Jabatan Kerja Raya Malaysia

Penyeliaan, Pengujian & Pertauliahan Kerja Pembetungan

Ir. Amir Asrol Bin Ahmad Bangi

Bahagian Kejuruteraan Awam (Kesihatan & Pendidikan, Caw. Kej. Awam & Struktur

Objektif:

1. Peserta akan diterangkan perkara berikut:

a. Klausa Spesifikasi Kerja Pembetungan JKR

b. Kaedah Penyeliaan Tapak JKR

c. Pengujian Dan Pentauliahan

Outcome:

Peserta dapat mengetahui keperluan yang perlu dipatuhi untuk kerja pembetungan berdasarkan Spesifikasi JKR, Kaedah Penyeliaan Tapak SPB JKR serta Pengujian dan Pentauliahan.

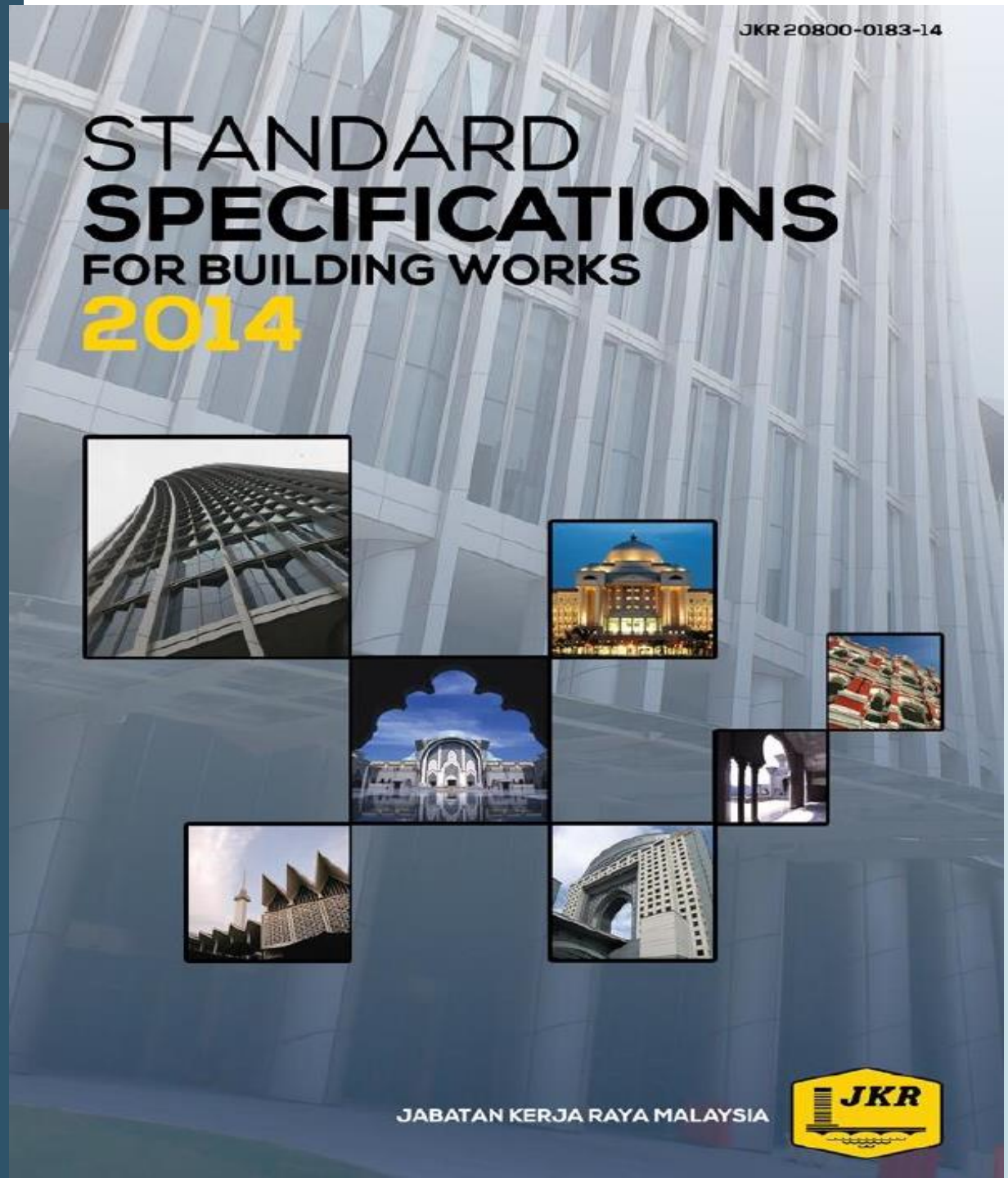
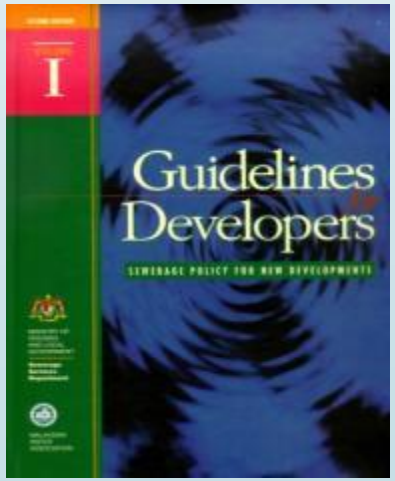


