

BAHAGIAN KEJURUTERAAN AWAM
CAWANGAN KEJURUTERAAN AWAM & STRUKTUR
IBU PEJABAT JKR MALAYSIA

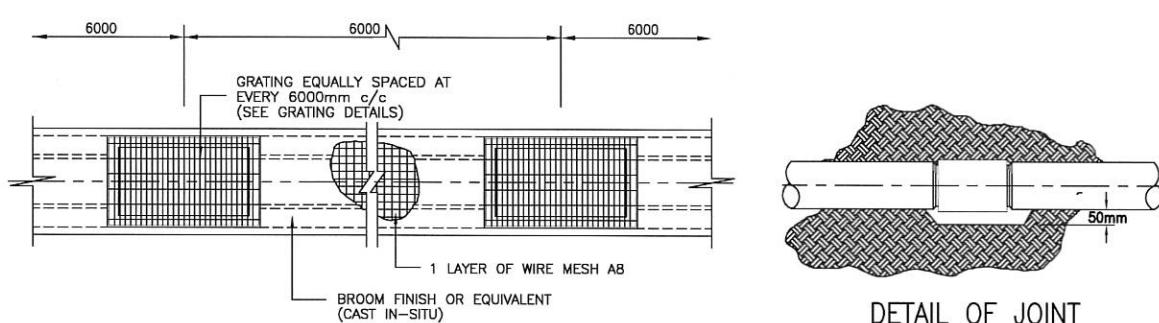
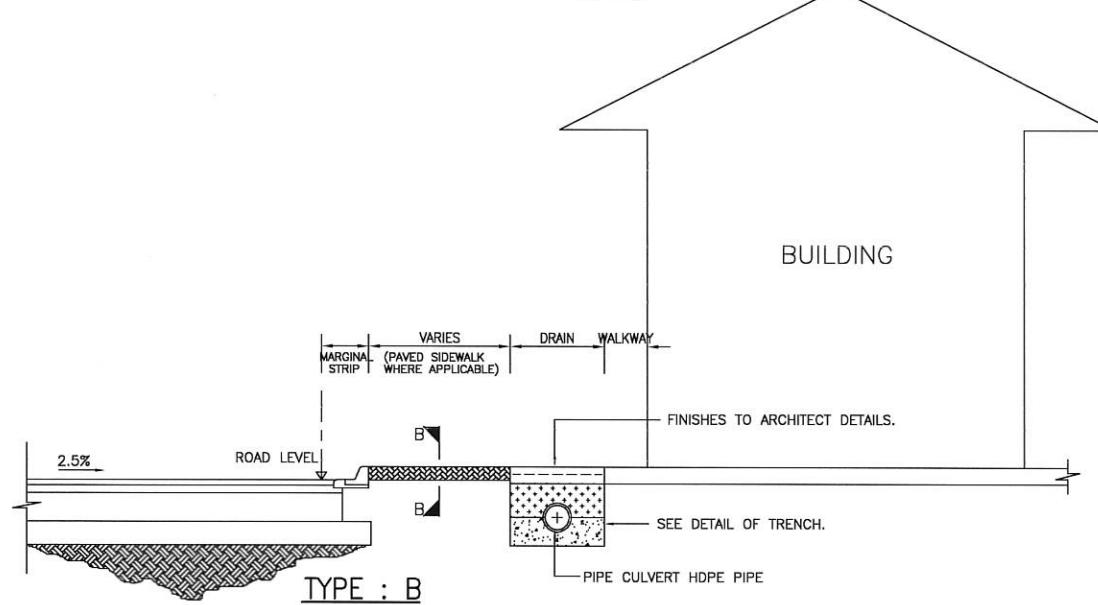
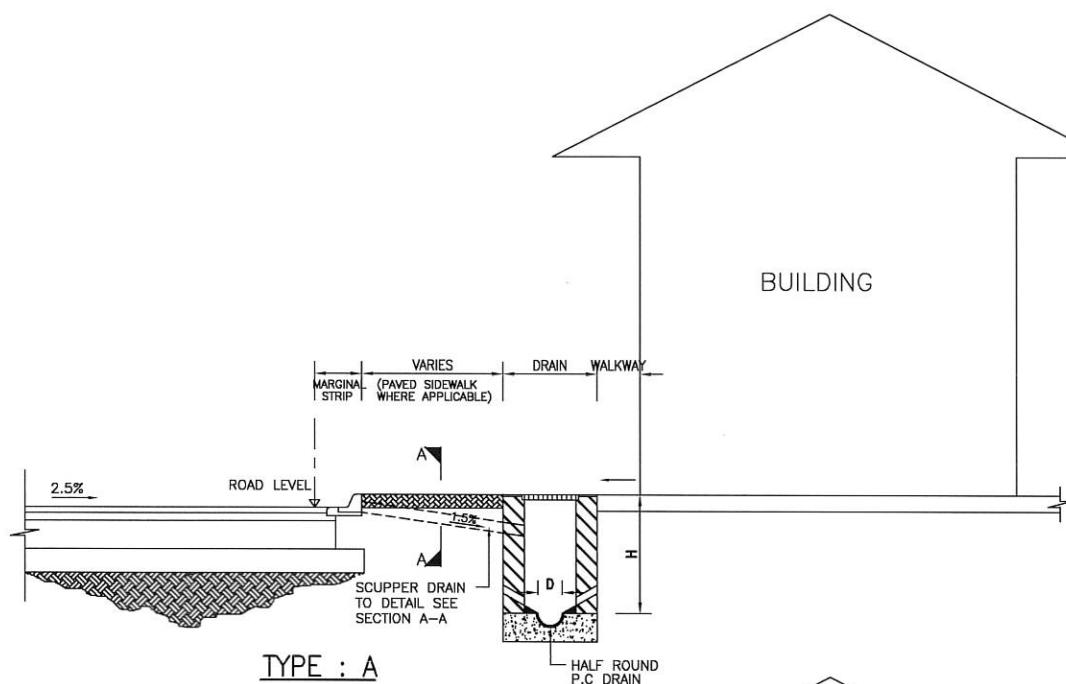
SISTEM SALIRAN

LUKISAN PIAWAI

SENARAI LUKISAN

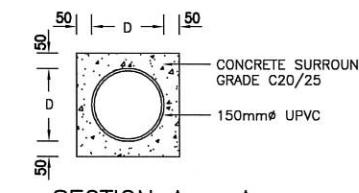
SISTEM SALIRAN

BIL.	TAJUK LUKISAN	NOMBOR LUKISAN
1	TYPICAL DETAILS OF PERIMETER DRAIN	JKR/CKAS/P-SS/BKA/30/PEL 18/(1/23)
2	TYPICAL ROAD DRAINS (RURAL)	JKR/CKAS/P-SS/BKA/30/PEL 18/(2/23)
3	TYPICAL ROAD DRAINS (RURAL)	JKR/CKAS/P-SS/BKA/30/PEL 18/(3/23)
4	DETAILS OF HALF ROUND (H/R) DRAIN	JKR/CKAS/P-SS/BKA/30/PEL 18/(4/23)
5	DETAILS OF P.C BLOCK DRAIN AND SCUPPER DRAINS	JKR/CKAS/P-SS/BKA/30/PEL 18/(5/23)
6	ROADSIDE DRAINAGE FOR URBAN AREA (RSD)	JKR/CKAS/P-SS/BKA/30/PEL 18/(6/23)
7	MEDIAN DRAINAGE FOR URBAN AREA	JKR/CKAS/P-SS/BKA/30/PEL 18/(7/23)
8	DETAILS OF HOT DIPPED GALVANIZED GRATING FOR DRAIN	JKR/CKAS/P-SS/BKA/30/PEL 18/(8/23)
9	TYPICAL DETAILS OF BRICK SUMP (TYPE A)	JKR/CKAS/P-SS/BKA/30/PEL 18/(9/23)
10	TYPICAL DETAILS OF BRICK SUMP (TYPE B) R.C SUMP AND RUBBISH TRAP	JKR/CKAS/P-SS/BKA/30/PEL 18/(10/23)
11	TYPICAL CASCADE DRAINS	JKR/CKAS/P-SS/BKA/30/PEL 18/(11/23)
12	TYPICAL SUMPS WITH P.C BLOCK CASCADING DRAIN IN CUT / FILL SECTION	JKR/CKAS/P-SS/BKA/30/PEL 18/(12/23)
13	DETAILS R.C SLAB COVER EXISTING DRAIN	JKR/CKAS/P-SS/BKA/30/PEL 18/(13/23)
14	TYPICAL DETAILS OF P.C CULVERT THROUGH SUMP	JKR/CKAS/P-SS/BKA/30/PEL 18/(14/23)
15	BEDDING TYPES AND R.C SQUARE PILE FOR R.C PIPE CULVERT	JKR/CKAS/P-SS/BKA/30/PEL 18/(15/23)
16	TYPICAL R.C PIPE CULVERT (BUTT OR REBATED JOINT)	JKR/CKAS/P-SS/BKA/30/PEL 18/(16/23)
17	R.C PIPE CULVERT (SPIGOT JOINT)	JKR/CKAS/P-SS/BKA/30/PEL 18/(17/23)
18	TYPICAL EXTENSION DETAILS FOR R.C PIPE CULVERT	JKR/CKAS/P-SS/BKA/30/PEL 18/(18/23)
19	STANDARD SINGLE BOX CULVERT (CULVERT DETAILS)	JKR/CKAS/P-SS/BKA/30/PEL 18/(19/23)
20	STANDARD SINGLE BOX CULVERT (WINGWALL DETAILS)	JKR/CKAS/P-SS/BKA/30/PEL 18/(20/23)
21	STANDARD TWIN BOX CULVERT (CULVERT DETAILS)	JKR/CKAS/P-SS/BKA/30/PEL 18/(21/23)
22	STANDARD TWIN BOX CULVERT (WINGWALL DETAILS)	JKR/CKAS/P-SS/BKA/30/PEL 18/(22/23)
23	TYPICAL SUMP P.C SLAB DETAILS	JKR/CKAS/P-SS/BKA/30/PEL 18/(23/23)



TYPICAL DETAILS OF DRAIN TYPE B

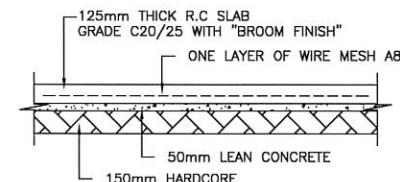
WHEN THE TRENCH HAS A LEVELLED BOTTOM,
A MINIMUM 50mm DEEP CLEARANCE SHOULD BE
DUG AT PIPE-END POSITIONS TO ACCOMODATE
THE COUPLING JOINTS.



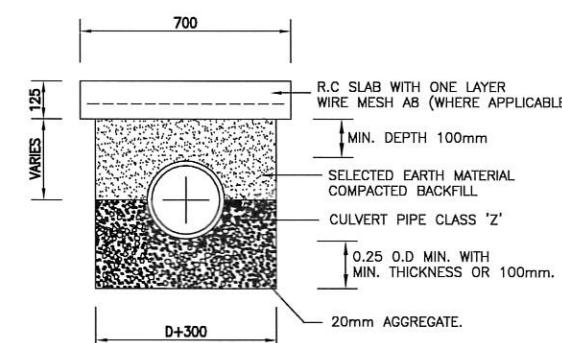
SECTION A - A

NOTES :	
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.	
2. D=SIZE OF HALF ROUND DRAIN.	
3. THE THICKNESS OF DRAINSIDE BRICKWALL SHALL BE :	
HEIGHT OF DRAIN WALL	THICKNESS OF BRICKWALL
1.05 OR LESS	225mm
1.05m TO 1.5m	340mm
1.5m TO 2.1m	450mm
2.1m TO 2.55m	675mm
4. R.C STRUT TO BE PROVIDED FOR ALL DRAINSIDE WALL EXCEEDING 1050MM HEIGHT.	
5. WEEPHOLES TO BE PROVIDED IN ALL CASES.	
6. 225mm THK. BRICKWALL WITH CEMENT PLASTER ON EXPOSED SURFACES.	
7. CEMENT PLASTER ON EXPOSED SURFACES SHALL BE 12mm THK.	
8. CEMENT MORTAR FOR PLASTERING SHALL BE 1:3 MIX.	

TANDATANGAN & COP PELANGGAN



SECTION B - B



DETAIL OF TRENCH

TANDATANGAN JURUTERA PROFESIONAL :
I hereby certify that these works have been designed
by me in accordance with sound engineering practice
and that I take full responsibility for the design and
properly performance of the same"



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PENGARAH KANAN :

Ir. Hj. MOHAMAD ZULKIFLY BIN SULAIMAN

PENGARAH KHIDMAT REKABENTUK :

Ir. Hj. BADIOEZAMAN BIN AB. KHALIK

JURUTERA AWAM PENGUSA KANAN :

CHOW WAH

JURUTERA AWAM PENGUSA :

—

JURUTERA AWAM KANAN :

Ir. FAIZAN BINTI ISMAIL

DIREKABENTUK :

Ir. SHAIFUL MUNIR/ELIZA/Ir. SYAMSUL/AI/SRI RAHAYU

DISEMAK :

Ir. FAIZAN BINTI ISMAIL

DILUKIS :

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI

NO. FAL LUKISAN PIawai :

JKR/CKAS/01.700/100/11

SKALA :

TANPA SKALA

TARikh :

SEPTEMBER 2018

PERKARA :

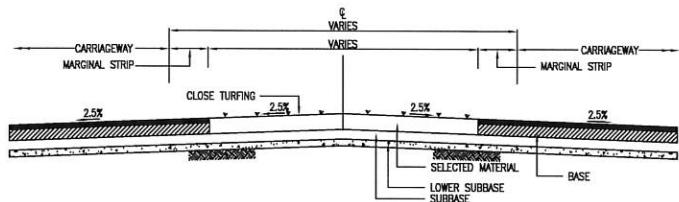
LUKISAN PIawai
SISTEM SALIRAN

TAJUK LUKISAN :

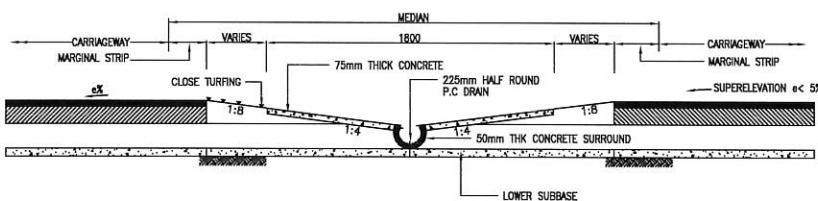
TYPICAL DETAILS OF
PERIMETER DRAIN

NO. LUKISAN :

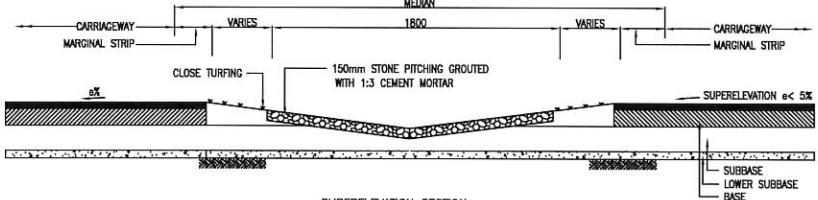
JKR/CKAS/P-SS/BKA/30/PEL18/(1/23)



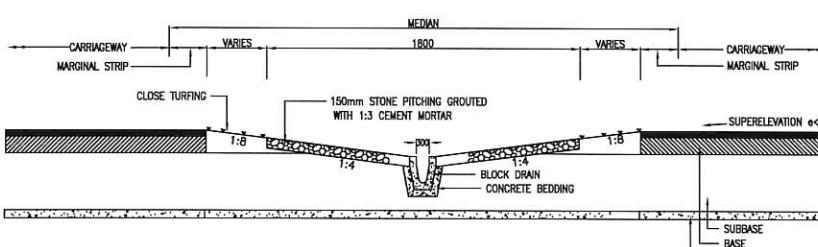
MEDIAN DRAINAGE FOR NORMAL CROSSFAL (MDRN)



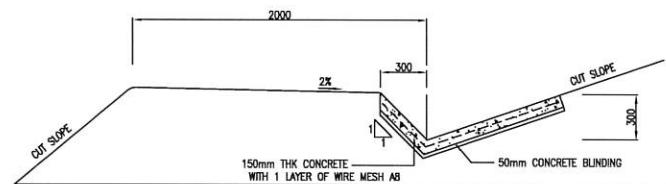
MEDIAN DRAIN TYPE 1 (MD1)
HALF ROUND DRAIN WITH CAST IN SITU CONCRETE SIDES



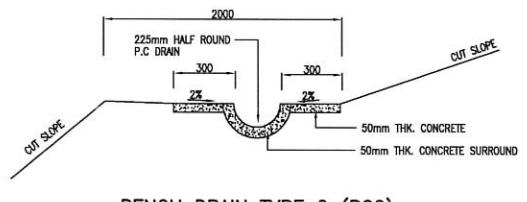
MEDIAN DRAIN TYPE 2 (MD2)
STONE LINED



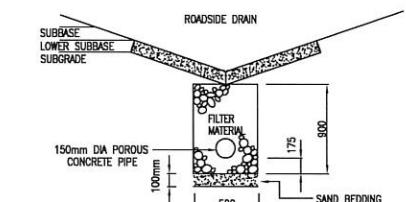
MEDIAN DRAIN TYPE 3 (MD3)
PRECAST BLOCK DRAIN WITH 150MM GROUTED STONE PITCHING



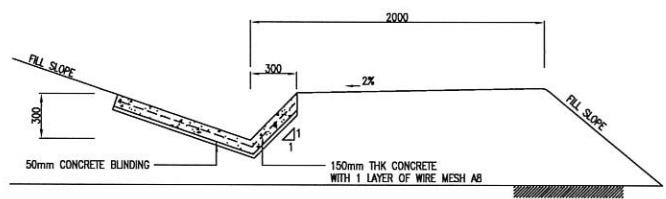
BENCH DRAIN TYPE 1 (BC1)
CAST IN SITU CONCRETE V DRAIN



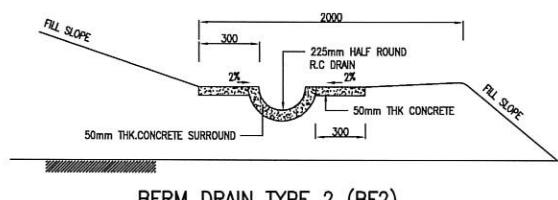
BENCH DRAIN TYPE 2 (BC2)
HALF ROUND DRAIN



