- Kerosakan bar boleh di kurangkan.

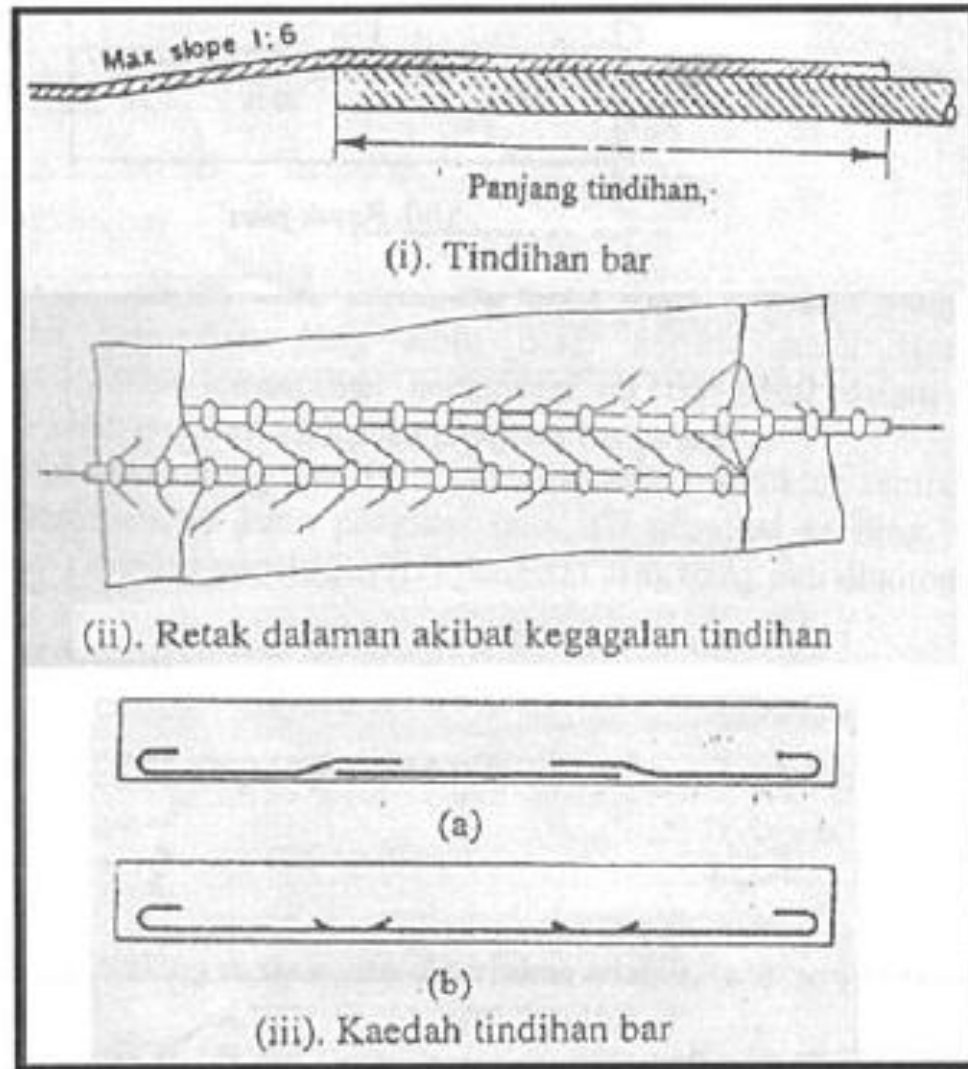


KAEDAH PEMOTONGAN BAR

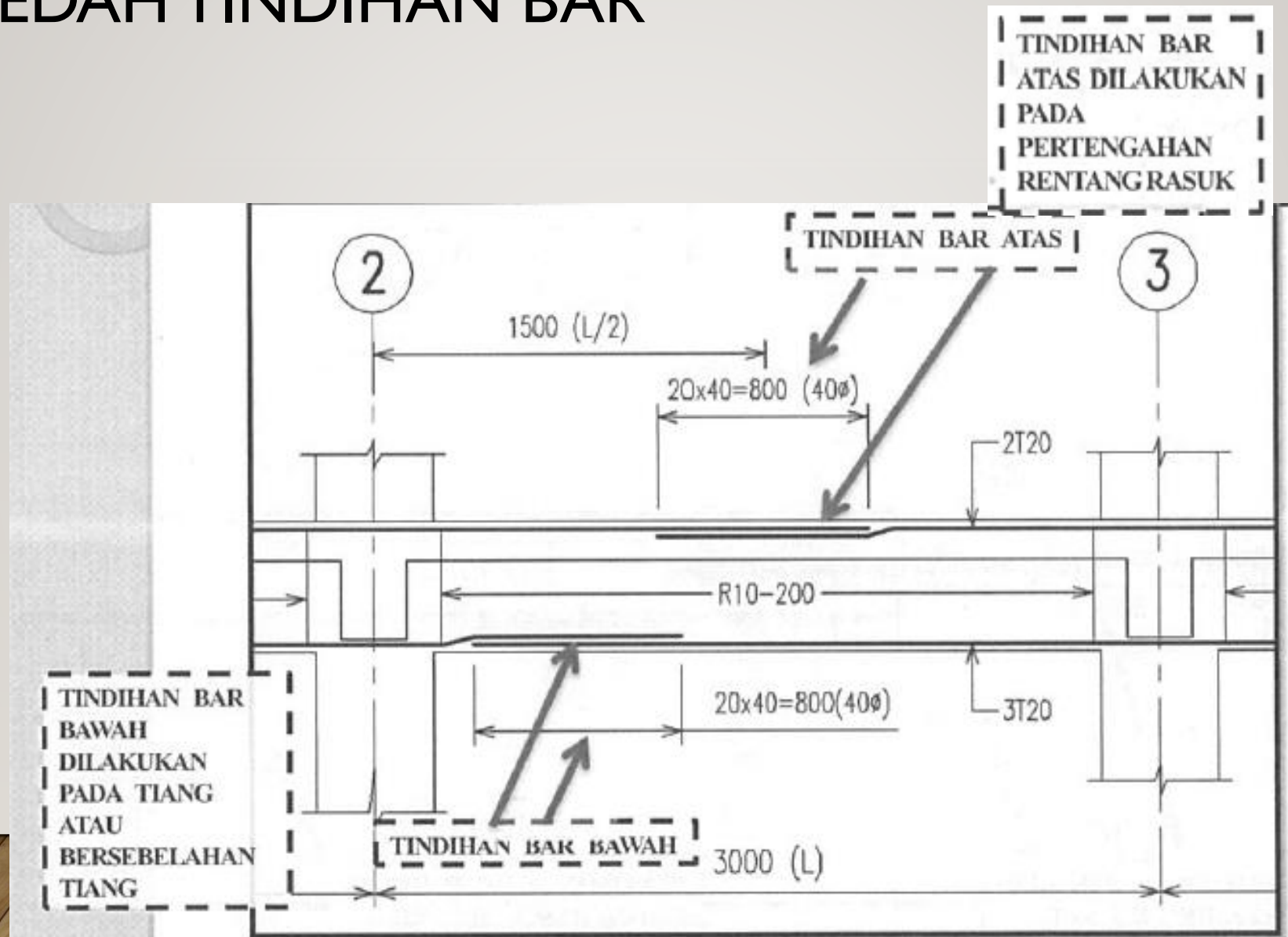


KAEDAH TINDIHAN BAR

Tindihan tetulang biasanya diperlukan untuk memindahkan daya-daya dari sebatang bar ke bar yang lain.