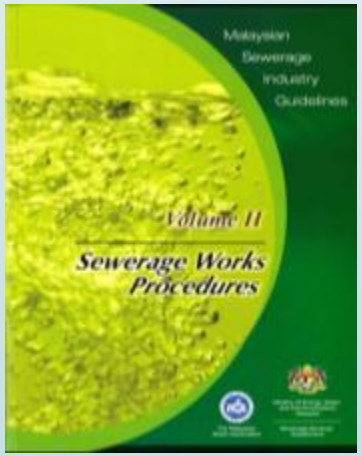
TABLE OF CONTENTS

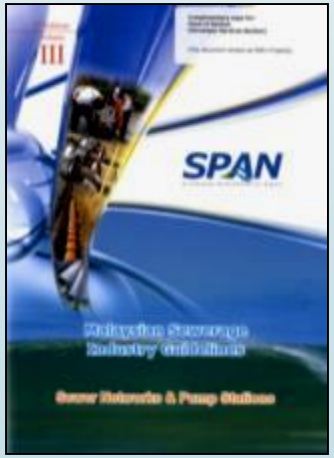
		PAGE
SECTION A	: PRELIMINARIES AND GENERAL CONDITIONS	A/1 - A/30
SECTION B	: EXCAVATION AND EARTHWORKS	B/1 - B/14
SECTION C	: FOUNDATION WORKS AND WORKS BELOW LOWEST FLOOR LEVEL	C/1 - C/42
SECTION D	: CONCRETE WORKS	D/1 - D/44
SECTION E	: NON-STRUCTURAL WALL SYSTEM	E/1 – E/10
SECTION F	: SEWERAGE WORKS	F/1 – F/10
SECTION G	: ROOFING WORKS	G/1 - G/8
SECTION H	: TIMBER, JOINERY AND IRONMONGERY WORKS	H/1 - H/30
SECTION I	: CEILING WORKS	I/1 - I/10
SECTION J	: STRUCTURAL STEEL AND METAL WORKS	J/1 - J/6
SECTION K	: PLASTERING, PAVING AND TILING WORKS	K/1 - K/14
SECTION L	: WATER RETICULATION, INTERNAL PLUMBING SYSTEM AND SANITARY FITTINGS	L/1 - L/14
SECTION M	: RAIN WATER COLLECTION	M/1 - M/6
SECTION N	: GLAZING WORKS	N/1 - N/4
SECTION O	: PAINTING WORKS	O/1 - O/8
SECTION P	: ROADS AND HARDSTANDING	P/1 - P/11
SECTION Q	: FENCING AND GATES	Q/1 - Q/2
SECTION R	: LANDSCAPING AND TURFING WORKS	R/1 - R/10
SECTION S	: DRAINAGE WORKS	S/1 - S/8
SECTION T	: SIGNAGE WORKS	T/1 -T/4

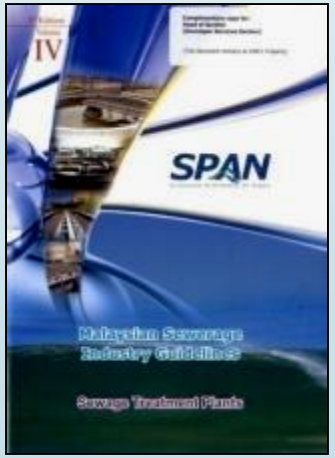
RUJUKAN

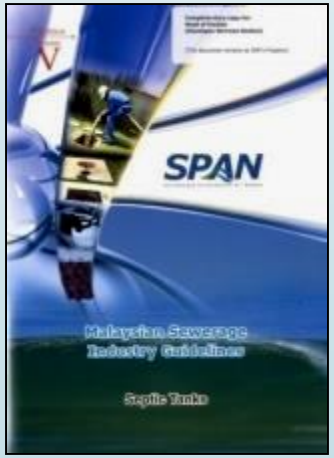
- MALAYSIAN SEWERAGE INDUSTRY GUIDELINES (MSIG)
  - Volume I – Guidelines for Developers
  - Volume II – Sewerage Works Procedures
  - Volume III – Sewer Networks & Pump Stations
  - Volume IV – Sewage Treatment Plants
  - Volume V - Septic Tank
- MS 1228 (Design & Installation Of Sewerage System)



