

CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN
BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI AUTOMOTIF
DI TVETMARA BESUT, TERENGGANU.

CIVIL AND STRUCTURAL

LUKISAN SEBUT HARGA



MAJLIS AMANAH RAKYAT (MARA)
IBU PEJABAT MARA, 21, JALAN MARA,
50609 KUALA LUMPUR.
TEL : 03-62132000 FAX : 03-62913620

JURUTERA SIVIL & STRUKTUR :

TECHNIPRO CONSULT
SDN. BHD.
(Civil, Structural & Geotechnical Consulting Engineer)
51-A & B, TINGKAT 2, JALAN TOK LAM,
20100 KUALA TERENGGANU,
TERENGGANU
Tel: 09-6223253
Fax: 09-6223263

ARKITEK :

ARKITEK ZAFWAN FARID
PT 2587, TINGKAT BAWAH,
TAMAN ADIS INDAH, JALAN TOK ADIS,
KUALA IBAI, 20400 KUALA TERENGGANU,
TERENGGANU.
TEL : 09 6317760
FAX : 09 6312760
EMAIL: admin@azf.com.my

JURUTERA MEKANIKAL & ELEKTRIKAL :

EMECH CONSULTING
ENGINEERS
NO.28092, ARAS 1 & 2, PERKEDAIAAN
PERMINT PERDANA,
KAMPUNG BATIN, SEBERANG TAKIR,
21300 KUALA TERENGGANU, TERENGGANU.
TEL : 09-666 7337 FAX : 09-666 7336
EMAIL : emechconsult@gmail.com

JURUUKUR BAHAN :

PERUNDING UKUR
BAHAN WFA SDN BHD
PT1898, TINGKAT 1 PERKEDAIAAN KP
PERDANA KUBANG PARIT,
20050 KUALA TERENGGANU,
TERENGGANU.
TEL : 09-626 1898
FAX : 09-626 1898
EMAIL : pub.wfasb@gmail.com

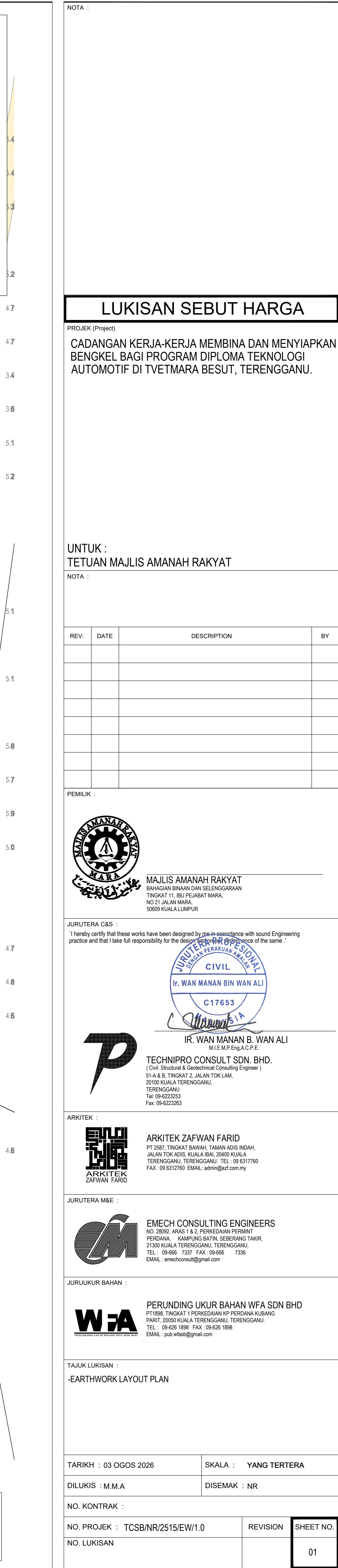
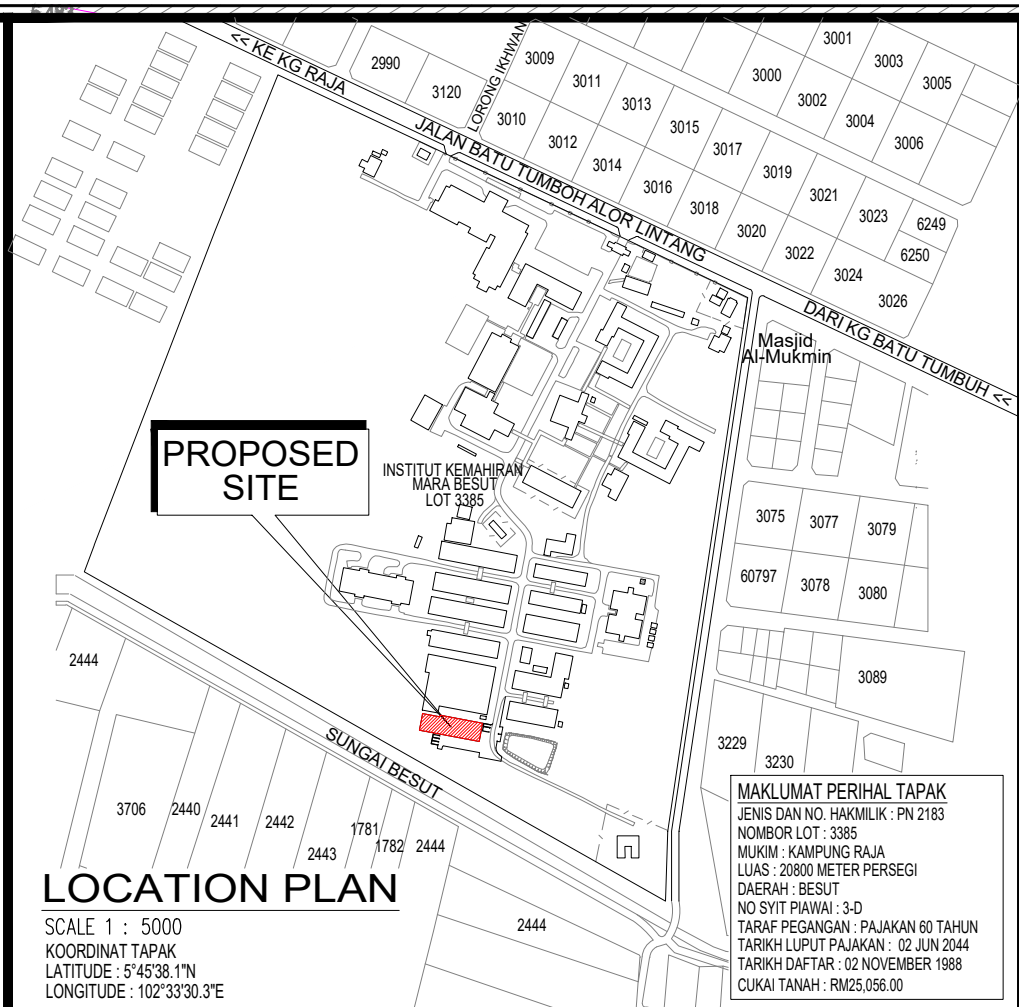
NO.	DRAWING TITLE	DRAWING NO.
	INFRASTRUCTURE DESIGN (INFRA)	
	1 UNIT BENGKEL TEKNOLOGI	
	EARTHWORK SYSTEM	
1.	-EARTHWORK LAYOUT PLAN	TCSB/NR/2515/EW/1.0
2.	-SECTION A-A, B-B & C-C	TCSB/NR/2515/EW/1.1
3.	-WASH TROUGH DETAILS -SILT TRAP DETAILS AND SECTION DETAILS -TYP. SECTION TEMPORARY EARTH DRAIN (Y-Y) -TYP. TEMPORARY GATE & FOOTING DETAILS	TCSB/NR/2515/EW/1.2
	ROAD & DRAINAGE SYSTEM	
4.	-ROAD & DRAINAGE LAYOUT PLAN	TCSB/NR/2515/R&D/1.0
5.	-TYPICAL OF PRECAST U-DRAIN DETAILS -TYPICAL PLAN OF BOX CULVERT AND SECTION DETAILS (A-A & B-B) -DRAIN SUMP AND M.S GRATING DETAIL	TCSB/NR/2515/R&D/1.1
6.	-OSD LAYOUT PLAN -TYPICAL INLET/OUTLET PIPE CONTROL -MESH SCREEN DETAIL	TCSB/NR/2515/R&D/1.2
	WATER RETICULATION SYSTEM	
7.	-WATER RETICULATION LAYOUT PLAN	TCSB/NR/2515/WR/1.0
8.	-DETAILS OF MARKER -DETAILS OF FITTING, HYDRANT AND CHAMBERS -BUTTERFLY / AIR VALVE AND CULVERT CROSSING DETAIL	TCSB/NR/2515/WR/1.1
9.	-TYPICAL ANCHOR BLOCK DETAIL FOR CLASS 15 PIPES - PIPE BEDDING AND BACKFILL - DETAIL WATER STAND METER - CONNECTION FROM MAIN PIPE TO METER - DETAILS OF COMMUNICATION PIPE AND TAPPING FROM MILD STEEL RETICULATION PIPE	TCSB/NR/2515/WR/1.2

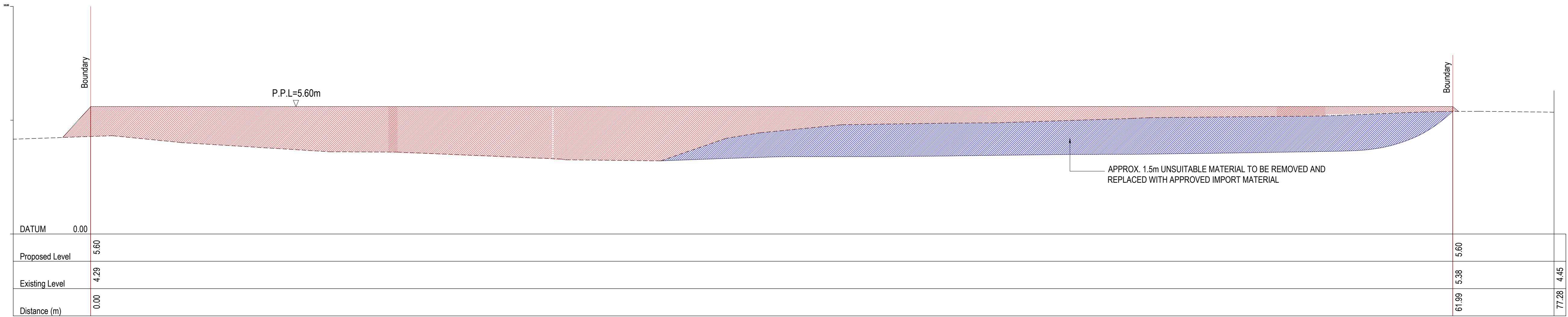
NO.	DRAWING TITLE	DRAWING NO.
	INFRASTRUCTURE DESIGN (INFRA)	
	SEWERAGE SYSTEM	
10.	-SEWERAGE LAYOUT PLAN	TCSB/NR/2515/SW/1.0
11.	-MANHOLE COVER DETAIL -INTERNAL MANHOLE	TCSB/NR/2515/SW/1.1
12.	-MANHOLE DETAILS	TCSB/NR/2515/SW/1.2
	REINFORCEMENT CONCRETE (RC)	
	1 UNIT BENGKEL TEKNOLOGI	
13.	-GENERAL NOTE - 01	TCSB/NR/2515/GN/1.0
14.	-GENERAL NOTE - 02	TCSB/NR/2515/GN/1.1
15.	-GENERAL NOTE - 03	TCSB/NR/2515/GN/1.2
16.	-GENERAL NOTE - 04	TCSB/NR/2515/GN/1.3
17.	-RAFT FOUNDATION LAYOUT PLAN, -TYP. RAFT FOUNDATION SECTION DETAIL, - COLUMN REINFORCEMENT SCHEDULE (GROUP), -CONCRETE WALKWAY DETAIL	TCSB/NR/2515/RC/1.0
18.	-ROOF BEAM LAYOUT PLAN	TCSB/NR/2515/RC/2.0
19.	-ROOF BEAM DETAILS	TCSB/NR/2515/RC/2.1
20.	-ROOF SLAB SECTION -WORKBAY BEAM DETAILS -TOP ROOF LEVEL BEAM DETAILS, -TOP OF ROOF LEVEL - 8650m	TCSB/NR/2515/RC/2.2
21.	-LIGHTWEIGHT ROOF TRUSSES LAYOUT -WORK BAYS TRUSSES LAYOUT -TRUSSES DETAILS & SECTION, -TYP. DETAIL ALUMINIUM LOUVERS	TCSB/NR/2515/RC/3.0

SAYA DENGAN INI MENGESAHKAN BAHAWA LUKISAN DOKUMEN
TENDER YANG DIKEMUKAKAN ADALAH BERSAMAAN DENGAN
SENARAI LUKISAN LUKISAN YANG DICATATKAN.

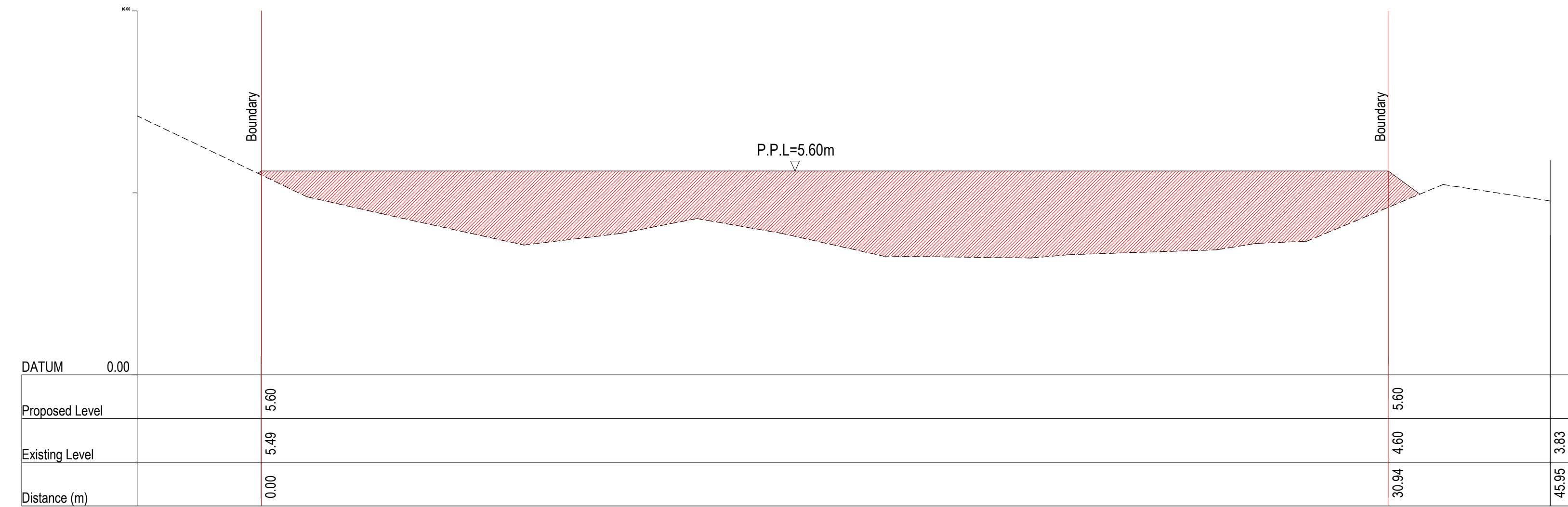


(TANDATANGAN & COP PERUNDING)

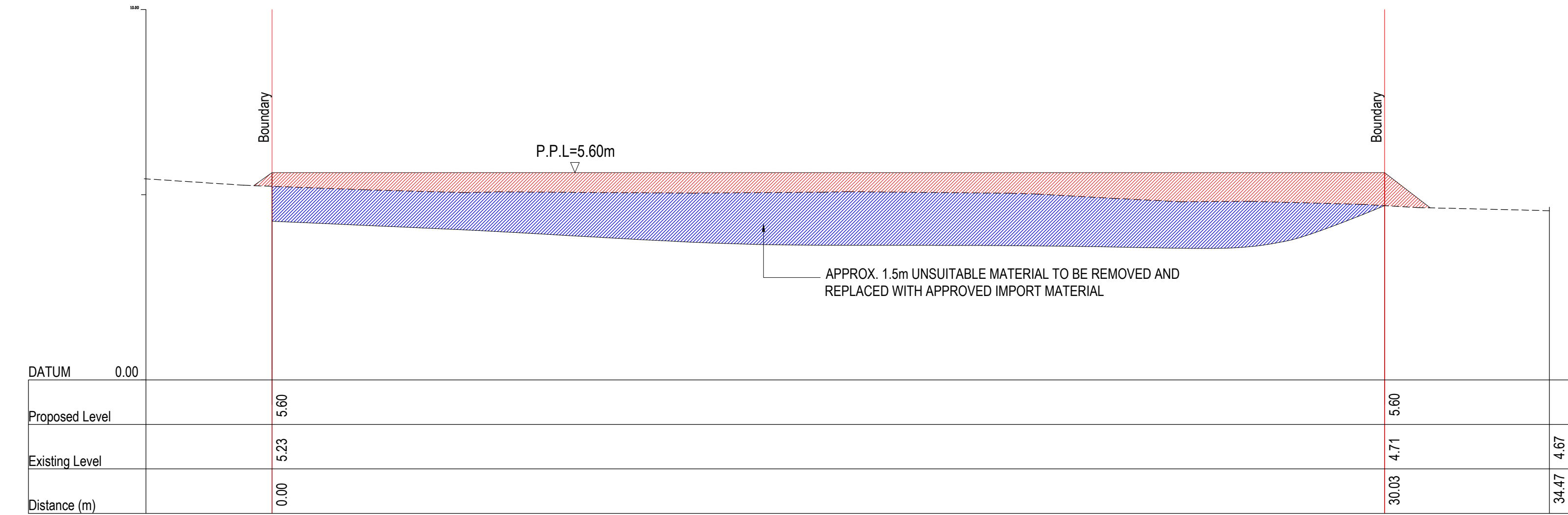




SECTION A-A
MENDATAR= 1: 100 , MENEGAK= 1: 100



SECTION B-B
MENDATAR= 1: 100 , MENEGAK= 1: 100



SECTION C-C
MENDATAR= 1: 100 , MENEGAK= 1: 100

NOTA :

LUKISAN SEBUT HARGA

PROJEK (Project)

CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

NOTA :

REV:	DATE	DESCRIPTION	BY

PEMLIK :



MAJLIS AMANAH RAKYAT
BAHAGIAN BINAAN DAN SELENGARAAN
TINGKAT 11, BLOK PELABAT MABA,
NO 21 JALAN MARA,
50009 KUALA LUMPUR

JURUTERA C&S :

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 performance of the same.



IR. WAN MANAN B. WAN ALI
M.I.E.M.P. Eng. A.C.P.E.



TECHNIPRO CONSULT SDN. BHD.
(Civil, Structural & Geotechnical Consulting Engineer)
51-A & B, TINGKAT 2, JALAN TOK LAM,
20100 KUALA TERENGGANU,
TERENGGANU
Tel: 09-6223253
Fax: 09-6223263

ARKITEK :



ARKITEK ZAFWAN FARID
PT 2587, TINGKAT BLOK TAMAN ADIS INDAH,
JALAN TOK ADIS, KUALA BAI, 20400 KUALA
TERENGGANU, TERENGGANU. TEL: 09-6317760
FAX: 09-6312760 EMAIL: admin@zaf.com.my

JURUTERA M&E :



EMECH CONSULTING ENGINEERS
NO. 20052, ARAS 1 & 2, PERKUSAN PERMINTA
PERDANA, KAMPUNG BATIN, SEBERANG TAKIR,
21100 KUALA TERENGGANU, TERENGGANU.
TEL.: 09-666 7337 FAX: 09-666 7336
EMAIL: emechconsult@gmail.com

JURUUKUR BAHAN :



PERUNDING UKUR BAHAN WFA SDN BHD
PT1898, TINGKAT 1, PERKUSAN KP PERDANA KUBANG
PARK, 20200 KUALA TERENGGANU, TERENGGANU.
TEL.: 09-626 1898 FAX: 09-626 1898
EMAIL: pub.wfab@gmail.com

TAJUK LUKISAN :

-SECTION A-A, B-B & C-C

TARIKH : 03 OGOS 2026

SKALA : YANG TERTERA

DILUKIS : M.M.A

DISEMAK : NR

NO. KONTRAK :

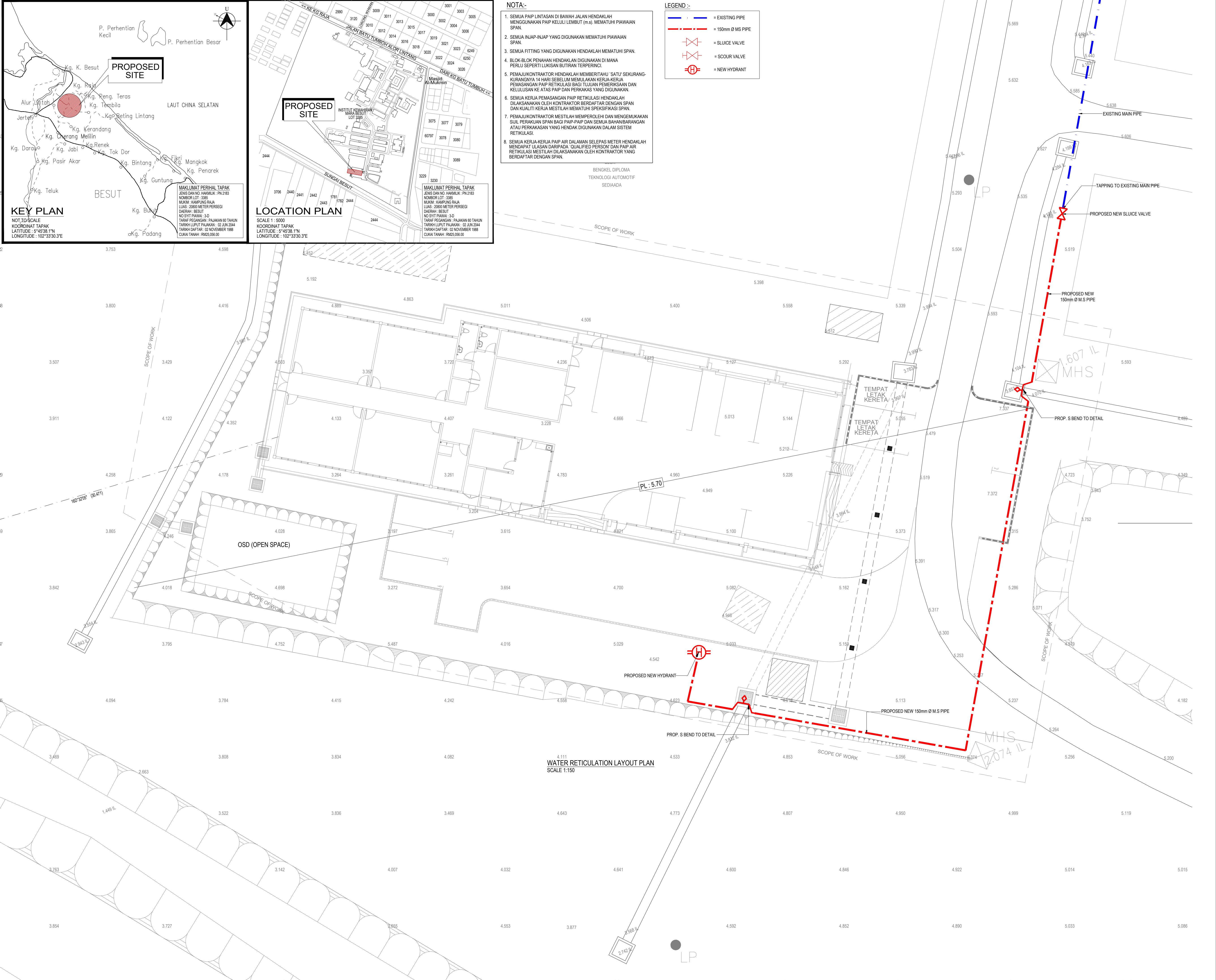
NO. PROJEK : TCSB/NR/2515/EW/1.1

REVISION

SHEET NO.

NO. LUKISAN

02



- NOTA:-
1. SEMUA PAIP LINTASAN DI BAWAH JALAN HENDAKLAH MENGGUNAKAN PAIP KELULI LEMBUT (m.s), MEMATUHI PIAWAIAN SPAN.
 2. SEMUA INJAP-INJAP YANG DIGUNAKAN MEMATUHI PIAWAIAN SPAN.
 3. SEMUA FITTING YANG DIGUNAKAN HENDAKLAH MEMATUHI SPAN.
 4. BLOK-BLOK PENAHAN HENDAKLAN DIGUNAKAN DI MANA PERLU SEPERTI LUKISAN BUTIRAN TERPERINCI.
 5. PEMAJUKONTRAKTOR HENDAKLAH MEMBERITAHU 'SATU' SEKURANG-KURANGNYA 14 HARI SEBELUM MEMULAKAN KERJA-KERJA PEMASANGAN PAIP RETIKULASI BAGI TUJUAN PEMERIKSAAN DAN KELULUSAN KE ATAS PAIP DAN PERKAKAS YANG DIGUNAKAN.
 6. SEMUA KERJA PEMASANGAN PAIP RETIKULASI HENDAKLAH DILAKSANAKAN OLEH KONTRAKTOR BERDAFTAR DENGAN SPAN DAN KUALITI KERJA MESTILAH MEMATUHI SPESIFIKASI SPAN.
 7. PEMAJUKONTRAKTOR MESTILAH MEMPEROLEHI DAN MENGEMUKAKAN SUL PERAKUAN SPAN BAGI PAIP-PAIP DAN SEMUA BAHANBARANGAN ATAU PERKAKASAN YANG HENDAK DIGUNAKAN DALAM SISTEM RETIKULASI.
 8. SEMUA KERJA-KERJA PAIP AIR DALAMAN SELEPAS METER HENDAKLAH MENDAPAT ULASAN DARIPADA QUALIFIED PERSON DAN PAIP AIR RETIKULASI MESTILAH DILAKSANAKAN OLEH KONTRAKTOR YANG BERDAFTAR DENGAN SPAN.

- LEGEND :-
- - - - - EXISTING PIPE
 - - - - - 150mm Ø MS PIPE
 - ⋈ SLUICE VALVE
 - ⋈ SCOUR VALVE
 - ⊕ NEW HYDRANT

NOTA :

LUKISAN SEBUT HARGA

PROJEK (Project)

CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

NOTA :

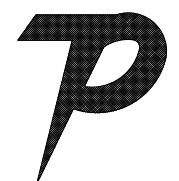
REV.	DATE	DESCRIPTION	BY

PEMLIK :



MAJLIS AMANAH RAKYAT
BAHAGIAN BINAAN DAN SELENGKARAAN
TINGKAT 11, BLOK PERAKAT MABA,
NO 21 JALAN MARA,
50009 KUALA LUMPUR

JURUTERA C&S :
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 construction of the same.



TECHNIPRO CONSULT SDN. BHD.
(Civil, Structural & Geotechnical Consulting Engineer)
51-A & B, TINGKAT 7, JALAN TOK LAM,
20100 KUALA TERENGGANU,
TERENGGANU
Tel: 09-6223253
Fax: 09-6223263

ARKITEK :



ARKITEK ZAFWAN FARID
PT 2897, TINGKAT BLOK TAMAN AGAS INDAH,
JALAN TOK AGAS, KUALA BAI, 20400 KUALA
TERENGGANU, TERENGGANU. TEL: 09-6211760
FAX: 09-6312760 EMAIL: admin@zaf.com.my

JURUTERA M&E :



EMECH CONSULTING ENGINEERS
NO 20052, ARAS 1 & 2 PERKUSAN PERMINTA
PERDANA, KAMPUNG BATIN, SEBERANG TAKIR,
21100 KUALA TERENGGANU, TERENGGANU
TEL: 09-666 7337 FAX: 09-666 7336
EMAIL: emechconsult@gmail.com

JURUUKUR BAHAN :



PERUNDING UKUR BAHAN WFA SDN BHD
PT1898, TINGKAT 1, PERKUSAN KP PERDANA KUBANG
PANT, 20200 KUALA TERENGGANU, TERENGGANU.
TEL: 09-626 1898 FAX: 09-626 1898
EMAIL: pub.wfa@gmail.com

TAJUK LUKISAN :

-WATER RETICULATION LAYOUT PLAN

TARIKH : 03 OGOS 2026

SKALA : YANG TERTERA

DILLUKIS : M.M.A

DISEMAK : NR

NO. KONTRAK :

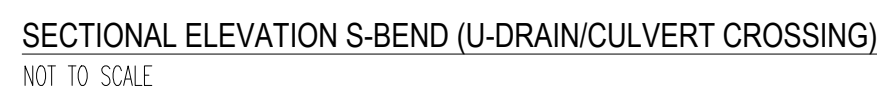
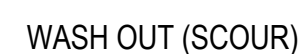
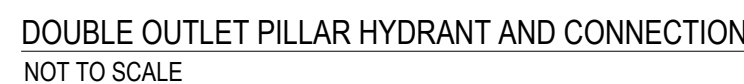
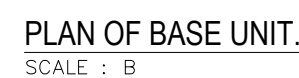
NO. PROJEK : TCSB/INR/2515/WR/1.0

REVISION

SHEET NO.

NO. LUKISAN

01



NOTA :

LUKISAN SEBUT HARGA

PROJEK (Project)

CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN
BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI
AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

NOTA :

PEMILIK :	
-----------	--



JURUTERA C&S :
 '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.'