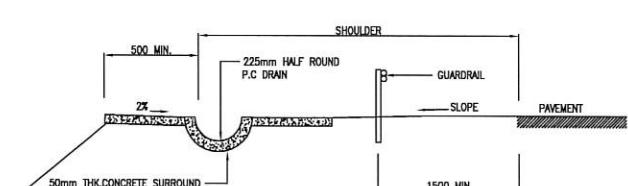
SUBSOIL DRAIN TYPE 1 (SSD1)
POROUS CONCRETE PIPE AND FILTER MATERIAL



BERM DRAIN TYPE 1 (BF1)
CAST IN SITU CONCRETE V DRAIN



BERM DRAIN TYPE 2 (BF2)
HALF ROUND DRAIN



SHOULDER DRAIN (SD1)

NOTES :

1. FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
2. PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.
3. CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
4. ALL UNITS ARE IN mm UNLESS OTHERWISE STATED.
5. P.C = PRECAST CONCRETE

TANDATANGAN & COP PELANGGAN

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Ir. Hj. MOHAMAD ZULKEFLY BIN SULAIMAN
PENGARAH KHIDMAT REKA BENTUK :
Ir. Hj. BADIOEZAMAN BIN AB. KHALIK

JURUTERA AWAM PENGUSAHA :
CHOW WAH

JURUTERA AWAM KANAN :
Ir. FAIZAN BINTI ISMAIL

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DISEMAK :
Ir. FAIZAN BINTI ISMAIL

DILUKIS :
SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI

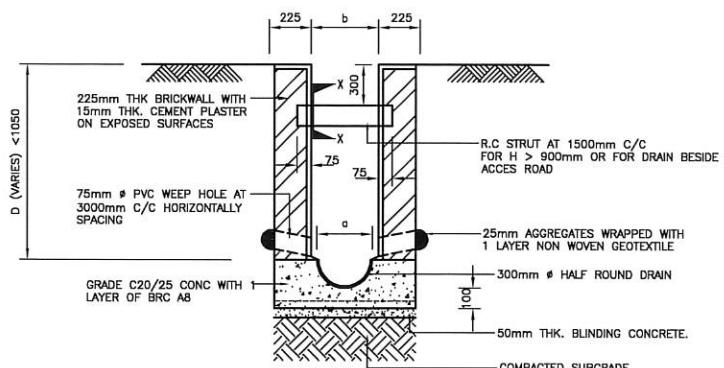
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JKR/CKAS/01.700/100/11

SKALA :
TANPA SKALA TARikh :
SEPTEMBER 2018

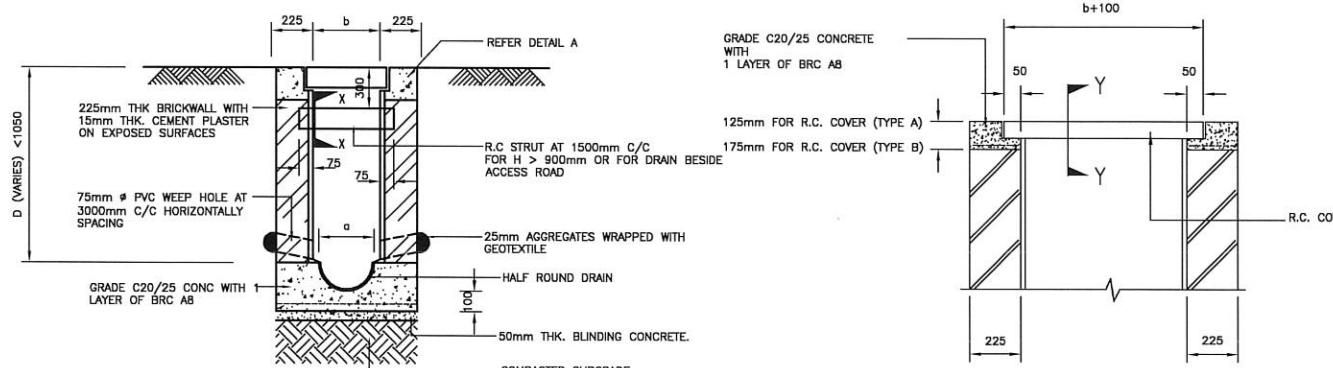
PERIKAR :
LUKISAN PIAWAI
SISTEM SALIRAN

TAJUK LUKISAN :
TYPICAL ROAD DRAINS (RURAL)

NO. LUKISAN :
JKR/CKAS/P-SS/BKA/30/PEL18/(3/23)



TYPICAL DETAIL OF HALF ROUND (H/R) DRAIN
(FOR DRAIN DEPTH, (D) < 1050mm)

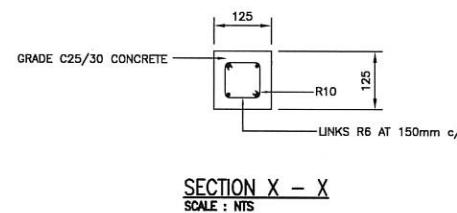


TYPICAL DETAIL OF HALF ROUND (H/R) DRAIN WITH PC COVER SLAB
(FOR DRAIN DEPTH, (D) < 1050mm)

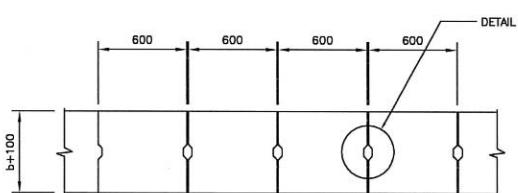
NOTES :

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
- MINIMUM ANCHORAGE LENGTH TO BE 30 TIMES THE DIAMETERS OR BAR.
- MINIMUM REINFORCEMENT COVER TO BE 35mm UNLESS OTHERWISE STATED.
- FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
- PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.
- CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
- ALL STEEL SHALL BE HIGH YIELD STEEL ($f_y=460N/mm$).
- ALL ANCHORAGE AND LAP LENGTH TO BE TENSION ANCHORAGE/LAP LENGTH.

TANDATANGAN & COP PELANGGAN



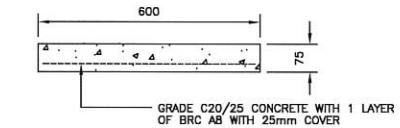
SECTION X - X
SCALE : NTS



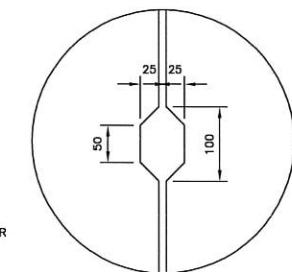
DETAIL A

TYPICAL DETAILS R.C. COVER

NOTES:-
1. RC REMOVABLE COVER THROUGHOUT WITH 1 NO. OF MS GRATING AT 6000mm INTERVAL.



SECTION Y - Y
(FOR R.C. COVER TYPE A)
SCALE : NTS



DETAIL B

JABATAN KERJA RAYA MALAYSIA

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CHOW WAH

JURUTERA AWAM PENGUSA :

—

JURUTERA AWAM KANAN :

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DISEMAK :

Ir. FAIZAN BINTI ISMAIL

DILUKIS :

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI

NO. FAL LUKISAN PIAWAI :

JKR/CAS/01.700/100/11

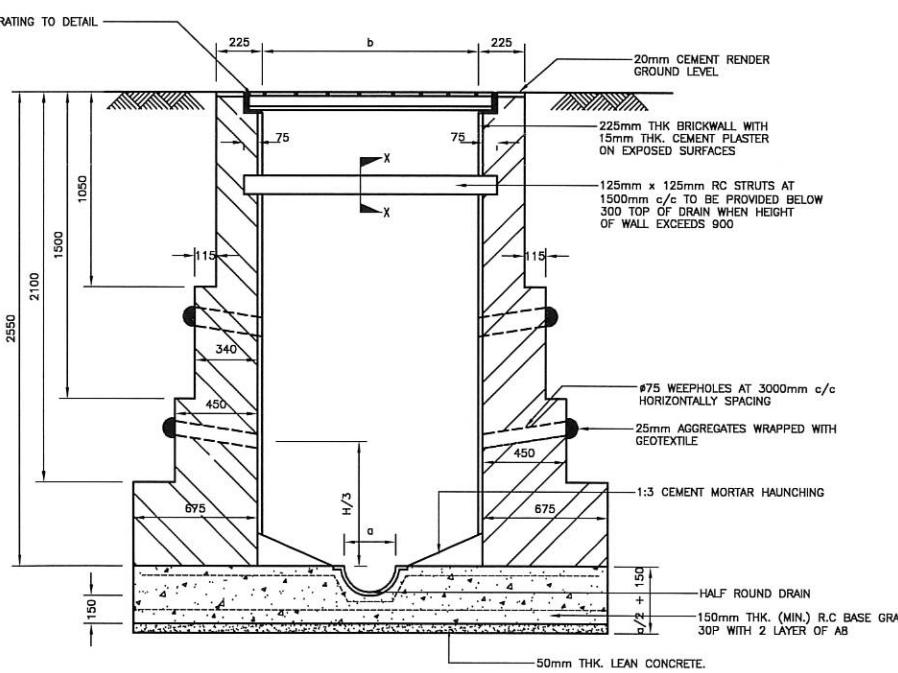
SKALA :

TANPA SKALA TARIKH :

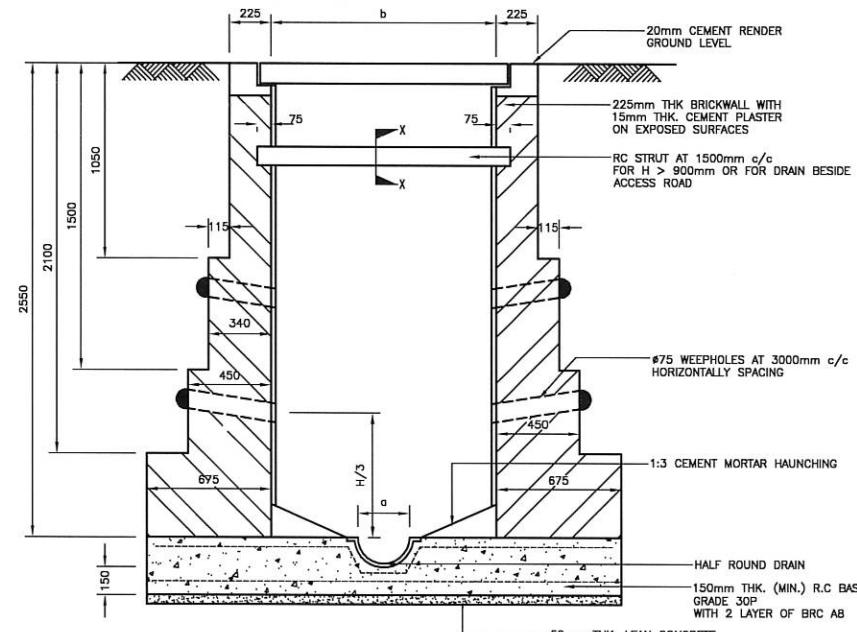
SEPTEMBER 2018

PERKARA :

LUKISAN PIAWAI
SISTEM SALIRAN



TYPICAL DETAIL OF HALF ROUND (H/R) DRAIN WITH GRATING
(FOR DRAIN 1050mm < DEPTH, (D) < 2550mm)



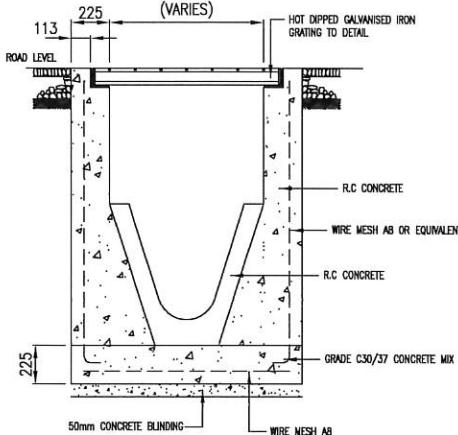
TYPICAL DETAIL OF HALF ROUND (H/R) DRAIN WITH PC COVER SLAB
(FOR DRAIN 1050mm < DEPTH, (D) < 2550mm)

DRAIN	a (mm)	b (mm)
D1	225	300
D2	300	450
D3	450	600
D4	600	750
D5	750	900

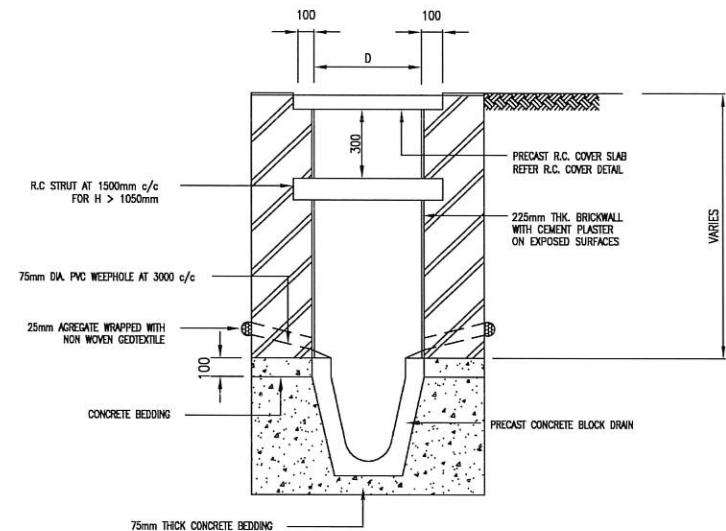
TABLE OF DRAIN SIZE

DRAIN	WIDTH, b	COVER TYPE
D1	300	TYPE A
D2	450	TYPE A
D3	600	TYPE A
D4	750	TYPE B
D5	900	TYPE B

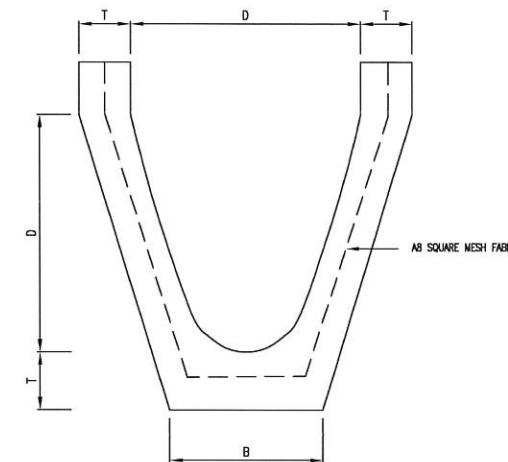
TABLE OF R.C. COVER



TYPICAL CROSS-SECTION OF P.C. BLOCK DRAIN FOR ROAD CROSSING FOR 75kN/m²



TYPICAL CROSS - SECTION OF P.C. BLOCK DRAIN



TYPICAL SECTION OF P.C. BLOCK DRAIN
(REFER TO TABLE 1)

NOTES :

- FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
- PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.
- CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
- CEMENT PLASTER ON EXPOSED SURFACES SHALL BE 15mm THK.
- CEMENT MORTAR FOR PLASTERING SHALL BE 1:3 MIX.
- ALL UNITS ARE IN mm UNLESS OTHERWISE SPECIFIED.