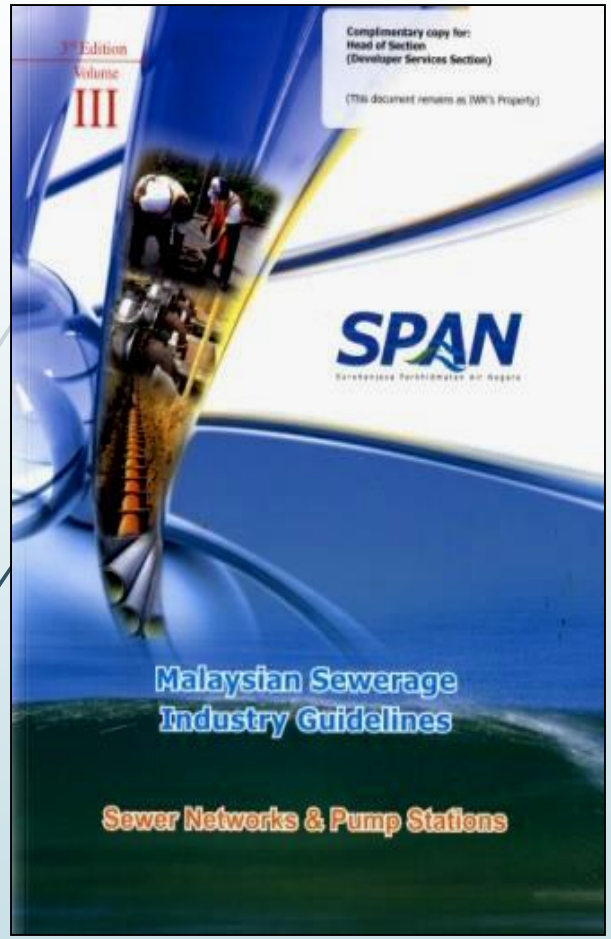




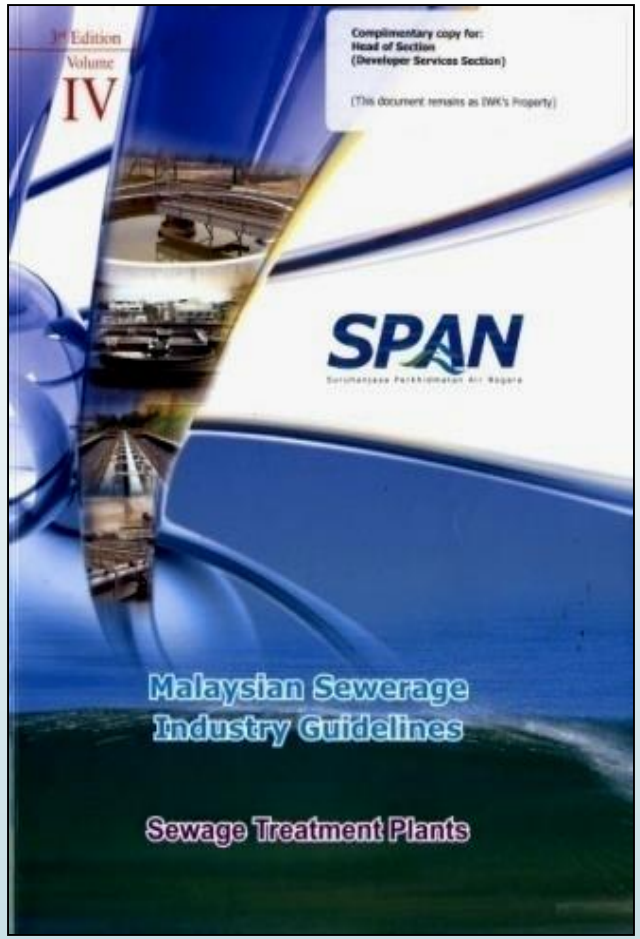




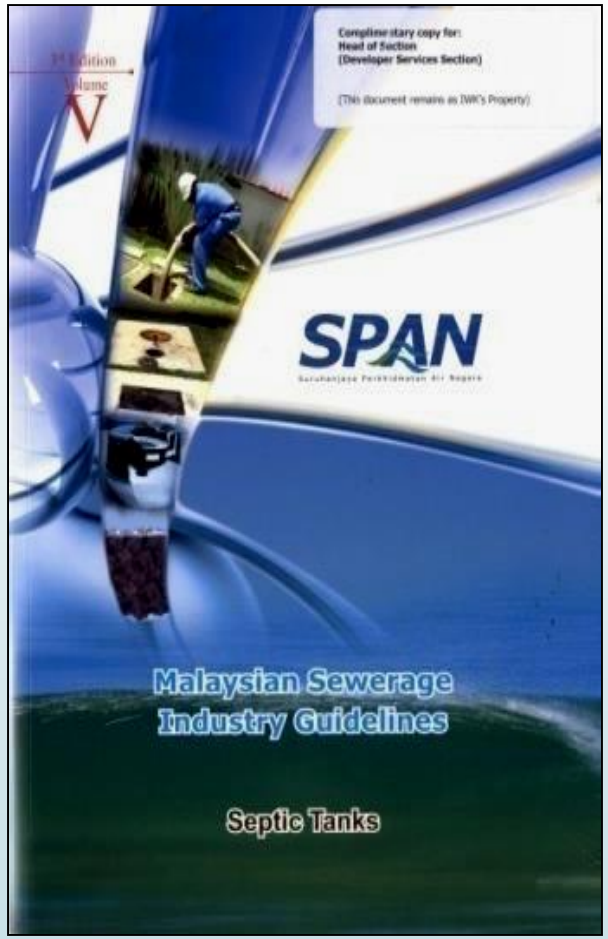
MSIG Volume 111 , 1V & V



Sewer Networks & Pump Station



Sewer Treatment Plants



Septic Tank

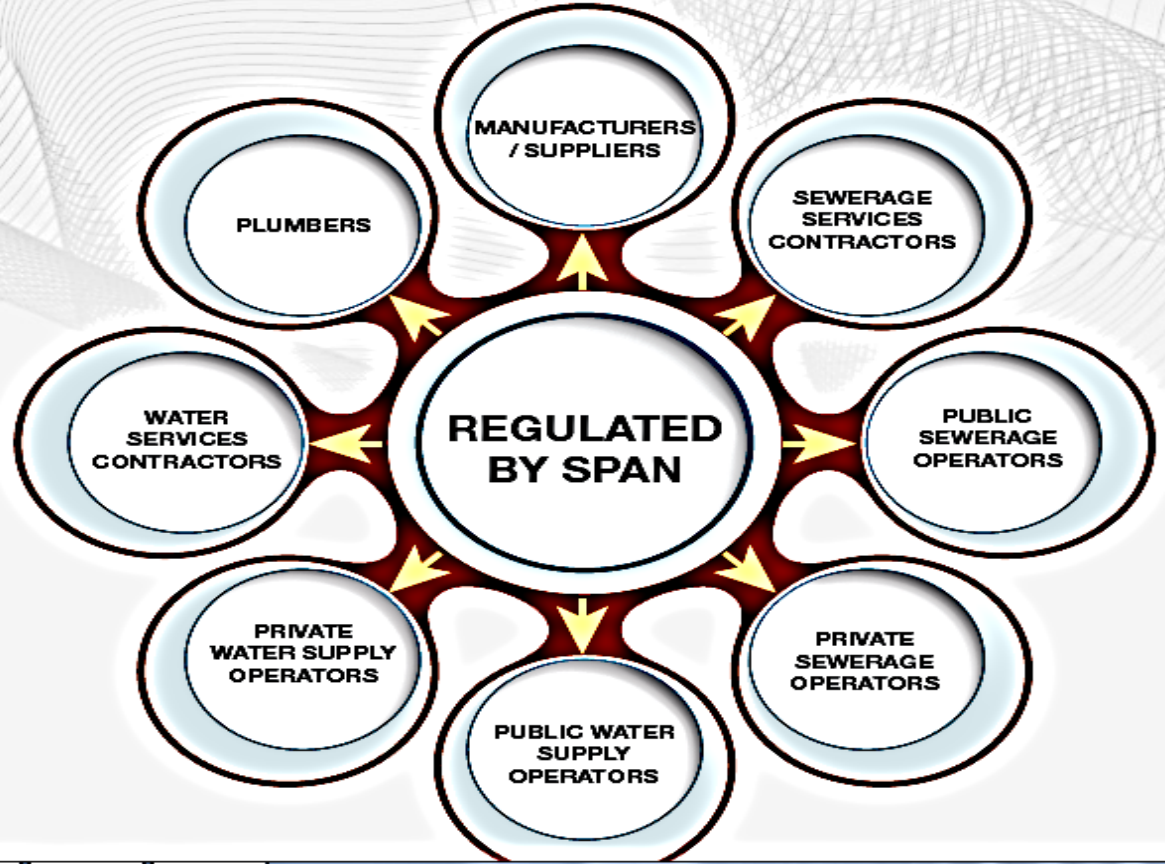
SURUHANJAYA PERKHIDMATAN AIR NEGARA
NATIONAL WATER SERVICES COMMISSION

The Commission's Role

SPAN is a technical and economic regulatory body for the water supply and sewerage services in Peninsular Malaysia and Federal Territories of Putrajaya and Labuan.