TECHNIPRO CONSULT SDN. BHD.
(Civil Structural & Geotechnical Consulting Engineer)
51-A & B, TINGKAT 2, JALAN TOK LAM,
20100 KUALA TERENGGANU,
TERENGGANU
Tel: 09-6223253
Fax: 09-6223263

ARKITEK



EMECH CONSULTING ENGINEERS
 NO. 28092, ARAS 1 & 2, PERKEDIAN PERMINT
 PERDANA, KAMPUNG BATIN, SEBERANG TAKIR,
 21300 KUALA TERENGGANU, TERENGGANU.
 TEL : 09-666 7337 FAX: 09-666 7336
 EMAIL : emechconsult@gmail.com

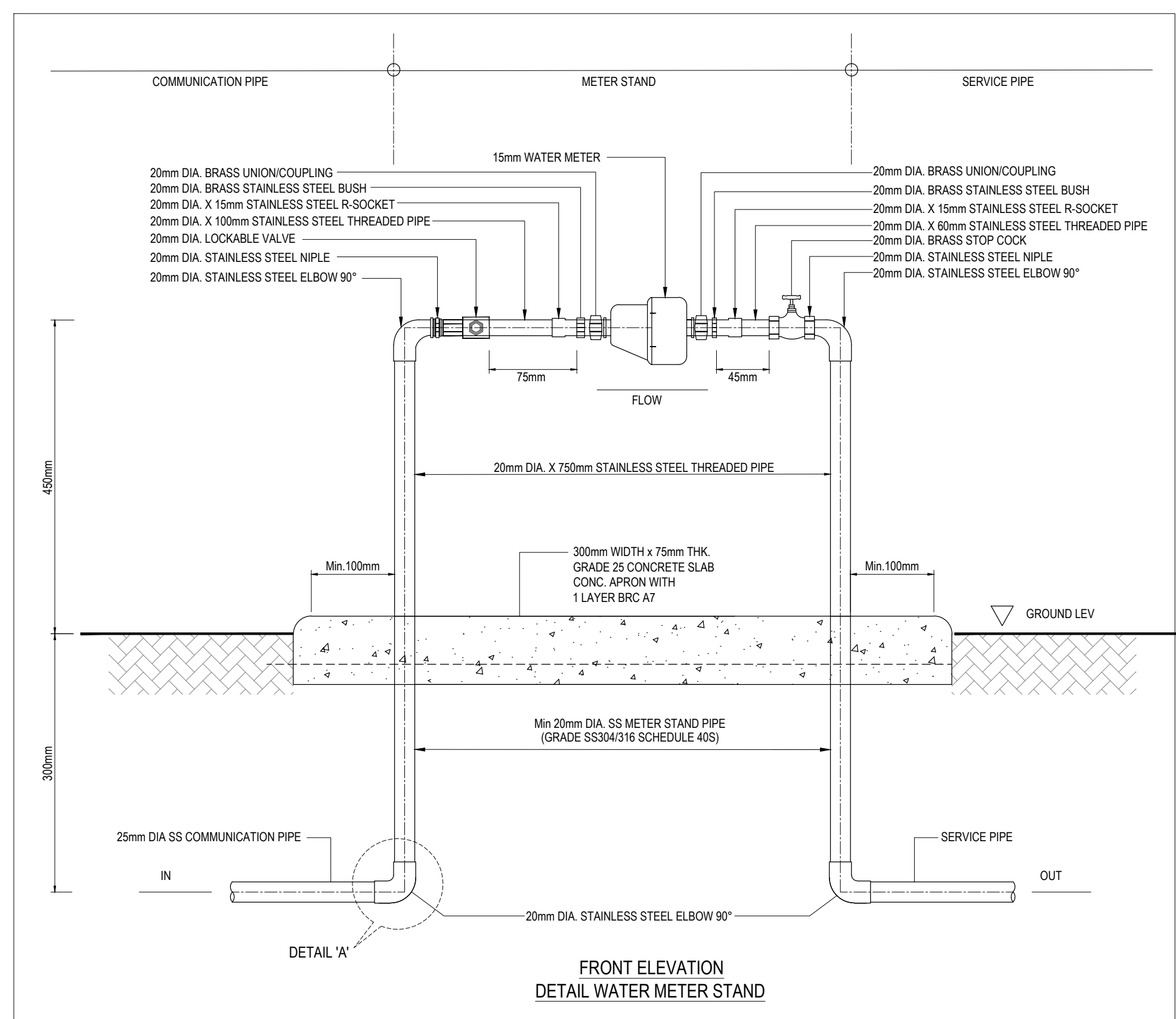
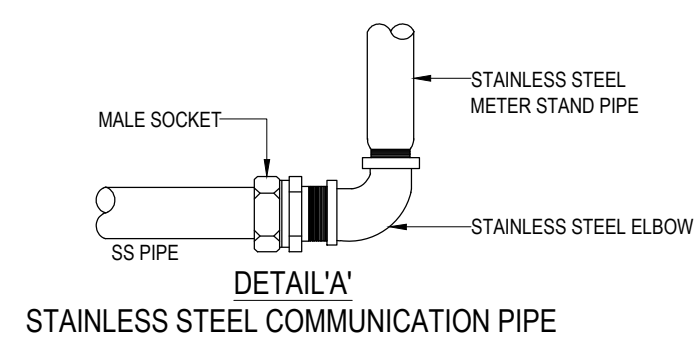
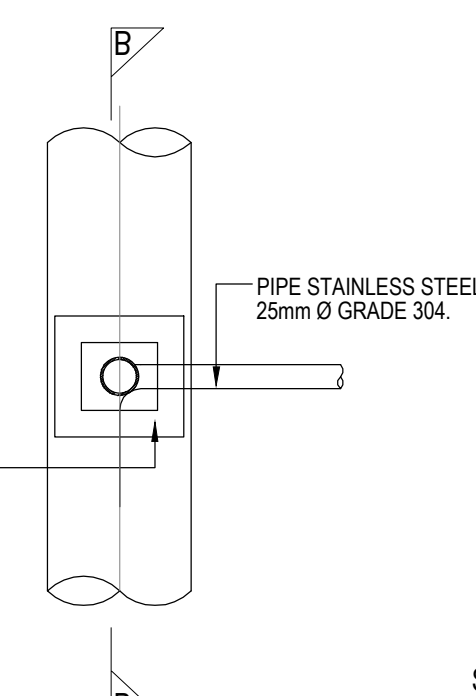
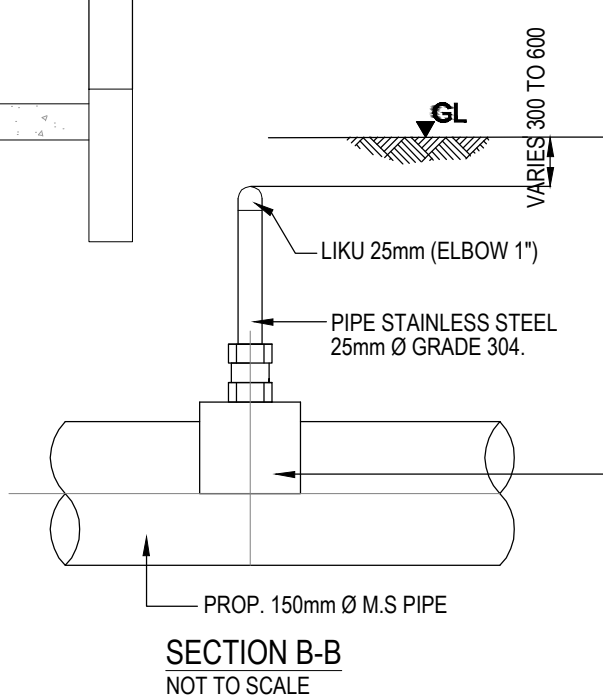
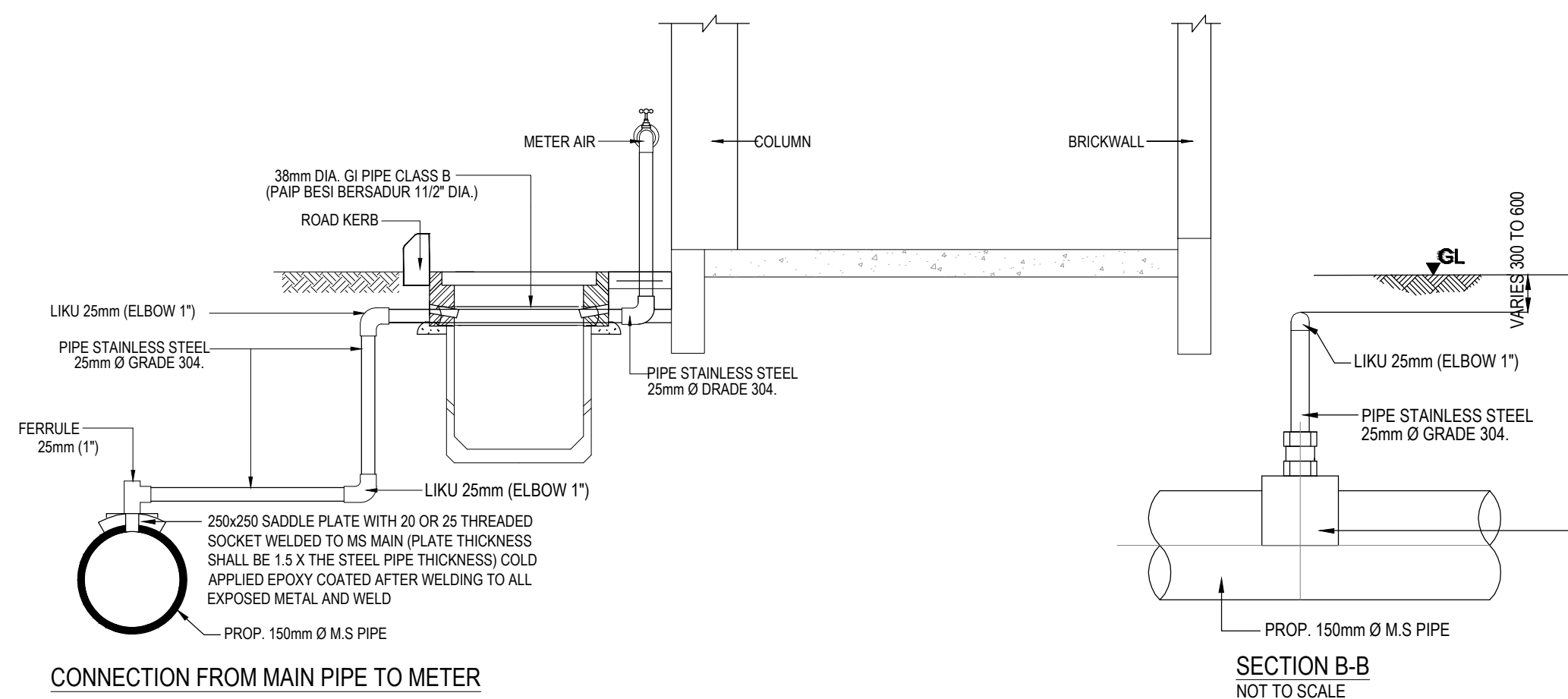
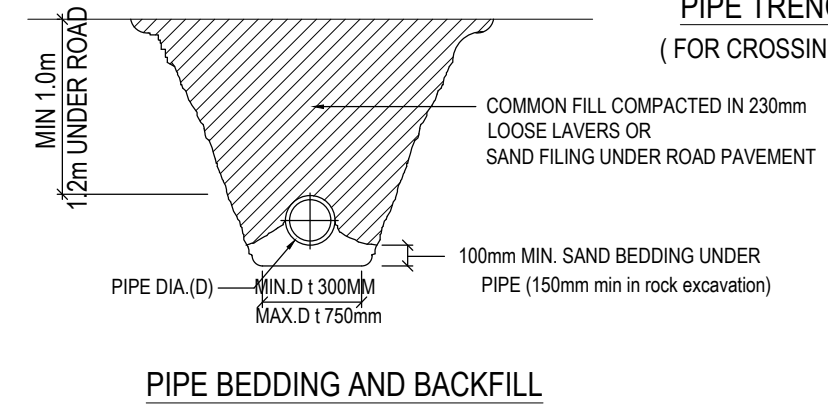
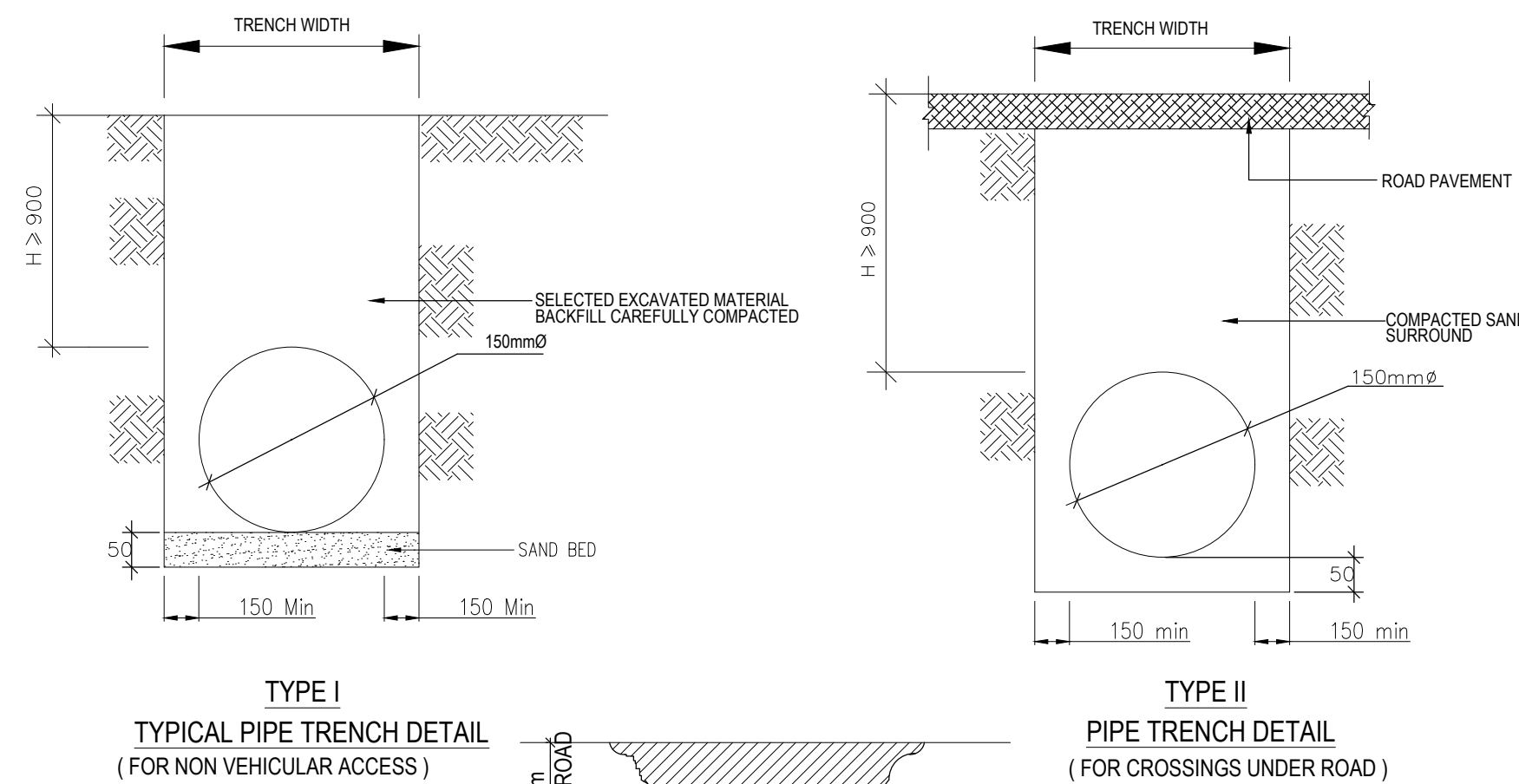
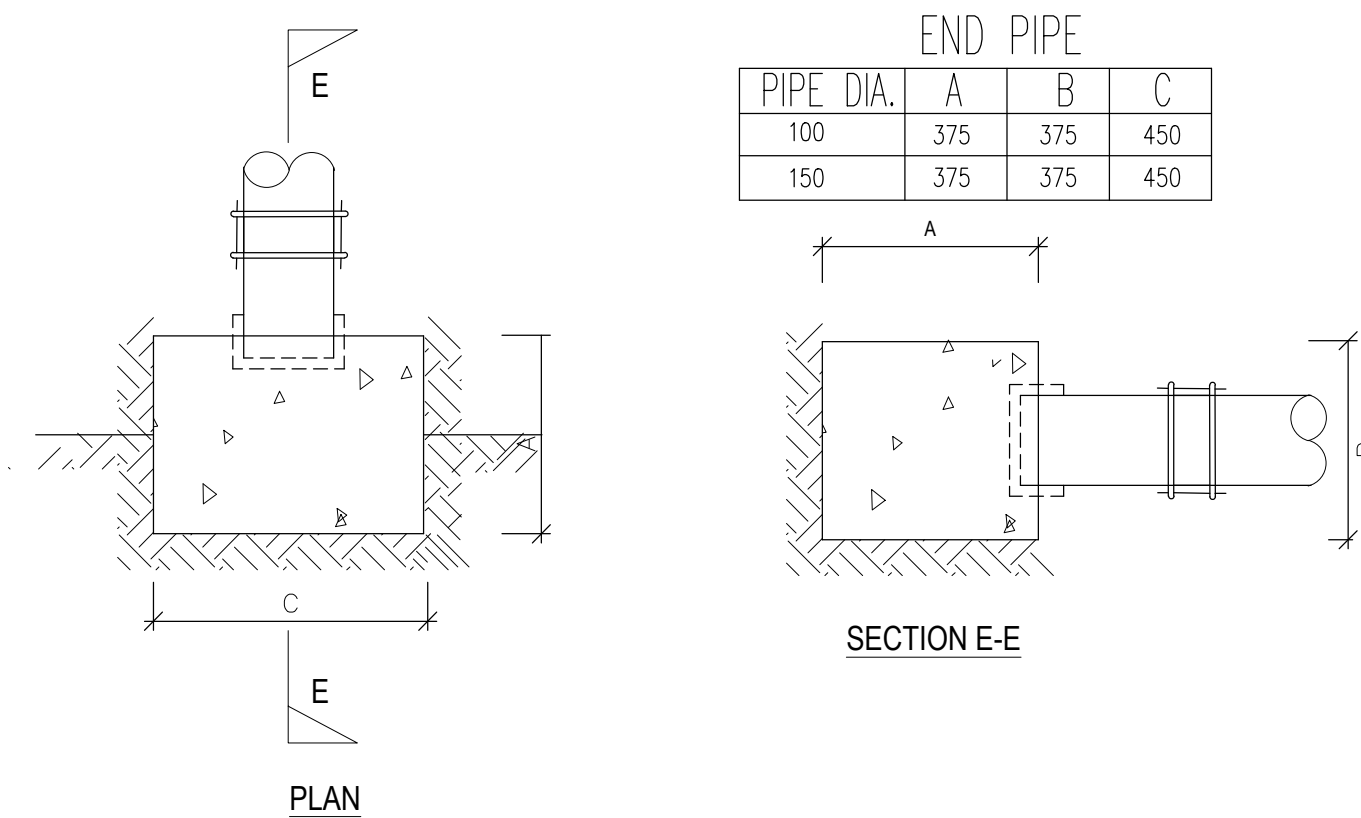
JURUUKUR BAHAN



TAJUK LUKISAN :

- DETAILS OF MARKER
- DETAILS OF FITTING, HYDRANT AND CHAMBERS
- BUTTERFLY / AIR VALVE AND CULVERT CROSSING DETAIL

TARIKH : 03 OGOS 2026	SKALA : YANG TERTEPA
DILUKIS : M.M.A	DISEMAK : NR
NO. KONTRAK :	
NO. PROJEK : TCSB/NR/2515/WR/1.1	REVISION
NO. LUKISAN	02



11 1/2" / 22 1/4" BENDS

PIPE DIA.	A	B	C	D	E
100	100	150	375	300	225
150	100	150	450	300	300
200	150	150	600	375	375
250	150	225	600	450	525
300	225	225	750	525	600
375	225	225	1050	600	900

90° BENDS

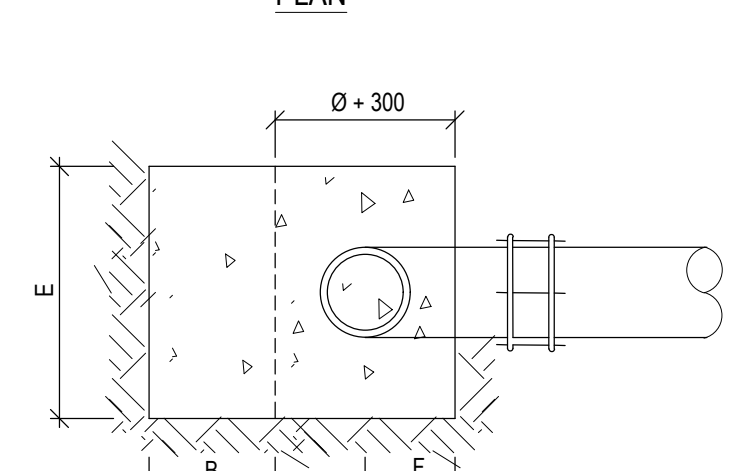
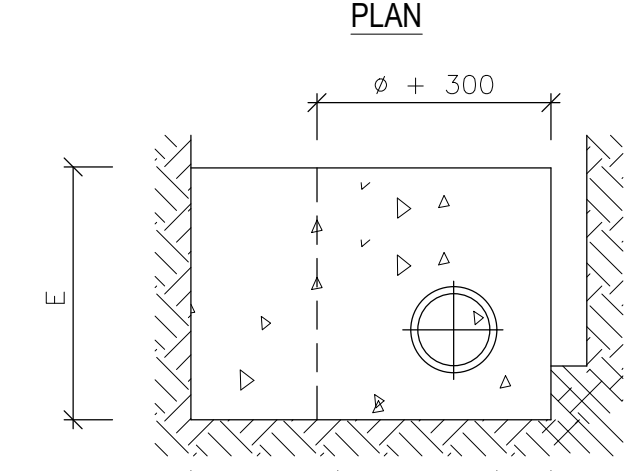
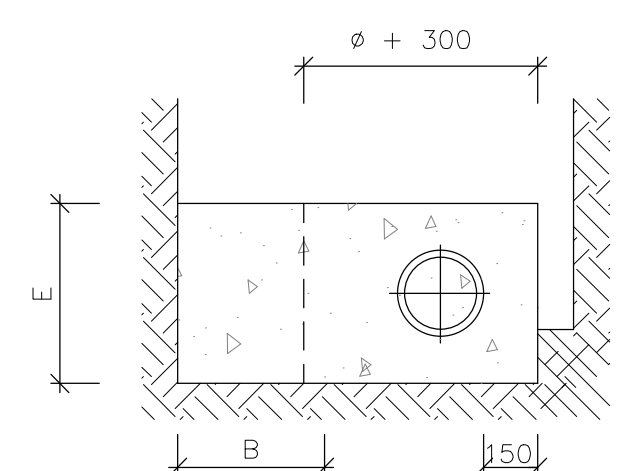
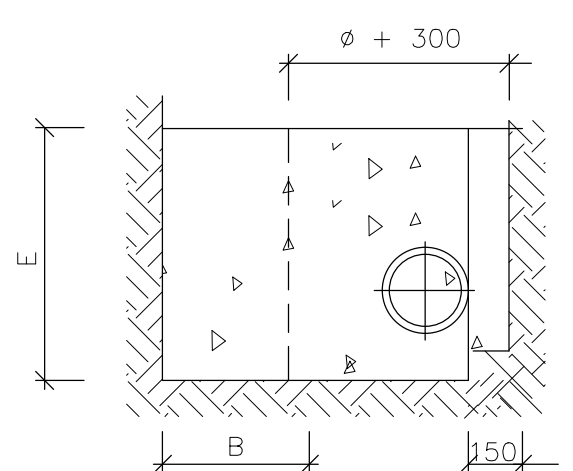
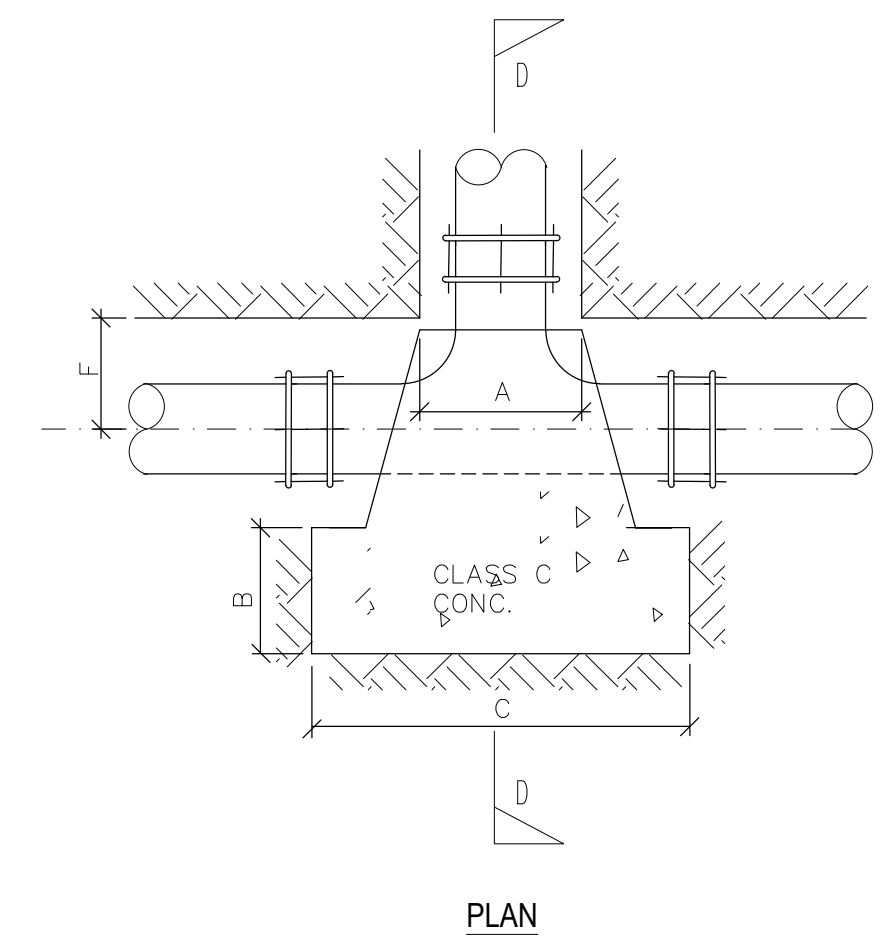
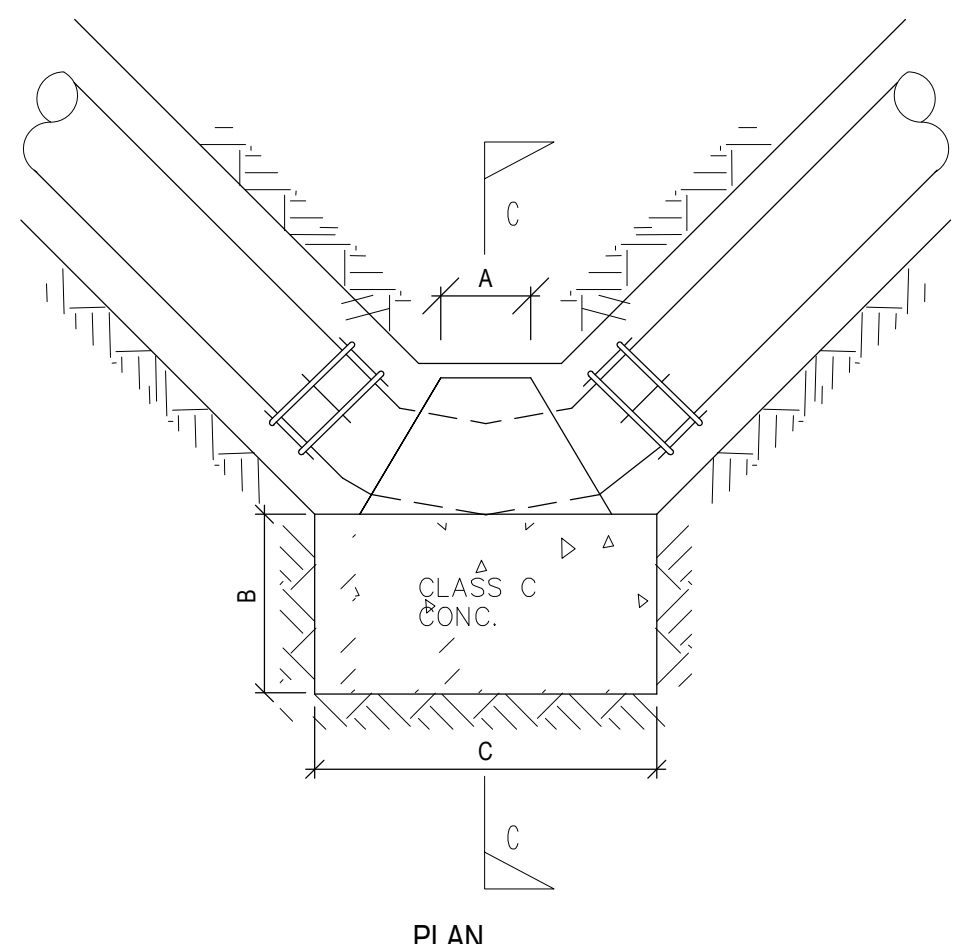
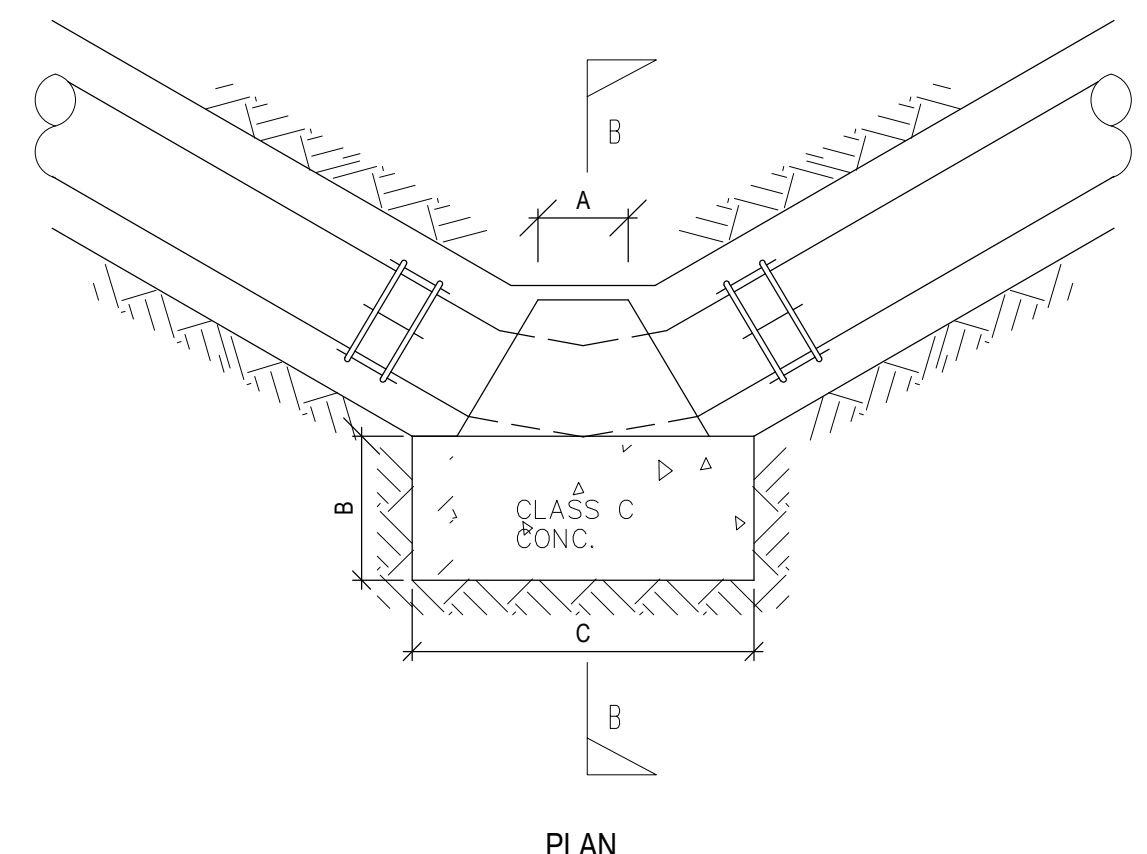
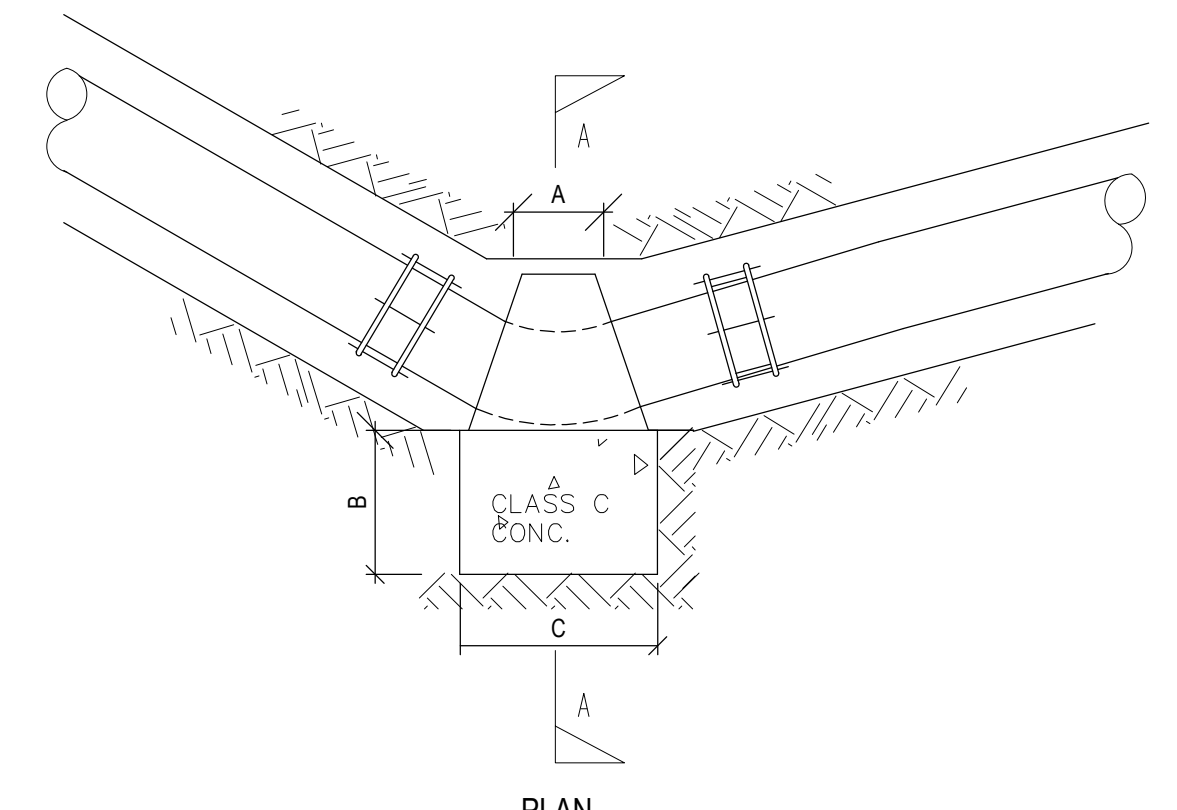
PIPE DIA.	A	B	C	D	E
100	100	150	600	225	375
150	150	150	900	300	450
200	225	150	1125	375	675
250	225	225	1275	450	900
300	300	300	1575	525	1050
375	300	300	1950	600	1350