TANDATANGAN & COP PELANGGAN

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PENGARAH KHIDMAT REKABENTUK : *[Signature]*

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JURUTERA AWAM PENGUSA KANAN : *[Signature]*

CHOW WAH

JURUTERA AWAM PENGUSA : *[Signature]*

JURUTERA AWAM KANAN : *[Signature]*

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DISEMAK : *[Signature]*

Ir. FAIZAN BINTI ISMAIL *[Signature]*

DILUKIS : *[Signature]*

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI

NO. FAIL LUKISAN PIAWAI :

JKR.CKAS/01.700/100/11

SKALA : *[Signature]* TARikh : SEPTEMBER 2018

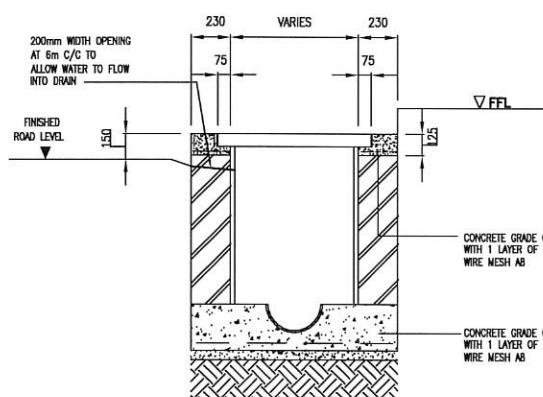
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LUKISAN PIAWAI
SISTEM SALIRAN

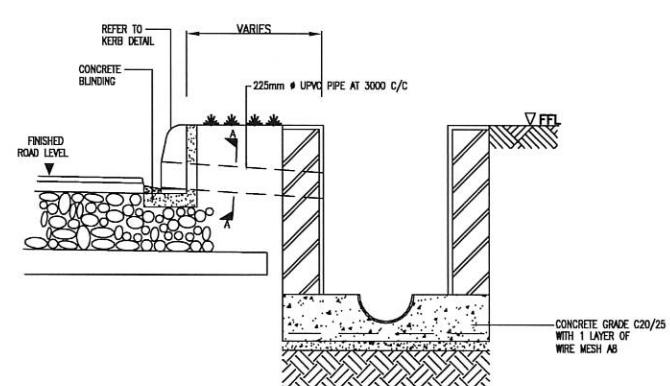
TAJUK LUKISAN :

DETAILS OF PC BLOCK
DRAIN AND SCUPPER DRAINS

NO. LUKISAN : *[Signature]* JKR/CKAS/P-SS/BKA/30/PEL18/(5/23) *[Signature]*



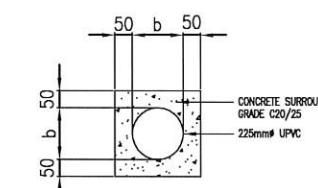
TYPICAL DETAILS OF SCUPPER DRAIN
TYPE 1 (SD1)



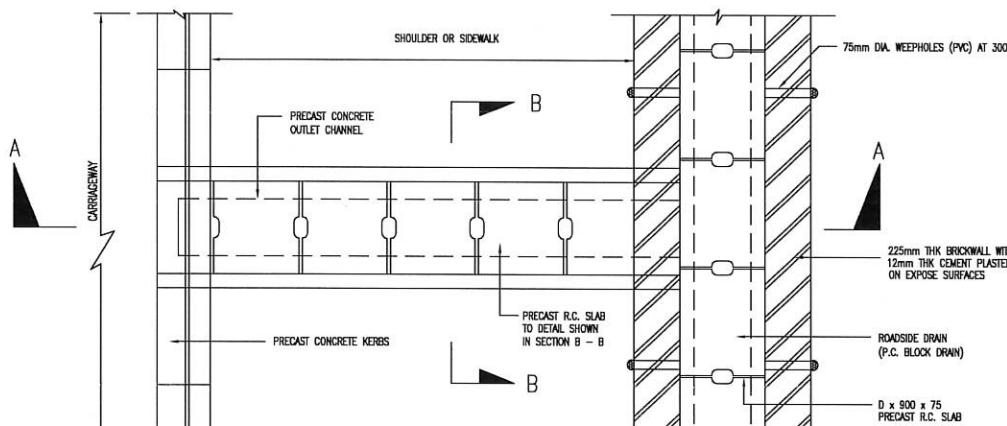
TYPICAL DETAILS OF SCUPPER DRAIN
TYPE 2 (SD2)

DRAIN SIZE	D	T
300x300	300	75
375x375	375	81
450x450	450	100
600x600	600	115

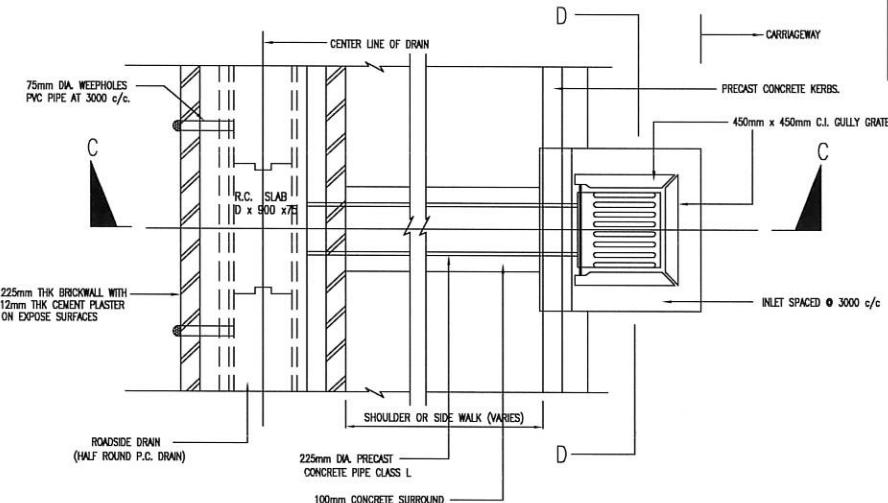
TABLE 1 : TYPICAL OF PRECAST
CONCRETE BLOCK DRAIN



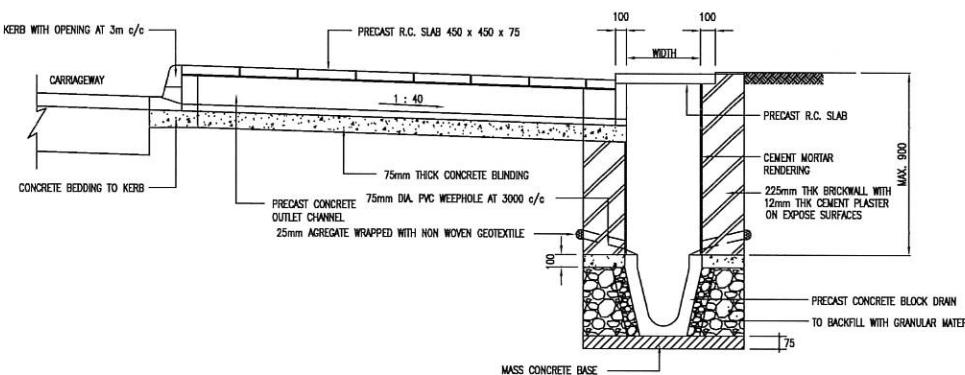
SECTION A-A



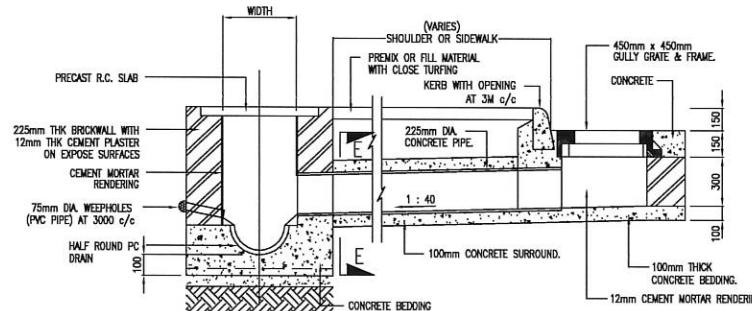
PLAN OF ROADSIDE DRAIN TYPE U1 (RSDU 1)
(PRECAST CONCRETE BLOCK DRAIN)



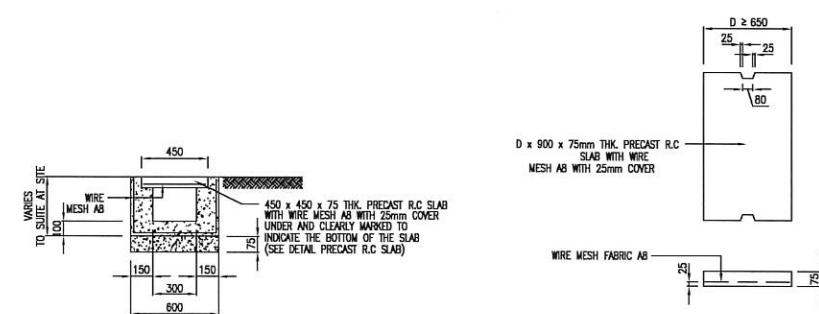
PLAN OF ROADSIDE DRAIN TYPE U2 (RSDU 2)
(HALF ROUND P. C. DRAIN)



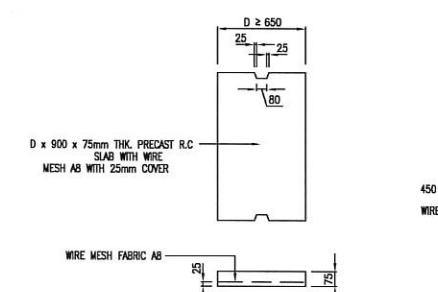
SECTION A - A OF ROADSIDE DRAIN TYPE U1 (RSDU 1)



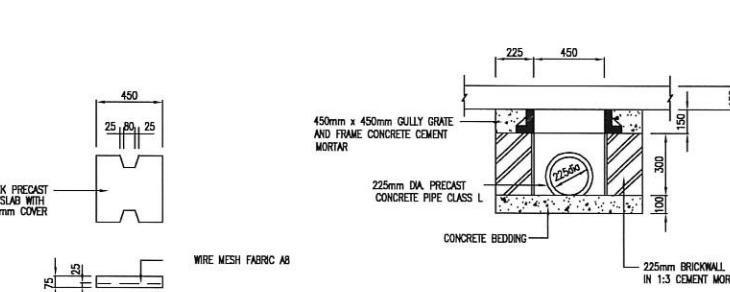
SECTION C - C OF ROADSIDE DRAIN TYPE U2 (RSDU 2)



SECTION B - B
PRECAST CONCRETE OUTLET CHANNEL
WITH PRECAST R. C. SLAB



PRECAST R. C. SLAB



PRECAST R. C. SLAB FOR CHANNEL

NOTES :

1. FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
2. PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.
3. CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
4. CEMENT PLASTER ON EXPOSED SURFACES SHALL BE 15mm THK.
5. CEMENT MORTAR FOR PLASTERING SHALL BE 1:3 MIX.
6. ALL UNITS ARE IN mm UNLESS OTHERWISE SPECIFIED.

TANDATANGAN & COP PELANGGAN

TANDATANGAN JURUTERA PROFESIONAL :
I hereby certify that these works have been designed by me in accordance with sound engineering practice and that I take full responsibility for the design and proper performance of the same'

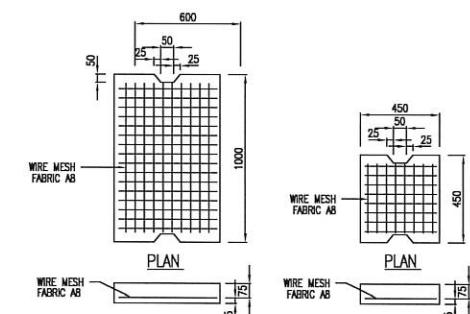
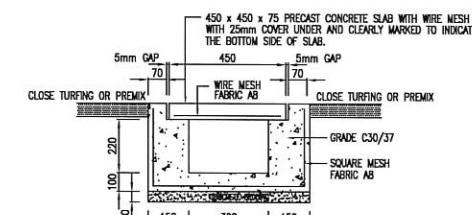
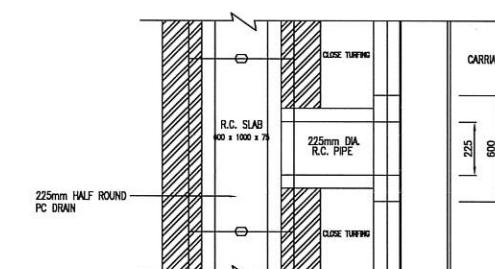
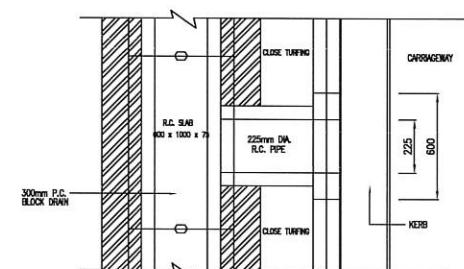
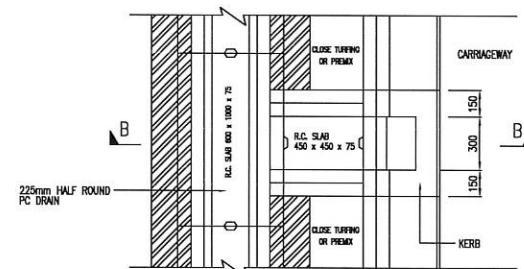
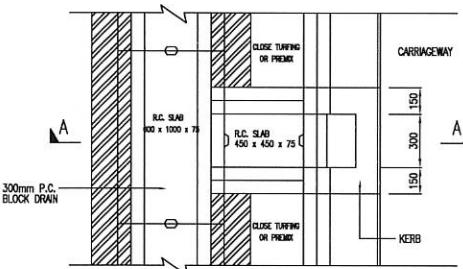
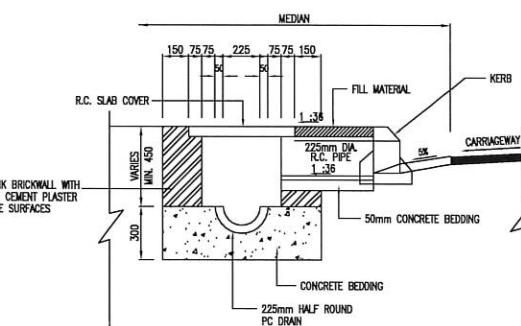
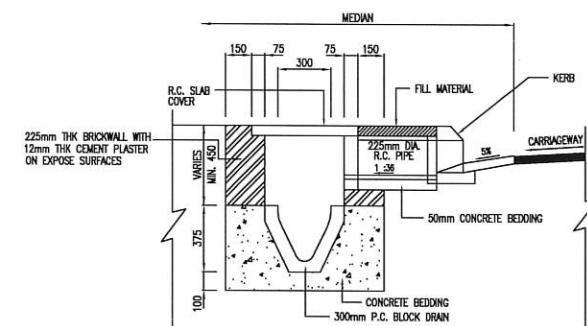
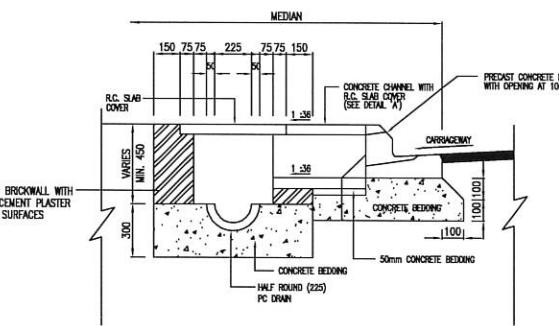
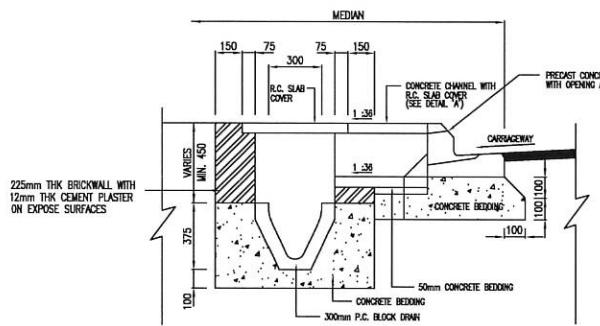


JABATAN KERJA RAYA MALAYSIA
BAHAGIAN KEJURUTERAAN AWAM
CAWANGAN KEJURUTERAAN AWAM DAN STRUKTUR
IBU PEJABAT JKR MALAYSIA

PENGARAH KANAN :
Ir. Hj. MOHAMAD ZULKIFLY BIN SULAIMAN
PENGARAH KHIDMAT REKABENTUK :
Ir. Hj. BADIEZAMAN BIN AB. KHALIK
JURUTERA AWAM PENGUSAHAN KANAN :
CHOW WAH
JURUTERA AWAM PENGUSAHAN :
--
JURUTERA AWAM KANAN :
Ir. FAIZAN BINTI ISMAIL
DIREKABENTUK :
Ir. SHAIFUL MUNIR/ELIZA/Ir. SYAMSUL/AU/SRI RAHAYU
DISEMAK :
Ir. FAIZAN BINTI ISMAIL
DILUKIS :
SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI
NO. FAIL LUKISAN PIAWAI :
JKR/CAS/01.700/100/11
SKALA :
TANPA SKALA TARikh : SEPTEMBER 2018
PERKARA :
LUKISAN PIAWAI SISTEM SALIRAN
TAJUK LUKISAN :
ROADSIDE DRAINAGE FOR URBAN AREA (RSD)
NO. LUKISAN :
JKR/CAS/P-SS/BKA/30/PEL18/(6/23)

NOTES :

1. FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
2. PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.
3. CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
4. CEMENT MORTAR FOR PLASTERING SHALL BE 15mm THICK.
5. PRECAST R.C PIPE TO BE CLASS L.
6. ALL UNITS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.



TANDATANGAN & COP PELANGGAN

TANDATANGAN JURUTERA PROFESIONAL :
I hereby certify that these works have been designed by me in accordance with sound engineering practice and that I take full responsibility for the design and proper performance of the same."



JABATAN KERJA RAYA MALAYSIA
BAHAGIAN KEJURUTERAAN AWAM
CAWANGAN KEJURUTERAAN AWAM DAN STRUKTUR
IBU PEJABAT JKR MALAYSIA

PENGARAH KANAN :
Ir. Hj. MOHAMAD ZULKIFLY BIN SULAIMAN
PENGARAH KHIDMAT REKABENTUK :
Ir. Hj. BADIOEZAMAN BIN AB. KHALIK
JURUTERA AWAM PENGUSA KANAN :
CHOW WAH
JURUTERA AWAM PENGUSA :
—
JURUTERA AWAM KANAN :
Ir. FAIZAN BINTI ISMAIL
DIREKABENTUK :
Ir. SHAIFAL MUNIR/ELIZA/Ir. SYAMSUL/AU/SRI RAHAYU
DISEMAK :
Ir. FAIZAN BINTI ISMAIL
DILUKIS :
SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI
NO. FAIL LUKISAN PIAWAI :
JKR/CKAS/01.700/100/11
SKALA :
TANPA SKALA TARikh :
SEPTEMBER 2018
PERKARA :
LUKISAN PIAWAI
SISTEM SALIRAN

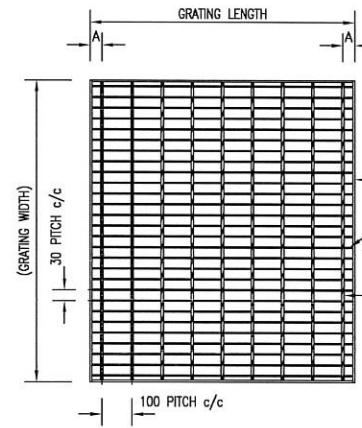
TAJUK LUKISAN :
MEDIAN DRAINAGE FOR
URBAN AREA

NO. LUKISAN :
JKR/CKAS/P-SS/BKA/30/PEL1B/(7/23)

NOTES :

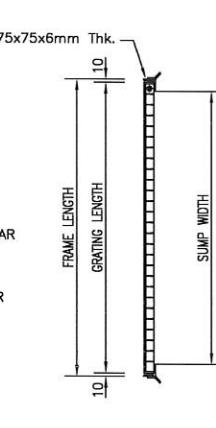
1. HEAVY DUTY TYPE TO BE USED WHERE HEAVY VEHICLE IS ANTICIPATED FATE.
2. LIGHT DUTY TYPE TO BE USED AT SIDEWALK AND PEDESTRIAL CROSSINGS.
3. GRATINGS ARE PRODUCED FROM HIGH QUALITY STEEL WHICH CONFORMS TO THE FOLLOWING EQUIVALENT STANDARDS: ASTM A36, BS 4360 GRADE 43A & JIS G3101 SS400.
4. GRATINGS ARE GALVANISED TO CONFORM TO ASTM A123, BS729 OR JIS HB641 GIVING AVERAGE MINIMUM COATING OF 610gm/sqm.
5. GRATINGS ARE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH RELEVANT INTERNATIONAL STANDARDS WHICH CONFORM TO THE REQUIREMENT OF B.S. 4592.