SPAN regulates all entities in the water supply and sewerage services industry including public water supply and sewerage services operators, private water supply and sewerage services operators, water supply and sewerage contractors, permit holders and suppliers of water and sewerage products.

SPAN regulates the water services industry in accordance Water Services Industry Act 2006 (Act 655) which was enforced on 1 January 2008.



Kandungan

1. General

2. Material

3. Layout

4. Excavation

5. Pipes & Fittings

6. Joint for Sewer Pipes

7. Pipe Laying

8. Bedding, Haunching & Surround

9. Connections

10. Manhole, IC and Valve Chamber

11. ST & STP

12. Connection to Public Sewerage Line

13. Testing for Sewer Pipe

14. Backfilling

Kepentingan Spesifikasi Bangunan JKR

- Dokumen rujukan sekiranya berlaku pertikaian di tapak
- Sebahagian daripada dokumen kontrak
- Tidak semua perincian dinyatakan di dalam lukisan. Cth: Ujian Paip Kumbahan

1. GENERAL

Kerja Pembetungan MERANGKUMI:

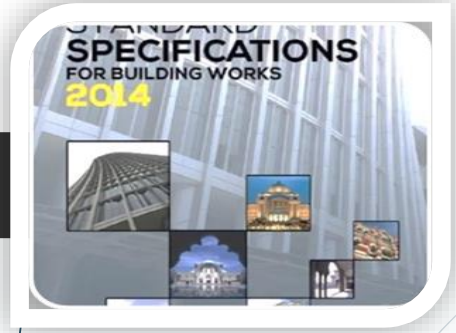
- Pembekalan
- Penghantaran
- Pembinaan
- Pengujian

Sehingga titik discaj akhir (Manhole Awam) ATAU manhole akhir sebelum Loji Rawatan Kumbahan

2. Material

Simen, Pasir, Agregate & Bata
• Rujuk Seksyen D - Kerja Konkrit • Rujuk Seksyen E – Non Structural Wall System (Claybrick)

Paip Kumbahan
• Pembekal berdaftar SPAN • Bahan di lulus SPAN • Pemeriksaan oleh SO • Laporan Ujian Bahan • Bahan di simpan dengan teratur



2. Products and Materials

Tanggungjawab Pegawai Penguasa untuk memastikan:
1. Produk yang diguna adalah baru
2. Diluluskan oleh SPAN
3. Diluluskan oleh SO
4. Pembekal bahan berdaftar dengan SPAN - Sijil pendaftaran perlu disertakan
5. Bahan telah diuji – Sijil SIRIM/IKRAM
6. Pemeriksaan perlu dijalankan oleh SO setelah produk dipasang

3. Layout

Kerja Pembetungan dilaksanakan mengikut PELAN SISTEM PEMBETUNGAN yang telah diluluskan oleh Agensi Perakuan Pembetungan.

4. Excavation

- Melaksanakan kerja ukur untuk penentuan lokasi paip
  Jarak kelegaan (Clerance) 1m dari bangunan & jalan
  Jajaran perlu disahkan oleh SO
- Trenches perlu di korek 300mm min. (kiri & kanan) lebih besar daripada saiz paip
- Trenches di korek menegak. Penyokong perlu disediakan jika kedalaman trenches melebihi 1.5m
- Jarak pengorekan maksimum trenches = 100m

4. Excavation

- Tanggungjawab kontraktor untuk melindungi utiliti sedia ada – paip air/gas/kabel eletrik
- Bahagian dasar trenches perlu dipastikan rata
- Dasar trenches yang bertanah lembut, perlu di tambun dengan ‘good earth, quarry dust or sand’ yang dipadatkan
- Air dalam trenches perlu dikeluarkan

4. Excavation

- Bahan korekan diletakkan 600mm min. jauh dari trenches
- Penanaman paip di jalan sedia ada – Make Good semula selepas siap kerja
  1 lorong jalan sahaja dibenarkan ditutup
- Jika menemui batu, perlu dipotong atau dikeluarkan. Rongga perlu di isi semula dengan konkrit gred 20P atau dipadatkan dengan bahan yg diluluskan SO
- Pipe Jacking – Method Statement perlu lulus SO
  Perlu mematuhi OSHA sepanjang melaksanakan kerja pembetungan

4. Excavation

- Disetiap sambungan, trenches hendaklah dikorek tidak kurang dari 300mm disekeliling bahagian sambungan tersebut
- Paip hendaklah dipasang di kawasan trenches yang telah dikorek pada satu satu hari tersebut, melainkan telah mendapat kelulusan SO
- Secara amnya, kerja-kerja pengorekan adalah perlu mematuhi SECTION B : EXCAVATION AND EARTHWORKS

5. PIPE & FITTINGS

Pipe = VCP or As Per Drawings

Comply to MS 1061 & SPAN

Approved by SO

Min. 150mm dia (Service Connection)

225mm dia (Sewerage Pipe)