45° BENDS

PIPE DIA.	A	B	C	D	E
100	100	150	450	300	225
150	150	150	600	300	375
200	225	150	750	375	525
250	225	225	900	450	675
300	300	300	1200	525	750
375	300	300	1350	600	1050

TEES

PIPE DIA.	A	B	C	D	E	F
100 x 100	100	150	600	225	225	100
150 x 100	150	150	600	225	225	150
150 x 150	225	100	625	300	375	150
200 x 100	150	225	600	300	225	150
200 x 150	225	225	825	300	375	150
200 x 200	300	225	1200	375	450	150
250 x 250	300	225	1200	450	675	225
300 x 300	375	300	1425	525	825	225
375 x 375	525	300	1500	625	1200	300



NOTA :

LUKISAN SEBUT HARGA

PROJEK (Project)

CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK : TETUAN MAJLIS AMANAH RAKYAT

NOTA :

REV.	DATE	DESCRIPTION	BY

PEMLIK :

MAJLIS AMANAH RAKYAT
BAHAGIAN BINAAN DAN SELENGGARAAN
TINGKAT II, BLOK PERAKAT MANGA,
NO 21 JALAN MARA,
50050 KUALA LUMPUR

JURUTERA C&S :
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 construction of the same.

JURUTERA TEKNIKAL (PROFESIONAL)
CIVIL
Ir. WAN MANAN BIN WAN ALI
C17653

IR. WAN MANAN B. WAN ALI
M.EMP. Eng. A.C.P.E.

TECHNIPRO CONSULT SDN. BHD.
(Civil, Structural & Geotechnical Consulting Engineer)
51-A & B, TINGKAT 1 & 2, PERKUSAN PERMATA
PERDANA, KAMPUNG BATIN, SEBERANG TAKIR,
21100 KUALA TERENGGANU, TERENGGANU.
Tel: 09-6223253 Fax: 09-6223253

ARKITEK :

ARKITEK ZAFWAN FARID
PT 2897, TINGKAT BAWAH, TAMAN AGAS INDAH,
JALAN TOK AGAS, KUALA BAH, 20400 KUALA
TERENGGANU, TERENGGANU. TEL: 09-6211760
FAX: 09-6312760 EMAIL: admin@zaf.com.my

JURUTERA M&E :

EMECH CONSULTING ENGINEERS
NO. 0802, ARAS 1 & 2, PERKUSAN PERMATA
PERDANA, KAMPUNG BATIN, SEBERANG TAKIR,
21100 KUALA TERENGGANU, TERENGGANU.
TEL: 09-666 7337 FAX: 09-666 7336
EMAIL: emechconsult@gmail.com

JURUUKUR BAHAN :

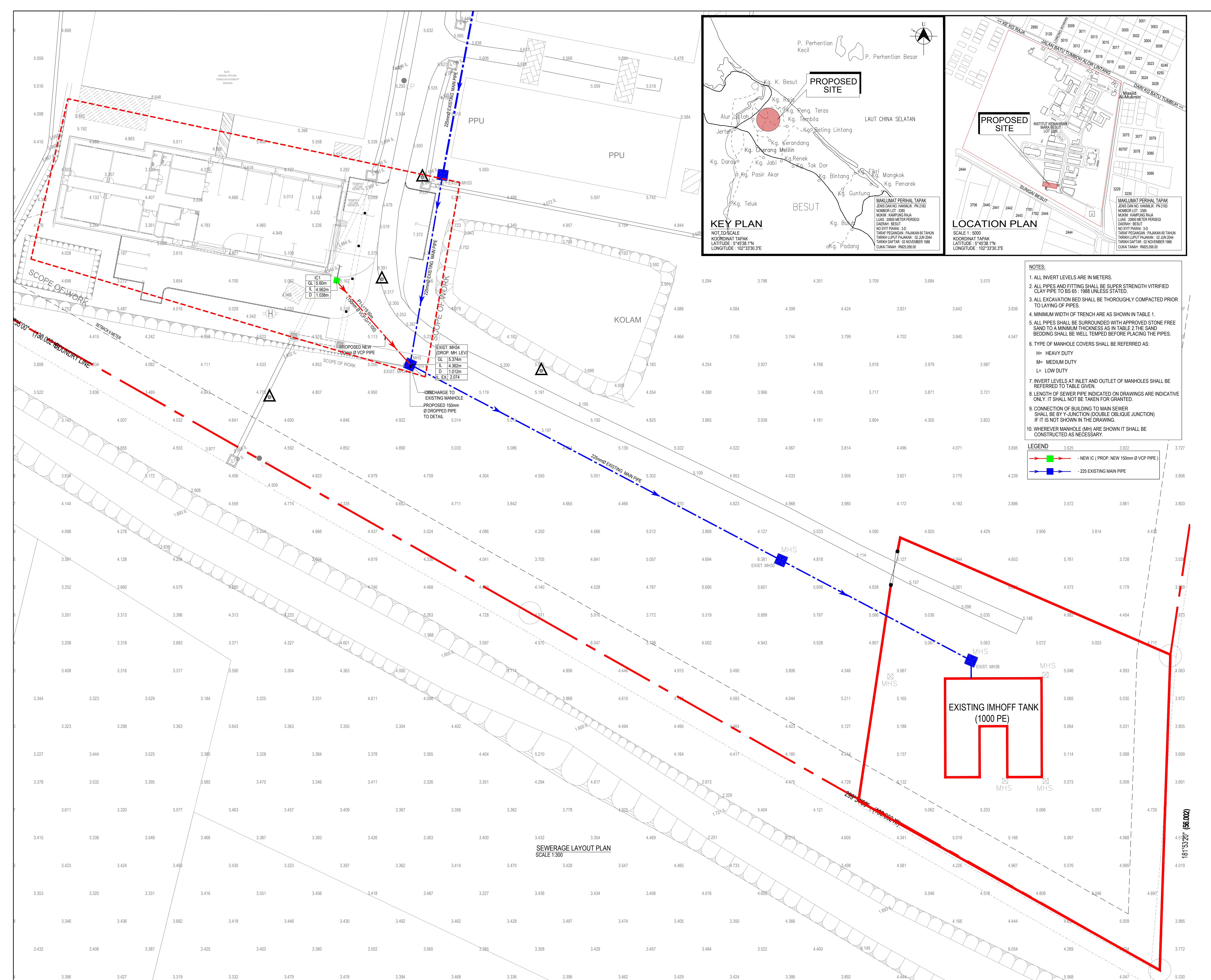
PERUNDING UKUR BAHAN WFA SDN BHD
PT 1898, TINGKAT 1, PERKUSAN KP PERDANA KUBANG
PANT, 20100 KUALA TERENGGANU, TERENGGANU.
TEL: 09-626 1898 FAX: 09-626 1898
EMAIL: pub.wfa@gmail.com

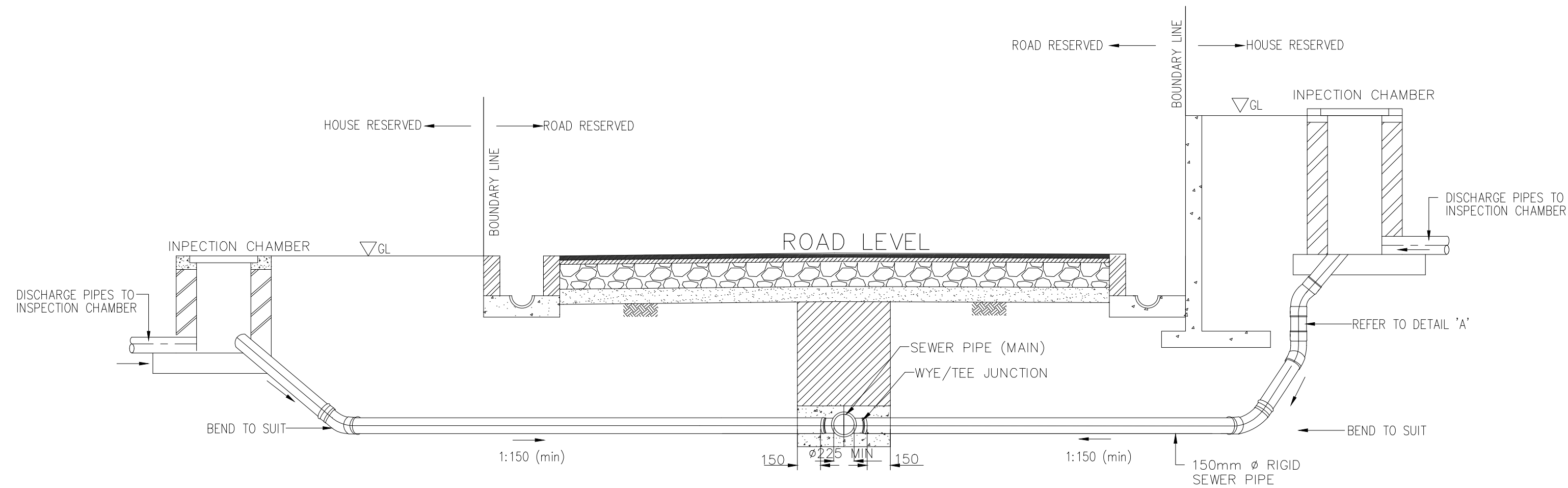
TAJUK LUKISAN :

- TYPICAL ANCHOR BLOCK DETAIL FOR CLASS 15 PIPES
- PIPE BEDDING AND BACKFILL
- DETAIL WATER STAND METER
- CONNECTION FROM MAIN PIPE TO METER
- DETAILS OF COMMUNICATION PIPE AND TAPPING FROM MILD STEEL RETICULATION PIPE

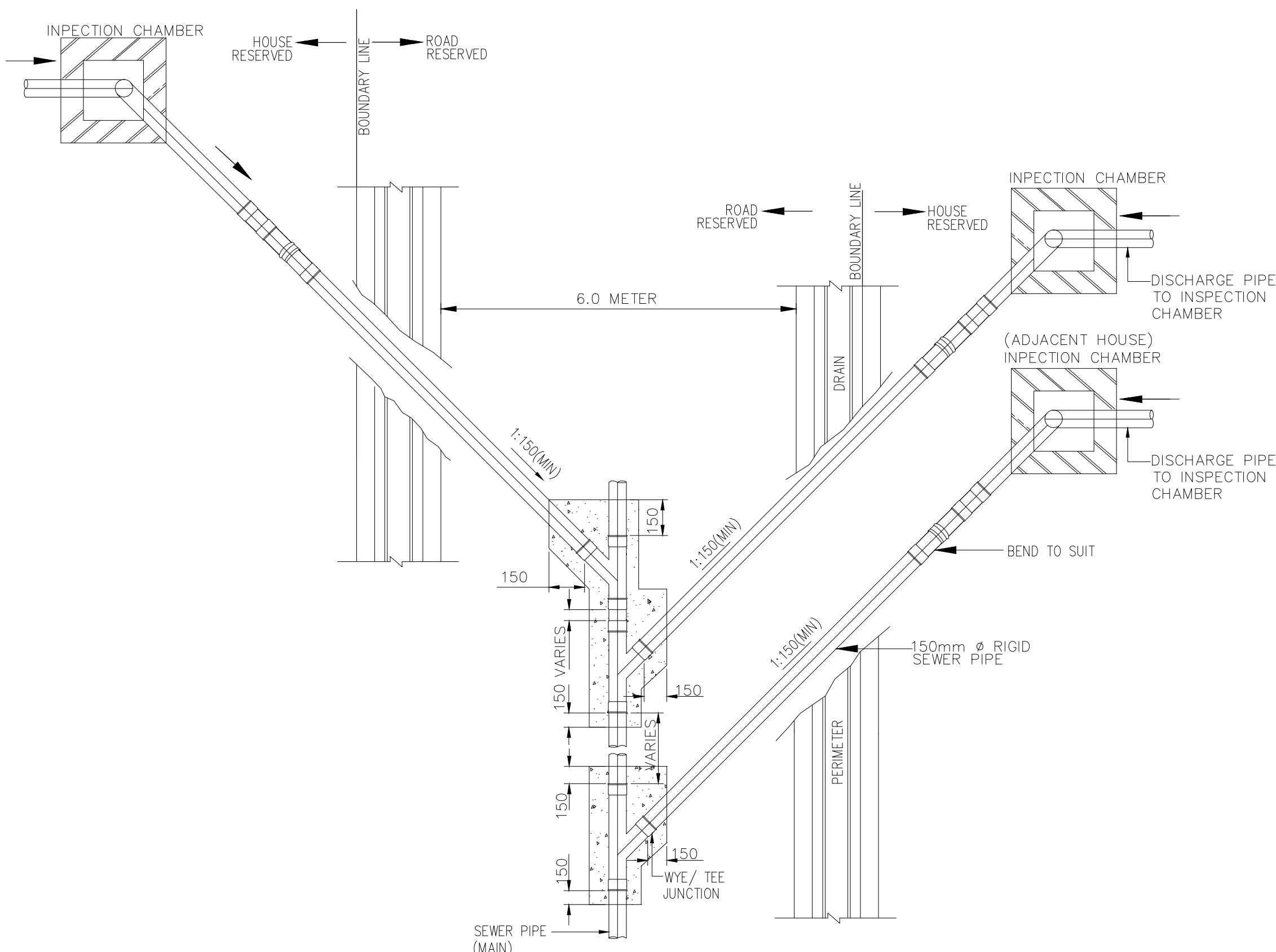
TARIKH : 03 OGOS 2026	SKALA : YANG TERTERA
DILUKIS : M.M.A	DISEMAK : NR
NO. KONTRAK :	
NO. PROJEK : TCSB/INR/2515/WR/1.2	REVISION
NO. LUKISAN	SHEET NO.

03





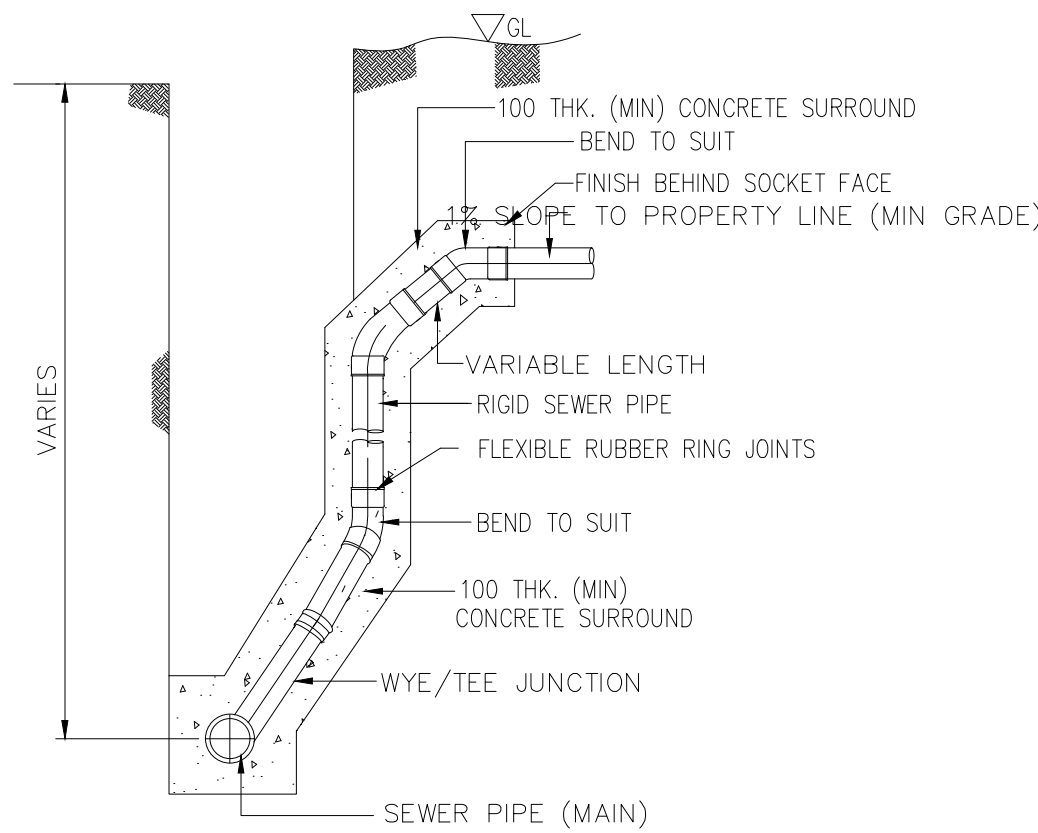
SECTION OF JUNCTION CONNECTION



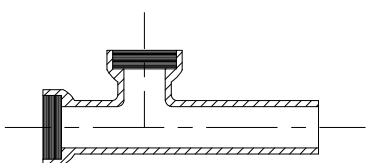
PLAN VIEW SEWER LATERAL CONNECTION

DEPTH OF COVER, H (m)	100mm DIA.	150mm DIA.	200mm DIA.	225mm DIA.	300mm DIA.	375mm DIA.	450mm DIA.
1.0 TO 1.5	28	28	32	28	36	45	43
<2.5	28	28	32	36	36	45	43
<3.0	28	28	32	36	36	45	43
<3.5	28	28	32	36	36	45	43
<4.0	28	28	32	36	36	45	43
<4.5	28	28	32	36	36	45	43
<5.0	28	28	32	36	36	45	43
<5.5	28	28	32	36	36	45	43

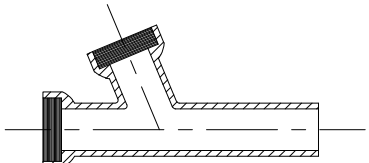
TABLE 2
MAXIMUM TRENCH WIDTH
NOTE:
ALL VOP PIPES CRUSHING STRENGTH FN (kN/m²) FOR VARIOUS DIAMETERS OF PIPE TO BE REFERRED TO TABLE 4 AND TABLE 5 MS 1061: PART 1



DETAIL 'A'
DEEP JUNCTION CONNECTION



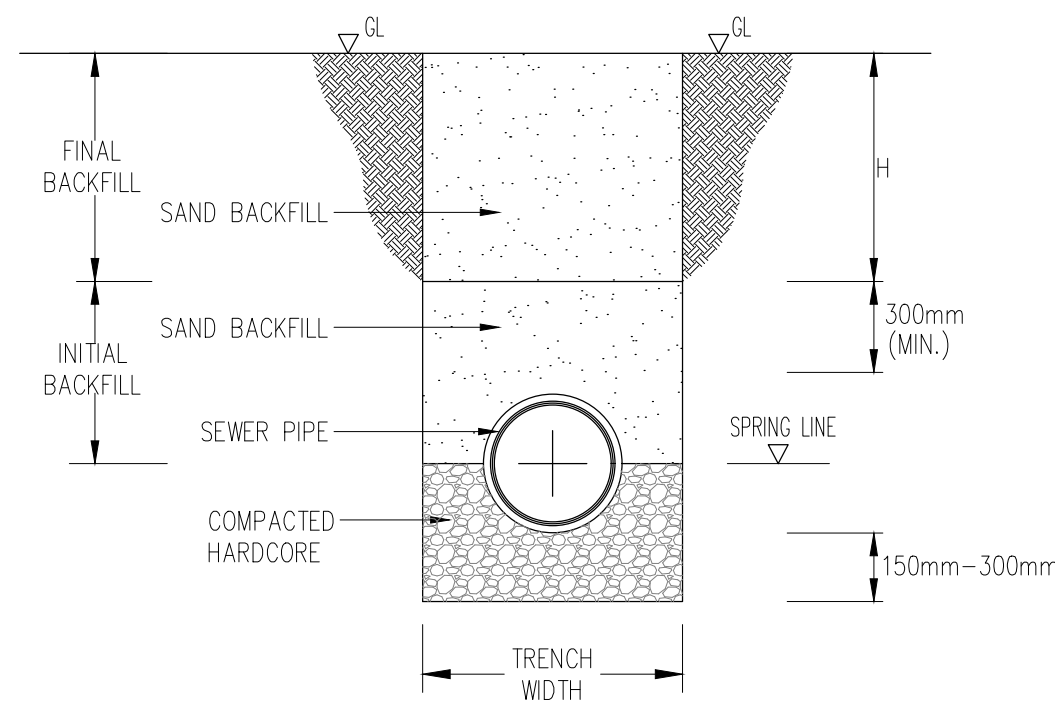
TYPICAL T-JUNCTION



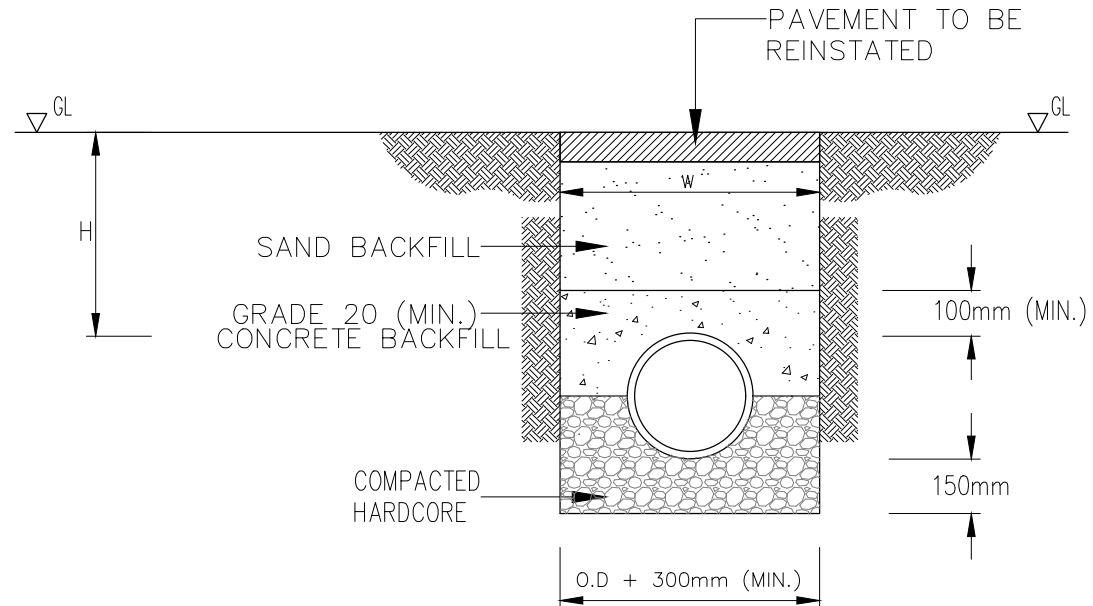
TYPICAL Y-JUNCTION

PIPE SIZE	MAXIMUM TRENCH WIDTH, W
100mm DIA.	700mm
150mm DIA.	750mm
225mm DIA.	825mm
300mm DIA.	900mm
375mm DIA.	975mm

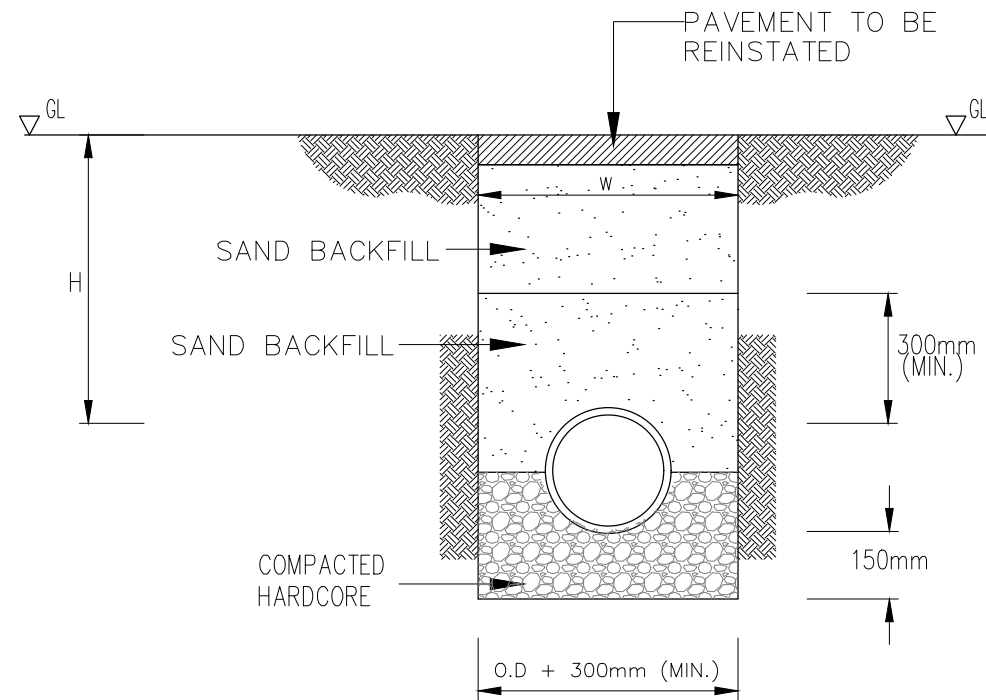
TABLE 1
MAXIMUM TRENCH WIDTH



TYPICAL SEWAGE PIPE BEDDING



CLASS 'A' BEDDING
(LOAD FACTOR = 2.8)
THE REMAINDER SIDE FILLS AND TOP OF THE PIPE AFTER EMBEDMENT TO BE BACKFILLED WITH MONOLITHIC PLAIN CONCRETE.