MATERIAL: HEAVY DUTY



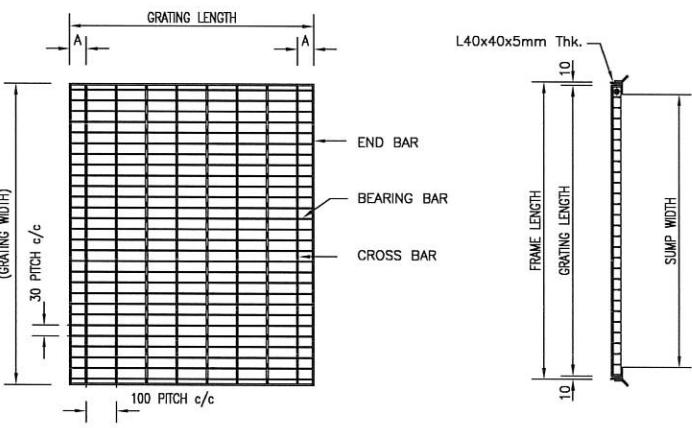
PLAN

MATERIAL: HEAVY DUTY

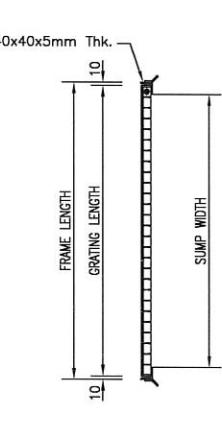


SECTION

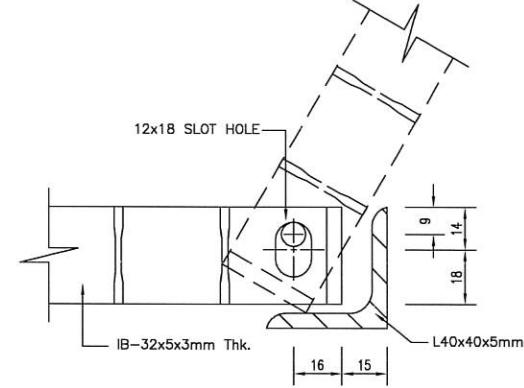
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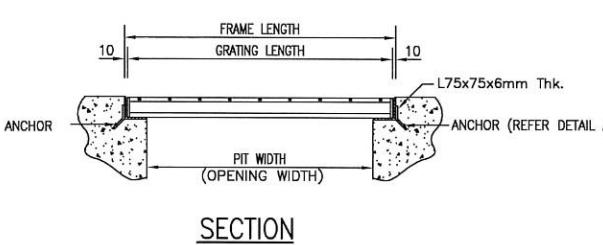
PLAN



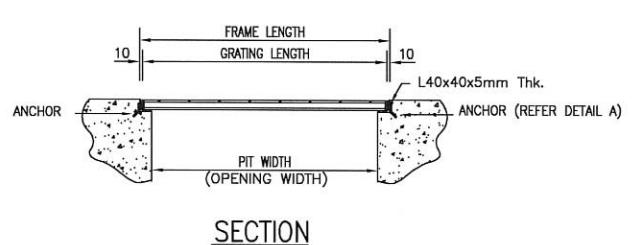
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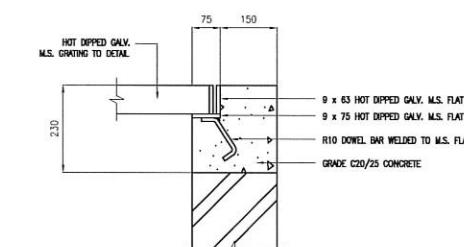
END PLATE HINGE HOLE DETAIL



SECTION



SECTION



DETAIL A

MATERIAL : HEAVY DUTY

BEARING BAR : I-BAR - 65 x 7mm x 4mm Thk. @ 30.00mm PITCH c/c
CROSS BAR : 8 x 8mm SQ. BAR @ 100mm PITCH c/c
END BAR : FLAT BAR 65 x 6mm Thk. WELDED TO EVERY LOAD
BEARING BAR (BS 4592) : L75x75x6mm THICK
ANGLE FRAME : HOT DIPPED GALVANIZED TO ASTM A123 OR B.S.729
SURFACE FINISH : HOT DIPPED GALVANIZED TO ASTM A123 OR B.S.729

MATERIAL : LIGHT DUTY

BEARING BAR : I-BAR - 32 x 5mm x 3mm Thk. @ 30.00mm PITCH c/c
CROSS BAR : 6 x 6mm SQ. BAR @ 100mm PITCH c/c
END BAR : FLAT BAR 32 x 5mm Thk. WELDED TO EVERY LOAD
BEARING BAR (BS 4592) : L40x40x5mm THICK
ANGLE FRAME : HOT DIPPED GALVANIZED TO ASTM A123 OR B.S.729
SURFACE FINISH : HOT DIPPED GALVANIZED TO ASTM A123 OR B.S.729

TANDATANGAN & COP PELANGGAN

TANDATANGAN JURUTERA PROFESIONAL :
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JABATAN KERJA RAYA MALAYSIA

BAHAGIAN KEJURUTERAAN AWAM
CAWANGAN KEJURUTERAAN AWAM DAN STRUKTUR
IBU PEJABAT JKR MALAYSIA

PENGARAH KANAN :

Ir. Hj. MOHAMAD ZULKIFLY BIN SULAIMAN

PENGARAH KHIDMAT REKABENTUK

Ir. Hj. BADIEZAMAN BIN AB. KHALIK

JURUTERA AWAM PENGUSAHAN KANAN :

CHOW WAH

JURUTERA AWAM PENGUSAHA :

-

JURUTERA AWAM KANAN :

Ir. FAIZAN BINTI ISMAIL

DIREKABENTUK :

Ir. SHAIFUL MUNIR/ELIZA/Ir. SYAMSUL/AJU/SRI RAHYAU

DISEMAK :

Ir. FAIZAN BINTI ISMAIL

DILUKIS :

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI

NO. FAIL LUKISAN PIAWAI :

JKR/CKAS/01.700/100/11

SKALA :

TANPA SKALA

TARIKH :

SEPTEMBER 2018

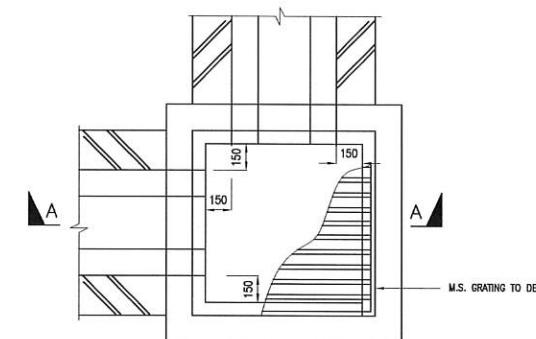
PERKARA :

LUKISAN PIAWAI
SISTEM SALIRAN

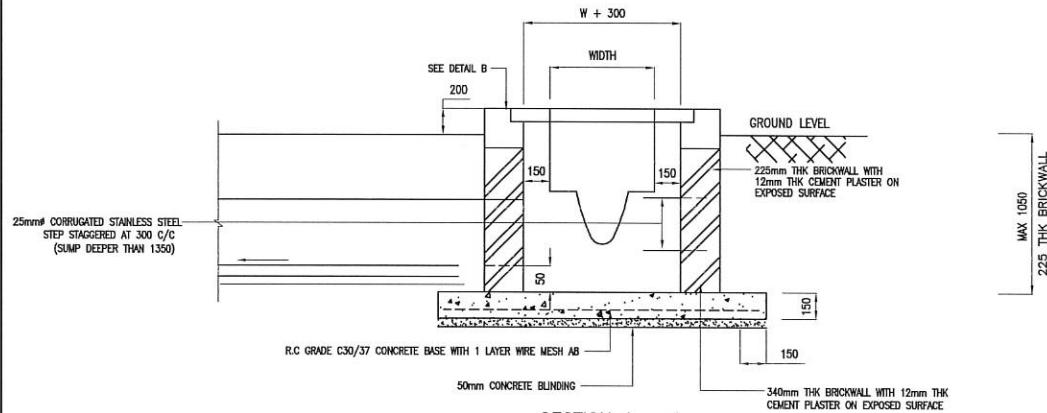
TAJUK LUKISAN :

DETAILS OF HOT DIPPED
GALVANIZED GRATING FOR DRAIN

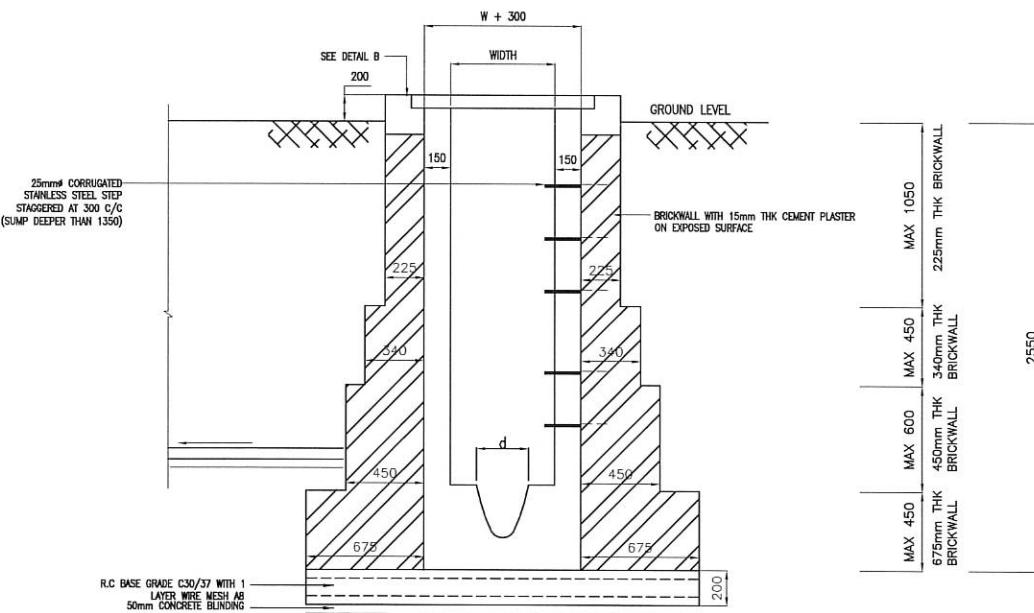
NO. LUKISAN :
JKR/CKAS/P-SS/BKA/30/PEL18/(8/23)



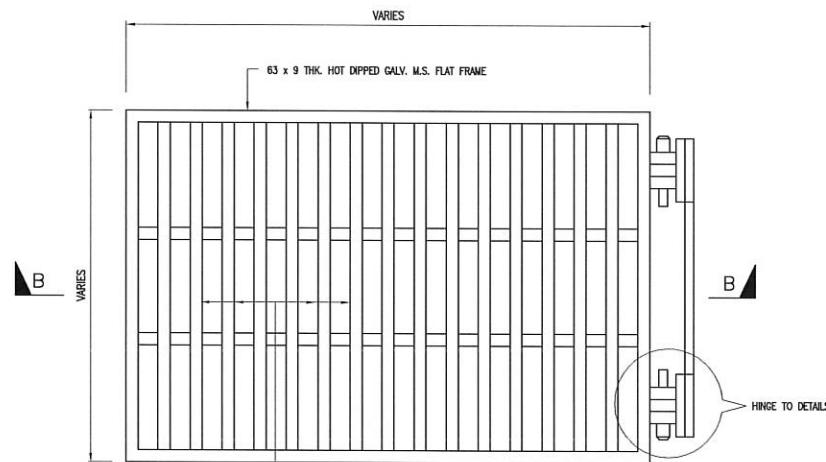
PLAN
TYPICAL DETAIL OF DRAINAGE BRICK SUMP (TYPE A)



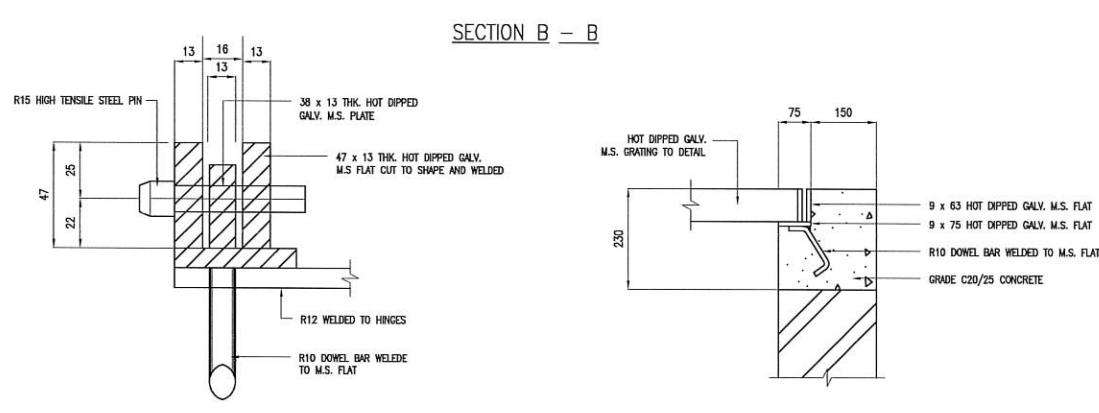
SECTION A - A
(DEPTH, D < 1050mm)



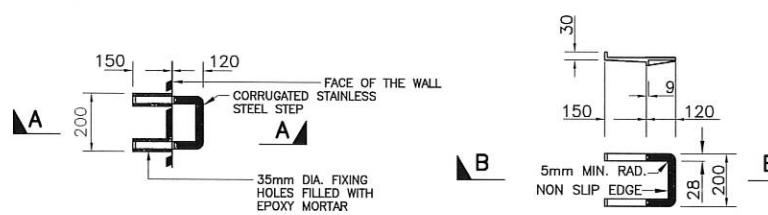
SECTION A - A
(1050mm < DEPTH, D < 2550mm)



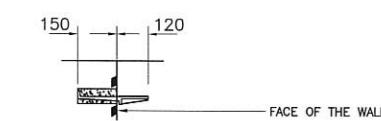
DETAIL OF M.S. GRATING COVER SUMP
HEAVY DUTY



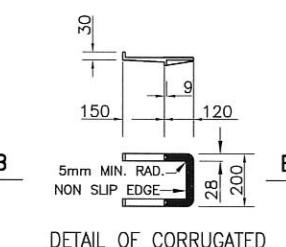
DETAIL B



FIXING DETAIL OF CORRUGATED
STAINLESS STEEL STEPS
NOT TO SCALE



SECTION A - A



SECTION B - B

TANDATANGAN JURUTERA PROFESIONAL :
I hereby certify that these works have been designed by me in accordance with sound engineering practice and that I take full responsibility for the design and proper performance of the same*