Approved by SO

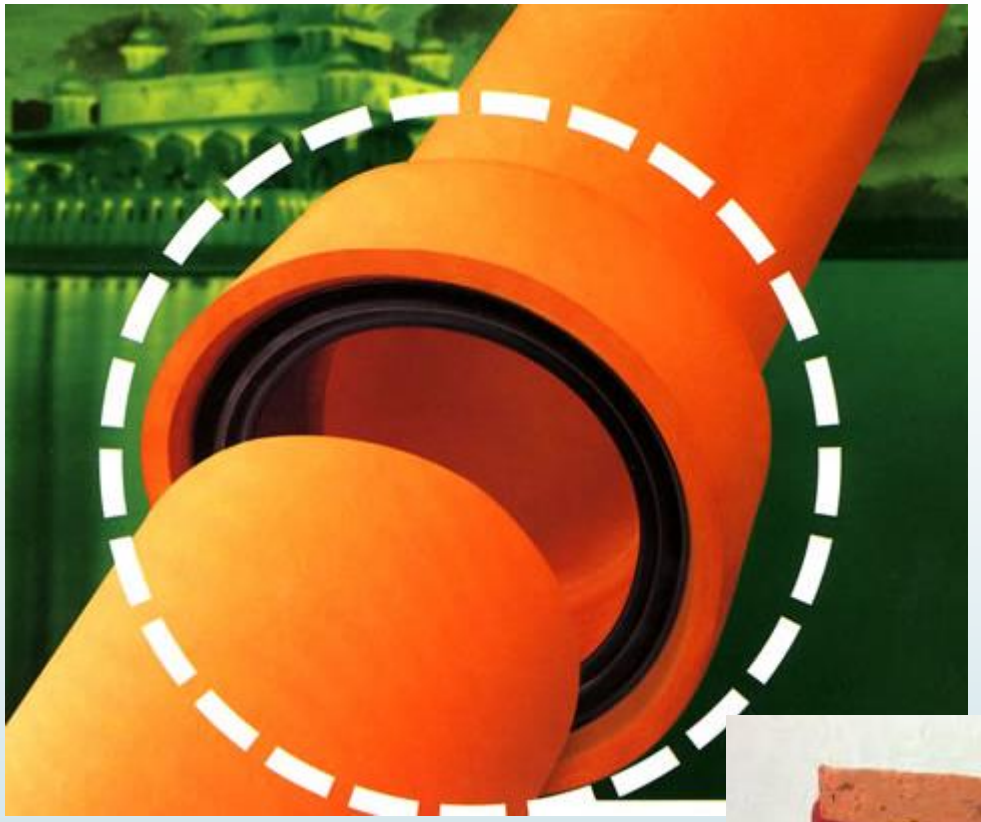
6. Joint for Sewer Pipe

Flexible & Watertight Type

Spigot & Socket perlu dibersihkan sebelum dibuat penyambungan

Kaedah 'Coupling'

COUPLING



SOCKET & SPIGOT

7. PIPE LAYING

- Paip perlu mematuhi – **SAIZ, LOKASI, DIMENSI, GRED, JAJARAN, INVERT LEVEL, KECERUNAN**
- **SEMAK** sebelum pemasangan – Paip pecah, retak, sumbing = Tak diterima
- Trenches perlu di **LULUSKAN** oleh SO
- **PENUTUP SEMENTARA** pada kedua-dua penghujung paip
- Paip di pasang **DOWNSTREAM ke UPSTREAM**
- Kedudukan Soket Paip di pasang **BERLAWAN ARAH** dengan aliran kumbahan
- **CONCRETE BEDDING, HAUNCHING, SURROUND, ENCASED** = Rujuk Lukisan Perincian
- **Min COVER** = 450mm
- Jarak Kelegaan **(Vertical & Horizontal Clearance)** dengan lain-lain utility = 100mm
- **FORCED MAIN Pipe** = Perlu Marker Post setiap 200m

7. PIPE LAYING

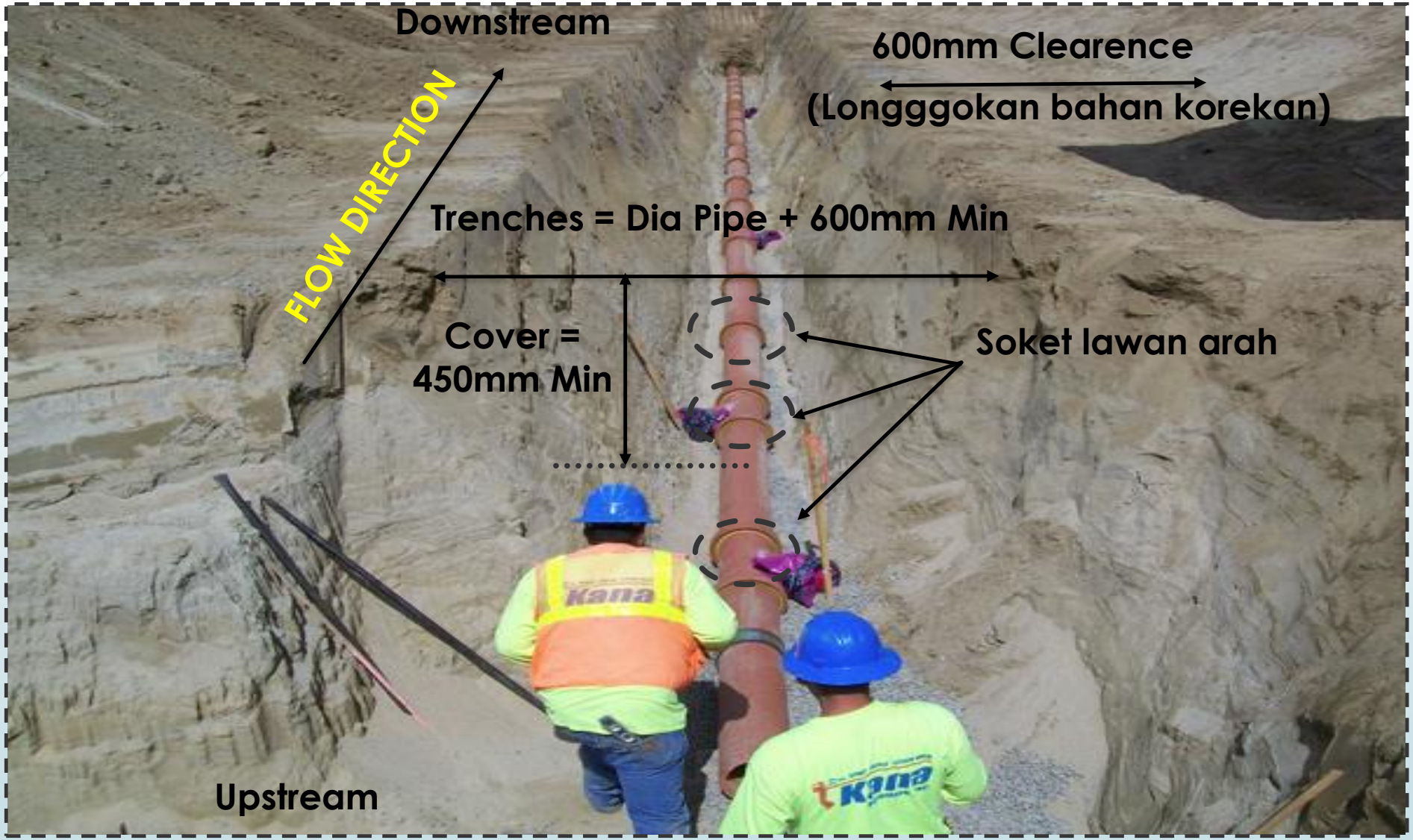
- Keperluan DOKUMEN PENYELIAAN TAPAK BINA
  a. Gambar Pemasangan Paip
  b. Laporan/Sijil Ujian
  c. Rekod Penyeliaan Tapak – Borang SPB JKR
  d. Pelan Terbina – As Built