CLASS 'B' BEDDING
(LOAD FACTOR = 1.9)
THE REMAINDER SIDE FILLS AND TOP OF THE PIPE AFTER EMBEDMENT TO BE COMPACTED CAREFULLY WITH BACKFILL.

SEWER PIPE DIAMETER	MIN. INTERNAL DIAMETER OF MANHOLE (mm)
225 - 300	1200
375 - 450	1350
525 - 600	1500

Table 2

NOTA :

LUKISAN SEBUT HARGA

PROJEK (Project)

CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

NOTA :

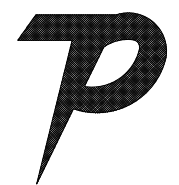
REV.	DATE	DESCRIPTION	BY

PEMLIK :



MAJLIS AMANAH RAKYAT
BAHAGIAN BINAAN DAN SELENGGARAAN
TINGKAT 11, BLOK PEJABAT MARA,
NO 21 JALAN MARA,
50089 KUALA LUMPUR

JURUTERA C&S :
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 performance of the same.



IR. WAN MANAN B. WAN ALI
M.I.E.M.P. Eng & C.P.E.
TECHNIPRO CONSULT SDN. BHD.
(Civil, Structural & Geotechnical Consulting Engineer)
51-A & B, TINGKAT 1, JALAN TOK LAM,
20100 KUALA TERENGGANU,
TERENGGANU.
Tel: 09-6223253
Fax: 09-6223263

ARKITEK :



ARKITEK ZAFWAN FARID
PT 2897, TINGKAT BLOK TAMAN AGUS INDAH,
JALAN TOK AGUS, KUALA BAI, 20400 KUALA
TERENGGANU, TERENGGANU. TEL: 09-6311760
FAX: 09-6312760 EMAIL: admin@zafwan.com.my

JURUTERA M&E :



EMECH CONSULTING ENGINEERS
NO. 20052, ARAS 1 & 2, PERKESIDAIAN PERMINTA
PERDANA, KAMPUNG BATIN, SEBERANG TAKIR,
21100 KUALA TERENGGANU, TERENGGANU.
TEL: 09-666 7337 FAX: 09-666 7336
EMAIL: emechconsult@gmail.com

JURUUKUR BAHAN :



PERUNDING UKUR BAHAN WFA SDN BHD
PT 1898, TINGKAT 1, PERKESIDAIAN KP PERDANA KUBANG
PARK, 20200 KUALA TERENGGANU, TERENGGANU.
TEL: 09-626 1898 FAX: 09-626 1898
EMAIL: pub.wfa@gnail.com

TAJUK LUKISAN :

-CONNECTION AND SEWER PIPE BEDDING

TARIKH : 03 OGOS 2026

SKALA : YANG TERTERA

DILUKIS : M.M.A

DISEMAK : NR

NO. KONTRAK :

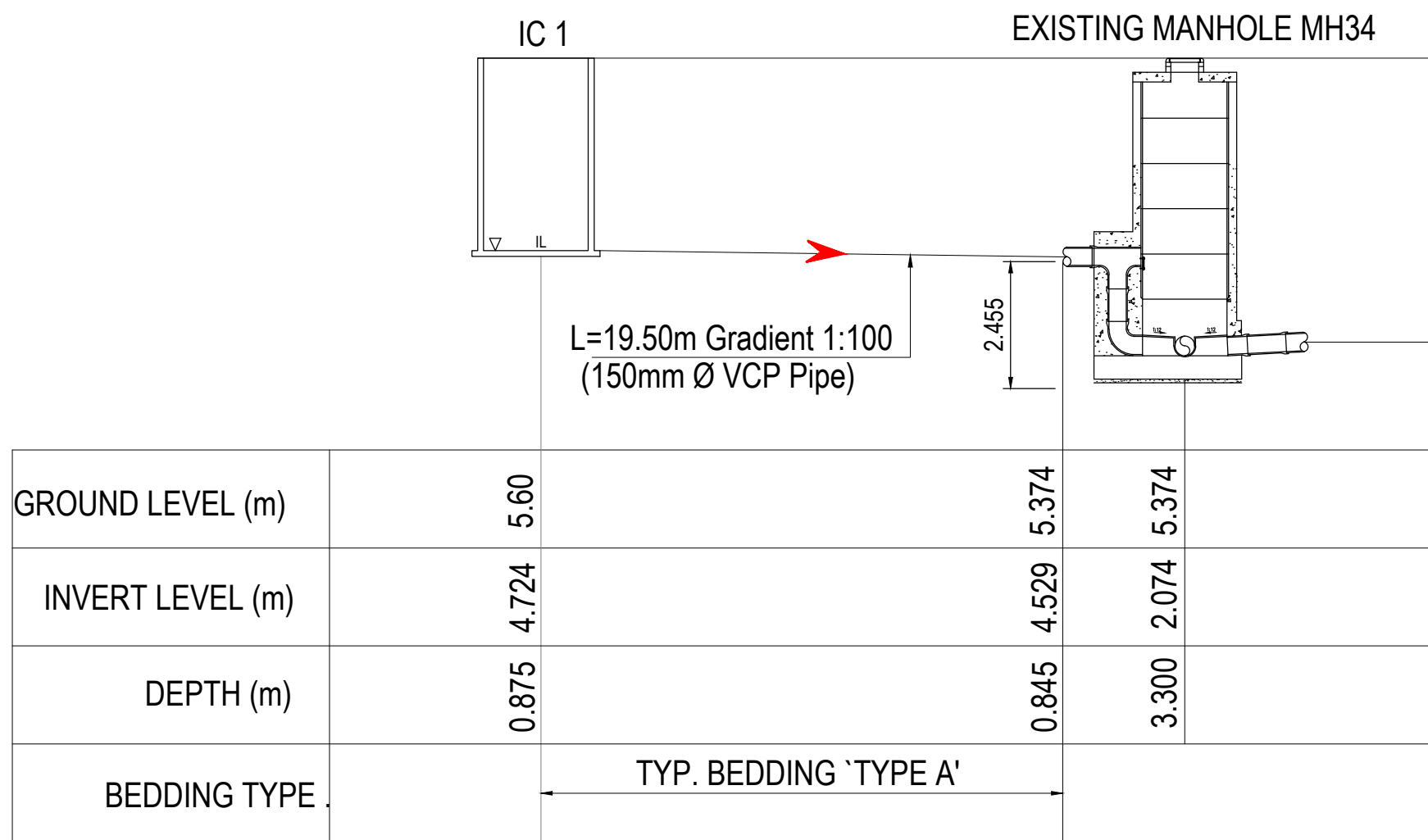
NO. PROJEK : TCBS/NR/2515/SW/1.1

REVISION

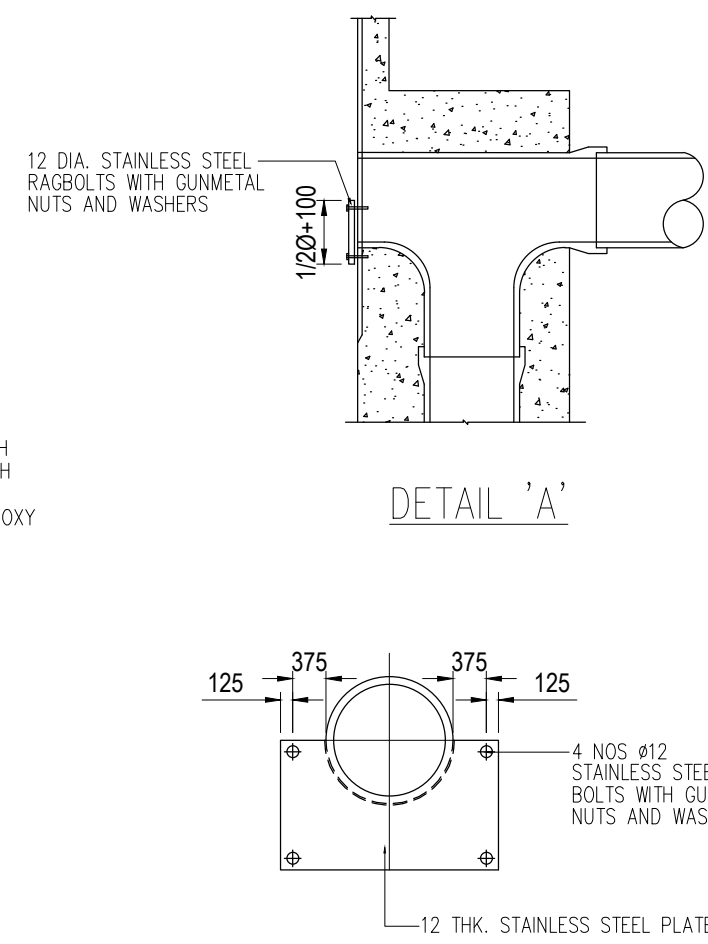
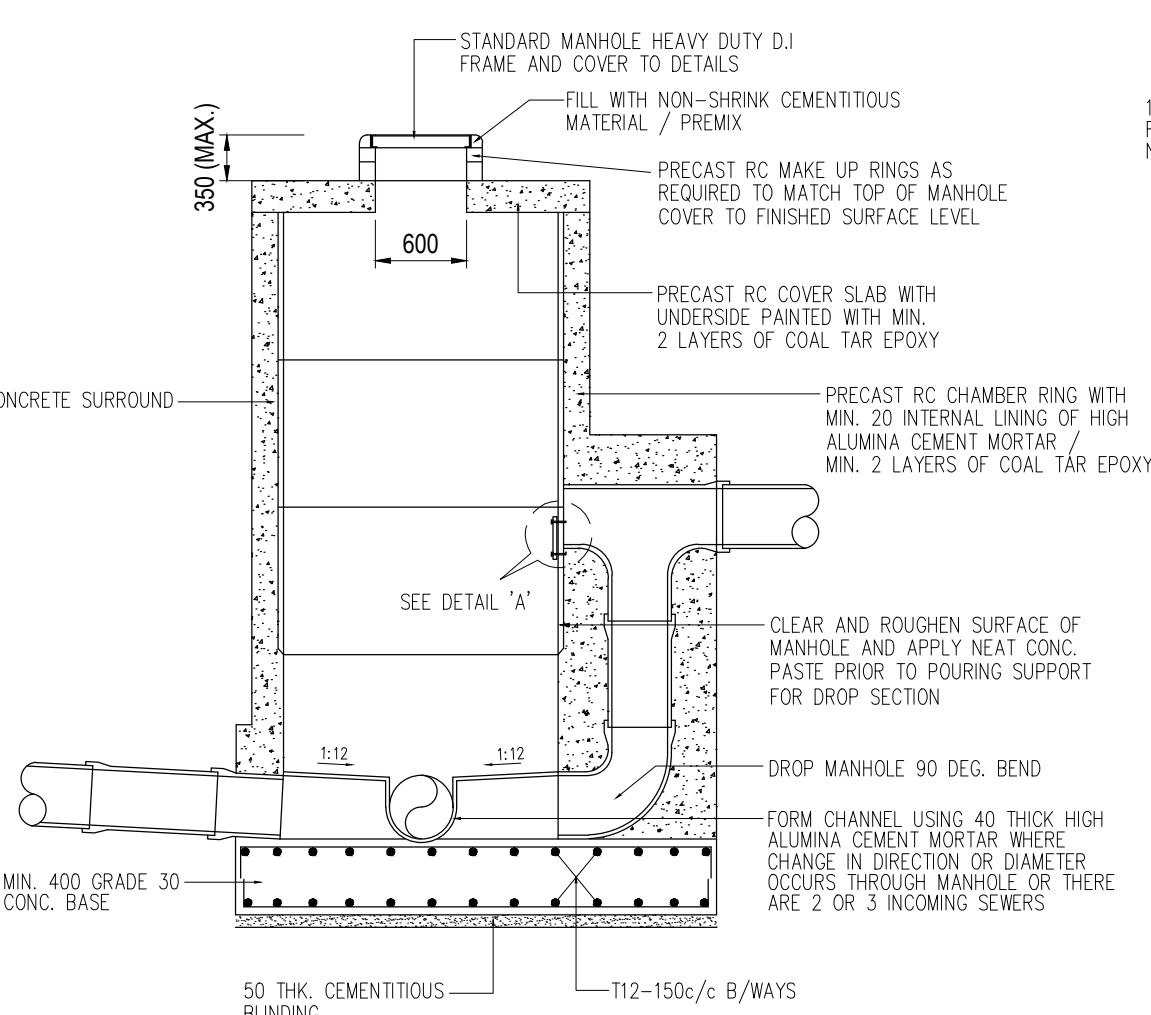
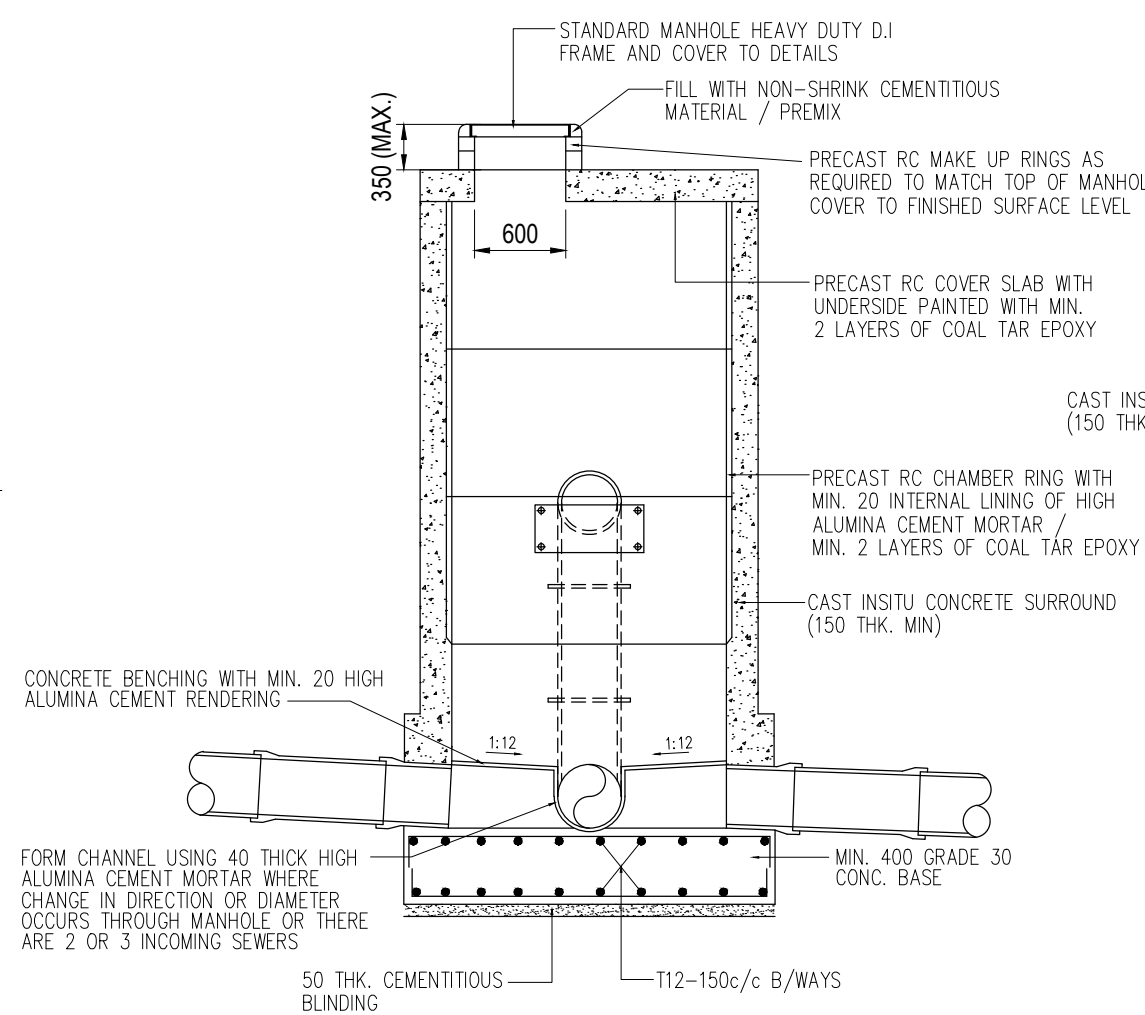
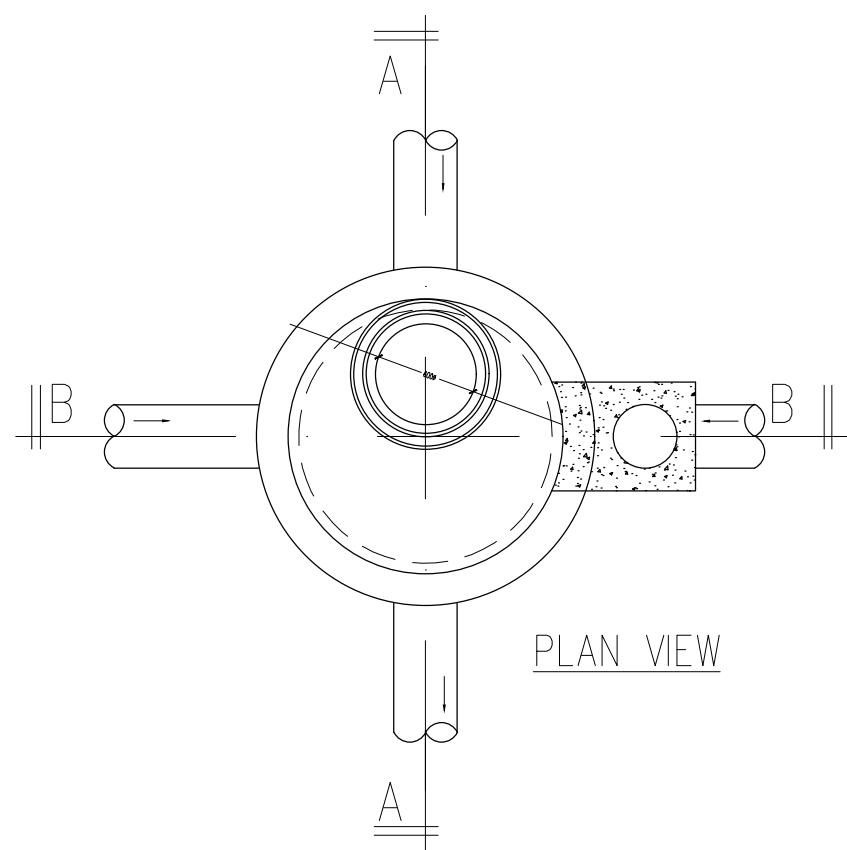
SHEET NO.

NO. LUKISAN

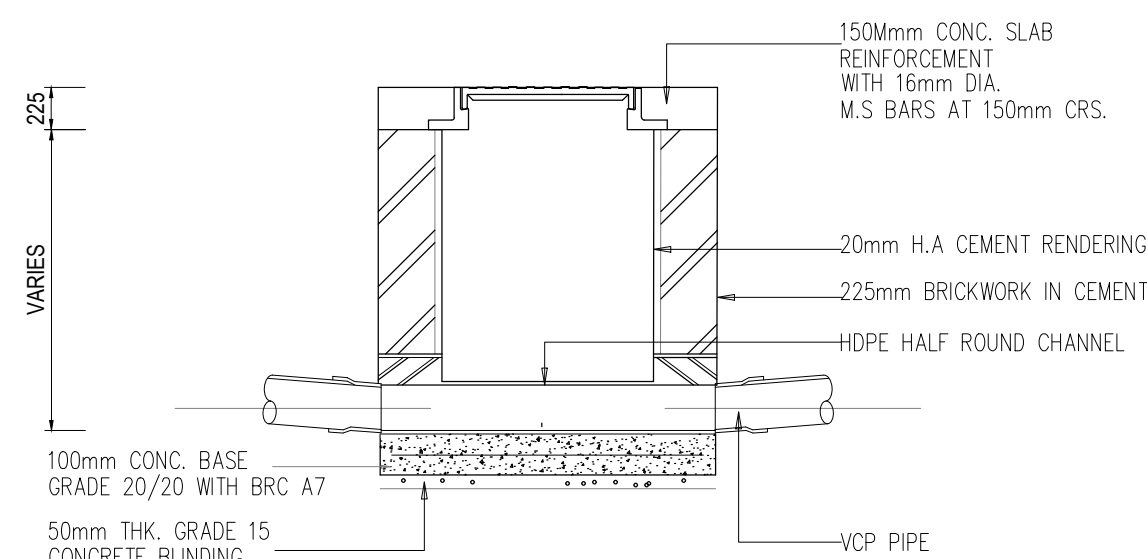
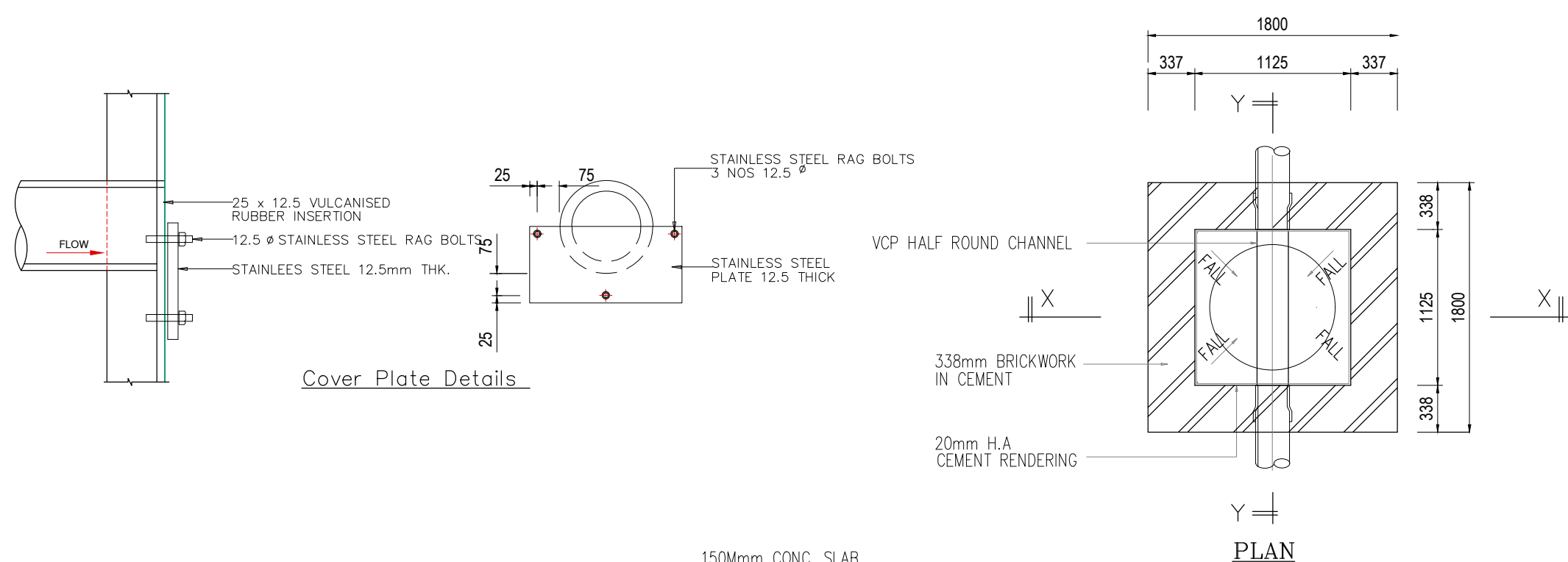
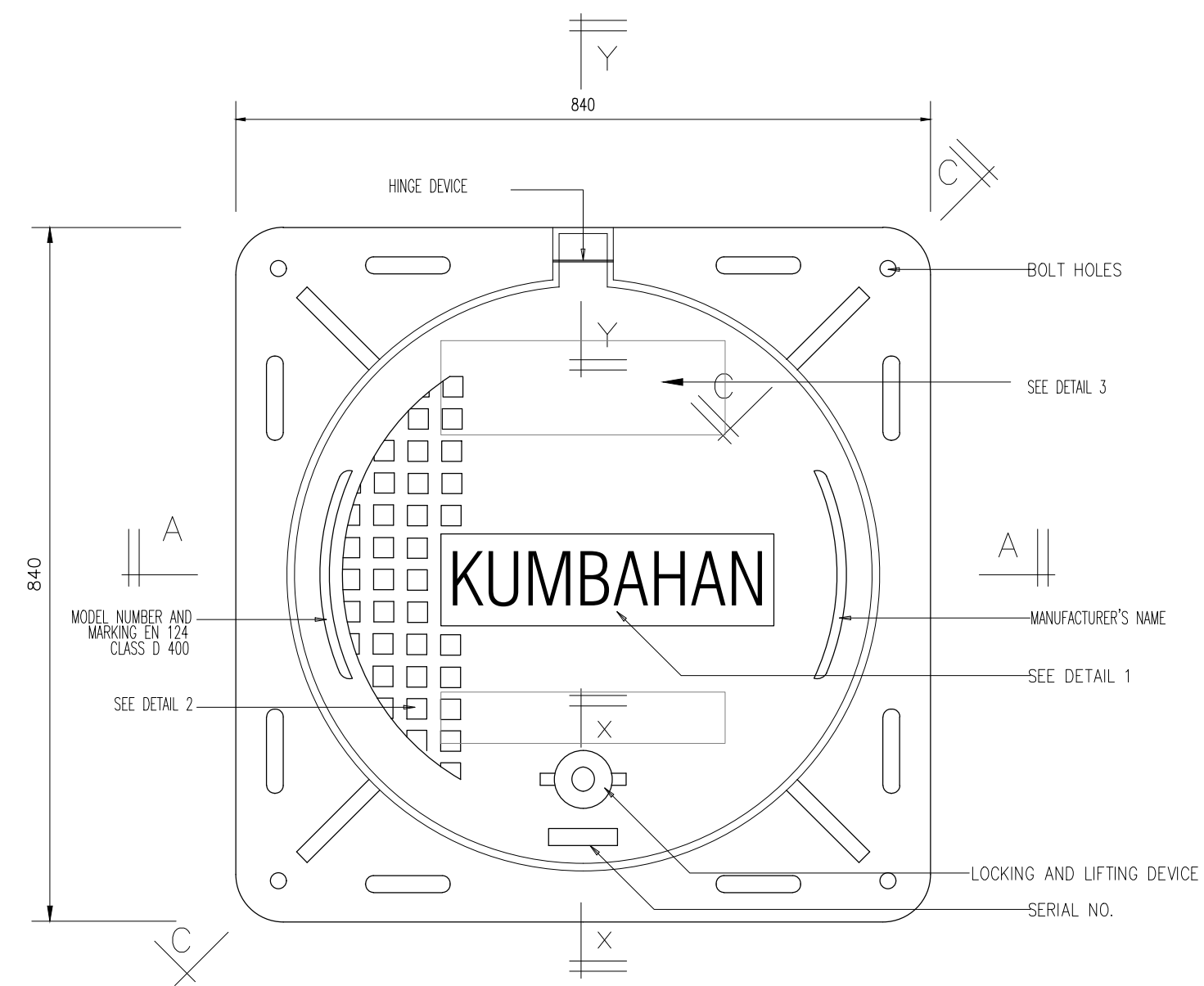
02



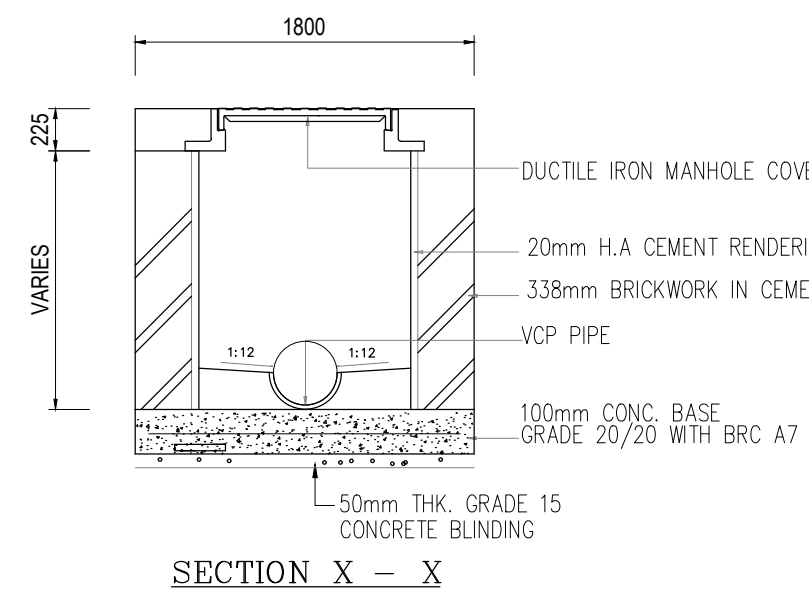
LONGITUDANAL



COVER PLATE DETAILS

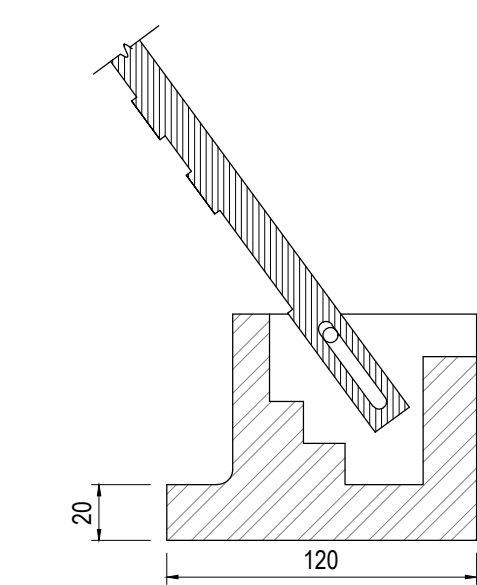


DETAIL OF INTERNAL MANHOLE
(Scale 1 : 20)