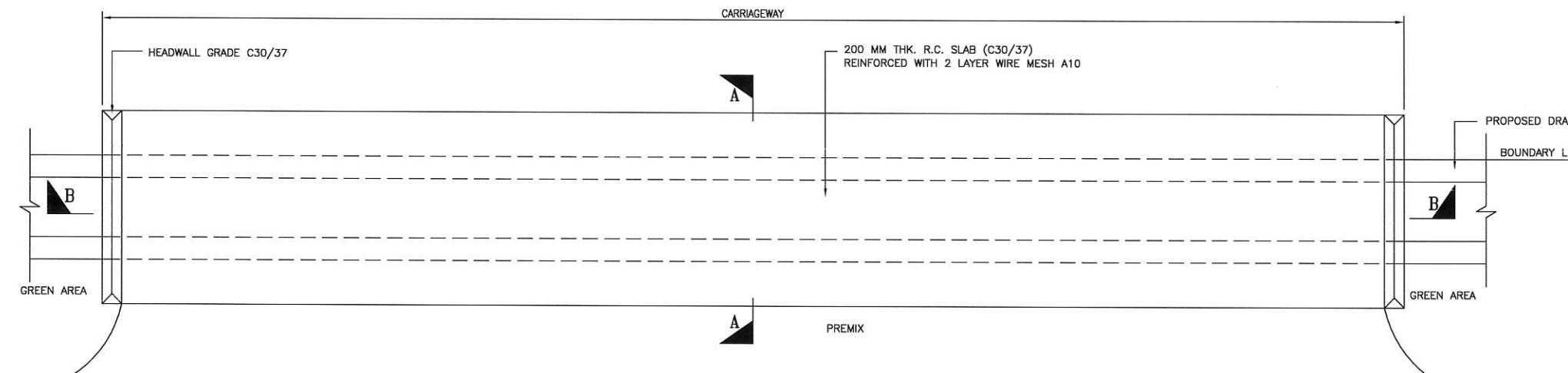
JABATAN KERJA RAYA MALAYSIA

BAHAGIAN KEJURUTERAAN AWAM
CAWANGAN KEJURUTERAAN AWAM DAN STRUKTUR
IBU PEJABAT JKR MALAYSIA

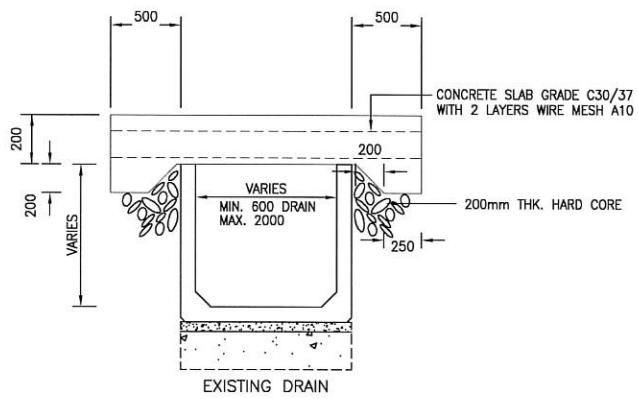
PENGARAH KANAN :
Ir. Hj. MOHAMAD ZULKIFLY BIN SULAIMAN
PENGARAH KHIDMAT REKABENTUK :
Ir. Hj. BADIOEZAMAN BIN AB. KHALIK
JURUTERA AWAM PENGUSA KANAN :
CHOW WAH
JURUTERA AWAM PENGUSA :
-
JURUTERA AWAM KANAN :
Ir. FAIZAN BINTI ISMAIL
DIREKABENTUK :
Ir. SHAFUL MUNIR/ELIZA/Ir. SYAMSUL/AU/SRI RAHAYU
DISEMAK :
Ir. FAIZAN BINTI ISMAIL
DILUKIS :
SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI
NO. FAIL LUKISAN PIAWAI :
JKR.CKAS/01.700/100/11
SKALA : TARIKH :
TANPA SKALA SEPTEMBER 2018
PERKARA :
LUKISAN PIAWAI
SISTEM SALIRAN
TAJUK LUKISAN :
TYPICAL DETAILS OF
BRICK SUMP (TYPE A)
NO. LUKISAN :
JKR/CKAS/P-SS/BKA/30/PEL18/(9/23)

NOTES :

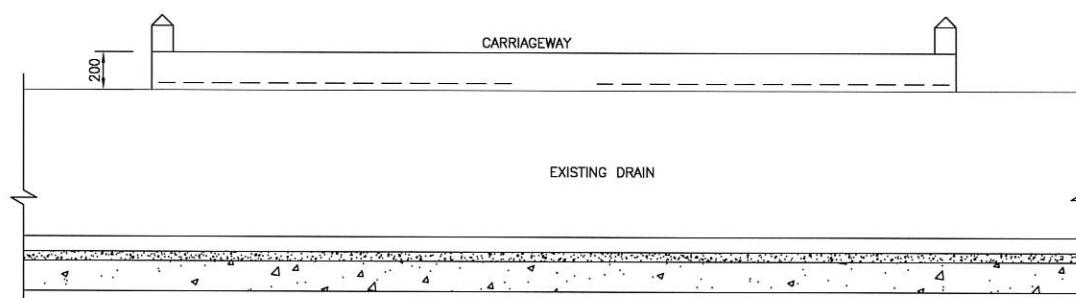
1. ALL DIMENSION ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
2. FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
3. PRECAST CONCRETE DRAIN USE GRADE C20/25.
4. CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
5. CEMENT MORTAR PLASTERING SHALL BE CEMENT PLASTER WITH 20mm THK 1:3.
6. SLAB COVER SHALL ONLY BE USED TO SPAN EXISTING DRAIN BETWEEN 600mm TO 2000mm.
7. FOR DRAIN SIZE LESS THAN 600mm GRATING MAY BE USED.



PLAN



SECTION A - A



SECTION B - B

TANDATANGAN & COP PELANGGAN

TANDATANGAN JURUTERA PROFESIONAL :
I hereby certify that these works have been designed by me in accordance with sound engineering practice and that I take full responsibility for the design and proper performance of the same."



JABATAN KERJA RAYA MALAYSIA

BAHAGIAN KEJURUTERAAN AWAM
CAWANGAN KEJURUTERAAN AWAM DAN STRUKTUR
IBU PEJABAT JKR MALAYSIA

PENGARAH KANAN :

Ir. Hj. MOHAMAD ZULKEFLY BIN SULAIMAN

PENGARAH KHIDMAT REKA BENTUK :

Ir. Hj. BADOEZAMAN BIN AB. KHALIK

JURUTERA AWAM PENGUSA KANAN :

CHOW WAH

JURUTERA AWAM PENGUSA :

-

JURUTERA AWAM KANAN :

Ir. FAIZAN BINTI ISMAIL

DIREKABENTUK :

Ir. SHAIFUL MUNIR/ELIZA/Ir. SYAMSUL/AU/SRI RAHAYU

DISEMAK :

Ir. FAIZAN BINTI ISMAIL

DILUKIS :

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI

NO. FAIL LUKISAN PIAWAI :

JKR/CKAS/01.700/100/11

SKALA : TARIKH :

TANPA SKALA SEPTEMBER 2018

PERKARA :

LUKISAN PIAWAI
SISTEM SALIRAN

TAJUK LUKISAN :

DETAILS R.C SLAB COVER
EXISTING DRAIN

NO. LUKISAN :

JKR/CKAS/P-SS/BKA/30/PEL18/(13/23)

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
3. PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.
4. CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
5. ALL PRECAST CULVERT SHALL BE CLASS Z OR EQUIVALENT.
6. FOR SUMP MORE THAN 1000mm DEPTH PROVIDE 75mmØ WEEPHOLE AT 600mm c/c VERTICALLY AND 300mm c/c HORIZONTALLY.

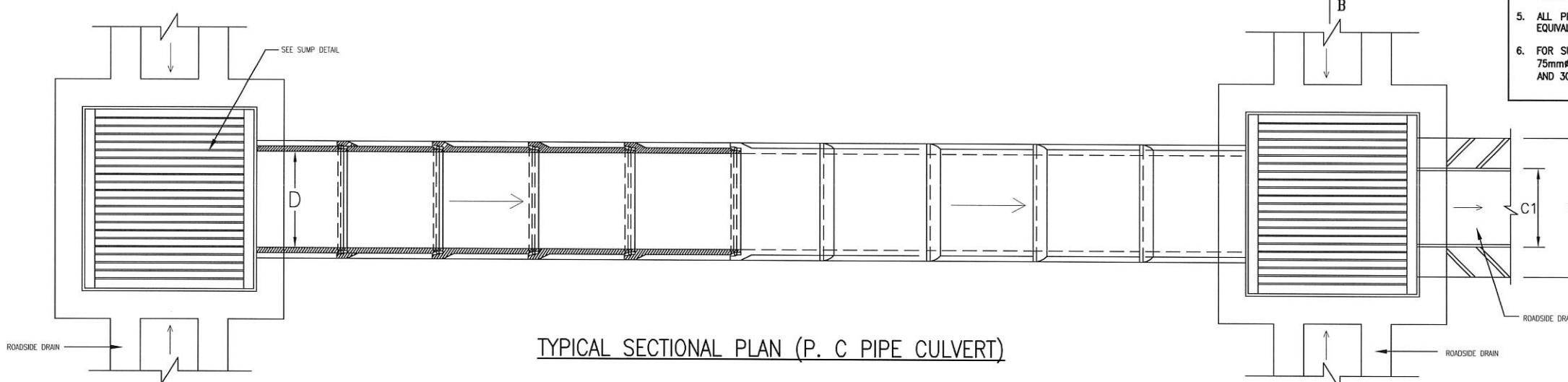
.....
TANDATANGAN & COP PELANGGAN

TANDATANGAN JURUTERA PROFESIONAL :
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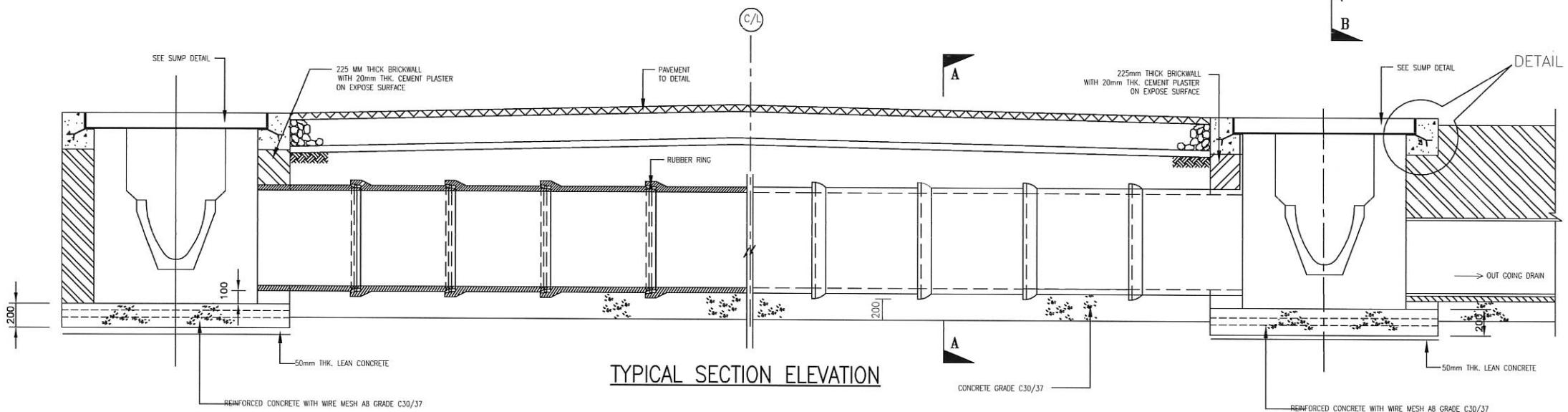


JABATAN KERJA RAYA MALAYSIA
BAHAGIAN KEJURUTERAAN AWAM
CAWANGAN KEJURUTERAAN AWAM DAN STRUKUR
IBU PEJABAT JKR MALAYSIA

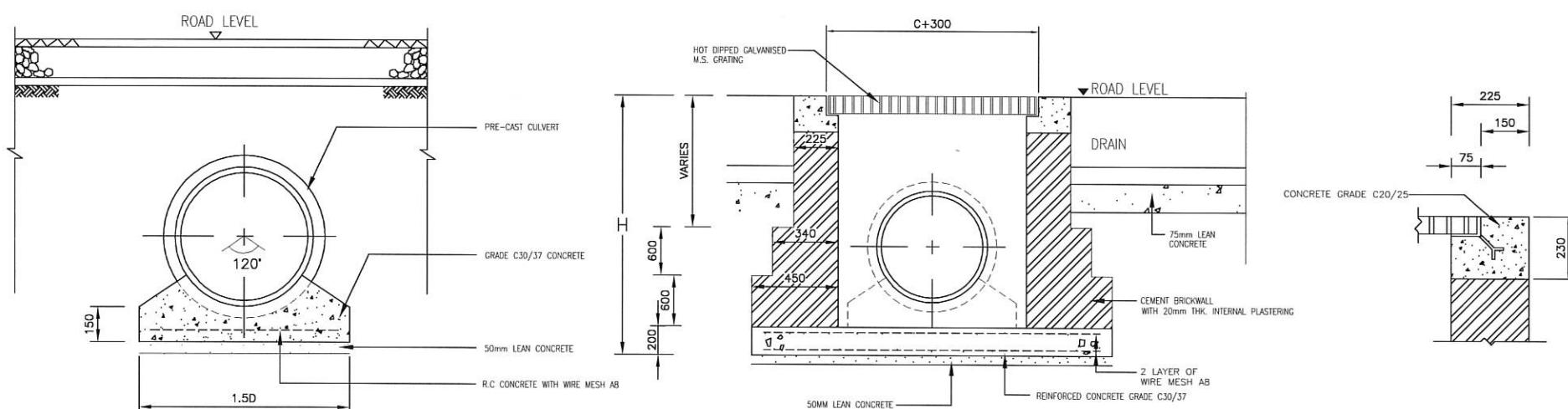
PENGARAH KANAN :	Ir. Hj. MOHAMAD ZULKELFY BIN SULAIMAN
PENGARAH KHIDMAT REKABENTUK :	Ir. Hj. BADIOEZAMAN BIN AB. KHAIR
JURUTERA AWAM PENGUSA KANAN :	CHOW WAH
JURUTERA AWAM PENGUSA :	
JURUTERA AWAM KANAN :	Ir. FAIZAN BINTI ISMAIL
DIREKABENTUK :	Ir. SHAFUL MUNIR/ELIZA/Ir. SYAMSUL/AJI/SRI RAHYAU
DISEMAK :	Ir. FAIZAN BINTI ISMAIL
DILUKIS :	SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI
NO. FAIL LUKISAN PIAWAI :	JKR.CKAS/01.700/100/11
SKALA :	TANPA SKALA
TARIKH :	SEPTEMBER 2018
PERKARA :	LUKISAN PIAWAI SISTEM SALIRAN
TAJUK LUKISAN :	TYPICAL DETAILS OF P.C PIPE CULVERT THROUGH SUMP
NO. LUKISAN :	JKR/CKAS/P-SS/BKA/30/PEL18/(14/23)



TYPICAL SECTIONAL PLAN (P.C PIPE CULVERT)



TYPICAL SECTION ELEVATION

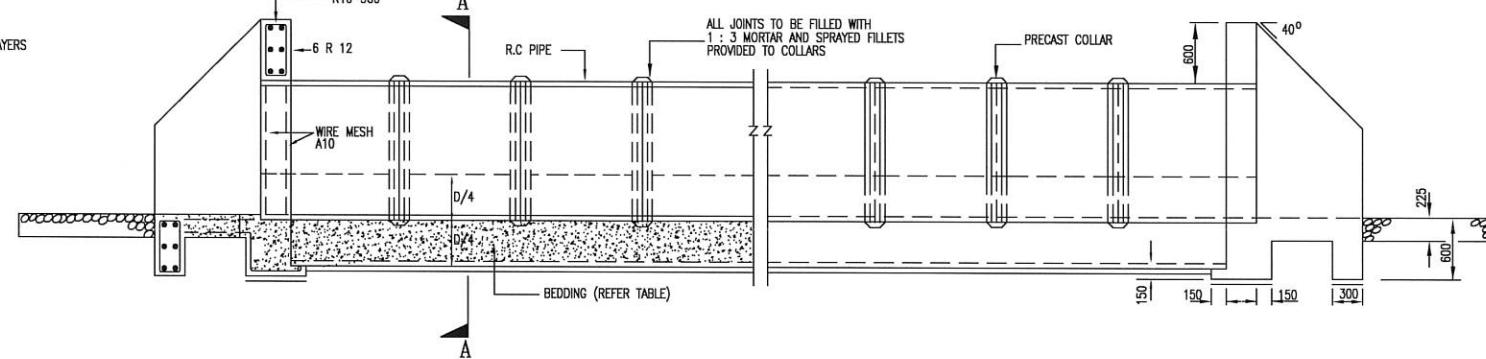
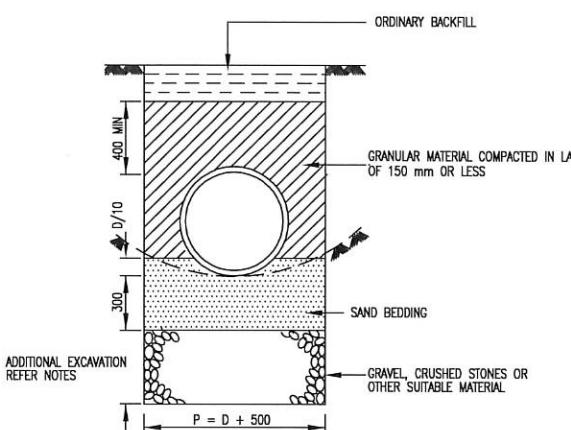


SECTION A - A

SECTION B - B

DETAIL A

CULVERT, C	DIAMETER OF PIPE CULVERT	WIDTH, W
C1	450mmØ	900mm
C2	600mmØ	900mm
C3	750mmØ	900mm
C4	900mmØ	1200mm
C5	1050mmØ	1200mm



- NOTES :
- ALL DIMENSION ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
 - ALL PIPE CULVERT AND BEDDINGS ARE TO BE LAID IN TRENCH CONDITION.
 - FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
 - PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.
 - CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
 - CONCRETE BEDDING TO BE PROVIDED TO FULL CULVERT LENGTH WHEN THE DEPT OF FILL IS 1000mm OR LESS.
 - COMPACTATION OF MATERIAL TO BE CARRIED OUT IN LAYERS OF 150mm ON BOTH SIDES OF THE PIPE.
 - FOR SOFT FOUNDATION A MINIMUM OF 600mm ADDITIONAL EXCAVATION IS REQUIRED. FURTHER EXCAVATION IF REQUIRED WILL BE DIRECTED BY THE S.O.
 - COVERS TO REINFORCEMENT SHALL BE 50mm UNLESS OTHERWISE STATED.
 - D - OUTSIDE DIAMETER OF REINFORCE CONCRETE PIPE CULVERT.
d - INTERNAL DIAMETER OF REINFORCE CONCRETE PIPE CULVERT.
 - PIPE CULVERT SHALL BE CONCRETE SURROUND IF THE COVER IS LESS THAN 1000mm.