Pipe Laying

- The sewer pipes shall be laid to the gradients as shown on the Drawings.
- Where the gradients are not shown in the drawings, the pipe shall be laid to the following gradients:

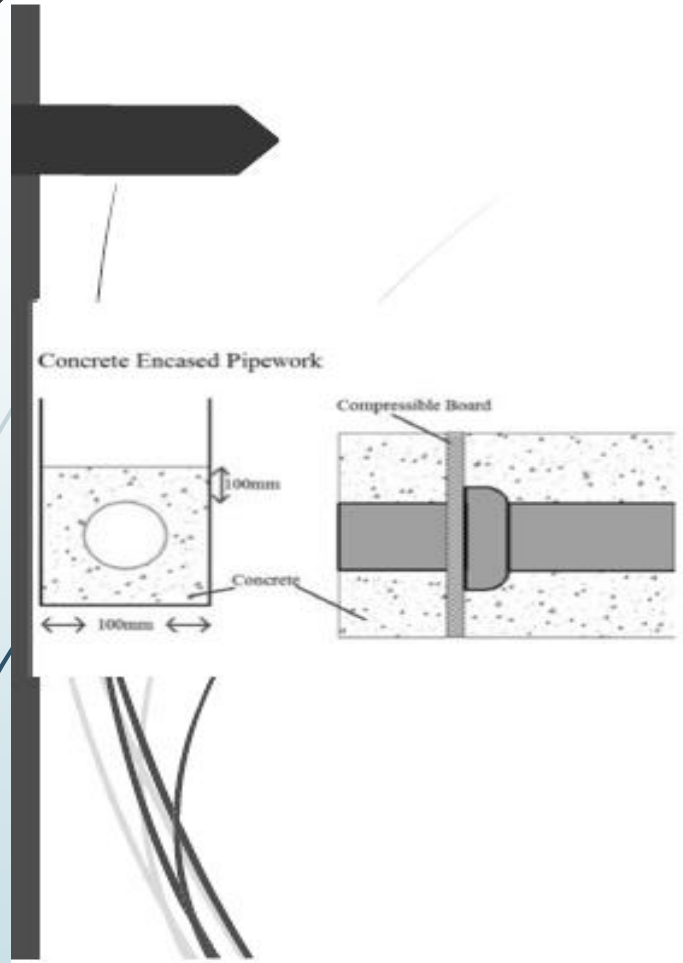
Size diameter (mm)	Gradient
100	1 : 60
150	1 : 80
225	1 : 110
250	1 : 120
300	1 : 140
375	1 : 170
450	1 : 200