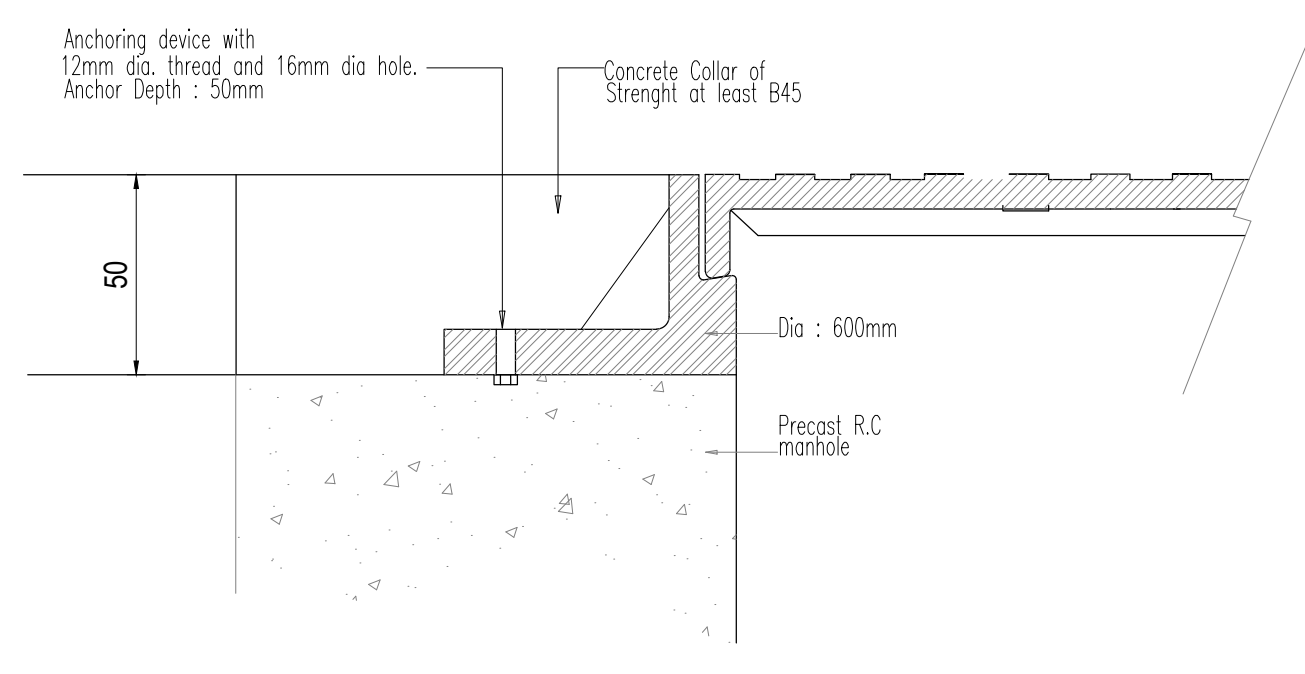
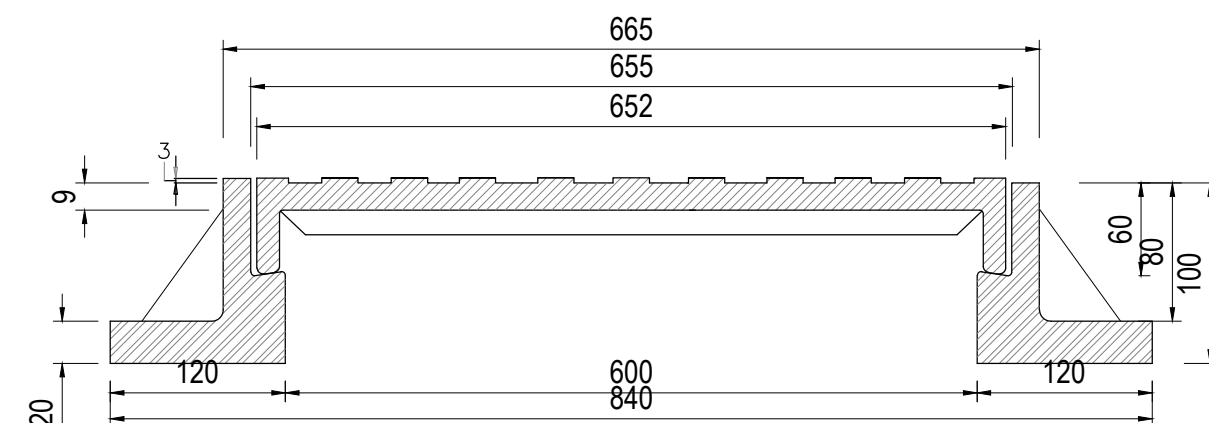


Section X - X
Typical Locking Device

Section Y-Y
Cover Hinged Open 90°



Section Y - Y
Typical Hinge



* PELAN-PELAN INI PERLU DIBACA BERSAMA-SAMA DENGAN
'MS 1228 AND MALAYSIAN SEWERAGE INDUSTRY GUIDELINES
VOLUME I-IV' DAN SEBARANG KEMUSYKILAN ATAU
'MS 1228 AND MALAYSIAN SEWERAGE INDUSTRY
GUIDELINES VOLUME I-IV PERLU DIRUJUK'
KETIDAKTEPATAN DALAM PELAN-PELAN

NOTA :

LUKISAN SEBUT HARGA

PROJEK (Project)

CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN
BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI
AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

NOTA :

REV.	DATE	DESCRIPTION	BY

PEMILIK :



JURUTERA C&S :

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 the safety of the same.



ARKITEK :



JURUTERA M&E :



JURUUKUR BAHAN :



TAJUK LUKISAN :

-DETAILS OF SEWER MANHOLES
-INTERNAL MANHOLE
-LONGITUDANAL

TARIKH : 03 OGOS 2026

SKALA : YANG TERTERA

DILLUKIS : M.M.A

DISEMAK : NR

NO. KONTRAK :

NO. PROJEK : TCSB/NR/2515/SW/1.2

REVISION

SHEET NO.

NO. LUKISAN

03

A

CONTRACT SPECIFICATION

1. THESE NOTES ARE TO BE READ IN CONJUNCTION WITH THE GENERAL SPECIFICATIONS.

2. THE CONTRACTOR MUST SEEK PRIOR APPROVAL FROM THE SUPERINTENDENT OFFICER (S.O) FOR EXECUTION OF ANY WORKS DEVIATING FROM THE SPECIFICATIONS.

3. TECHNICAL SPECIFICATIONS AS STATED IN THE DRAWING SHALL TAKE PRECEDENCE OVER SPECIFICATION REQUIREMENTS SPELT OUT IN THE SPECIFICATIONS.

4. UNLESS OTHERWISE SPECIFIED OR APPROVED BY THE S.O., THE FOLLOWING STANDARDS SHALL BE ADOPTED.

a) EN 1992 : DESIGN OF CONCRETE THE STRUCTURES

b) EN 1992 : PART 1-3: PRECAST CONCRETE ELEMENT AND STRUCTURE

c) EN 1993 : DESIGN OF STEEL STRUCTURES

d) EN 1998 : PART 5: FOUNDATION, RETAINING STRUCTURE AND GEOTECHNICAL ASPECTS

e) OTHER APPROVED RELEVANT CODES OF PRACTICE AND STANDARDS.

5. THE CONTRACTOR HAVE TO CARRY OUT ALL REQUIREMENTS COMPLYING WITH THE LATEST BUILDING CONTROL ACT AND REGULATIONS PERTINENT TO THE SUPERVISION OF CIVIL/STRUCTURAL WORKS.

6. THE CONTRACTOR IS TO SUBMIT THE STRUCTURAL PLANS AND DESIGN CALCULATIONS OF ALL TEMPORARY WORKS, ENDORSED BY A PROFESSIONAL ENGINEER, FOR REVIEW BEFORE THE COMMENCEMENT OF WORKS. THE CONTRACTOR'S PROFESSIONAL ENGINEER SHALL ALSO BE RESPONSIBLE AS FOLLOWS :

a) TAKE ALL NECESSARY PRECAUTIONARY MEASURES AND CONSTANTLY MONITOR THE EFFECT OF THE CONTRACTOR'S WORKS TO ENSURE THAT THE ADJACENT PROPERTIES ARE NOT DAMAGED OR DISTURBED.

b) INSPECT REGULARLY THE CONDITIONS OF THE TEMPORARY WORKS TO ENSURE IT SAFETY

c) CARRY OUT MONITORING PROGRAMMES AND SUBMIT MONITORING REPORT MONTHLY.

d) TAKE IMMEDIATE ACTION ON THE AFFECTED SURROUNDING STRUCTURES TO PREVENT FURTHER DAMAGE IF THE DAMAGE IS LIKELY TO BE CAUSED BY THE CONSTRUCTION WORKS.

B

SETTING OUT AND LEVELS

1. THE CONTRACTOR SHALL ENGAGE A LICENSED SURVEYOR TO SET OUT PROFILE OF THE BUILDINGS AND ALL RELATED WORKS TO THIS CONTRACT IN ACCORDANCE TO SETTING OUT DRAWINGS.

2. FOUR (4) COPIES OF THE SETTING OUT DRAWING DULY ENDORSED BY THE LICENSED SURVEYOR TO BE SUBMITTED TO S.O. FOR RECORD TWO WEEKS AFTER COMPLETION OF SETTING OUT SURVEY.

3. ALL DIMENSIONS SHALL BE READ AND NOT SCALED. DIMENSIONS ARE GIVEN IN MILLIMETRES (mm) UNLESS OTHERWISE STATED.

4. ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE ARCHITECTURAL, MECHANICAL AND ELECTRICAL ENGINEERING DRAWINGS.

5. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND LEVELS ON SITE AND RESOLVE ALL DISCREPANCIES WITH THE ARCHITECT OR ENGINEER BEFORE COMMENCEMENT OF WORKS.

C

MATERIAL

- UNLESS OTHERWISE SPECIFIED:

1. ALL CONCRETE USED IN STRUCTURAL ELEMENTS SHALL CONFORM TO THE FOLLOWING REQUIREMENTS, UNLESS OTHERWISE STATED.

a. CHARACTERISTICS COMPRESSIVE STRENGTH OF C25/30 AT 28 DAYS, REFER TO RELEVANT DRAWINGS

b. MAXIMUM COARSE AGGREGATE OF 20mm.

c. MAXIMUM WATER/CEMENT RATIO OF 0.50.

2. ALL LEAN CONCRETE USED SHALL BE GRADE : 15 CONCRETE.

3. REINFORCING BARS USED SHALL CONFORM TO EN. 1993 HIGH YIELD STEEL HAVING A YIELD STRENGTH OF 500N/mm2 (H) STEEL FABRIC OR STEEL WELDED WIRE MESH HAVING A YIELD STRENGTH OF 485 N/mm2.

4. SUBMISSION FOR S.O.'S APPROVAL.

4.1 UNLESS OTHERWISE SPECIFIED, CONTRACTOR SHALL MAKE ALL NECESSARY SUBMISSIONS AT LEAST TWO WEEKS BEFORE SCHEDULED DATE OF EXECUTING WORKS FOR WORKS WHOSE METHODS AND/OR MATERIALS REQUIRE S.O.'S APPROVAL BEFORE EXECUTION.

4.2 CONTRACTOR MUST ENSURE THAT THE SUBMISSION CONTAINS ALL NECESSARY AND MOST UP TO DATE INFORMATION AND IS ADEQUATE FOR THE S.O. TO CONSIDER AND/OR APPROVE THE PROPOSAL/SUBMISSION WITHIN THE TWO WEEKS PERIOD.

4.3 IMPROPER SUBMISSION, OR SUBMISSION LACKING IN INFORMATION SHALL BE REJECTED FOR APPROVAL CONSIDERATION.

4.4 CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DELAY AND TO BEAR ALL COST ARISING FROM LATE PROPER SUBMISSION TO S.O. FOR APPROVAL. ALL WORKS DONE PRIOR FORMAL APPROVAL BY THE S.O. SHALL BE REJECTED. S.O.'S APPROVAL REFERS TO THE FOLLOWINGS:

4.4.1 ALL ADDITIVES AND ADMIXTURES TO CONCRETE MUST BE SUBMITTED TO THE S.O. FOR HIS APPROVAL PRIOR TO USAGE.

4.4.2 SAMPLES OF ALL MATERIALS AND MANUFACTURER'S SPECIFICATION.

4.4.3 CONCRETE MIX DESIGN AND REINFORCEMENT TEST CERTIFICATES MUST BE SUBMITTED TO THE ENGINEER IMMEDIATELY UPON AWARD OF CONTRACT. NO CONCRETING WORK IS PERMITTED UNLESS ENGINEER HAS APPROVED THE MIX DESIGN AND ACCEPTED THE REINFORCEMENT TEST CERTIFICATES.

4.4.4 METHOD(S) OF CURING CONCRETE AND MATERIAL(S) USED SHALL BE SUBMITTED TO THE S.O. FOR APPROVAL PRIOR TO ANY CONCRETING WORKS NO CONCRETING WORK IS PERMITTED PRIOR TO S.O.'S APPROVAL. THE CONTRACTOR SHALL ADOPT THE APPROVED METHOD(S) OF CURING AND THE MATERIAL(S) FOR THE WHOLE CONTRACT.

4.4.5 CONTRACTOR SHALL SEEK PRIOR AGREEMENT AND APPROVED FROM THE S.O. SHOULD THE ORIGINAL APPROVED METHOD(S) AND MATERIAL(S) NEED TO BE CHANGED FOR VALID REASONS.

D

CONCRETING

D.1

GENERAL

1. BEFORE COMMENCING CONCRETING THE CONTRACTOR SHALL SUBMIT TO THE S.O FOR HIS APPROVAL, ALL DETAILED PROPOSAL FOR THE SEQUENCE OF PLACING CONCRETE AND THE POSITIONS OF ALL VERTICAL AND HORIZONTAL CONTRUCTION JOINTS. SUCH PROPOSALS SHALL BE SUBMITTED TO THE S.O AT LEAST TWO WEEKS BEFORE CONCRETING WORKS SCHEDULE

2. NO. CONCRETE SHALL BE PLACED UNTIL THE STEEL REINFORCEMENT HAS BEEN CHECKED AND APPROVED BY THE S.O

3. ALL FRESH CONCRETE SHALL BE PROTECTED BY APPROVED MEANS FROM RAIN, SUN AND DRYING WIND TO MAINTAIN SUITABLE TEMPERATURE AND MOISTURE.

4. ALL CONCRETE WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE LATEST BS OR EN CODES OF PRACTICE AND CONTRACT SPECIFICATIONS, A COPY OF THESE DOCUMENTS SHOULD BE KEPT ON SITE.

5. THE WATER USED UNLESS OTHERWISE SPECIFIED, SHALL COMPLY WITH BS EN 206.

6. FINE AND COURSE AGGREGATES USED UNLESS OTHERWISE SPECIFIED SHALL COMPLY WITH BS EN 12620.

7. CEMENT FOR CONCRETE SHALL BE ORDINARY PORTLAND UNLESS OTHERWISE STATED.

8. UNLESS OTHERWISE NOTED, ALL CONCRETE SIZES AND LEVELS ARE STRUCTURAL.

9. ALL CONCRETE MUST BE PROPERLY CURED BY KEEPING ALL EXPOSED SURFACES IN MOIST OR DAMP CONDITION FOR AT LEAST THE FIRST SEVEN (7) DAYS AFTER CONCRETING.

10. TOP SURFACE/SIDES OF PRECAST UNITS & CONSTRUCTION JOINTS SHALL BE ROUGHENED TO A DEPTH OF 6mm (MAX.) FOR BONDING WITH IN-SITU CONCRETE, OR AS DESCRIBED IN EN 1992

11. 15mm THICK CEMENT/SAND MORTAR SEATING SHALL BE PROVIDED TO ALL PRECAST BEAMS AND PLANKS EXCEPT AT THE EXPANSION JOINTS.

12. THE TESTING OF CONCRETE SHALL BE CARRIED OUT IN ACCORDANCE WITH EN 12350.

13. CONCRETE GRADE FOR SPACER SHALL BE OF THE SAME GRADE AS SPECIFIED IN THE RELEVANT STRUCTURAL DRAWINGS AND APPROVED BY THE S.O. SPACING OF SPACER SHALL BE DETERMINED AT SITE BY THE S.O.'S APPROVAL.

E

CONCRETE COVER

E.1

BUILDING WORK

1. UNLESS OTHERWISE SHOWN IN DRAWINGS, CONCRETE COVER TO ALL REINFORCING BARS SHALL BE AS TABULATED.

STRUCTURAL COMPONENT	1 HOUR FIRE RATING			1.5 HOUR FIRE RATING		
	COVER (mm)	CONCRETE GRADE	MIN. CEMENT CONTENT (kg/m3)	COVER (mm)	CONCRETE GRADE	MIN. CEMENT CONTENT (kg/m3)
BUILDING						
1. Pilecap/Foundation	75	C25/30	300	75	C25/30	300
2. Ground Floor Level						
a) Beams	30	C25/30	300	40	C25/30	300
b) Slabs/Aprons	25	C25/30	300	35	C25/30	300
c) Stumps/Columns	35	C25/30	300	40	C25/30	300
d) Others Structure	35	C25/30	300	40	C25/30	300
3. Typical Floor Level						
a) Beams	30	C25/30	300	40	C25/30	300
b) Slabs	25	C25/30	300	35	C25/30	300
c) Staircases	35	C25/30	300	40	C25/30	300
d) Others	35	C25/30	300	40	C25/30	300
4. Roof Level						
a) Beams	30	C25/30	300	40	C25/30	300
b) Slabs	25	C25/30	300	35	C25/30	300
c) Others Strucutre	35	C25/30	300	40	C25/30	300

F

STRUCTURES IN CONTACT WITH GROUND

1. BEFORE PLACEMENT OF LEAN CONCRETE OR HARDCORE FOR NON-SUSPENDED SLABS, SUB-GRADES SHALL BE COMPACTED MECHANICALLY TO THE SATISFACTION OF THE S.O.

2. 50mm THICK GRADE 15 LEAN CONCRETE SHALL BE PROVIDED UNDER THE SOFFIT OF ALL REINFORCED CONCRETE MEMBERS IN CONTACT WITH GROUND SURFACE.

3. REFER TO ARCHITECTURAL DRAWING FOR WATER PROOFING OF STRUCTURE IN CONTACT WITH THE GROUND.

4. APPROVED WATERSTOPS SHALL BE PROVIDED IN ALL EXPANSION JOINTS INDICATED IN THE STRUCTURAL FLOOR PLANS.

G

JOINTS

- UNLESS OTHERWISE DETAILS IN DRAWING AND JOINT DETAIL SHALL BE :-

1. CONSTRUCTION JOINTS

A. LOCATION OF CONSTRUCTION JOINTS SHALL BE IN ACCORDANCE TO CONSTRUCTION DRAWINGS AND/OR SPECIFICATION.

B. CONTRACTOR MAY PROPOSE ALTERNATIVE LOCATION BUT THESE MUST BE AGREED BY THE S.O PRIOR TO OFFICIAL SUBMISSION BY CONTRACTOR. OFFICIAL SUBMISSION SHALL BE SUBMITTED AT LEAST TWO WEEKS BEFORE CONCRETING.

STEEL BARS CONTINUOUS

CONTACT SURFACE

1st. CAST.

2nd. CAST.

CONTACT SURFACE OF 1st. CAST SHALL BE HACKED TO CLEAR OFF ALL LAITANCE, LOOSE MATERIALS AND TO EXPOSED SURFACE COARSE AGGREGATES. SURFACE MUST BE CLEANED BY PRESSURISED WATER JET.

STEEL BARS CONTINUOUS

CONTACT SURFACE

1st. CAST.

2nd. CAST.

CONTACT SURFACE OF 1st. CAST SHALL BE FORMED WITH STOP BOARD. SURFACE SHALL BE CLEANED UPON REMOVAL OF FORMWORK AND SHALL BE COATED WITH TWO(2) COATS OF APPROVED BITUMINOUS PAINT PRIOR TO CONCRETING OF THE 2nd. CAST.

3. EXPANSION JOINTS

A. WATERSTOP SHALL BE FIXED STRICTLY IN ACCORDANCE TO SUPPLIER'S RECOMMENDATION WHICH HAVE BEEN APPROVED BY THE S.O.

B. RECEIVING SURFACES SHALL BE MADE CLEAN PRIOR CALLING FOR S.O'S INSPECTION. APPROVED SEALANT SHALL BE APPLIED ONLY AFTER S.O HAS INSPECTED THE RECEIVING SURFACES.

C. UNLESS OTHERWISE SPECIFIED IN DRAWING MINIMUM WIDTH OF WATERSTOP SHALL BE 200mm.

D. REFER TO CONSTRUCTION DRAWINGS FOR ACTUAL WIDTH AND LOCATION OF EXPANSION JOINTS.

APPROVED WATERSTOP

1 mm WIDE EXPANSION JOINT

APPROVED SEALANT (t mm x t mm x LENGTH OF JOINT)

APPROVED JOINT FILLER

SUSPENDED STRUCTURE

APPROVED SEALANT

50mm LEAN CONCRETE

GROUND STRUCTURE

EXCEPT FOR WATERSTOP, ALL OTHER JOINT DETAILS ARE SIMILAR TO JOINT FOR SUSPENDED SLAB.

H

OPENINGS, CONCEALED CABLES AND CAST-IN CONDUITS

I. NO HOLES OR CHASES ARE PERMITTED IN CONCRETE MEMBERS OTHER THAN THOSE AS DETAILED IN THE STRUCTURAL DRAWINGS OR AUTHORISED BY THE STRUCTURAL ENGINEERS PRIOR TO CONCRETING.

II. NO HACKING OR CORING OF STRUCTURE IS PERMITTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE S.O.

III. PRIOR TO CONSTRUCTION, THE CONTRACTOR IS DEEMED TO HAVE ALL STRUCTURAL, ARCHITECTURAL AND MECHANICAL & ELECTRICAL (M&E) DRAWINGS FOR OPENINGS, CONCEALED CABLE AND CAST-IN CONDUITS. THE CONTRACTOR SHALL INFORM THE S.O IMMEDIATELY AT ANY DISCREPANCIES IN DRAWINGS PRIOR TO CONTRUCTION.

R.C. LINTOL
(REFER TO ABOVE TABLE FOR REBARS)

300mm MIN.

R.C. STIFFENER
(REFER TO TABLE ABOVE)

400

400

STARTER BARS H8 - 300

STARTER BARS H8 - 300

BRICKWALL

DOOR/WINDOW OPENING

BRICKWALL

I

TYPICAL RC COPPING FOR WINDOW

REFER
DETAIL A

100

4H10

H8-200c/c

DETAIL A

HEIGHT OF WINDOW

REFER
DETAIL B

100

100

4H10

H8-200c/c

BRICKWALL

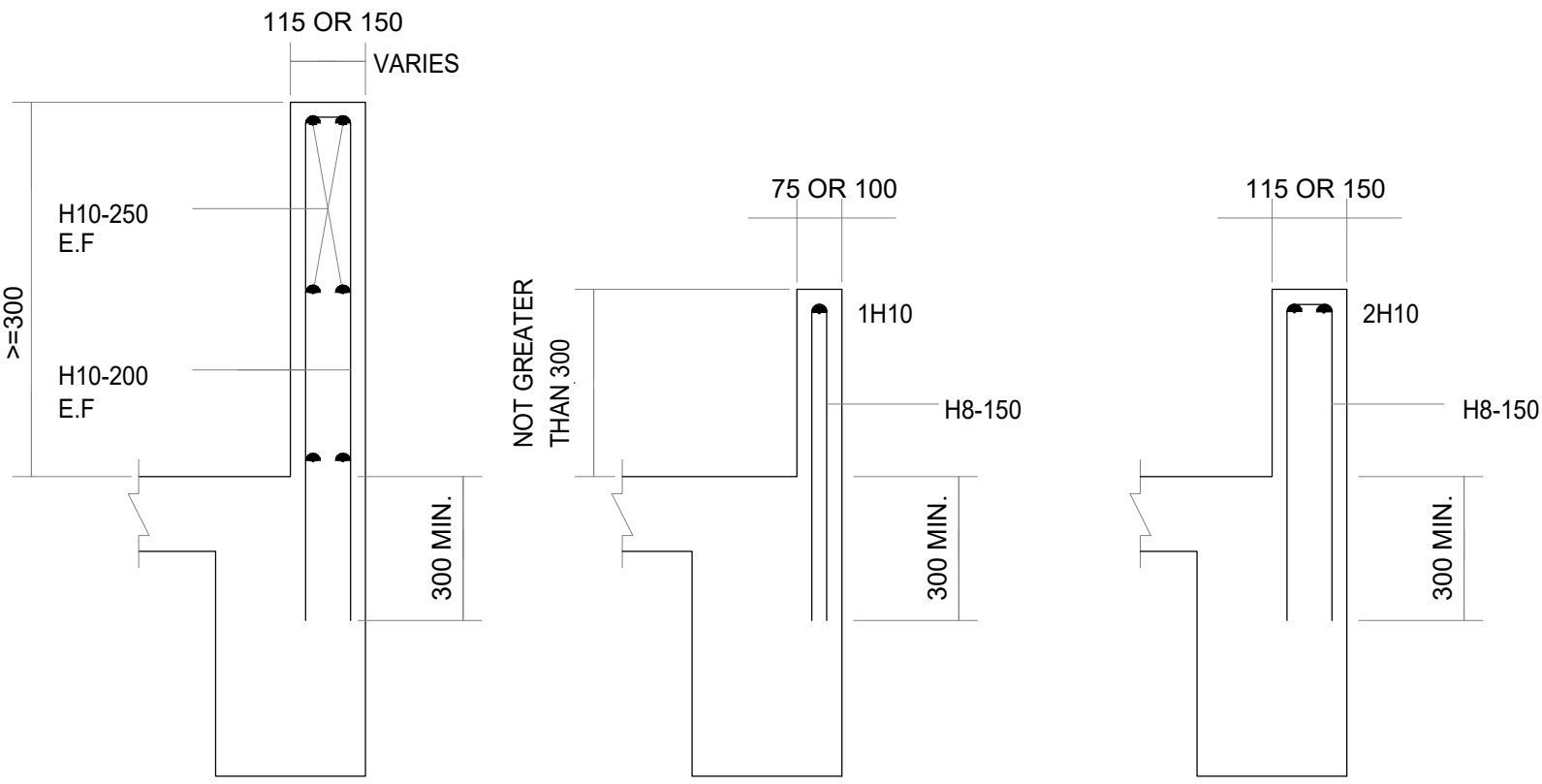
DETAIL B

[illegible]

STANDARD REINFORCEMENT DETAILS (CONTD.)

NOTA :

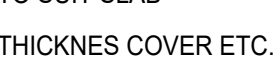
10. UNLESS OTHERWISE SHOWN IN DRAWINGS, REINFORCEMENT DETAILS FOR PARAPET WALLS AND R.C. KERBS SHALL BE:



TYPICAL PARAPET WALL

TYPICAL KERB WALL

- a. WHERE DETAILS SHOWN BOTTOM REBARS CUT AT SUPPORT POSITION, H8 - 200 CTRS DOWEL BARS OF LENGTH 600+ ϕ B SHALL BE PROVIDED AS SHOWN
- b. $B = \frac{1}{2}$ WIDTH OF BEAM SUPPORTING THE SLAB.
- c. FOR THE ABOVE SLAB SECTION, SPAN OF SLAB IS TAKEN , TO BE $L > L_1 > L_2$ 1 2 3
- d. SPACER CIRS OF H10 @ 1000 CTRS EACH WAY SHALL BE PROVIDED UNDER ALL TOP REBARS OF SLAB: DETAILS OF SPACER CHAIR ARE AS SHOWN BELOW:



L STANDARD HOOK DETAILS FOR CEILING BEAMS

NOTES :
FOR POSITIONS AND QUANTITIES, REFER TO ARCHITECTURAL DRAWINGS

BEAMS WITH PIPE PENETRATIONS

1. AS DEFINED IN THE TABLE BELOW
2. LOCATED WITHIN THE MIDDLE THIRD DEPTH OF THE BEAM
3. LOCATED WITHIN THE MIDDLE 0.6 SPAN OF THE BEAM SHALL
BE TRIMMED WITH ADDITIONAL REBARS AS SHOWN IN DETAILS.

CONTRACTOR SHALL SUBMIT TO THE S.O. PROPER PENETRATION COORDINATION DRAWINGS FOR ALL PIPE PENETRATION THROUGH BEAMS, WHETHER WITHIN THE PERMITTED ZONE OR NOT, AND APPROVAL PRIOR CONSTRUCTION.

ADDITIONAL LINKS

ADDITIONAL LINLS (SAME DIAMETER
& NO. OF SETS
AS LOCAL AREA STIRRUPS)
@ 100mm CTRS MAXIMUM.



OF COLUMN OR WALL



VALUES FOR MINIMUM ANCHORAGE, FRAMING ANCHORAGE AND CRITICAL RADIUS (R_c) ARE AS TABULATED BELOW:

R

Diagram illustrating the installation of a service duct in a concrete slab. The duct is a rectangular opening to be filled with 100mm THK. G30 CONCRETE AFTER INSTALLATION OF SERVICES. The slab is reinforced with H10-200 T&B bars. The duct is centered within the slab, and the concrete fill is indicated by a diagonal hatching pattern.