TANDATANGAN & COP PELANGGAN

TANDATANGAN JURUTERA PROFESIONAL :
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PENGARAH KHIDMAT REKABENTUK :

Ir. Hj. BADIOEZAMAN BIN AB. KHALIK

JURUTERA AWAM PENGUSA KANAN :

CHOW WAH

JURUTERA AWAM PENGUSA :

-

JURUTERA AWAM KANAN :

Ir. FAIZAN BINTI ISMAIL

DIREKABENTUK :

Ir. SHAIFUL MUNIR/ELIZA/Ir. SYAMSUL/AI/SRI RAHYAU

DISEMAK :

Ir. FAIZAN BINTI ISMAIL

DILUKIS :

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI

NO. FAIL LUKISAN PIAWAI :

JKR/CKAS/01.700/100/11

SKALA :

TANPA SKALA

TARIKH :

SEPTEMBER 2018

PERIKARA :

LUKISAN PIAWAI

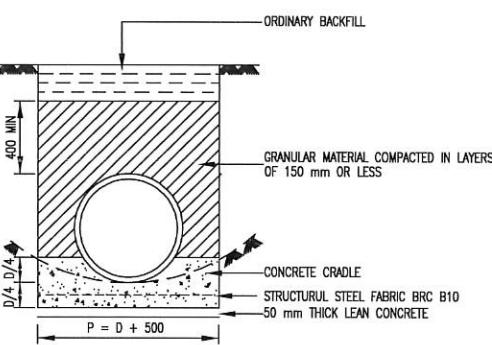
SISTEM SALIRAN

TAJUK LUKISAN :

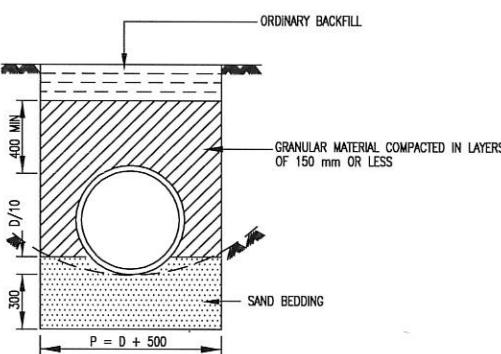
BEDDING TYPES FOR P. C
PIPE CULVERT

NO. LUKISAN :
JKR/CKAS/P-SS/BKA/30/PEL18/(15/23)

SECTION A - A - TYPE B MEDIUM

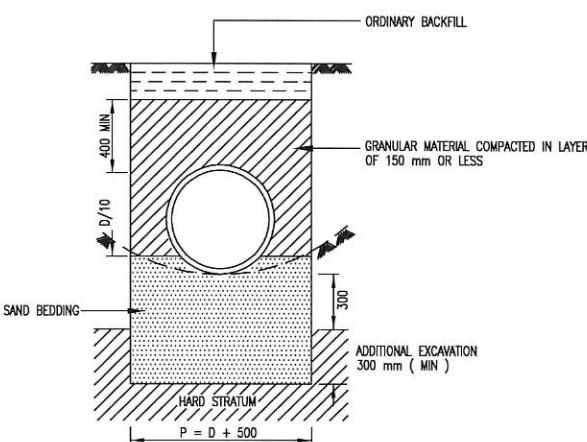


SECTION A - A - TYPE C NORMAL

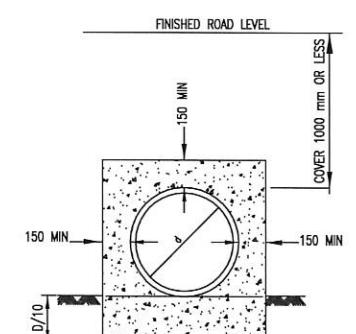


TYPE OF BEDDING

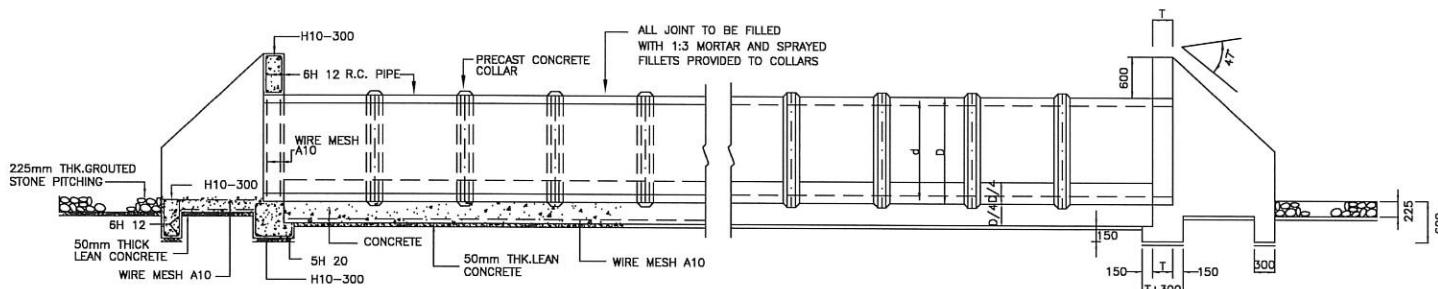
TYPE	SOIL CONDITION	JKR Blow/ft
A	SOFT	5-10
B	MEDIUM	11-30
C	NORMAL	31-40
D	HARD	>40



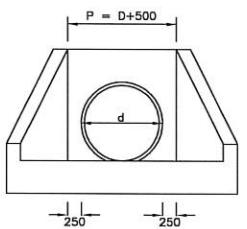
SECTION A - A - TYPE D HARD



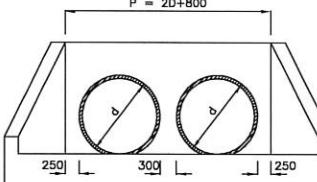
CONCRETE SURROUND PIPE CULVERT



TYPICAL SECTIONAL ELEVATION



END ELEVATION
SINGLE PIPE

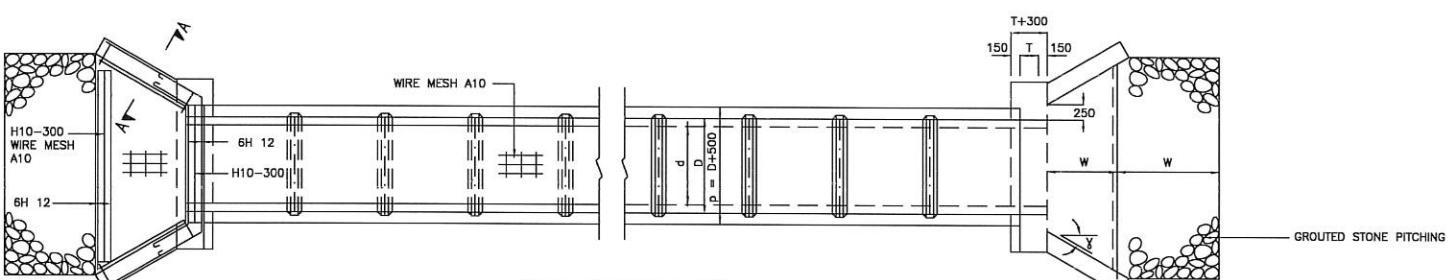


END ELEVATION
TWIN PIPE

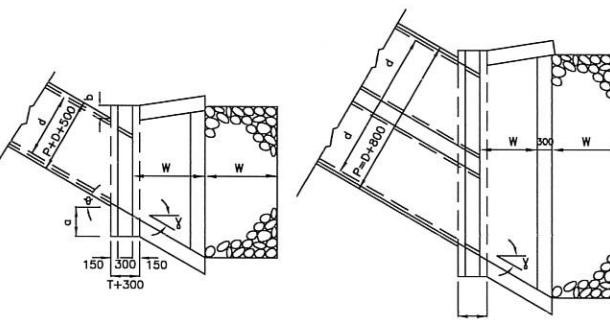
NOTES :

1. FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
2. PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.
3. CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
4. MINIMUM LAP LENGTH TO BE 42 TIMES THE DIAMETER OF BAR.
5. COVER TO STEEL REINFORCEMENT TO BE 50mm UNLESS OTHERWISE STATED.
6. CONCRETE PIPE SHALL MEET THE REQUIREMENT IN MS 881.
7. MILD STEEL REINFORCEMENT TO CONFORM TO MS 146.
8. INTERNAL DIAMETER OF PRECAST CONCRETE PIPE ID 'd'.
9. a = 225mm SEC $\gamma + 300\text{mm tan } \theta$
b = 225mm SEC $\gamma + 300\text{mm tan } \theta$

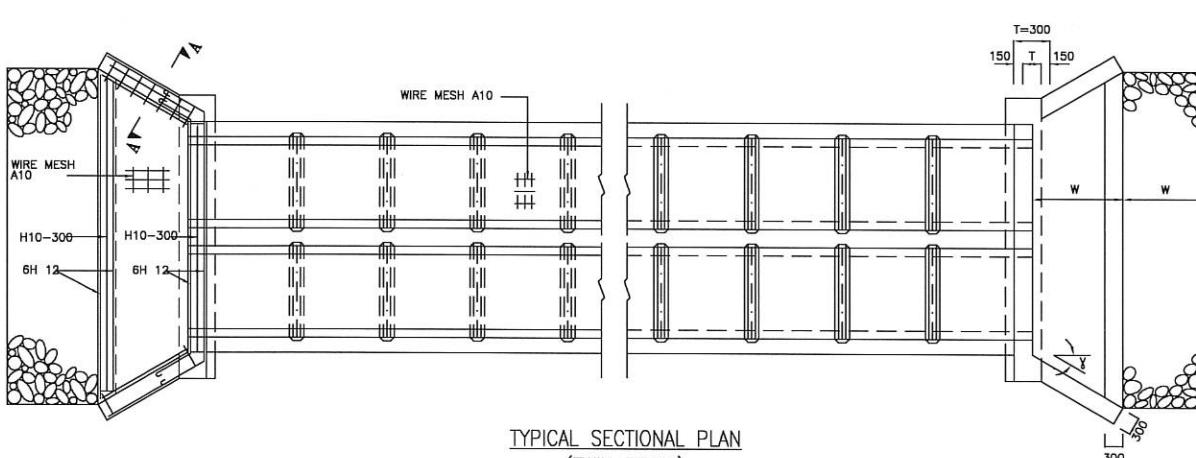
.....
TANDATANGAN & COP PELANGGAN



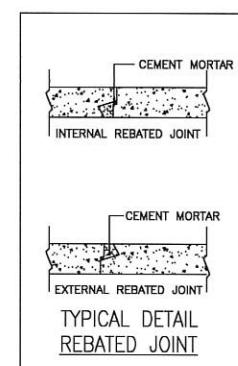
TYPICAL SECTIONAL PLAN
(SINGLE PIPE)
D - External Diameter



PLAN OF SKEW
(SINGLE PIPE)



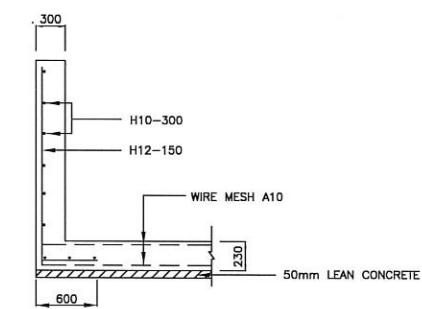
TYPICAL SECTIONAL PLAN
(TWIN PIPES)



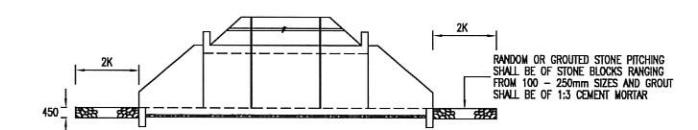
TYPICAL DETAIL
REBATED JOINT

SKEW <	B	γ
0°	30'	30'
10°	20'	30'
15°	15'	30'
30°	10'	40'
45°	10'	55'

d (mm)	900	1050	1200	1350	1500	1650	1800
W (mm)	1200	1200	1200	1500	1500	1650	1650
T (mm)	225	250	300	300	300	350	350



SECTION A - A



RANDOM OR GROUTED STONE PITCHING

TANDATANGAN JURUTERA PROFESIONAL :
I hereby certify that these works have been designed by me in accordance with sound engineering practice and that I take full responsibility for the design and proper performance of the same*



JABATAN KERJA RAYA MALAYSIA

BAHAGIAN KEJURUTERAAN AWAM
CAWANGAN KEJURUTERAAN AWAM DAN STRUKTUR
IBU PEJABAT JKR MALAYSIA

PENGARAH KANAN :

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PENGARAH KHIDMAT REKBENTUK :

Ir. Hj. BADIOEZAMAN BIN AB. KHALIK

JURUTERA AWAM PENGUSA KANAN :

CHOW WAH

JURUTERA AWAM PENGUSA :

-

JURUTERA AWAM KANAN :

Ir. FAIZAN BINTI ISMAIL

DIREKABENTUK :

Ir. SHAIFUL MUNIR/ELIZA/Ir. SYAMSUL/AJU/SRI RAHAYU

DISEMAK :

Ir. FAIZAN BINTI ISMAIL

DILUKIS :

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI

NO. FAIL LUKISAN PIAWAI :

JKR/CAS/01.700/100/11

SKALA :

TANPA SKALA

TARIKH :

SEPTEMBER 2018

PERKARA :

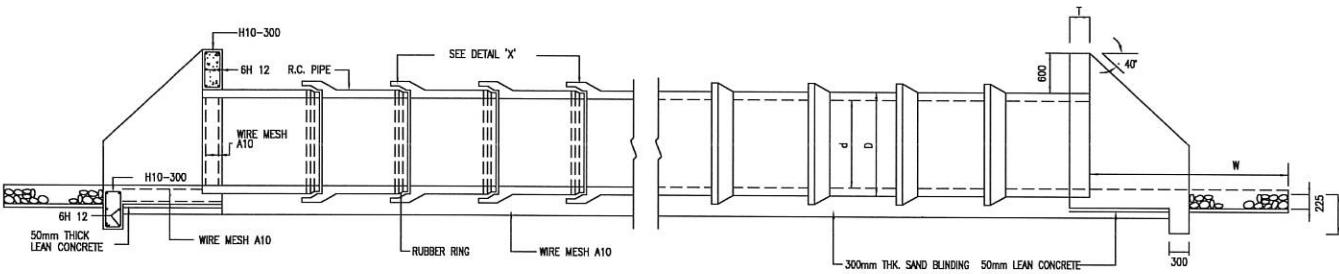
LUKISAN PIAWAI
SISTEM SALIRAN

TAJUK LUKISAN :

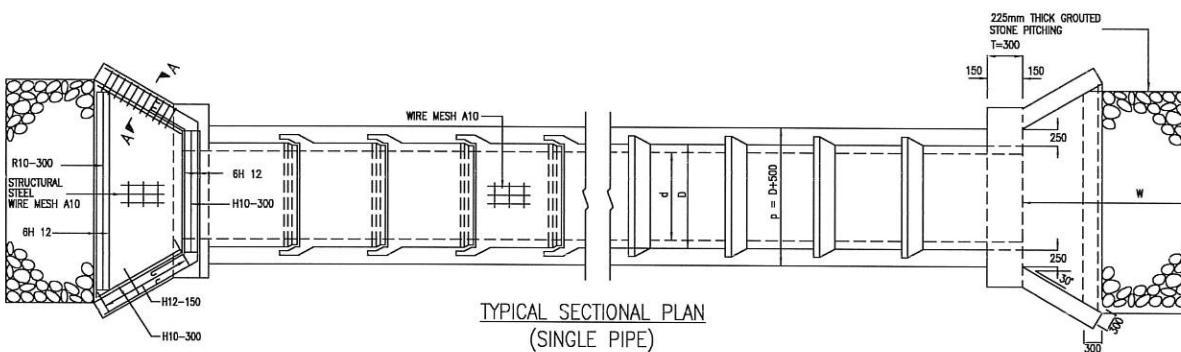
TYPICAL P. C PIPE CULVERT
(BUTT OR REBATED JOINT)

NO. LUKISAN :

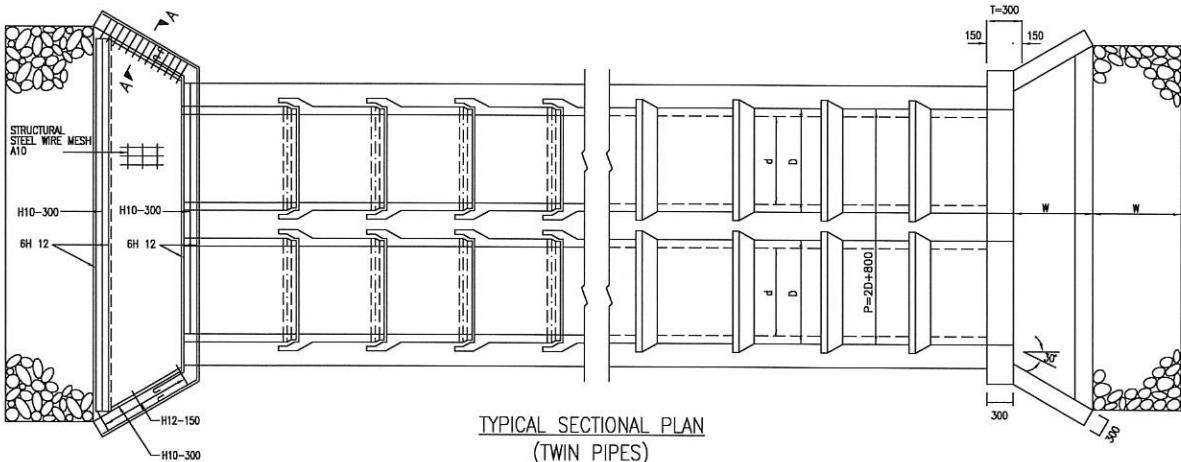
JKR/CKAS/P-SS/BKA/30/PEL18/(16/23)