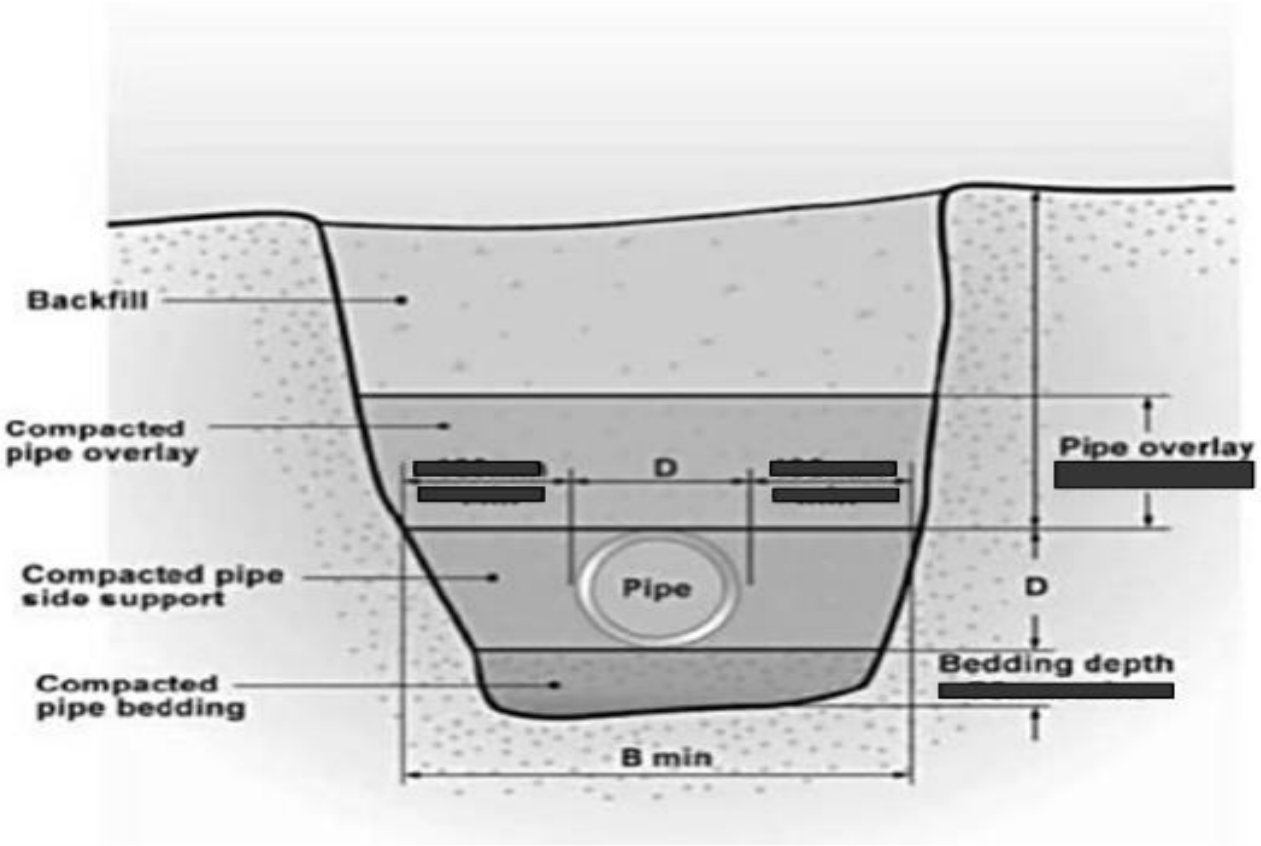
- The invert level of each pipe laid shall be checked during laying and immediately after laying as shown on the Drawings.


Downstream
600mm Clearence
(Longggokan bahan korekan)
FLOW DIRECTION
Trenches = Dia Pipe + 600mm Min
Cover =
450mm Min
Soket lawan arah
Upstream

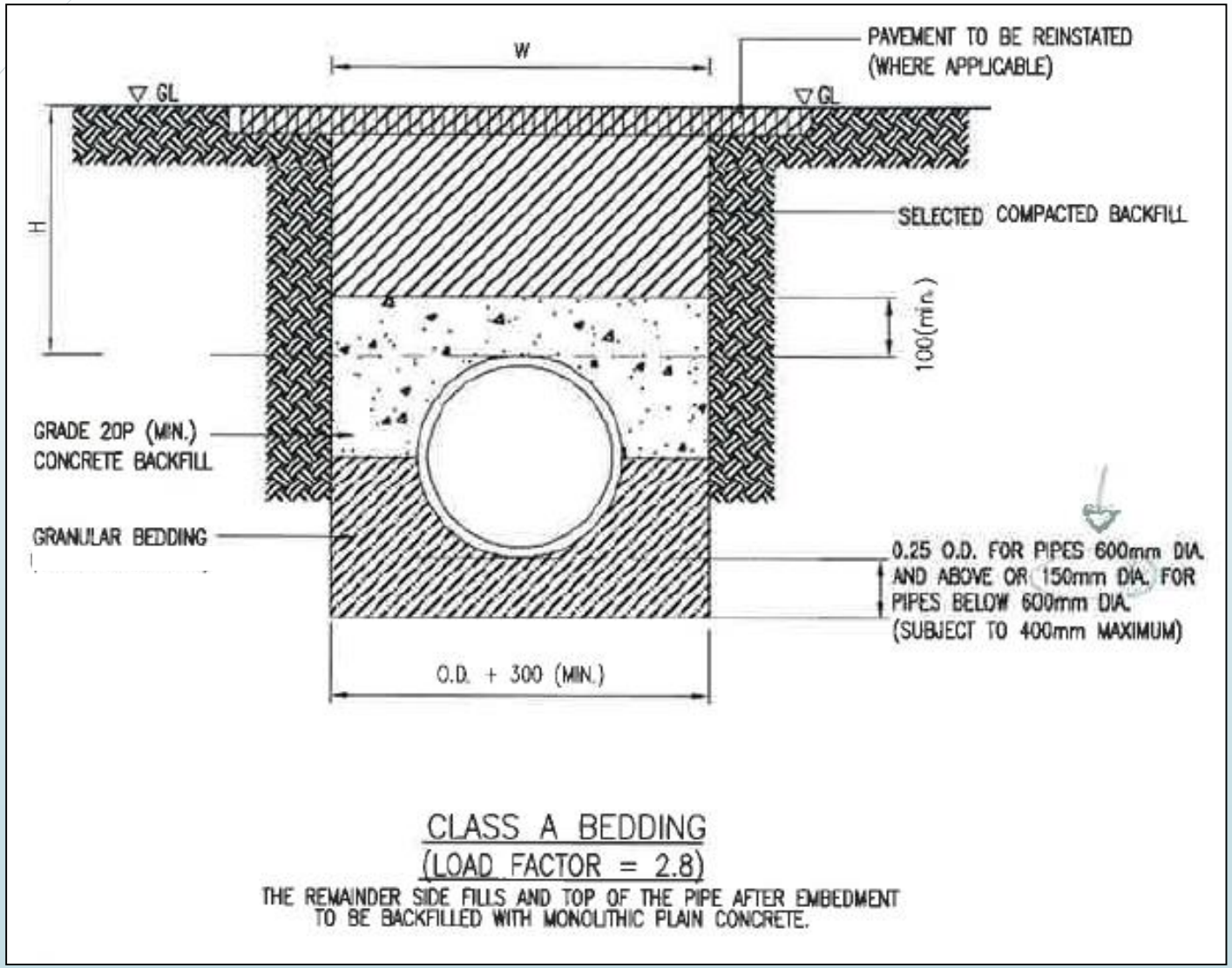
8. Bedding, Haunching & Surround

- Gred Konkrit 20P
- Perlu disediakan selepas siap pengorekan trenches
- Semak & diluluskan oleh SO