SURFACE OF FIRST CAST CONCRETE SHALL BE ROUGHENED TO EXPOSE COARSE AGGREGATES AND CLEANED USING WATER JET UNDER PRESSURE

SECTION ACROSS INFILL DUCT

8. SLAB - REINFORCING BARS STANDARD DETAILS

THICKNESS OF SCREED RENDERING EXCEEDING 75MM SHALL BE
REINFORCED WITH ONE LAYER OF B5 MESH

1. THE CONTRACTOR SHALL ENGAGE A QUALIFIED WATERPROOFING SPECIALIST TO SUPPLY, INSTALL, AND PROTECT WATERPROOFING SYSTEM AS REQUIRED IN THE DRAWING, ALL IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
2. THE WATER PROOFING SPECIALIST SHALL BE APPROVED BY THE ENGINEER AND SHALL BE SELECTED ON THE BASIS OF PAST TRACK RECORD, TECHNICAL RELIABILITY, CAPABILITY AND WILLINGNESS TO SUPPLY TECHNICAL ASSISTANCE.
3. THE CONTRACTOR ARE REQUIRED TO SUBMIT COMPLETE DETAILS AND SPECIFICATIONS OF THE WATER PROOFING SYSTEM BEING OFFERED AT THE TIME OF TENDERING. ANY ALTERNATIVE SYSTEM OFFERED AFTER THE AWARD OF TENDER WOULD BE STRICTLY AT THE DISCRETION OF THE EMPLOYER AND THE ENGINEER.
4. THE CONTRACTOR SHALL GIVE A TEN (10) YEARS GUARANTEE FOR WATER-TIGHTNESS OF THE STRUCTURE EFFECTIVE FROM THE DATE OF COMPLETION OF THE WHOLE WORKS. THE FORM OF GUARANTEE SHALL BE TO THE SATISFACTION OF THE EMPLOYER/ENGINEER.
5. SHOULD ANY LEAK, MOIST LINES, POINTS OR PATCHES OCCUR DURING THE GUARANTEE PERIOD OF 10 YEARS, THE CONTRACTOR SHALL IMMEDIATELY CARRY OUT THE NECESSARY REMEDIAL WORKS TO RESTORE THE WATER-TIGHTNESS OF THE STRUCTURE AT NO EXTRA COST TO THE EMPLOYER/ENGINEER.
6. THE CONTRACTOR SHALL MAKE GOOD DAMAGES TO ALL FINISHES (SUCH AS PLASTER, PAINTS, PANELLING, TILING, ETC.) ELECTRICAL OR OTHER INSTALLATIONS, OR OTHER PROPERTY, CAUSED BY WATER LEAKAGE OR DAMPPNESS AT NO EXTRA COST TO THE EMPLOYER/ENGINEER.

PROJEK (Project)

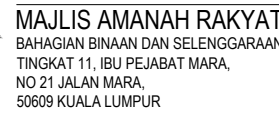
CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN
BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI
AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

NOTA :

[illegible]

PEMILIK :



JURUTERA C&S :
 '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.'



TECHNIPRO CONSULT SDN. BHD
(Civil, Structural & Geotechnical Consulting Engineer)
51-A & B, TINGKAT 2, JALAN TOK LAM,
20100 KUALA TERENGGANU,
TERENGGANU
Tel: 09-6223253
Fax: 09-6223263

ARKITEK



JURUTERA M&E :



JURUUKUR BAHAN



TAJUK LUKISAN :

-GENERAL NOTES - 03

TARIKH : 03 OGOS 2026	SKALA : YANG TERTERA
DILUKIS : M.M.A	DISEMAK : NR
NO. KONTRAK :	
NO. PROJEK : TCSB/NR/2515/GN/1.2	REVISION
NO. LUKISAN	SHEET NO. 03

P	WATERPROOFING SYSTEM
---	-------------------------------

7. THE CONTRACTOR SHALL PROVIDE THE ENGINEER RELEVANT APPROVING AUTHORITY METHOD STATEMENT TOGETHER WITH COMPREHENSIVE SHOP DRAWINGS SHOWING ALL DETAILS AND PROCEDURES OF CONSTRUCTION FOR THE RELEVANT PARTS OF THE WORKS IN A TIMELY SEQUENCE. DETAILS TO BE SUBMITTED SHALL INCLUDED BUT NOT LIMITED TO THE FOLLOWING :
 - (I) SURFACE PREPARATION
 - (II) CONSTRUCTION SEQUENCE AND COVERAGE BY EACH STAGE OF WORKS
 - (III) EQUIPMENT USED
 - (IV) CORNER DETAILS ETCREASONABLE TIME SHOULD BE ALLOWED FOR CHECKING BY THE ENGINEER IN PROGRAMMING THE PRODUCTION OF SHOP DRAWINGS AND METHOD STATEMENTS.
8. THE MANUFACTURER'S STANDARD APPLICATION DETAILS SHALL BE USED ONLY AS A GUIDE FOR THE PREPARATION OF SHOP DRAWINGS. WHERE NECESSARY THE CONTRACTOR IS EXPECTED TO IMPROVE UPON THE MANUFACTURER'S STANDARD DETAILS TO SUIT THE PROJECT REQUIREMENTS WITHOUT EXTRA CONTACT COST AND/OR TIME.
9. WATER PROOFING WORKS AS RECOMMENDED AND SPECIFIED SHALL BE APPLIED TO THE FOLLOWING STRUCTURES:-
 - (i) GROUND FLOOR SLAB
 - (ii) TOILET FLOOR SLAB
 - (iii) LIFT PIT
 - (iv) PLANTER BOXES
 - (v) WATER TANK SLAB
 - (vi) FLAT ROOF
10. ALL WATERPROOFING LAYERS SHALL BE APPLIED WITH ONE COAT OF ' XYPEX' CONCENTRATED AS BOTTOM COAT AND ONE COAT OF ' XYPEX' MODIFIED AS UPPER COAT TO A PROPERLY CONCRETE SURFACE AT 0.8kg/sq.m OR APPROVED EQUIVALENT.

Q

STEELWORKS

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED

2. ALL LEVELS AND DIMENSIONS SHALL BE VERIFIED AT SITE. THE CONTRACTOR SHALL CARRY OUT INDEPENDENT SURVEY TO ASCERTAIN LEVELS / DIMENSIONS INDICATED IN THE DRAWING .THE CONTRACTOR SHOULD NOTIFY THE ENGINEERS FOR ANY DISCREPANCIES PRIOR TO COMMENCEMENT OF WORKS.

3. ALL DESIGN AND CONSTRUCTION OF STRUCTURAL STEELWORKS SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIFICATIONS, BS EN 1993-1-1:2005 AND OTHER RELEVANT STANDARD CODE OF PRACTICE.

4. ALL STRUCTURAL STEEL SHALL CONFORM WITH THE REQUIREMENTS OF BS EN 1993-1-11:2006 UNLESS OTHER WISE STATED

5. COLD FORMED STEEL SECTION SHOULD CONFIRM WITH THE REQUIREMENTS OF BS EN 1993-1-3:2006

6. BOLTS & NUTS SHOULD COMPLY WITH BS EN 1993-1-9:2005

- ALL CAST - IN BOLTS AND ARE TO BE INSTALLED BY THE R.C. WORKS CONTRACTOR TO THE SPECIFIED LINES AND LEVELS.
- ALL BOLTS ARE TO BE GRADE 4.6 OR GRADE 8.8 AS SHOWN ON THE DRAWINGS.

7. WASHERS SHALL BE PROVIDED UNDER ALL NUTS AND BOLT HEADS. WASHERS FOR ALL BOLTS ARE TO BE IN ACCORDANCE WITH B.S 4320 AND THE CONTRACT SPECIFICATION. FOR ALL BOLTED CONNECTION, THE BOLT WHEN FASTENED SHALL BE SPOT WELDED AS ANTI-THEFT MEASURE.

8. ALL HOLES FOR FASTENER ARE TO BE DRILLED AND ALL SLURRY TO BE REMOVED PRIOR TO FIT UP AND TRIAL BOLTING.

- BOLT Ø < 24mm HOLE = BOLT Ø + 2mm
- BOLT Ø < 24mm HOLE = BOLT Ø + 3mm

9. SURFACE PREPARATION PRIOR TO GALVANIZING AND PAINTING SHALL COMPLY WITH SAND BLASTED TO SSPC SP10 (SWEDISH Sa2.5)

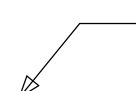
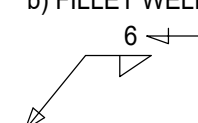
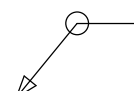
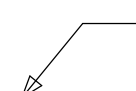
10. GALVANIZING WORK FOR STRUCTURAL STEELWORKS SHALL BE ACCORDING WITH THE SPECIFICATION

11. PAINTING FOR STRUCTURAL STEELWORKS SHALL BE AS FOLLOW

- i)1st. COAT - NIPPON GALVAPRIMER - 50 um.
- ii)2nd. COAT - NIPPON 8048 ZINC PHOSPHATE PRIMER - 50 um.
- iii) 3rd. COAT - NIPPON 8048 EPOXY MIO - 50 um.
- iv) 4th. COAT - NIPPON POLYURETHANE - 50 um.

12. ALL FILLET WELD SHALL BE 6mm THICK UNLESS OTHERWISE STATED. ALL BUTT WELD SHALL BE COMPLETED PENETRATION WELDS MADE BETWEEN PREPARED FUSION FACE

13. WELDING SYMBOL SHOWN THUS :-

a) BUTT WELD 	b) FILLET WELD  THICKNESS OF WELDING	c) SITE WELD 	d) SITE WELD 
---	---	---	---

14. ALL STEEL WORKS IS TO BE COLD SAWN OR MACHINE FLAME CUT. HAND FLAME CUTTING, CUTTING IS NOT PERMITTED. BUTT ENDS OF MEMBERS ARE TO BE MACHINED OR GROUND TO BE A SMOOTH PROFILE FREE OF ALL NOTCHES AND DRAG LINES BEFORE WELDING.

15. THE CONTRACTOR SHALL SUBMIT TEST CERTIFICATES OF THE TEST CARRIED OUT BY AN APPROVED AGENCY TO THE ENGINEER FOR APPROVAL

16. THE SPECIFICATION FOR MATERIALS AND WORKMANSHIP SHALL CONFORM WITH THE REQUIREMENT OF BS EN 1993-1-10:2005

17. HIGH STRENGTH FRICTION GRIP BOLT SHALL BE OF PARALLEL SHANK GENERAL GRADE CONFORMING TO BS EN 1993-1-8:2005

18. ALL SPLICED JOINTS SHALL BE FULL STRENGTH BUTT WELDED JOINTS.

19. WELDING ELECTRODES SHALL COMPLY TO E51 AS PER BS EN 1993-1-8:2005 AND WELDING PLANT AND EQUIPMENT IS TO COMPLY WITH BS EN 1993-1-8:2005

STEELWORKS (CONT'D)

20. ALL WELDING IS TO BE CARRIED OUT IN ACCORDANCE WITH BS EN 1993-1-8:2005 TO WELDING PROCEDURES APPROVED UNDER B.S EN 288-3 AND WITH WELDERS QUALIFIED UNDER B.S 4872 OR B.S EN 287-1.

21. STEELWORKS ENCASED IN CONCRETE SHALL BE UNPAINTED.

22. 6mm THICK NEOPRENE PACKING SHALL BE PROVIDED AT ALL CONNECTIONS/CONTACT POINT BETWEEN TWO DIFFERENT METALS, E.G. CONNECTION BETWEEN STEEL AND GALVANIZED STEEL, CONNECTION BETWEEN ALUMINIUM AND STEEL ETC.

23. UNLESS OTHERWISE SPECIFIED, ALL STEELWORKS INCLUDING BRACKETS, CLEATS, CHAIN, BOLTS AND NUTS SHALL BE HOT DIP GALVANIZED.

24. QUALITY ASSURANCE PROGRAM

a) ALL WELDING SHALL COMPLY TO BS EN 1993-1-8:2005

b) ONLY LICENSED, COMPETENT WELDERS SHALL BE ALLOWED TO UNDERTAKE WELDING TO THE STRUCTURE.

c) WELDING TEST

i) ALL WELD (i.e. 100%) TO BE VISUALLY INSPECTED TO BS EN 1993-1-8:2005

ii) AT LEAST 50% OF THE FILLET WELDS SHALL BE DPI TESTED BY AN APPROVED INDEPENDENT QUALIFIED WELD TESTING HOUSE. THE WELDS TO BE TESTED SHALL BE SELECTED BY THE ENGINEER.

iii) AT LEAST 50% OF THE FILLET WELDS SHALL BE ULTRA-SONIC TESTED BY AN APPROVED INDEPENDENT QUALIFIED WELD TESTING HOUSE. THE WELDS TO BE TESTED SHALL BE SELECTED BY THE ENGINEER.

25. ERECTION

THE CONTRACTOR SHALL SUBMIT DETAILED ERECTION METHOD STATEMENT OUTLINING PROPOSED LIFTING POINTS, MONITORING DEFLECTION ETC. FOR THE APPROVAL OF THE ENGINEER 3 WEEKS BEFORE ERECTION OF STRUCTURE AT SITE.

26. ERECTION TOLERANCES FOR THE ERECTION OF ALL STRUCTURAL STEEL WORK ARE TO COMPLY STRICTLY WITH THE FOLLOWING LIMITS AND AS OTHERWISE DESCRIBED IN B.S 5990.

PLAN LOCATION OF COLUMNS	=10mm.
PLAN LOCATION OF BEAMS	=50mm.
LEVEL OF BEAMS	=10mm SUBJECT TO LIMIT OF NOT MORE THAN 5mm IN ANY 5m LENGTH.
DEVIATION FROM VERTICAL	=5mm EACH STOREY SUBJECT TO AND OVERALL LIMIT CF = 10mm FROM TOP OF FOUNDATION TO TOP OF COLUMN.

27. THE ENGINEER RESERVES THE RIGHT TO PROVIDED ADDITIONAL GUSSET PLATES AT THE CRITICAL JOINTS AT NO EXTRA COST.

28. THE ENGINEER RESERVES THE CONTRACTOR SHALL SUBMIT ONE COPY OF 'AS-BUILT' DRAWING ON TRACINGS AND AUTOCAD FILES TO ENGINEERS FOR RECORD.

29. UNLESS OTHERWISE STATED 6mm THICK END PLATE SHALL BE PROVIDED AT ALL OPEN ENDS OF HOLLOW SECTION

30. ALL GROUT FOR BASE PLATES AND END PLATES IS TO BE APPROVED NON-SHRINK GROUT WITH A MINIMUM 28 DAYS COMPRESSIVE STRENGTH OF 40N/mm² APPLIED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

31. CONTRACTOR SHALL ALLOW FOR CHAMFER IN ACCORDANCE TO METHOD OF CONSTRUCTION SO AS TO ARCHIEVE THE SPECIFIED SHAPE AND DIMENSION.
IF IN DOUBT, THE ENGINEER SHALL BE NOTIFIED CLARIFICATION SOUGHT BEFORE FABRICATION.

32. THE CONTRACTOR SHALL PROVIDED TEMPORARY BRACING WHERE NECESSARY FOR A PROPER CONSTRUCTION AND COMPLETION.

33. ALL END OF HOLLOW SECTION TO BE SEALED OFF WITH min 4mm THK. M.S PLATE.

R	GALVANIZING 1. <u>PREGALVANIZING</u> a) ITEM FOR GALVANIZING SHALL BE IDENTIFIED BY METAL TAG WELDED TO THE ITEM OR WIRED TO THE BODY. IDENTIFICATION CAN ALSO BE DONE BY WELDING. b) BEFORE BEING DELIVERED TO THE GALVANIZING PLANT, THE ITEM SHALL BE CLEANED OF PAINT LACQUER, OIL, GREASE, HEAVY OIL, WELDING SPATTERS AND WELDING SLAG. THIS CAN BE DONE BY SWEEP BLASTING, GRINDING, BUFFING AND CHIPPING. c) MATERIAL RECEIVED BY GALVANIZING PLANT SHALL BE CHECKED TO ENSURE THAT THE QUANTITY, QUALITY, IDENTIFICATION AND SIZE ARE ACCEPTABLE. ANY DEFECTIVE MATERIAL FOUND SHALL BE SEGREGATED AND REPORTED TO THE RESPECTIVE CLIENT. d) HANDLING OF MATERIAL IN GALVANIZING PLANT SHALL BE DONE IN A SYSTEMATIC MANNER WITH PROPER MATERIAL HANDLING EQUIPMENT TO ENSURE THAT THERE IS NO DAMAGE TO THE MATERIAL. e) SPECIAL PRECAUTION SHALL BE TAKEN TO ENSURE THAT HOLLOW SECTIONS i.e. STEEL ROOF TRUSSES, HANDRAIL, PIPES AND WELDED STRUCTURAL MEMBERS HAVE SUFFICIENT VENTING HOLES TO PREVENT EXPLOSION AND UNCOATED SPOT OCCURRENCES. 2. <u>GALVANIZING PROCESS</u> a) THE DETAILED PROCEDURE TO CARRY OUT THE GALVANIZING PROCESS SHALL BE SUBMITTED BY THE GALVANIZING COMPANY FOR APPROVAL. THE PROCEDURE SHALL CONSIST OF HANDLING, CLEANING, GALVANIZING AND INSPECTION FOR QUALITY. QUALITY CONTROL HEAD SHALL REVIEW THE PROCEDURE. b) THE COATING WEIGHT SHALL COMPLY WITH THE MINIMUM VALUES QUOTED IN TABLE 1. HIGHER OR LOWER WEIGHTS CAN BE AGREED BETWEEN THE CLIENT AND THE GALVANIZER IN PARTICULAR DEFINED CASES. FOR EXAMPLE, HEAVIER COATINGS MAY BE OBTAINED BY GRIT-BLASTING BEFORE GALVANIZING OR BY USING FULLY-KILLED SILICON STEELS. IN SOME INSTANCES IT MAY BE NECESSARY TO GRIT-BLAST BEFORE GALVANIZING IN ORDER TO ACHIEVE THE COATING WEIGHTS SPECIFIED IN TABLE 1.
---	--

R

GALVANIZING (CONTD.)

TABLE 1 COATING WEIGHT*

CATEGORY		MINIMUM AVERAGE COATING WEIGHT OF ANY INDIVIDUAL TEST AREA (g/m2)**
STEEL ARTICLES WHICH ARE NOT CENTRIFUGED***	5mm THICK AND OVER	610*
	UNDER 5mm BUT NOT LESS THAN 2mm	460
	UNDER 2mm BUT LESS THAN 1mm	335
GREY AND MALLEABLE IRON CASTING		610
THREADED WORK AND OTHER ARTICLES WHICH ARE CENTRIFUGED**		305

* THE COATING WEIGHT PER UNIT AREA OF THE SURFACE IS GIVEN IN TERMS OF g/m² OF SURFACE.
IF THE COATING THICKNESS IS REQUIRED, THE FOLLOWING CONVERSION SHOULD BE USED, WHICH ASSUMES
THE DENSITY OF THE COATING TO BE 7 g/m³ : 1 g/m² = 0.14um (305 g/m² = 1 oz/ft² = 43 um = 0.0017 in)

** FOR SMALL ARTICLES THE TEST AREA SHALL CONSIST OF THE WHOLE SURFACE OR AGREED PARTS THEREOF.
FOR LARGE ARTICLES, e.g. STRUCTURAL STEEL SECTIONS, THE MINIMUM COATING WEIGHT REFERRED TO TABLE 1
SHALL BE THE AVERAGE OF DETERMINATIONS OVER A TEST AREA OF 600 TO 1200mm².

*** WHERE THE THREADS OF BOLTS UNSUITABLE FOR CENTRIFUGING ARE BRUSHED AFTER GALVANIZING, THE COATING
WEIGHTS ON THE BRUSHED AREAS SHALL BE EXEMPT FROM THE REQUIREMENTS OF TABLE 1.

**** BOLTS ARE GALVANIZED AFTER SCREWING UNLESS OTHERWISE SPECIFIED. BOLTS WHICH ARE TO BE FITTED WITH
NUTS ARE SCREWED TO THE TOLERANCE LAID DOWN IN THE APPROPRIATE SPECIFICATION WITHOUT ALLOWANCE
BEING MADE FOR GALVANIZING. THE NUTS ARE TAPPED UP TO 0.4mm OVERSIZE AFTER GALVANIZING AND THE
THREADS ARE OILED.

3. INSPECTION

a) AFTER THE GALVANIZING PROCESS, THE SURFACE SHALL BE FREE FROM UNCOATED SPOTS. THE COATING SHALL
BE SMOOTH, CONTINUOUS AND FREE FROM FLUX STAINS.

b) THE COATING SHALL BE SUFFICIENTLY ADHERENT TO WITHSTAND NORMAL HANDLING CONDITIONS WITHOUT
PEELING OR FLAKING. ANY TESTS OF ADHESION SHALL BE AGREED BETWEEN THE PURCHASER AND THE GALVANIZER.

c) UNLESS AGREED IN WRITING BETWEEN THE CLIENT AND THE GALVANIZER, INSPECTION AND TESTING FOR COMPLIANCE
WITH BS EN ISO 1461 SHALL BE PLACED AT THE GALVANIZER'S PLANT PRIOR TO DISPATCH.

d) THE ARCHITECT, CONSULTANT, ENGINEER AND THE CLIENT SHALL HAVE ACCESS TO ANY PART OF THE
GALVANIZING PROCESS IN THE GALVANIZER'S PLANT.

S	PROTECTIVE COATING - STEEL
S1	SPS-1

1. SURFACE PREPARATION

ALL SURFACE TO BE COATED SHOULD BE CLEAN, DRY AND FREE FROM CONTAMINATION. PRIOR TO APPLICATION, ALL SURFACES SHOULD BE ASSESSED AND TREATED IN ACCORDANCE WITH ISO 8504:2000. REMOVE WELD SPATTER AND SMOOTH WELD SEAMS AND SHARP EDGES. OIL OR GREASE SHOULD BE REMOVED ACCORDING TO SSPC-SP1 SOLVENT CLEANING.

ABRASIVE BLAST CLEANING

FOR BEST ADHESION RESULTS THE SURFACES SHOULD BE PREPARED BY ABRASIVE BLAST CLEANING TO MINIMUM SA 2.5 (ISO 8501-1:2007) OR SSPC-SP10. A SHARP, ANGULAR SURFACE PROFILE OF >80 MICRON IS REQUIRED.

THE COATING SYSTEM MUST BE APPLIED BEFORE OXIDATION OF THE STEEL OCCURS. IF OXIDATION DOES OCCUR THE ENTIRE OXIDIZED AREA SHOULD BE REBLASTED TO THE STANDARD SPECIFIED ABOVE. SURFACE DEFECTS REVEALED BY THE BLAST CLEANING PROCESS SHOULD BE GROUND, FILLED OR TREATED IN THE APPROPRIATE MANNER.

2. COATING

A) 1ST COAT

ONE COAT OF SURFACE TOLERANT TWO PACK CERAMIC COMPOSITE EPOXY COATING 'CERAMIC-POLYMER STP-EP-HV'. COLOR SHALL BE CONFIRMED BY S.O..

B) 2ND COAT

ONE COAT OF SURFACE TOLERANT TWO PACK CERAMIC COMPOSITE EPOXY COATING 'CERAMIC-POLYMER STP-EP-HV'. COLOR SHALL BE CONFIRMED BY S.O..

3. APPLICATION

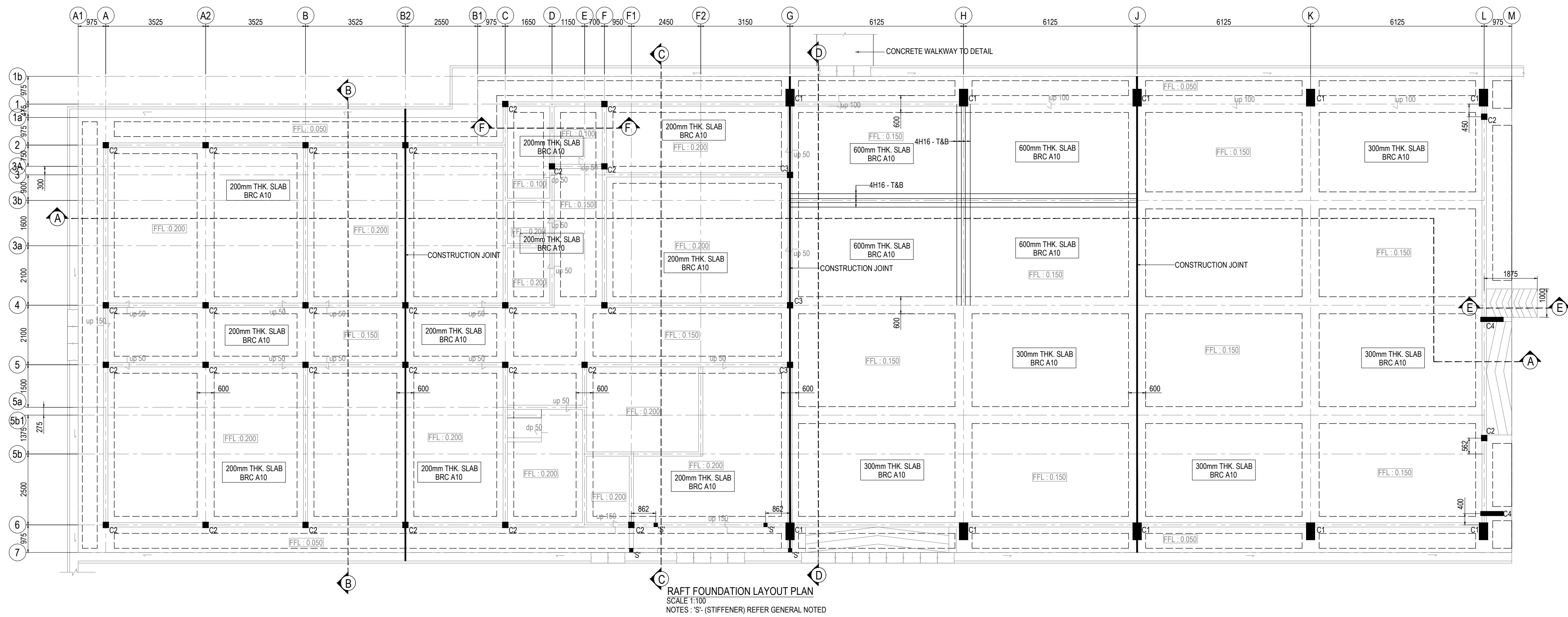
DRY FILM THICKNESS:

A) 1ST COAT : 150 MICRON
B) 2ND COAT : 150 MICRON

4. STRUCTURAL COMPONENTS

1) ALL STEEL MEMBERS

[illegible]



GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm
2. READ THIS DRAWING WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWING
3. ALL DIMENSIONS TO BE CONFIRMED ON SITE. DISCREPANCIES TO BE REPORTED TO THE S.O BEFORE WORK COMMENCES.
4. REINFORCEMENT TO BE EN 1993
H DENOTES HIGH TENSILE STEEL (CHARACTERISTIC STRENGTH $f_y = 500$ N/mm²)
R DENOTES MILD STEEL (CHARACTERISTIC STRENGTH $f_y = 250$ N/mm²)
5. MINIMUM LAP LENGTH OF BARS SHALL BE 50 DIA
6. COVER TO MAIN REINFORCEMENT UNLESS OTHERWISE STATED

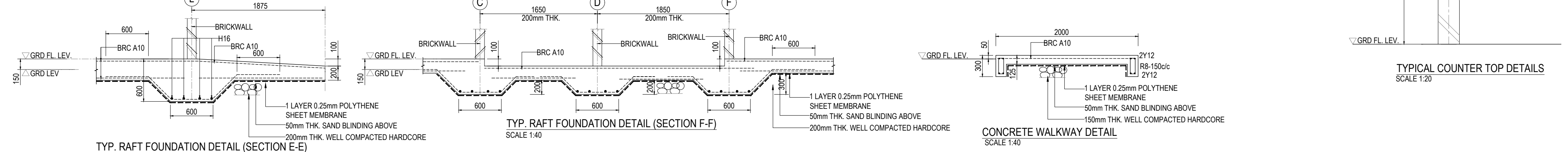
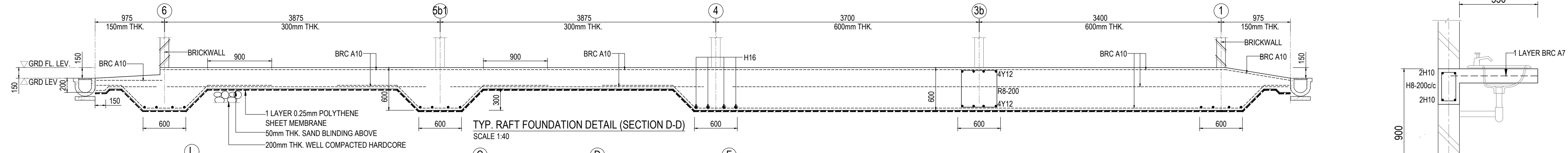
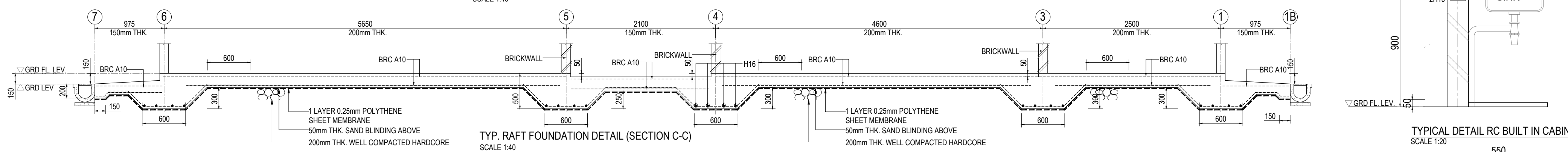
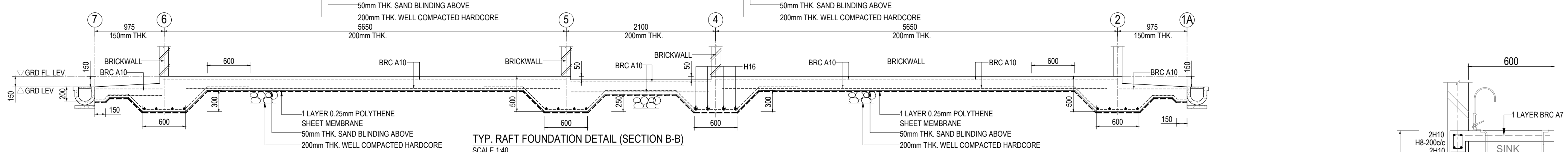
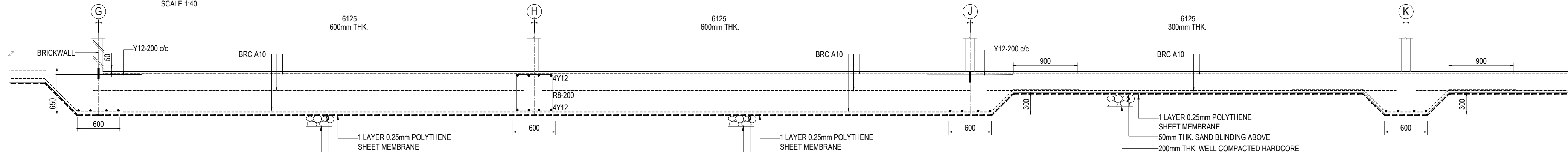
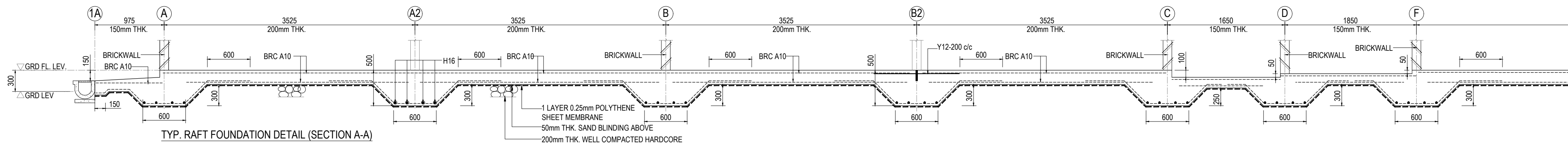
STRUCTURAL COMPONENT

i. SLAB	= 25 mm
ii. BEAM	= 30 mm
iii. FOUNDATION	= 75 mm
iv. COLUMN	= 35 mm
v. WALL	= 30 mm