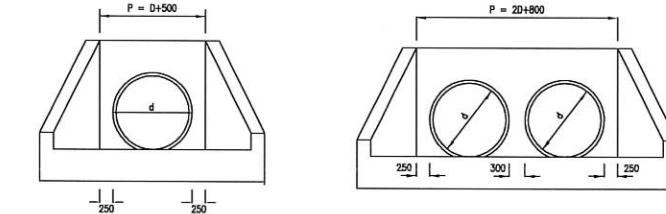
TYPICAL SECTIONAL ELEVATION



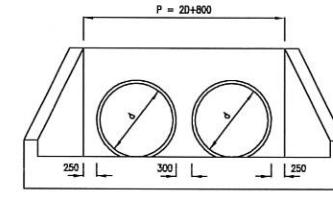
TYPICAL SECTIONAL PLAN
(SINGLE PIPE)



TYPICAL SECTIONAL PLAN
(TWIN PIPES)



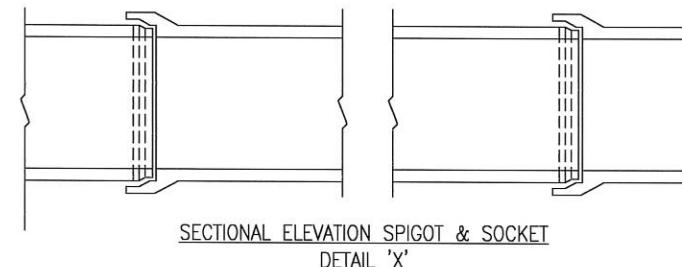
END ELEVATION
SINGLE PIPE



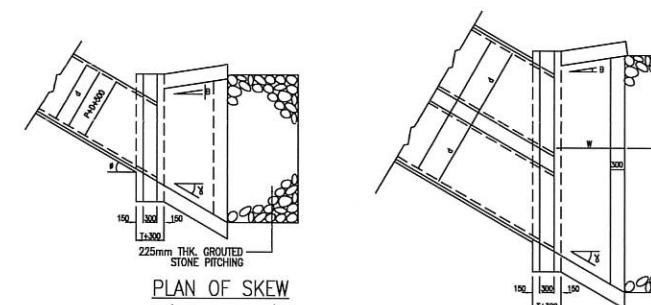
END ELEVATION
TWIN PIPES

NOTES :								
1. FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.								
2. PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.								
3. CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.								
4. MINIMUM LAP LENGTH TO BE 42 TIMES THE DIAMETER OF BAR.								
5. COVER TO STEEL REINFORCEMENT TO BE 50mm UNLESS OTHERWISE STATED.								
6. CONCRETE PIPE SHALL MEET THE REQUIREMENT IN MS 881.								
7. MILD STEEL REINFORCEMENT TO CONFORM TO MS 146.								
8. INTERNAL DIAMETER OF PRECAST CONCRETE PIPE ID 'd'.								
9. a = 225mm SEC γ + 300mm tan φ b = 225mm SEC γ + 300mm tan φ								

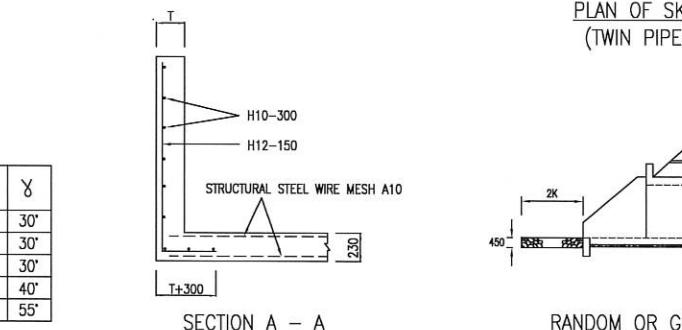
TANDATANGAN & COP PELANGGAN



SECTIONAL ELEVATION SPIGOT & SOCKET
DETAIL 'X'



PLAN OF SKEW
(SINGLE PIPE)

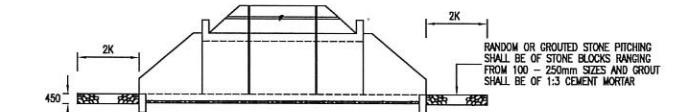


PLAN OF SKEW
(TWIN PIPES)

SKEW φ	B	γ
0°	30°	30°
10°	20°	30°
15°	15°	30°
30°	10°	40°
45°	10°	55°

SECTION A - A

d (mm)	900	1050	1200	1350	1500	1650	1800	2700	3000	3600
W (mm)	1200	1200	1200	1500	1500	1650	1650	2500	2800	3300
T (mm)	225	250	300	300	350	350	600	600	700	



RANDOM OR GROUTED STONE PITCHING



JABATAN KERJA RAYA MALAYSIA

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CAWANGAN KEJURUTERAAN AWAM DAN STRUKTUR
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Ir. Hj. BADIOEZAMAN BIN AB. KHALIK

JURUTERA AWAM PENGUSA KANAN :

CHOW WAH

JURUTERA AWAM PENGUSA :

-

JURUTERA AWAM KANAN :

Ir. FAIZAN BINTI ISMAIL

DIREKABENTUK :

Ir. SHAIFUL MUNIR/ELIZA/Ir. SYAMSUL/AU/SRI RAHAYU

DISEMAK :

Ir. FAIZAN BINTI ISMAIL

DILUKIS :

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI

NO. FAIL LUKISAN PIAWAI :

JKR/CAS/01.700/100/11

SKALA :

TANPA SKALA

TARIKH :

SEPTEMBER 2018

PERKARA :

LUKISAN PIAWAI

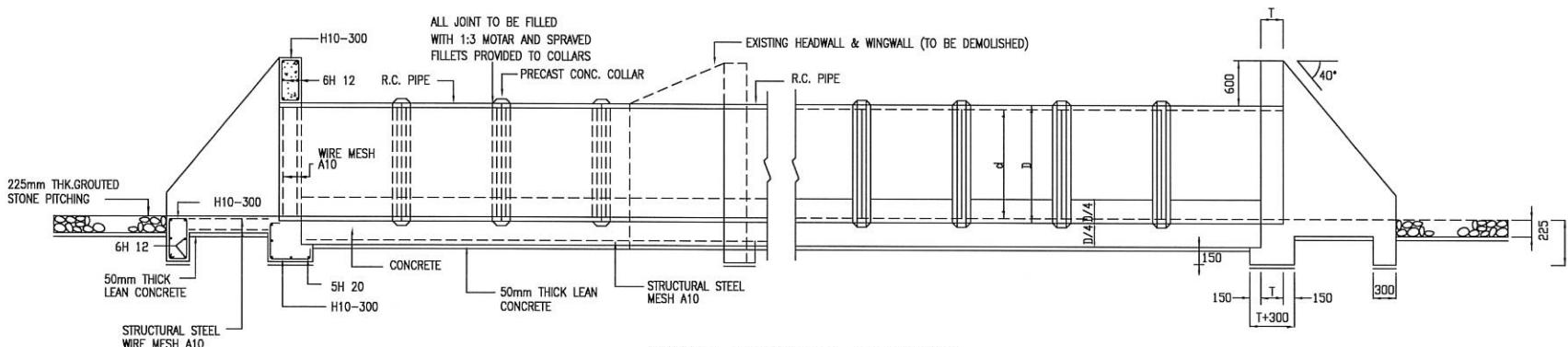
SISTEM SALIRAN

TAJUK LUKISAN :

P. C PIPE CULVERT
(SPIGOT JOINT)

NO. LUKISAN :

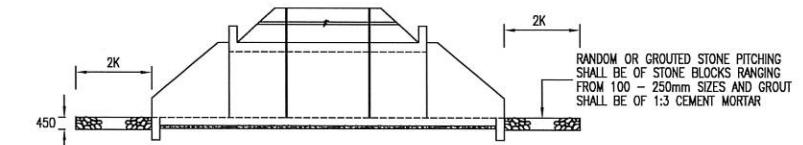
JKR/CKAS/P-SS/BKA/30/PEL18/(17/23)



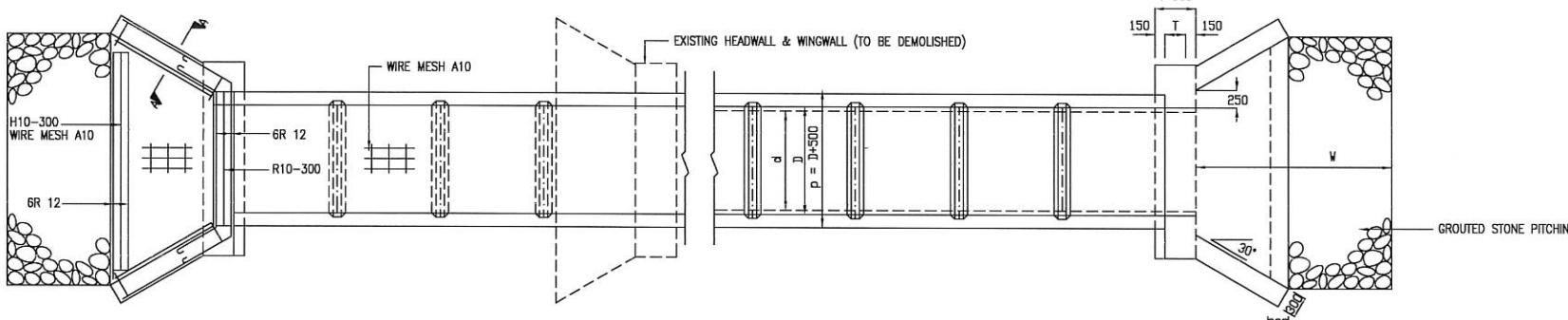
TYPICAL SECTIONAL ELEVATION

NOTES :

1. FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
2. PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.
3. CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
4. MINIMUM LAP LENGTH TO BE 42 TIMES THE DIAMETER OF BAR.
5. COVER TO STEEL REINFORCEMENT TO BE 50mm UNLESS OTHERWISE STATED.
6. CONCRETE PIPE SHALL MEET THE REQUIREMENT IN MS 881.
7. MILD STEEL REINFORCEMENT TO CONFORM TO MS 146.
8. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
9. PIPE CULVERT SHALL BE CONCRETE SURROUND IF THE COVER IS LESS THAN 1000mm.



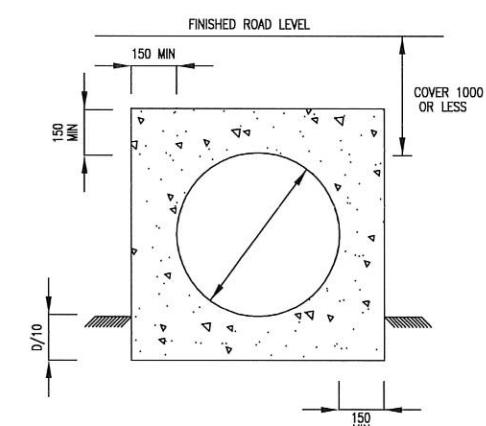
TANDATANGAN & COP PELANGGAN



TYPICAL SECTIONAL PLAN

(SINGLE PIPE)
D - Outer Diameter

RANDOM OR GROUTED STONE PITCHING

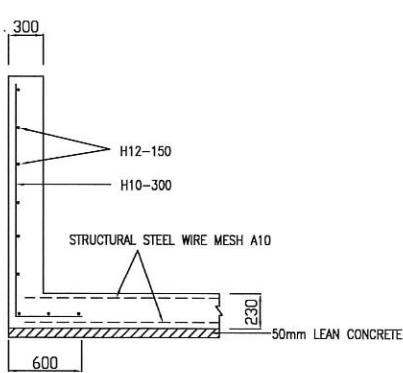
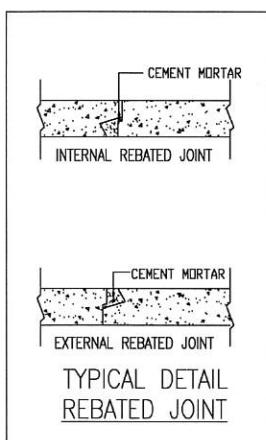


CONCRETE SURROUND
PIPE CULVERT

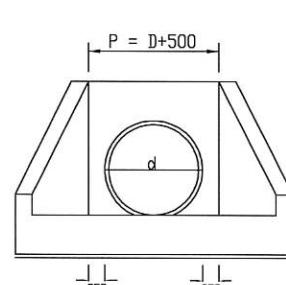
SKEW Ø	B	γ
0°	30°	30°
10°	20°	30°
15°	15°	30°
30°	10°	40°
45°	10°	55°

$$a = 225 \sec \gamma + 300 \tan \theta$$

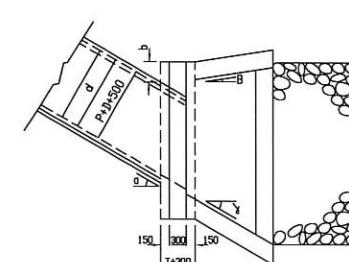
$$b = 225 \sec \theta + 300 \tan \theta$$



SECTION A - A



END ELEVATION
SINGLE PIPE



PLAN OF SKEW
(SINGLE PIPE)

d (mm)	900	1050	1200	1350	1500	1650	1800
W (mm)	1200	1200	1200	1500	1500	1650	1650
T (mm)	225	250	300	300	300	350	350

TAJUK LUKISAN :
TYPICAL EXTENSION DETAILS
FOR R. C PIPE CULVERT

NO. LUKISAN :
JKR/CKAS/P-SS/BKA/30/PEL18/(18/23)



JABATAN KERJA RAYA MALAYSIA

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CAWANGAN KEJURUTERAAN AWAM DAN STRUKUR
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PENGARAH KANAN :

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JURUTERA AWAM PENGUSAH KANAN :

CHOW WAH

JURUTERA AWAM PENGUSAH :

-

JURUTERA AWAM KANAN :

Ir. FAIZAN BINTI ISMAIL

DIREKABENTUK :

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DISEMAK :

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DILUKIS :

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKAR

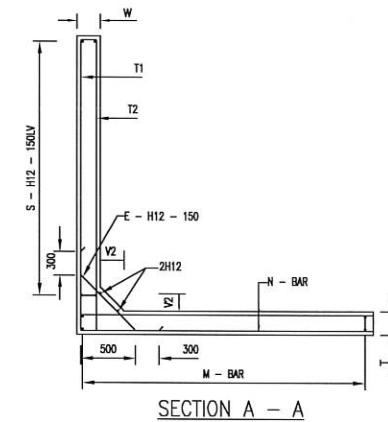
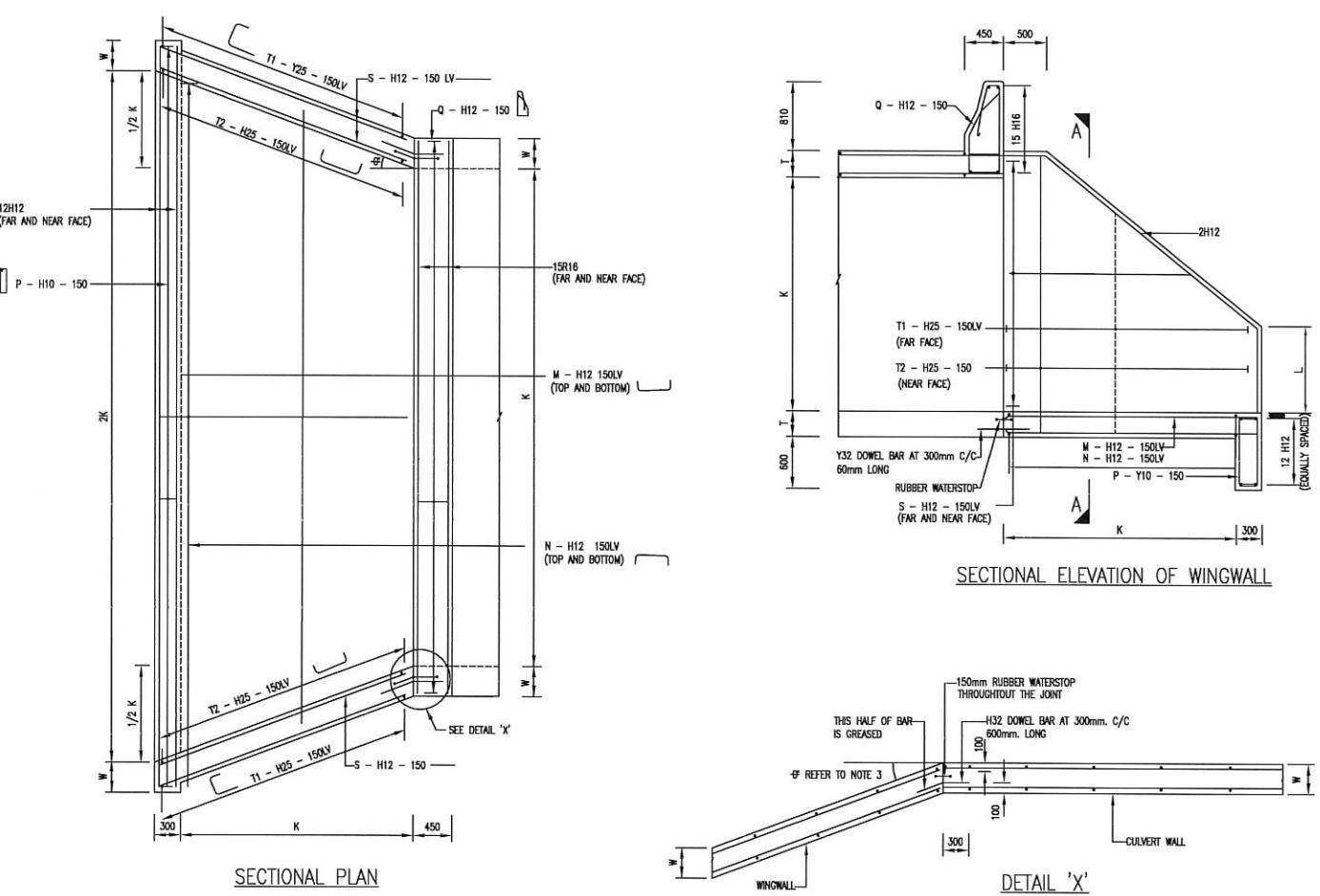
NO. FAIL LUKISAN PIAWAI :

JKR/LKAS/01.700/100/11

SKALA : TANPA SKALA TARikh : SEPTEMBER 2018

PERIKAR :

LUKISAN PIAWAI
SISTEM SALIRAN



NOTES :													
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.													
2. THE INSIDE ANGLE (0°) BETWEEN CULVERT WALL AND WINGWALL.													
<table border="1"> <tr> <td>BOX SIZE (K)</td> <td>Ø</td> </tr> <tr> <td>1500</td> <td>22.62</td> </tr> <tr> <td>2000</td> <td>23.60</td> </tr> <tr> <td>2500</td> <td>24.06</td> </tr> <tr> <td>3000</td> <td>24.44</td> </tr> <tr> <td>3500</td> <td>24.73</td> </tr> </table>		BOX SIZE (K)	Ø	1500	22.62	2000	23.60	2500	24.06	3000	24.44	3500	24.73
BOX SIZE (K)	Ø												
1500	22.62												
2000	23.60												
2500	24.06												
3000	24.44												
3500	24.73												
3. REINFORCED CONCRETE SHALL BE OF GRADE C30/37.													
4. CONCRETE COVER TO REINFORCEMENT TO BE 50mm.													
5. ALL HIGH TENSILE AND MILD STEEL REINFORCEMENT SHALL CONFORM TO M.S 146.													
6. MINIMUM LAP LENGTH FOR ALL BARS BE 42 x DIAMETER OF BAR.													
7. FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.													
8. PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.													
9. CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.													
10. 8 - H12 - 300 LV LENGTH VARIES SPACING OF BAR DIAMETER OF BAR TYPE OF BAR, H-HIGH YIELD NUMBER OF BAR													

TANDATANGAN & COP PELANGGAN

TANDATANGAN JURUTERA PROFESIONAL :
I hereby certify that these works have been designed by me in accordance with sound engineering practice and that I take full responsibility for the design and proper performance of the same."