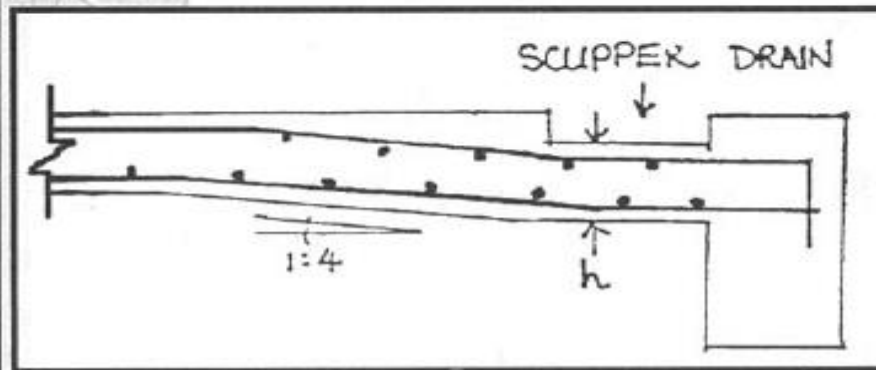
KAEDAH TINDIHAN BAR



PERINCIAN BUTIRAN PAPAK

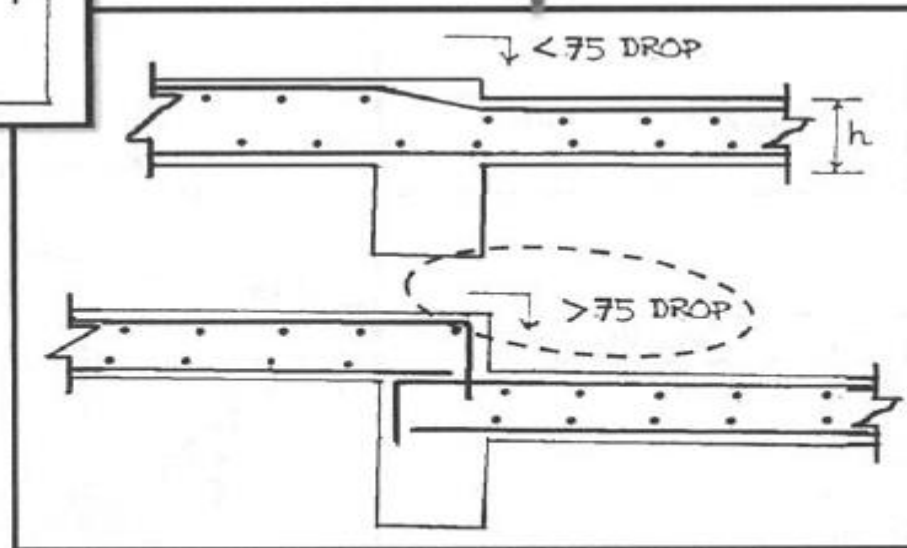
KONSEP PENYEDIAAN LUKISAN STRUKTUR

4.3.4 Perincian butiran (Papak)

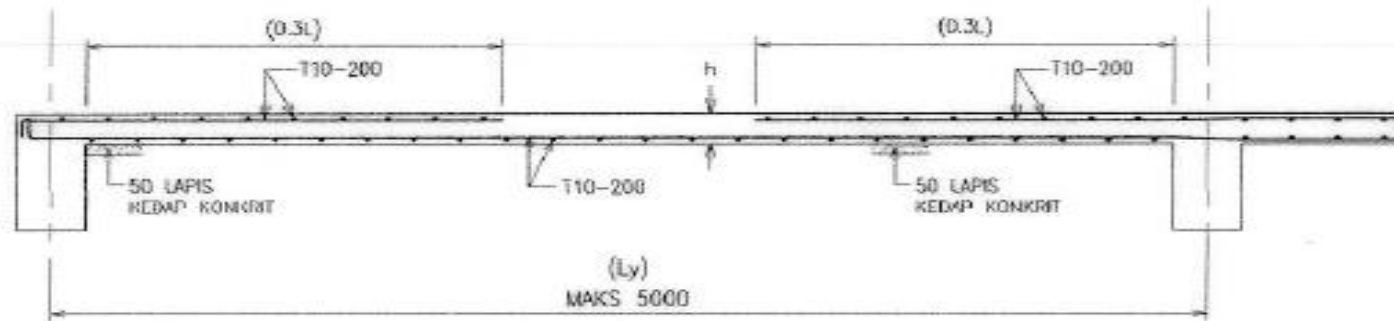


BAGI KES PAK
MEMPUYAI S.DRAIN, PAK DAN
BAR MESTI DIBENTUK SECARA
HAUNCHING

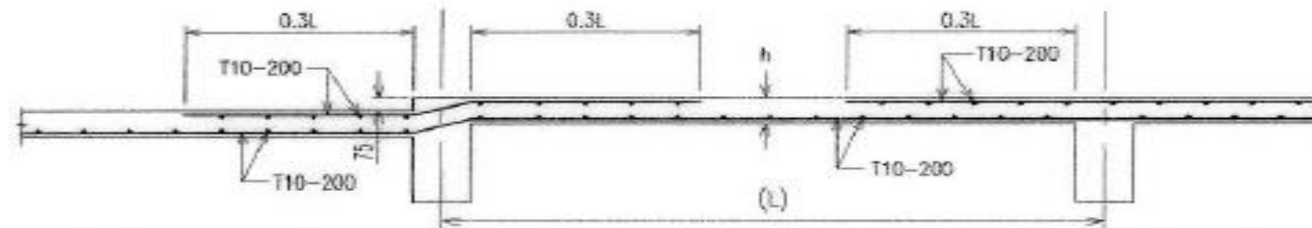
BENGKOKAN BAR PADA PAK
YANG MEMPUYAI DROP.
SEKIRANYA DROP < 75mm, BAR
BOLEH DI BENGKOK TERUS.
JIKA DROP > 75mm, BAR
HENDAKLAH DIBENGKOK BIASA.



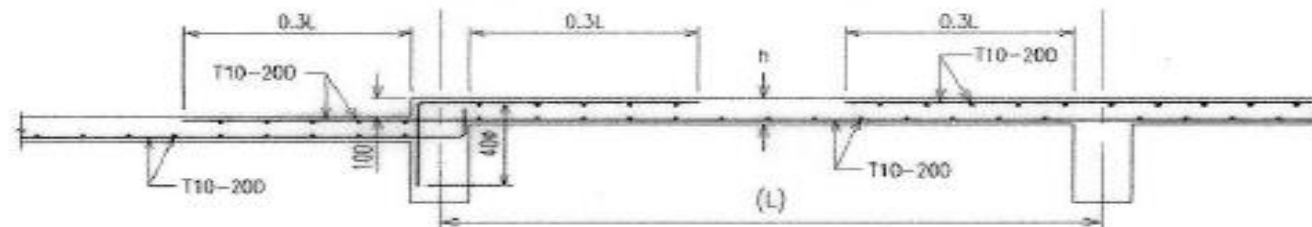
PERINCIAN BUTIRAN PAPAK



KERATAN TIPIKAL M-M



KERATAN TIPIKAL PAPAK BAGI TURUN KURANG 75mm (<75mm)



KERATAN TIPIKAL PAPAK BAGI TURUN LEBIH 75mm (>75mm)

**SEKIAN,
TERIMA KASIH**