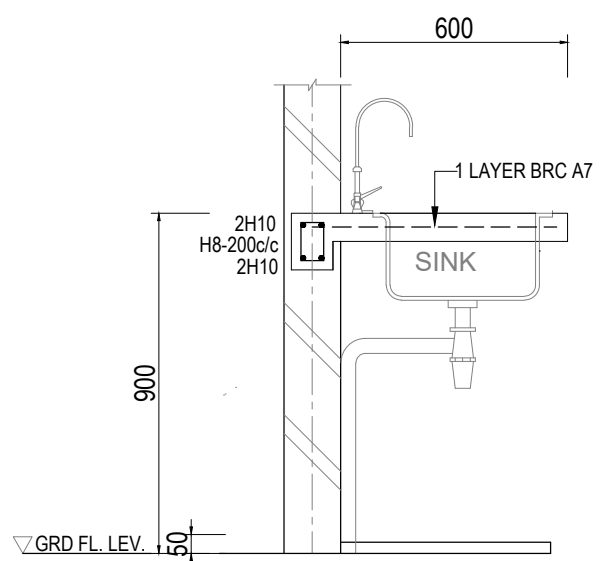
7. MINIMUM CONCRETE GRADE TO BE C25/30 UNLESS OTHERWISE STATED
8. MINIMUM PERIODS BETWEEN CONCRETING AND REMOVAL OF FORMS.
 - i. VERTICAL FACES OF BEAM, WALL, COLUMN, PILES, FOUNDATION PLINTS AND PRECAST ITEMS = 5 DAYS.
 - ii. UNDERSIDES OF SLAB = 14 DAYS.
 - iii. UNDERSIDES OF BEAM = 28 DAYS.
9. WIREMESH FABRIC REINFORCEMENT SHALL BE WELL LAPPED IN ACCORDANCE WITH MANUFACTURED RECOMMENDATION.
10. EXISTING OR FILL GROUND SHALL BE THROUGH COMPACTED TO ACHIEVE A MIN. DESIGN BEARING CAPACITY OF 100 KN/m².
11. CRUSHER-RUN HARDWARE SHALL BE COMPACTED WITH 3-PASSES OF 8 TON SMOOTH WHEEL ROLLER.
12. ANY HAUNCH OR EXCAVATION FORMED IN THE CRUSHER-RUN HARDWARE SHALL BE THOROUGHLY COMPACTED WITH PLATE COMPACTOR.
13. ALL PROPOSED BURIED PIPES AND SANITARY FITTING SHALL BE ACCURATELY PLACED PRIOR TO CONCRETING OF FLOOR SLAB.
14. WATERPROOFING COMPOUND ADDITIVE SHALL BE PROVIDED MIXED INTO CONCRETE FOR ALL TOILET AND ROOF SLAB AREA PRIOR TO CONCRETING WORKS.
15. ANTI-TERMITE NOTE:
THE CONTRACTOR SHALL SPRAY THE ANTI-TERMITE CHEMICAL AS RECOMMENDED BY THE SUPPLIER IN ACCORDANCE WITH THEIR SPECIFICATION TO AREA OF THE BUILDING UP TO BORDER OF PERIMETER DRAIN (REFER TO ARCHITECT DWG.).
16. ALL OPENING TO SLEEVES/DOWEL BARS SHALL FILLED WITH APPROVED EPOXY GROUT.

COLUMN MARK		C1	C2	C3	C4	S1
FLOOR						
TRL	To					
	MAIN BAR				8H20	4H12
	TIES				3R8 - 125	R8 - 200
WRB	To					
	MAIN BAR				8H20	4H12
	TIES				3R8 - 125	R8 - 200
WRB	To					
	MAIN BAR	8H20		4H16	8H20	4H12
	TIES	3R8 - 125		R8 - 200	3R8 - 125	R8 - 200
RB	To					
	MAIN BAR	8H20	4H16	4H16	8H20	
	TIES	3R8 - 125	R8 - 200	R8 - 200	3R8 - 125	
GB	To					
	MAIN BAR	8H20	4H16	4H16	8H20	
	TIES	3R8 - 125	R8 - 200	R8 - 200	3R8 - 125	
GB	To					
	MAIN BAR	8H20	4H16	4H16	8H20	
	TIES	3R8 - 125	R8 - 200	R8 - 200	3R8 - 125	

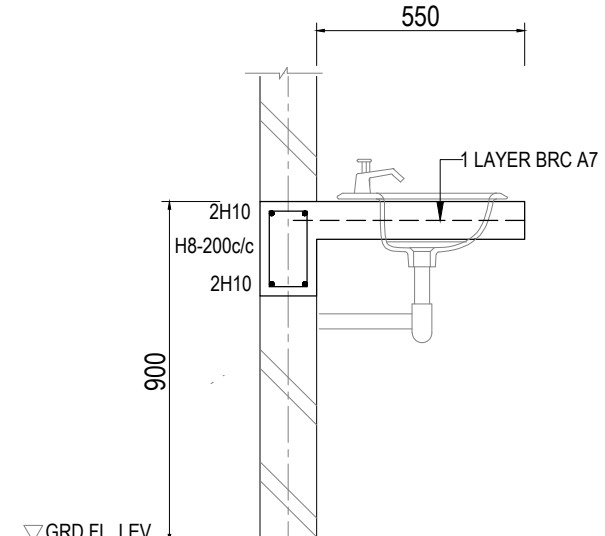
COLUMN REINFORCEMENT SCHEDULE (GROUP)



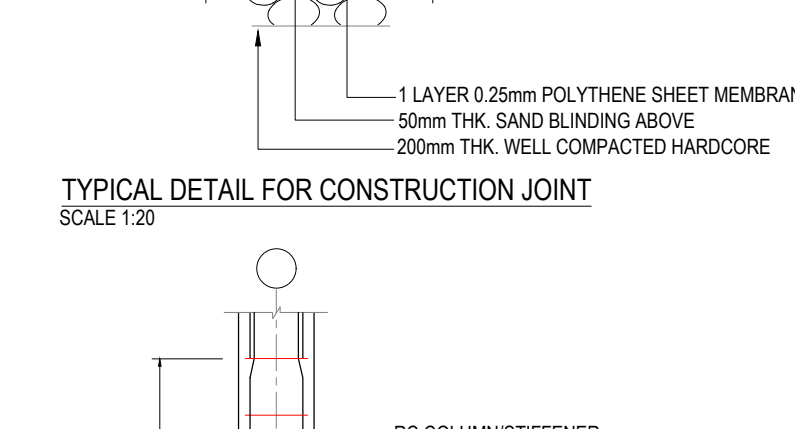
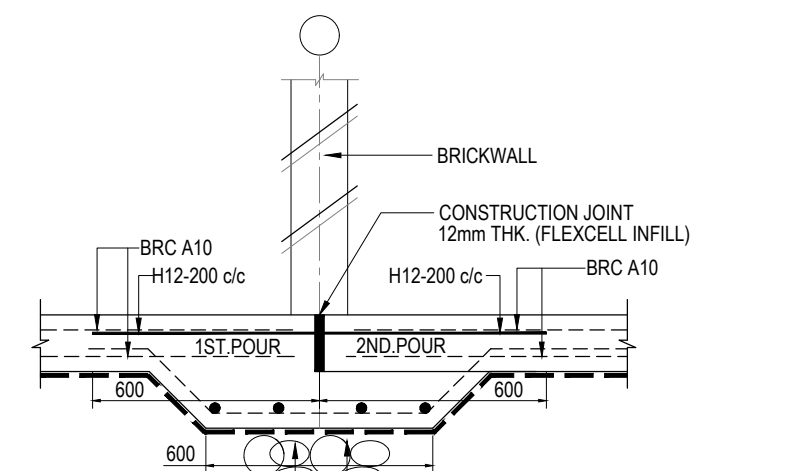
CONCRETE WALKWAY DETAIL SCALE 1:40



TYPICAL DETAIL FOR CONSTRUCTION JOINT SCALE 1:20



TYPICAL DETAIL FOR COLUMN / STIFFENER SCALE 1:20



NOTA :

LUKISAN SEBUT HARGA

PROJEK (Project)

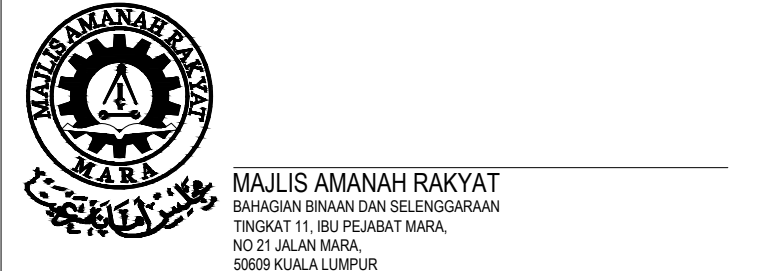
CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

NOTA :

REV.	DATE	DESCRIPTION	BY

PEMILIK :



JURUTERA C&S
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 construction of the same.



IR. WAN MANAN B. WAN ALI
M.EMP.Eng.A.C.P.E.
TECHNIPRO CONSULT SDN. BHD.
(Civil, Structural & Geotechnical Consulting Engineer)
51-A & B, TINGKAT 1, JALAN TOK KUAL, 20100 KUALA TERENGGANU, TERENGGANU.
TEL: 09-6223253 FAX: 09-6223263

ARKITEK :
ARKITEK ZAFWAN FARID
PT 2897, TINGKAT 1, PEREDARAN PERMATA, JALAN TOK KUAL, KUALA BAI, 20400 KUALA TERENGGANU, TERENGGANU. TEL: 09-6211760 FAX: 09-6211760 EMAIL: admin@zaf.com.my

JURUTERA M&E :
EMECH CONSULTING ENGINEERS
NO. 0802, ARAS 1 & 2, PEREDARAN PERMATA, PERDANA, KAMPUNG BATIN, SEBERANG TAKIR, 21100 KUALA TERENGGANU, TERENGGANU. TEL: 09-666 7337 FAX: 09-666 7336 EMAIL: emechconsult@gmail.com

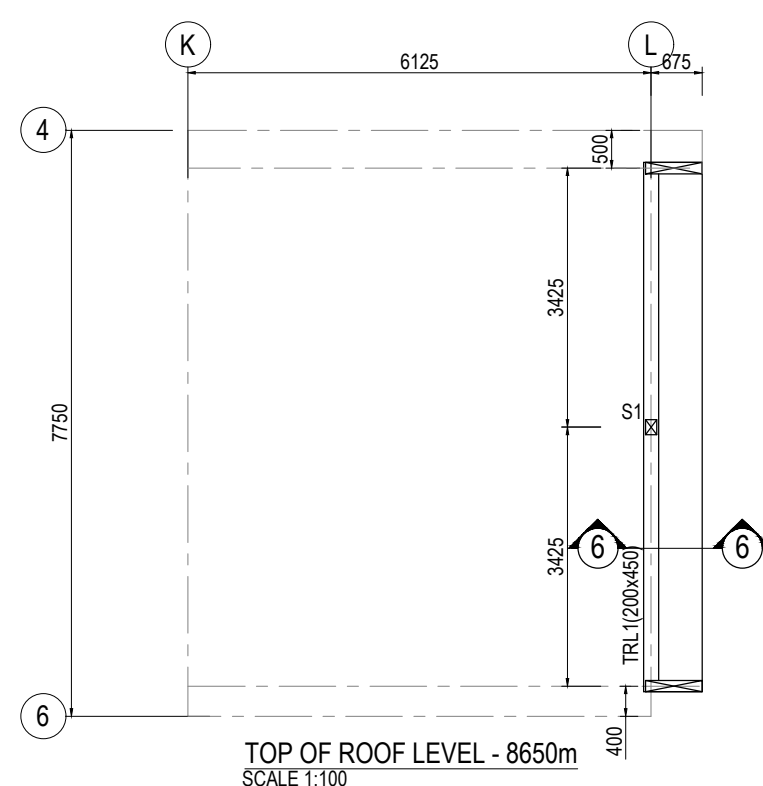
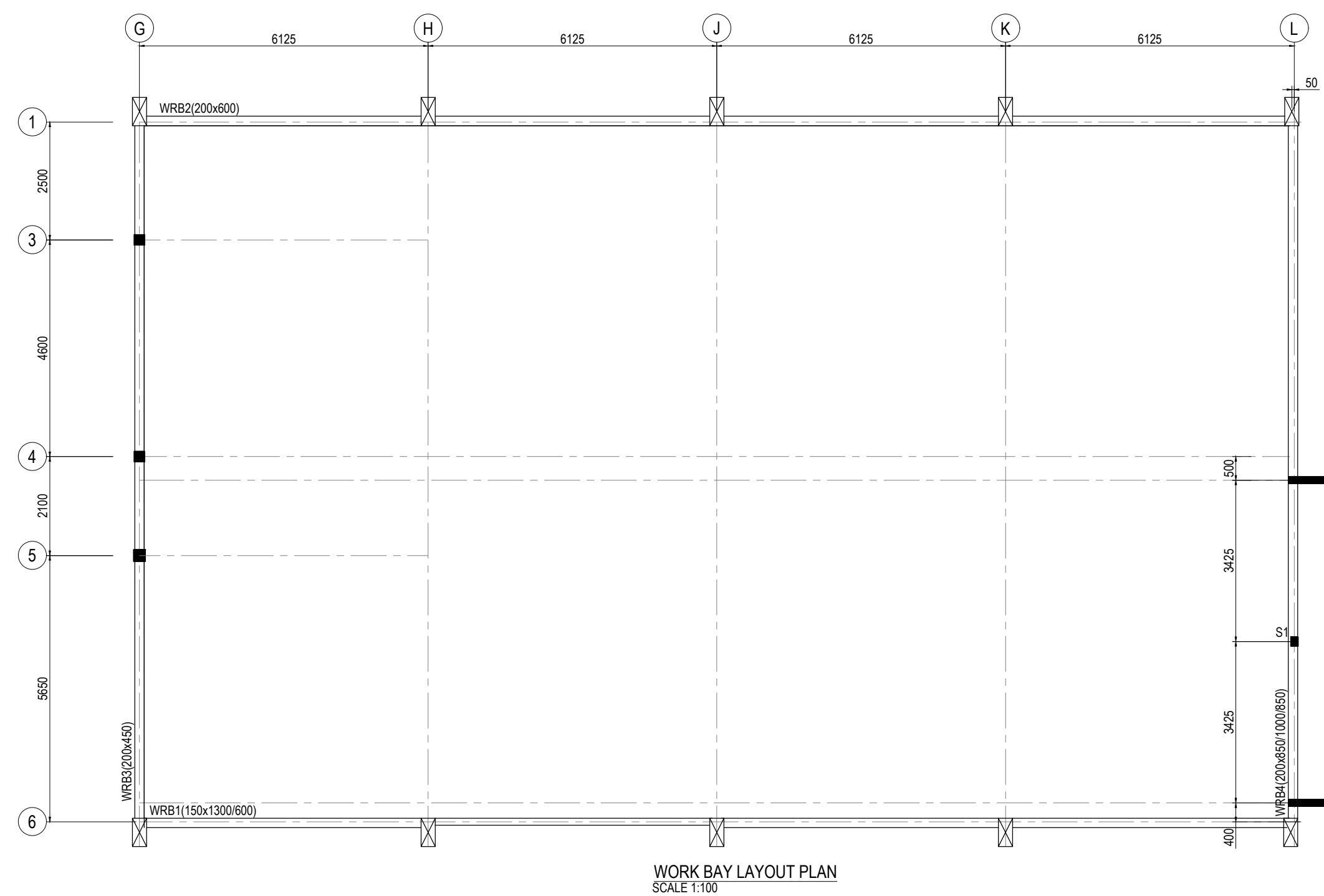
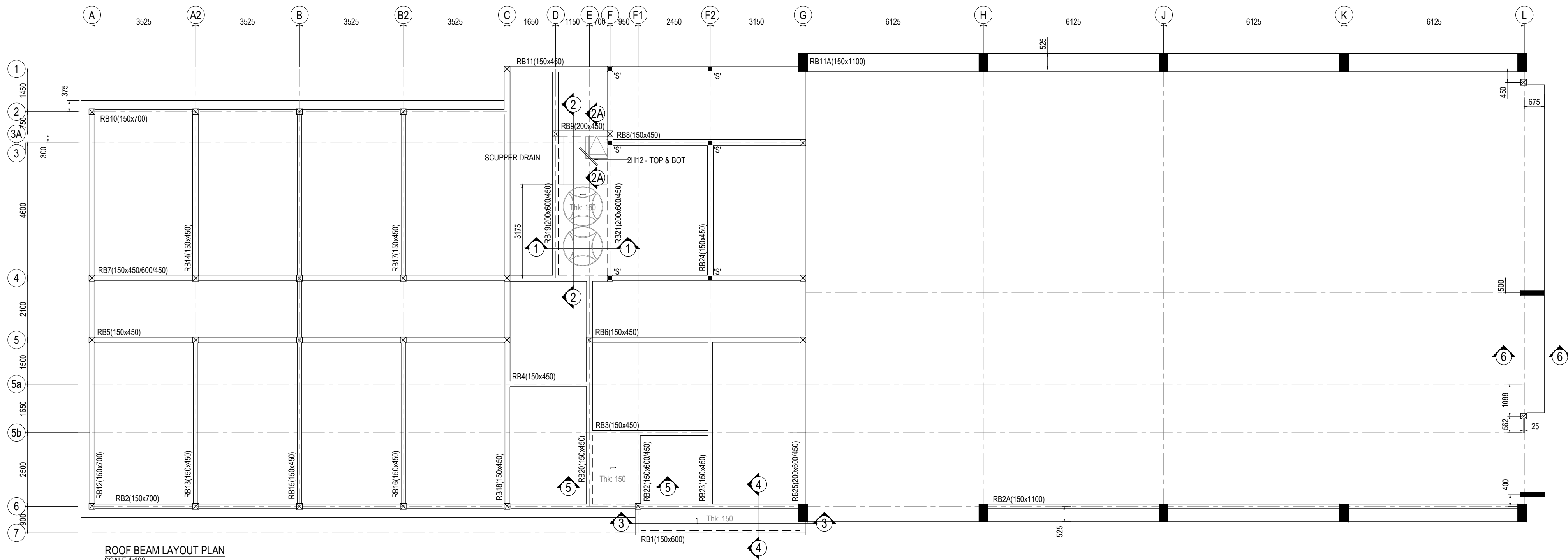
JURUUKUR BAHAN :
PERUNDUK UKUR BAHAN WFA SDN BHD
PT 1888, TINGKAT 1, PEREDARAN KP PERDANA KUBANG, PAKSI, 20500 KUALA TERENGGANU, TERENGGANU. TEL: 09-625 1888 FAX: 09-625 1888 EMAIL: pub.wfa@gmail.com

TAJUK LUKISAN :
-RAFT FOUNDATION LAYOUT PLAN
-TYP. RAFT FOUNDATION SECTION DETAIL
-COLUMN REINFORCEMENT SCHEDULE (GROUP)
-CONCRETE WALKWAY DETAIL

TARIKH : 03 OGOS 2026
DILUKIS : M.M.A
NO. KONTRAK :
NO. PROJEK : TCSB/NR/2515/RC/1.0
NO. LUKISAN :

SKALA : YANG TERTERA
DISEMAK : NR

REVISION
SHEET NO.
01



- GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm
2. READ THIS DRAWING WITH ALL RELEVANT ARCHITECTS AND ENGINEER'S DRAWING.
3. ALL DIMENSIONS TO BE CONFIRMED ON SITE. DISCREPANCIES TO BE REPORTED TO THE S.O BEFORE WORK COMMENCES.
4. REINFORCEMENT TO BE EN 1993
H DENOTES HIGH TENSILE STEEL
(CHARACTERISTIC STRENGTH f_y - 500 N/mm sq.)
R DENOTES MILD STEEL (CHARACTERISTIC STRENGTH f_y - 250 N/mm sq. sq.)
5. MINIMUM LAP LENGTH OF BARS SHALL BE 50 DIA.
6. COVER TO MAIN REINFORCEMENT UNLESS OTHERWISE STATED

STRUCTURAL COMPONENT	
i. SLAB	= 25 mm
ii. BEAM	= 30 mm
iii. FOUNDATION	= 75 mm
iv. COLUMN	= 35 mm
iv. WALL	= 30 mm

7. MINIMUM CONCRETE GRADE TO BE C25/30
OR OTHERWISE STRENGTH
8. MINIMUM PERIODS BETWEEN CONCRETING AND REMOVAL OF FORMS.
9. VERTICAL FACES OF BEAM WALL COLUMN, PILLS,
FOUNDATION PLINTS AND PRECAST ITEMS = 3 DAYS.
- ii. UNDERSIDES OF SLAB = 14 DAYS.
- iii. UNDERSIDES OF BEAM = 28 DAYS.
9. WIREMESH FABRIC REINFORCEMENT SHALL BE WELL LAPPED IN
ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION.
10. EXISTING OR FILL GROUND SHALL BE THROUGH COMPACTED TO
ACHIEVE A DESIGN DENSITY OF 95% OF 100 g/m³ (100 g/m³ = 1.65 t/m³)
11. CRUSHER-RUN HARDWARE SHALL BE COMPACTED WITH
3-PASSES OF 8 TON SMOOTH WHEEL ROLLER.
12. ANY HAUNCH OR EXCAVATION FORMED IN THE CRUSHER-RUN
HARDWARE SHALL BE THOROUGHLY COMPACTED WITH PLATE COMPACTOR.
13. ALL PROPOSED BURIED PIPES AND SANITARY FITTING SHALL BE
ACCURATELY PLACED PRIOR TO CONCRETING OF FLOOR SLAB.
14. WATERPROOFING COMPOUND ADDITIVE SHALL BE PROVIDEMIXED
INTO CONCRETE FOR ALL TOILET AND ROOF SLAB AREA PRIOR TO
CONCRETING WORKS.
15. ANTI-TERMITE TREATMENT
THE CONTRACTOR SHALL SPRAY THE ANTI-TERMITE CHEMICAL AS RECOMMENDED
BY THE SUPPLIER IN ACCORDANCE WITH THEIR SPECIFICATION TO AREA OF
THE BUILDING UP TO BORDER OF PERIMETER DRAIN (REFER TO ARCHITECT DWG.)
16. ALL OPENING TO SLEEVES/DOWEL BARS SHALL FILLED WITH APPROVED EPOXY GROUT.

NOTA :

LUKISAN SEBUT HARGA

PROJEK (Project)

CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN
BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI
AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

NOTA :

[illegible]

PEMILIK :	
-----------	--



MAJLIS AMANAH RAKYAT
BAHAGIAN BINAAN DAN SELENGGARAAN
TINGKAT 11, IBU PEJABAT MARA,
NO 21 JALAN MARA,
50609 KUALA LUMPUR

JURUTERA C&S :
'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.'



IR. WAN MANAN B. WAN AL
M.I.E.M.P.Eng.A.C.P.E.

TECHNIPRO CONSULT SDN. BHD.
(Civil, Structural & Geotechnical Consulting Engineer)

51-A & B, TINGKAT 2, JALAN TOK LAM,
20100 KUALA TERENGGANU,
TERENGGANU

Tel: 09-6223253
Fax: 09-6223263

ARKITEK :



ARKITEK ZAFWAN FARID
PT 2587, TINGKAT BAWAH, TAMAN ADIS INDAH,
JALAN TOK ADIS, KUALA IBAI, 20400 KUALA
TERENGGANU, TERENGGANU. TEL : 09 6317760
FAX : 09 6312760 EMAIL: admin@azf.com.my

JURUTERA M&E :



EMECH CONSULTING ENGINEERS
NO. 28092, ARAS 1 & 2, PERKEDAAN PERMINT
PERDANA, KAMPUNG BATIN, SEBERANG TAKIR,
21300 KUALA TERENGGANU, TERENGGANU.
TEL : 09-666 7337 FAX : 09-666 7336
EMAIL : emechconsults@gmail.com

JURUUKUR BAHAN :

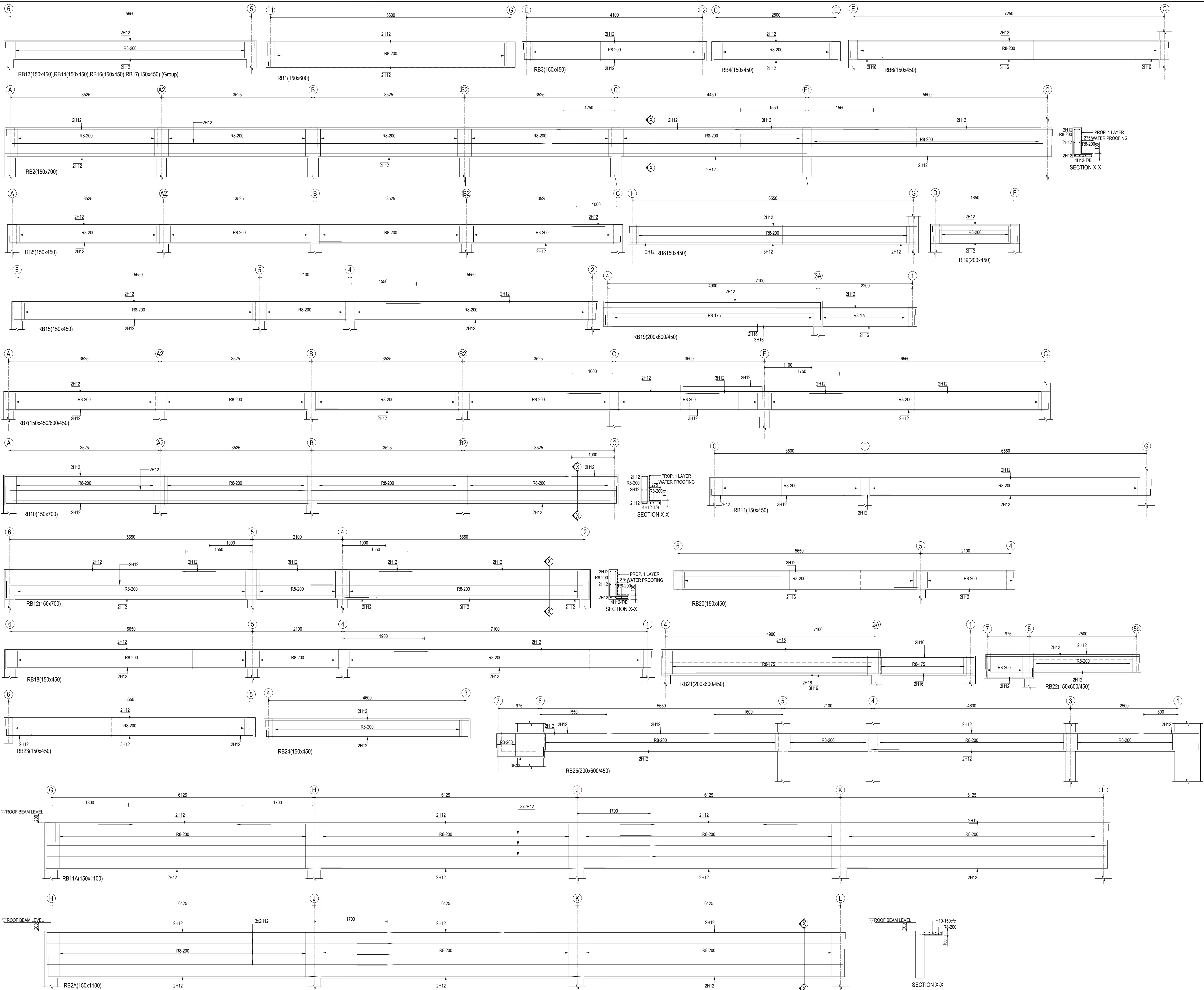


PERUNDING UKUR BAHAN WFA SDN BHD
PT1898, TINGKAT 1 PERKEDAAN KP PERDANA KUBANG
PARIT, 20050 KUALA TERENGGANU, TERENGGANU.
TEL : 09-626 1898 FAX : 09-626 1898
EMAIL : pub.wfab@gmail.com

TAJUK LUKISAN :

- ROOF BEAM LAYOUT PLAN
- WORK BAY LAYOUT PLAN
- TOP OF ROOF LEVEL - 8650m

TARIKH : 03 OGOS 2026	SKALA : YANG TERTERA
DILUKIS : M.M.A	DISEMAK : NR
NO. KONTRAK :	
NO. PROJEK : TCSB/NR/2515/RC/2.0	REVISION
NO. LUKISAN	SHEET NO. 02



NOTA :

LUKISAN SEBUT HARGA

PROJEK (Project)

CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

NOTA :

REV.	DATE	DESCRIPTION	BY

PEMLIK :



MAJLIS AMANAH RAKYAT
BAHAGIAN BINAAN DAN SELENGKARAAN
TINGKAT 11, BLOK PEJABAT MARA,
NO 21 JALAN MARA,
50089 KUALA LUMPUR

JURUTERA C&S
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 construction of the same.