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CHOW WAH

JURUTERA AWAM PENGUSA :

JURUTERA AWAM KANAN :

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DISEMAK :

Ir. FAIZAN BINTI ISMAIL

DILUKIS :

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKARI

NO. FAIL LUKISAN PIAWAI :

JKR/CKAS/01.700/100/11

SKALA :

TANPA SKALA SEPTEMBER 2018

PERKARA :

LUKISAN PIAWAI
SISTEM SALIRAN

TAJUK LUKISAN :
STANDARD SINGLE BOX CULVERT
(WINGWALL DETAILS)

Disuruh sebahagian daripada
No. Lukisan = KPKR/J/R/STD/AM 321

NO. LUKISAN :

JKR/CKAS/P-SS/BKA/30/PEL18/(20/23)

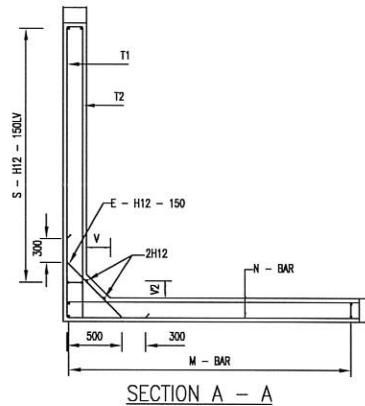
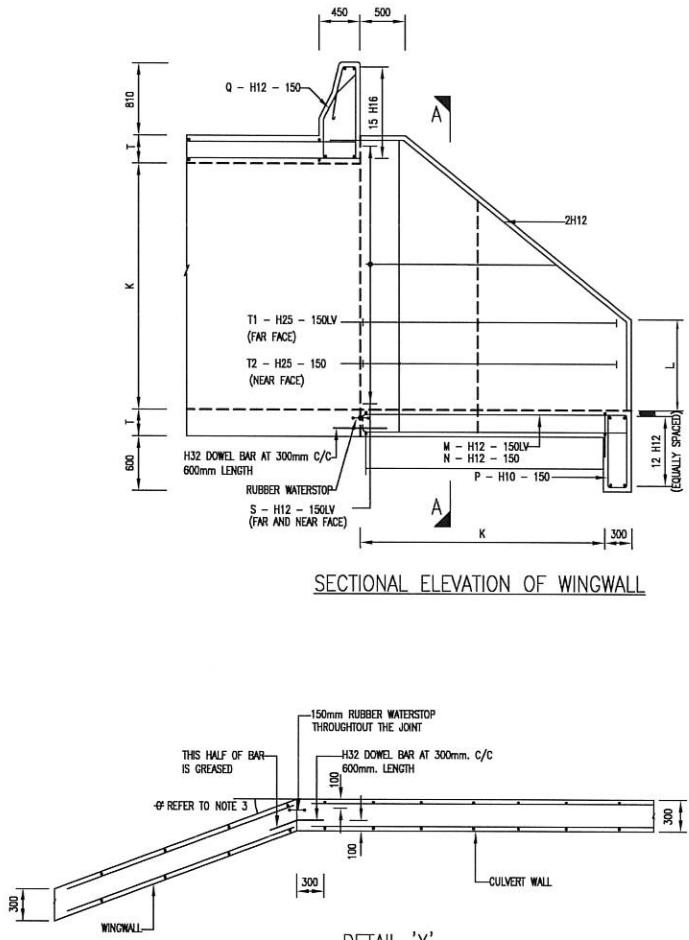
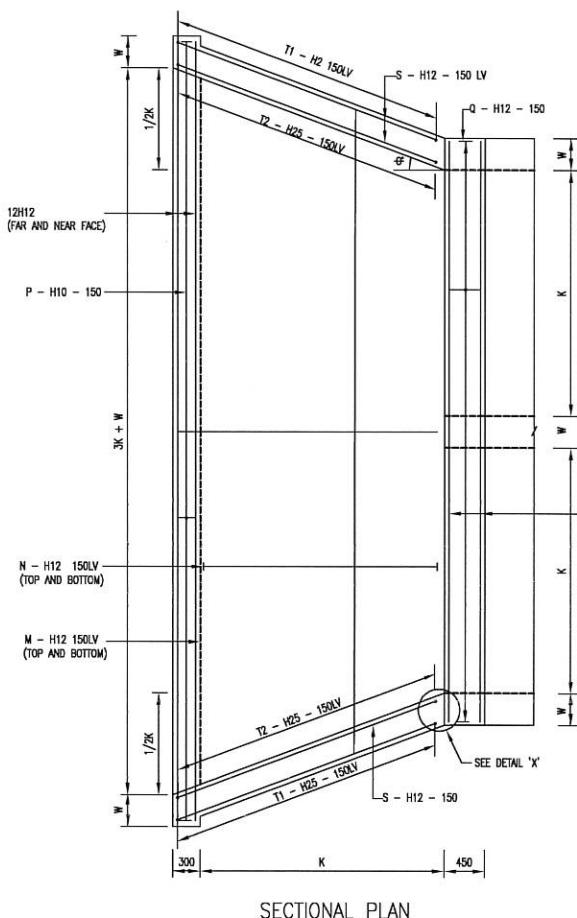
SIZE OF BOX (K) (mm)	REINFORCEMENT DETAILS FOR ONE WINGWALL														REMARKS									
	M - BAR (H12)		N - BAR (H12)		P - BAR (H10)		Q - BAR (H12)		T1 - BAR (H25)		T2 - BAR (H25)		S - BAR (H12)		E - BAR (H12)		12H12	15H16	2H12	H12				
NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	
1500 x 1500	40	73.2	65.0	20	59.0	52.5	24	51.0	31.5	14	47.7	42.5	28	56.4	217.4	28	46.6	179.6	52	68.1	50.5	26	32.5	28.8
2000 x 2000	56	131.1	116.4	28	109.2	97.0	31	68.2	42.0	17	51.1	45.4	34	91.1	351.1	34	84.3	324.9	64	113.8	101.0	35	52.5	46.3
2500 x 2500	70	209.2	185.8	34	171.7	152.5	39	93.6	57.6	22	70.6	62.7	42	131.6	507.2	42	116.0	447.1	80	163.8	145.5	42	67.5	59.6
3000 x 3000	84	285.0	253.0	40	252.0	223.8	46	110.4	68.0	25	83.5	74.1	50	174.6	672.9	50	164.6	634.4	92	224.3	199.2	48	77.0	68.1
3500 x 3500	102	420.2	373.0	47	336.6	298.5	54	145.8	89.8	31	108.8	96.6	56	250.4	965.0	56	254.0	978.9	112	311.2	276.3	56	106.5	94.5

TABLE 2

SIZE OF BOX (K) (mm)	CONCRETE DETAILS					TOTAL AREA OF FORMWORK (m ²) FOR ONE WINGWALL
	T = W	V1	V2	L		
1500 x 1500	250	200	200	500		3.8
2000 x 2000	300	300	300	680		6.5
2500 x 2500	400	300	300	850		11.0
3000 x 3000	400	300	300	1000		16.0
3500 x 3500	550	350	350	1200		28.5
						66.0

TABLE 1

Disuruh sebahagian daripada
No. Lukisan = KPKR/J/R/STD/AM 321



SIZE OF BOX (K) (mm)	CONCRETE DETAILS					TOTAL AREA OF FORMWORK (m ²) FOR ONE WINGWALL
	T = W	V1	V2	L	TOTAL VOLUME OF CONCRETE (m ³) FOR ONE WINGWALL	
1500 x 1500	250	150	150	500	5.5	26.0
2000 x 2000	300	200	200	680	9.0	38.0
2500 x 2500	300	200	200	850	13.0	50.0
3000 x 3000	350	200	200	1000	19.0	66.0
3500 x 3500	350	200	200	1200	25.0	81.0

TABLE 1

NOTES :	
1.	ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED.
2.	THIS DRAWING IS TO BE READ IN CONJUNCTION WITH STANDARD DRAWING STD-J/C02/1.
3.	THE INSIDE ANGLE (θ) BETWEEN CULVERT WALL AND WINGWALL.
4.	REINFORCED CONCRETE SHALL BE OF GRADE C30/37.
5.	CONCRETE COVER TO REINFORCEMENT TO BE 50mm.
6.	ALL HIGH TENSILE AND MILD STEEL REINFORCEMENT SHALL CONFORM TO M.S. 146.
7.	MINIMUM LAP LENGTH FOR ALL BARS SHALL BE 42 x DIAMETER OF BAR.
8.	FOR CAST IN-SITU CONCRETE DRAIN USE CONCRETE GRADE C30/37.
9.	PRECAST CONCRETE DRAIN USE CONCRETE GRADE C20/25.
10.	CONCRETE BLINDING AND SURROUND USE CONCRETE GRADE C20/25.
11.	8 - H12 - 300 LV
	LENGTH VARIES SPACING OF BAR DIAMETER OF BAR
	TYPE OF BAR, H=HIGH YIELD NUMBER OF BAR

TANDATANGAN JURUTERA PROFESIONAL :
I hereby certify that these works have been designed by me in accordance with sound engineering practice and that I take full responsibility for the design and proper performance of the same."



JABATAN KERJA RAYA MALAYSIA
BAHAGIAN KEJURUTERAAN AWAM
CAWANGAN KEJURUTERAAN AWAM DAN STRUKTUR
IBU PEJABAT JKR MALAYSIA

PENGARAH KANAN :
Ir. Hj. MOHAMAD ZULKELFY BIN SULAIMAN
PENGARAH KHIDMAT REKABENTUK :
Ir. Hj. BADIOEZAMAN BIN AB. KHALIK

JURUTERA AWAM PENGUSA KANAN :

CHOW WAH

JURUTERA AWAM PENGUSA :

-

JURUTERA AWAM KANAN :

Ir. FAIZAN BINTI ISMAIL

DIREKABENTUK :

Ir. SHAIFUL MUNIR/ELIZA/Ir. SYAMSUL/ALI/SRI RAHAYU

DISEMAK :

Ir. FAIZAN BINTI ISMAIL

DILUKIS :

SITI KHODIJAH BINTI MUSA/NOR AZMI BIN MOHD BUKAR

NO. FAIL LUKISAN PIAWAI :

JKR/CKAS/01.700/100/11

SKALA : TARIKH :

TANPA SKALA SEPTEMBER 2018

PERKARA :

LUKISAN PIAWAI
SISTEM SALIRAN

TAJUK LUKISAN :

STANDARD TWIN BOX CULVERT
(WINGWALL DETAILS)

Disuruh sebahagian daripada
No. Lukisan = KPKR/J/R/STD/AM 323

NO. LUKISAN :
JKR/CKAS/P-SS/BKA/30/PEL18/(22/23)

SIZE OF BOX (K) (mm)	REINFORCEMENT DETAILS FOR ONE WINGWALL																																			
	M - BAR (H12)		N - BAR (H12)		P - BAR (H10)		Q - BAR (H12)		T1 - BAR (H25)		T2 - BAR (H25)		S - BAR (H12)		E - BAR (H12)		12H12		15H16		2H12		H12													
NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)	NO	TOTAL LENGTH (m)	WEIGHT (kg)										
1500 x 1500	64	121.2	107.6	22	103.4	91.8	35	74.2	45.7	25	80.1	71.1	28	56.4	217.4	28	46.6	179.6	56	74.6	66.2	26	33.3	29.6	12	61.8	54.9	15	54.8	86.5	4	13.4	11.9	4	7.4	6.5
2000 x 2000	86	174.6	155.0	28	148.4	131.8	46	102.1	62.9	33	109.1	96.9	34	91.1	351.1	34	84.3	324.9	64	113.8	101.0	34	57.0	45.3	12	81.6	72.5	15	72.0	113.7	4	16.4	14.5	4	9.6	8.5
2500 x 2500	106	301.7	267.9	34	253.2	224.9	56	124.3	76.6	40	132.2	117.4	42	122.2	471.0	42	109.6	422.4	76	158.7	140.9	42	63.0	55.9	12	99.6	88.4	15	87.0	137.4	4	19.9	17.7	4	11.9	10.6
3000 x 3000	128	432.1	383.7	40	358.0	317.9	67	155.4	95.7	47	160.0	142.1	50	168.2	648.2	50	155.6	597.9	92	224.3	199.2	48	78.2	69.4	12	119.4	106.0	15	104.2	184.5	4	23.2	20.6	4	14.1	12.5
3500 x 3500	152	604.3	536.6	48	508.8	451.8	79	199.1	122.6	56	190.7	169.3	56	222.4	857.1	56	214.0	824.8	112	313.5	278.4	56	107.5	95.5	12	137.4	122.0	15	119.2	188.2	4	27.0	23.9	4	16.3	14.5

TABLE 2

NOTES:

1. ALL INTERNAL ROAD WORKS SHALL BE READ TOGETHER WITH ARAHAN TEKNIK (JALAN) AND STANDARD DRAWING FOR ROAD WORKS FROM CAWANGAN JALAN
2. ALL DRAIN TYPES AND LOCATION SHALL BE AS SHOWN ON THE PLAN AND LONGITUDINAL SECTION DRAWINGS OR AS DIRECTED BY THE S.O.
3. CONCRETE SHALL BE GRADE C20/25 EXCEPT FOR CONCRETE BINDING
4. FILL / CUT SLOPE INCLINATION ANGLE SHOULD BE DESIGNED
5. ALL STANDARD DIMENSION SHALL BE REFER TABLE 1 AND 2 DRG. 1/21.
6. SUMP PC SLAB AS SHOWN IN THE DRAWING IS ONE PART OF SEVERAL TYPE OF ARRANGEMENT IN DRAINAGE SUMP OF DRAINAGE COVER AS DIRECTED BY S.O

.....
TANDATANGAN & COP PELANGGAN

TANDATANGAN JURUTERA PROFESIONAL :
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SKALA :

TANPA SKALA

TARIKH :
SEPTEMBER 2018

PERKARA :

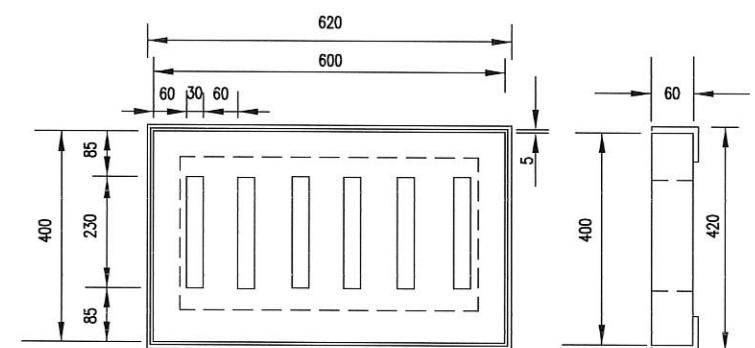
LUKISAN PIAWAI
SISTEM SALIRAN

TAJUK LUKISAN :

TYPICAL SUMP P.C.
SLAB DETAILS

NO. LUKISAN :

JKR/CKAS/P-SS/BKA/30/PEL18/(23/23)



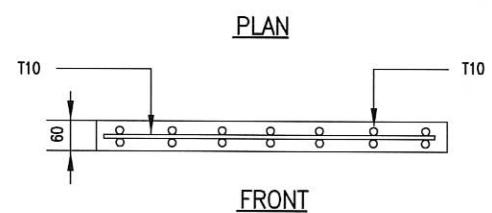
PLAN

SIDE

60mm X 60mm X 5mm THK.
ANGLE FRAME → 60mm THK. P.C. SLAB

FRONT

TYPICAL SUMP P.C. SLAB DETAILS



PLAN

SIDE

FRONT

REINFORCEMENT DETAILS