IR. WAN MANAN B. WAN ALI
M.I.E.M.P. Engg & C.P.E.
TECHNIPRO CONSULT SDN. BHD.
(Civil, Structural & Geotechnical Consulting Engineer)
51-A & B, TINGKAT 1, JALAN TOK LAM,
20100 KUALA TERENGGANU,
TERENGGANU.
Tel: 09-6223253
Fax: 09-6223263

ARKITEK :



ARKITEK ZAFWAN FARID
PT 2897, TINGKAT BAWAH, TAMAN AISYAH INDAH,
JALAN TOK AISYAH, KUALA BAI, 20400 KUALA
TERENGGANU, TERENGGANU. TEL: 09-6211760
FAX: 09-6312760 EMAIL: admin@zafwan.com.my

JURUTERA M&E :



EMECH CONSULTING ENGINEERS
NO. 20052, ARAS 1 & 2, PERKAMPUNAN PERMINT
PERDANA, KAMPUNG BATIN, SEREBANG TAKIR,
21100 KUALA TERENGGANU, TERENGGANU.
TEL: 09-666 7337 FAX: 09-666 7336
EMAIL: emechconsult@gmail.com

JURUUKUR BAHAN :



PERUNDING UKUR BAHAN WFA SDN BHD
PT 1898, TINGKAT 1, PERKAMPUNAN KP PERDANA KUBANG
PANT, 20050 KUALA TERENGGANU, TERENGGANU.
TEL: 09-626 1898 FAX: 09-626 1898
EMAIL: pub.wfa@wfa.com

TAJUK LUKISAN :

-ROOF BEAM DETAILS

TARIKH : 03 OGOS 2026

SKALA : YANG TERTERA

DILUKIS : M.M.A

DISEMAK : NR

NO. KONTRAK :

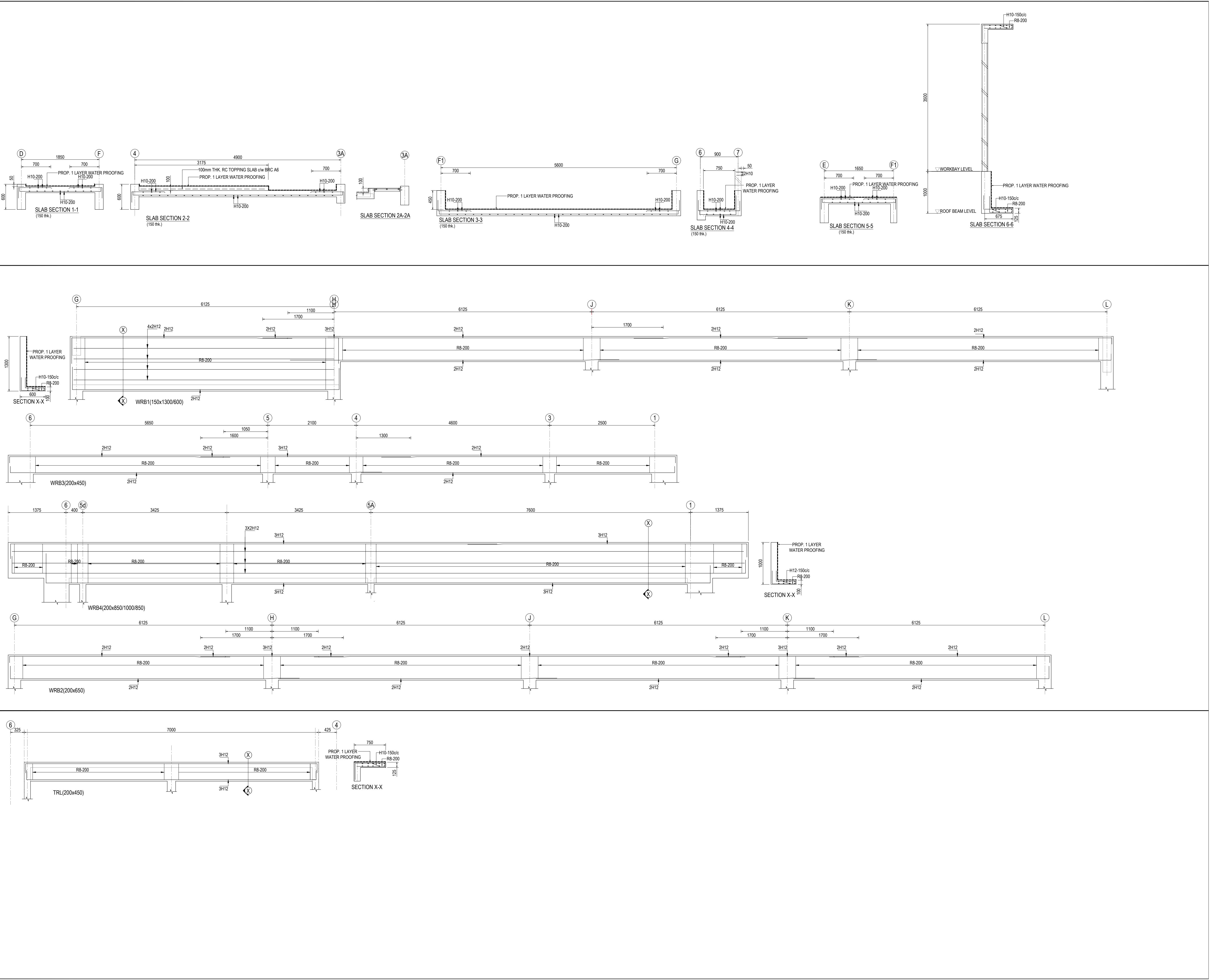
NO. PROJEK : TCSB/NR/2515/RC/2.1

REVISION

SHEET NO.

NO. LUKISAN

03



NOTA :

LUKISAN SEBUT HARGA

PROJEK (Project)
CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

NOTA :

REV.	DATE	DESCRIPTION	BY

PEMLIK :

MAJLIS AMANAH RAKYAT

BAHAGIAN BINAAN DAN SELENGGARAAN

TINGKAT 11, BLOK PERABAT MARA,

NO 21 JALAN MARA,

50059 KUALA LUMPUR

JURUTERA C&S :
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 performance of the same.

IR. WAN MANAN B. WAN ALI

M.EMP. Eng. A.C.P.E.

TECHNIPRO CONSULT SDN. BHD.

(Civil, Structural & Geotechnical Consulting Engineer)

S1-A & S2, TINGKAT 12, JALAN TOK LAM,

20100 KUALA TERENGGANU,

TERENGGANU

Tel : 09-6223253

Fax : 09-6223263

ARKITEK :

ARKITEK ZAFWAN FARID

PT 2587, TINGKAT BIVAN, TAMAN AGAS INDAH,

JALAN TOK AGAS, KUALA BAI, 20400 KUALA

TERENGGANU, TERENGGANU. TEL : 09-6311760

FAX : 09-6312760 EMAIL : admin@zaf.com.my

JURUTERA M&E :

EMECH CONSULTING ENGINEERS

NO 20052, ARAS 1 & 2, PERKESIDAHAN PERMINTA

PERDANA, KAMPUNG BATIN, SEBERANG TAKIR,

21100 KUALA TERENGGANU, TERENGGANU

TEL : 09-666 7337 FAX : 09-666 7336

EMAIL : emechconsult@gmail.com

JURUUKUR BAHAN :

PERUNDING UKUR BAHAN WFA SDN BHD

PT1898, TINGKAT 1, PERKEDAIAN KP PERDANA KUBANG

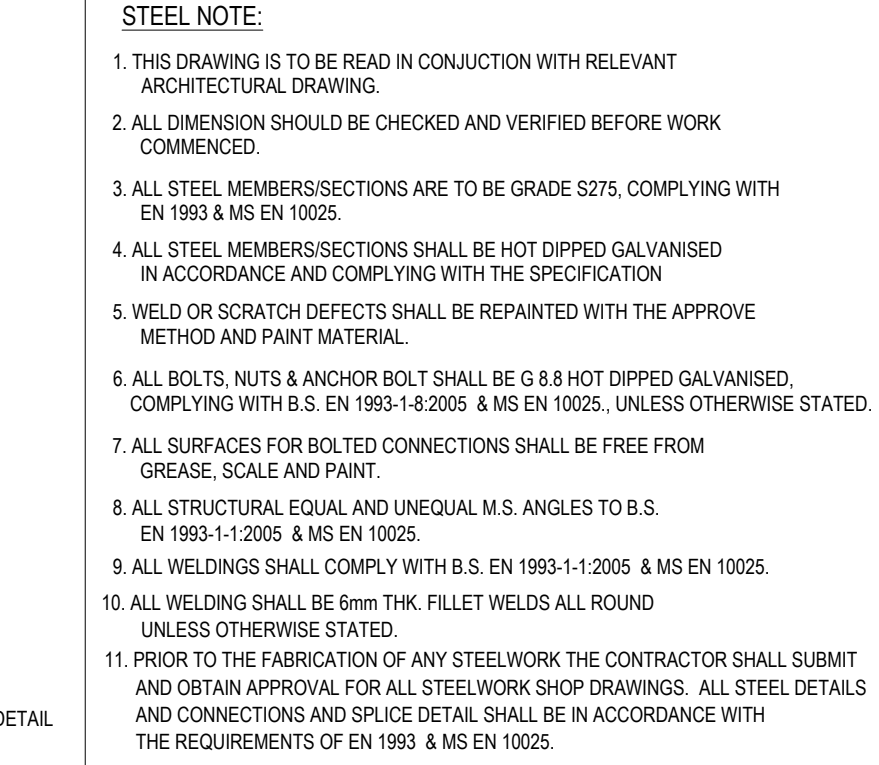
PASIR, 20200 KUALA TERENGGANU, TERENGGANU.

TEL : 09-626 1898 FAX : 09-626 1898

EMAIL : pub.wfab@gmail.com

TAJUK LUKISAN :
-ROOF SLAB SECTION
-WORKBAY BEAM DETAILS
-TOP ROOF LEVEL BEAM DETAILS

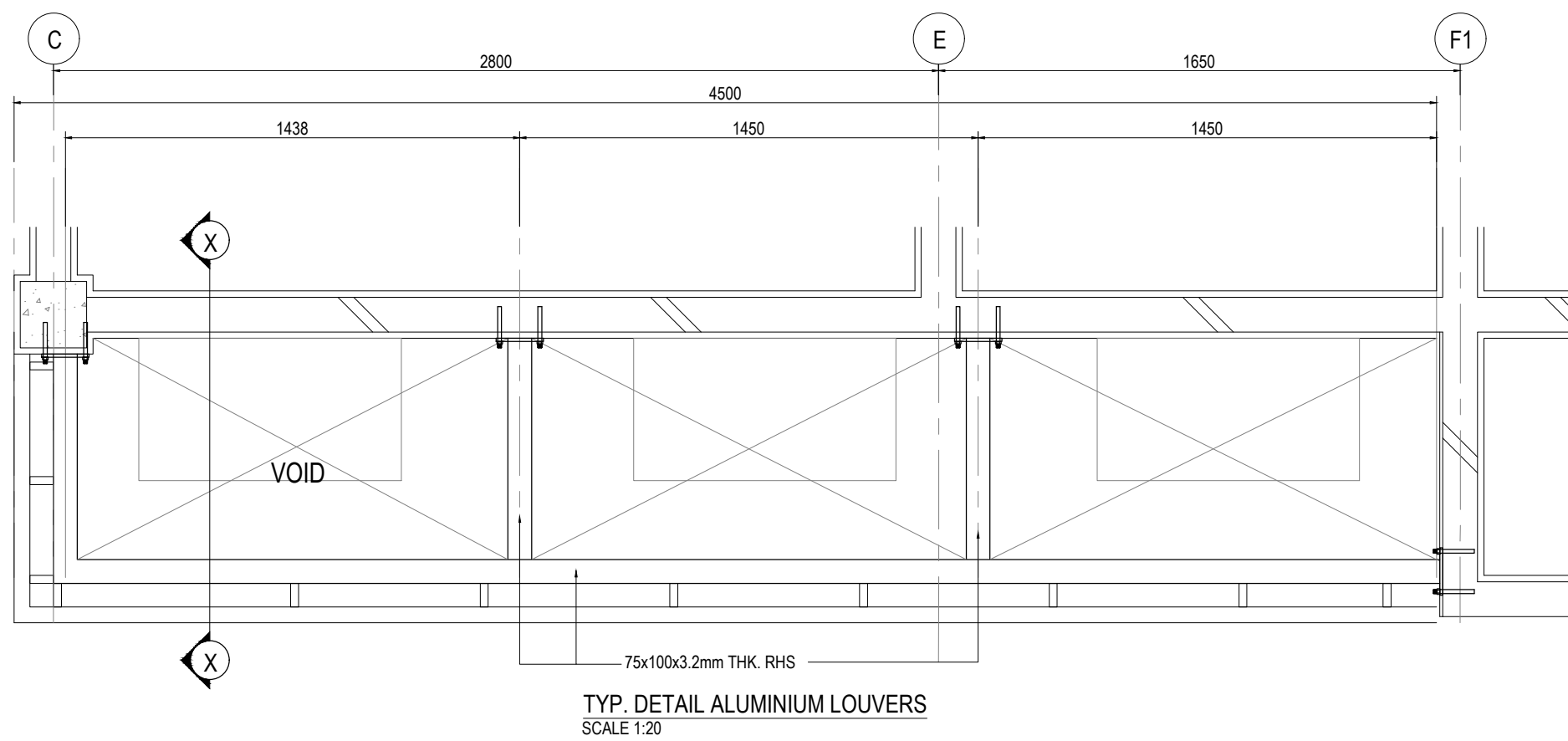
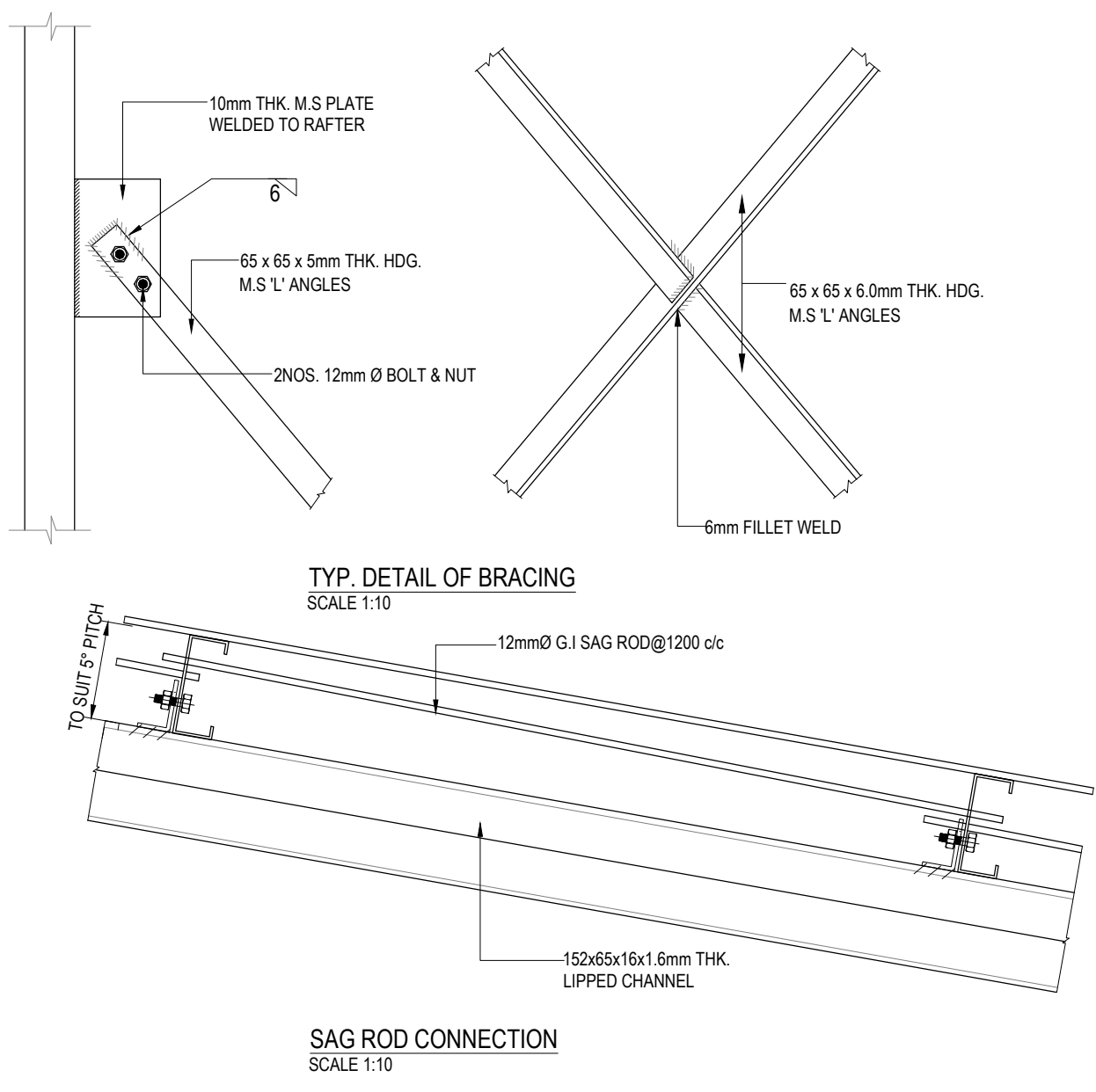
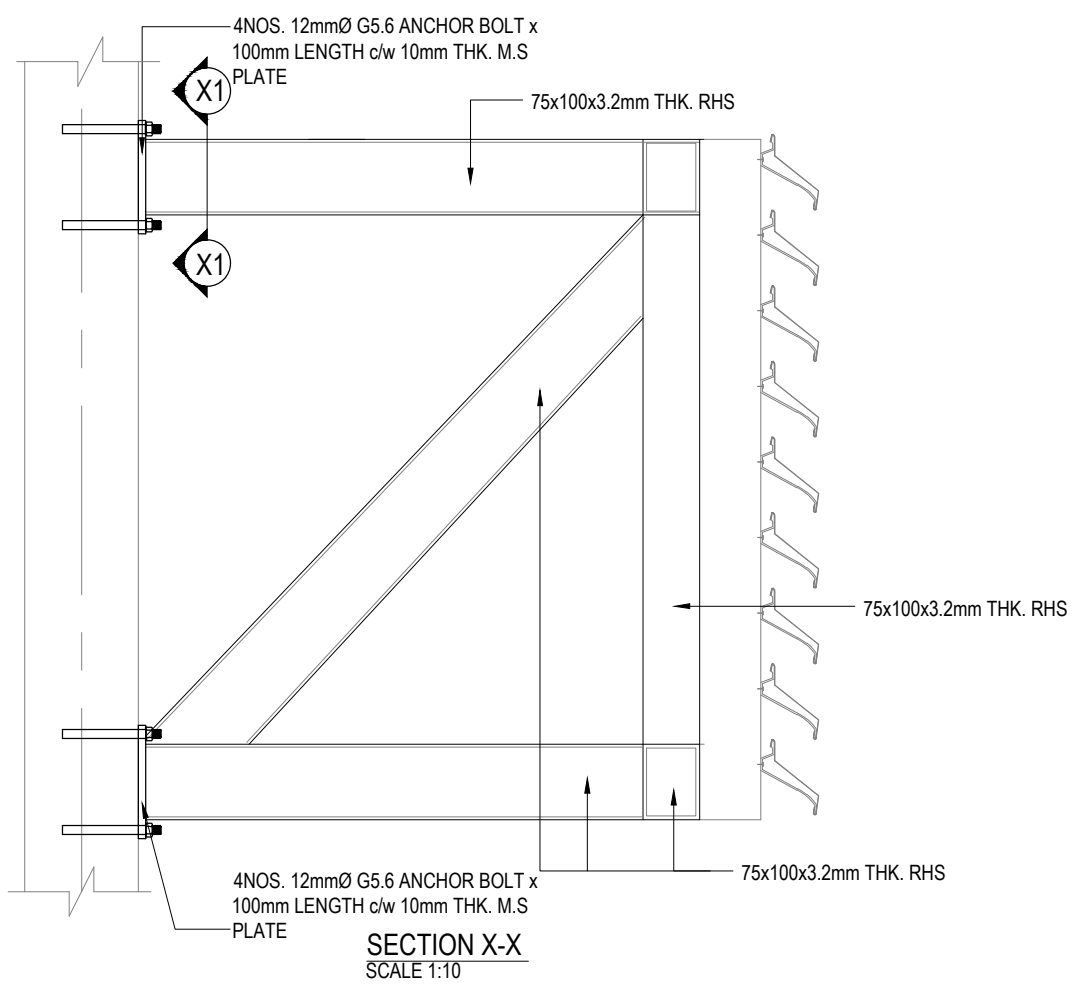
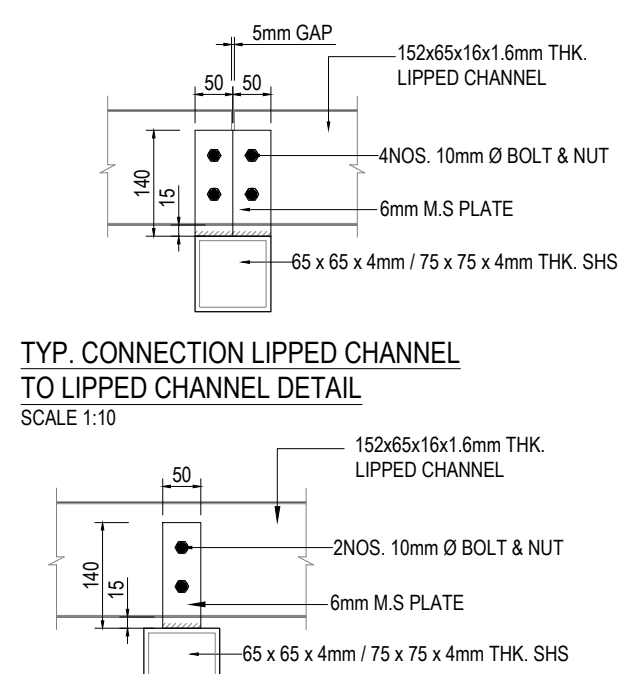
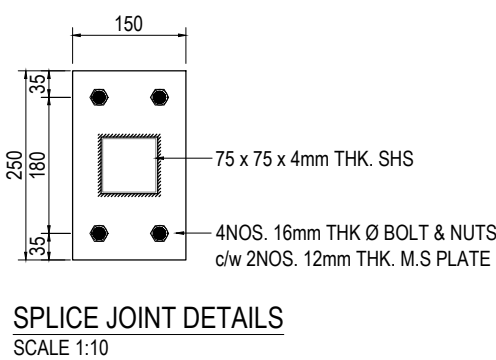
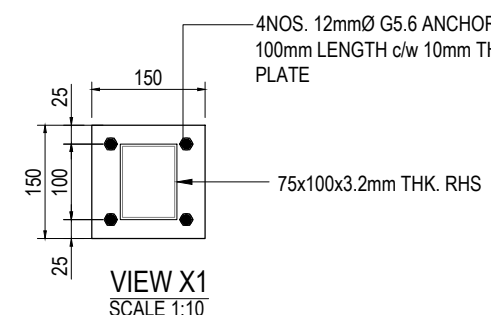
TARIKH : 03 OGOS 2026	SKALA : YANG TERTERA	
DILUKIS : M.M.A	DISEMAK : NR	
NO. KONTRAK :		
NO. PROJEK : TCSB/NR/2515/RC/2.2	REVISION	SHEET NO.
NO. LUKISAN		04



Webbs & Chords	C Sections Height: C 75mm, C100 (TRUSSES)	
Design Standard	MS 1553:2002 and prevailing wind loads of the region MS EN 1991-1-10:2010 PERMANENT ACTION	
	Live load on roof	0.25 kN / m ²
	Roof loads	0.7 kN / m ²
	Ceiling Load	0.25 kN / m ²
	Wind Speed	35 m / sec
	Structure Design (AS/NZS 4600:2018 & MS EN 1993-1-1:2019)	
Roof battens	Truss deflection (permanent load only)	1 / 250 span
	Batten deflection	1 / 150 purlin span
	Asymmetrical height of 35mm	Manufacture from same material as web and chord
Base Steel Standard	Malaysian Standard MS 1196:2000 & MS 2660:2002	Min 550 Mpa for steel < 12mm
Section < 1mm thick	Protective metallic alloy coating of Zinc (43.5 %), aluminum (5 %) and silicon (1.5%) applied by hot dip process	Coating Thickness on both sides 0.05mm (total) as in AS 1397- 1993 for coating class A2150
Fasteners & Galvanised bolts & nuts (Grade 8.8)	Comply with AS 3566 Class 2	All anchor bolt comply with RS EN 10269:2013 and connecting plates shall be either galvanised or manufactured from the same material as the trusses
Batten spacing	In the case of metal deck, batten spacing of 330mm shall be assumed	

STEEL ROOF TRUSSES CONSTRUCTION

1. ALL ROOF TRUSSES MEMBERS SHALL BE USED LIGHT WEIGHT & STEEL ROOF TRUSSES SYSTEMS.
2. ROOF TRUSSES SHALL BE DESIGN FOR 35 m/s WIND LOADING
3. THE STEEL ROOF TRUSS MEMBERS SYSTEM SHALL BE :
 - a) FIRE RESISTANT AND COMPLY WITH UBBL STANDARD
 - b) LIGHT-WEIGHT HIGH TENSILE TYPE
 - c) WARRANTY AGAINST CORROSION
 - d) MINIMUM THICKNESS FOR C-CHANNEL SHALL BE 1mm THK
4. THE STEEL IS COATED WITH A 95% ALUMINIUM, 43.5% ZINC & 1.5% SILICON ALLOY COATING
 - i) STEEL GRADE IS G550
 - ii) COATING SYSTEM ARE APPLIED TO STEEL TO PREVENT RUST
5. THE CONTRACTOR SHALL BE DESIGN AND CONSTRUCT THE STEEL ROOF TRUSS SYSTEM ACCORDING TO THE RELEVANT CODE OF PRACTICE. THE SHOP DRAWINGS SHALL BE SUBMITTED TO S.O APPROVAL AND COMPLETE WITH CALCULATION AND ENDORSED BY PROFESSIONAL ENGINEER
6. SYSTEM PROVIDER FOR ROOF TRUSSES SYSTEM SHALL BE IN APPROVED LIST OF JKR.



LUKISAN SEBUT HARGA

PROJEK (Project)

CADANGAN KERJA-KERJA MEMBINA DAN MENYIAPKAN
BENGKEL BAGI PROGRAM DIPLOMA TEKNOLOGI
AUTOMOTIF DI TVETMARA BESUT, TERENGGANU.

UNTUK :
TETUAN MAJLIS AMANAH RAKYAT

[illegible]

PEMILIK :



MAJLIS AMANAH RAKYAT
BAHAGIAN BINAAN DAN SELENGGARAAN
TINGKAT 11, IBU PEJABAT MARA,
NO 21 JALAN MARA,
50609 KUALA LUMPUR

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.



IR. WAN MANAN B. WAN AL
M.Eng, M.P.E.

TECHNIPRO CONSULT SDN. BHD.
(Civil, Structural & Geotechnical Consulting Engineer)
51-A & B, TINGKAT 2, JALAN TOK LAM,
20100 KUALA TERENGGANU,
TERENGGANU
Tel: 09-6223253
Fax: 09-6223263

ARKITEK



ARKITEK ZAFWAN FARID
PT 2587, TINGKAT BAWAH, TAMAN ADIS INDAH
JALAN TOK ADIS, KUALA IBAI, 20400 KUALA
TERENGGANU, TERENGGANU. TEL : 09 631777
FAX : 09 6312760 EMAIL: admin@azf.com.my

JURUTERA M&E :



EMECH CONSULTING ENGINEERS
 NO. 28092, ARAS 1 & 2, PERKEDAIAN PERMIT
 PERDANA, KAMPUNG BATIN, SEBERANG TAKIR,
 21300 KUALA TERENGGANU, TERENGGANU.
 TEL: 09-666 7337 FAX: 09-666 7336
 EMAIL: emechconsult@gmail.com

JURUUKUR BAHAN :



WFA
PERKORPORASIAN LUKAS BAHAN WFA SDN BHD

PERUNDING UKUR BAHAN WFA SDN BHD
PT1698, TINGKAT 1 PERKEDAIAN KP PERDANA KUBANG
PART, 20050 KUALA TERENGGANU, TERENGGANU.
TEL : 09-626 1898 FAX : 09-626 1898
EMAIL : pub.wfasb@gmail.com

TAJUK LUKISAN :

- LIGHTWEIGHT ROOF TRUSSES LAYOUT
- WORK BAYS TRUSSES LAYOUT
- TRUSSES DETAILS & SECTION
- TYP. DETAIL ALUMINIUM LOUVERS

TARIKH : 03 AGOS 2026

SKALA : YANG TERTERA

DILUKIS : M.M.A

DISEMAK : NR

NO. KONTRAK :

NO. PROJEK : TCSB/NR/2515/RC/3.0

NO. LUKISAN

REVISION	SHEET NO.
----------	-----------

05