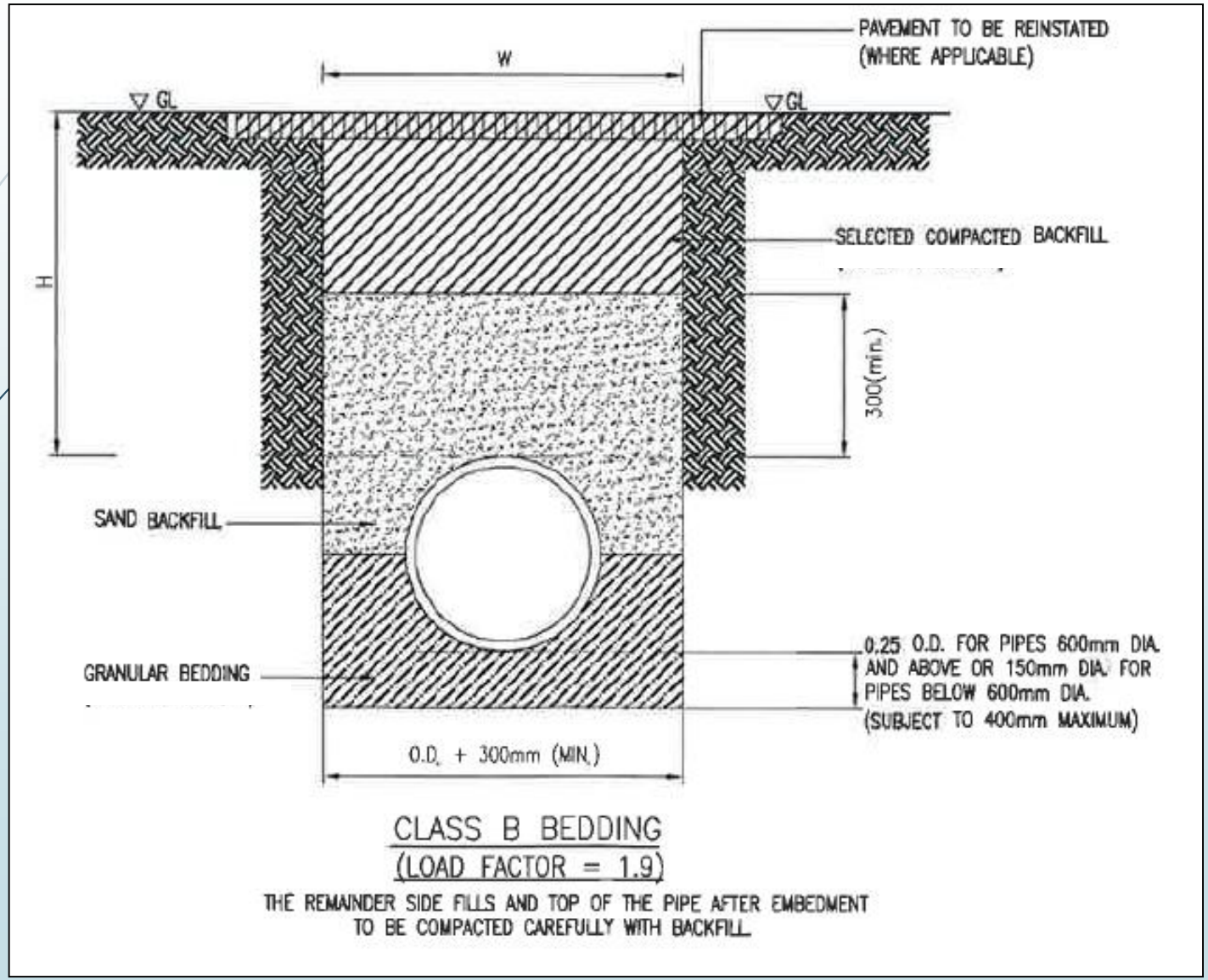

Concrete Encased Pipework
Compressible Board
100mm
Concrete
100mm


Backfill
Compacted pipe overlay
Compacted pipe side support
Compacted pipe bedding
D
Pipe
Pipe overlay
D
Bedding depth
B min

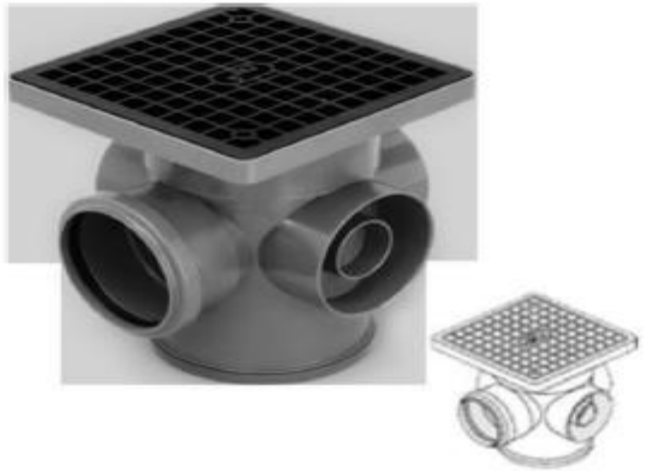
* Class A Bedding



* Class B Bedding



9. Connections



10. Manhole, Inspection Chamber & Valve Chamber

MANHOLE

- Patuhi Spec MSIG
  Kelulusan SPAN/SIRIM
- Kelulusan SO
- Dilindungi dgn lapisan 'Sulphate Resistant Cement Mortar' 20mm min or PVC/HDPE/Epoxy Coating
- Penutup Manhole
  a. Hot applied bituminious material **OR**
  b. Cold apllied bituminious material

10. MANHOLE TESTING
(Before Backfilling)

Water Tightness

A. Tiada kebocoran antara penutup manhole dan frame

Visual Inspection

A. Slope of Benching

B. Penyambungan anatara paip dan manhole

C. Sambungan paip masuk & keluar dari manhole

D. Struktur manhole

E. Kualiti pembinaan

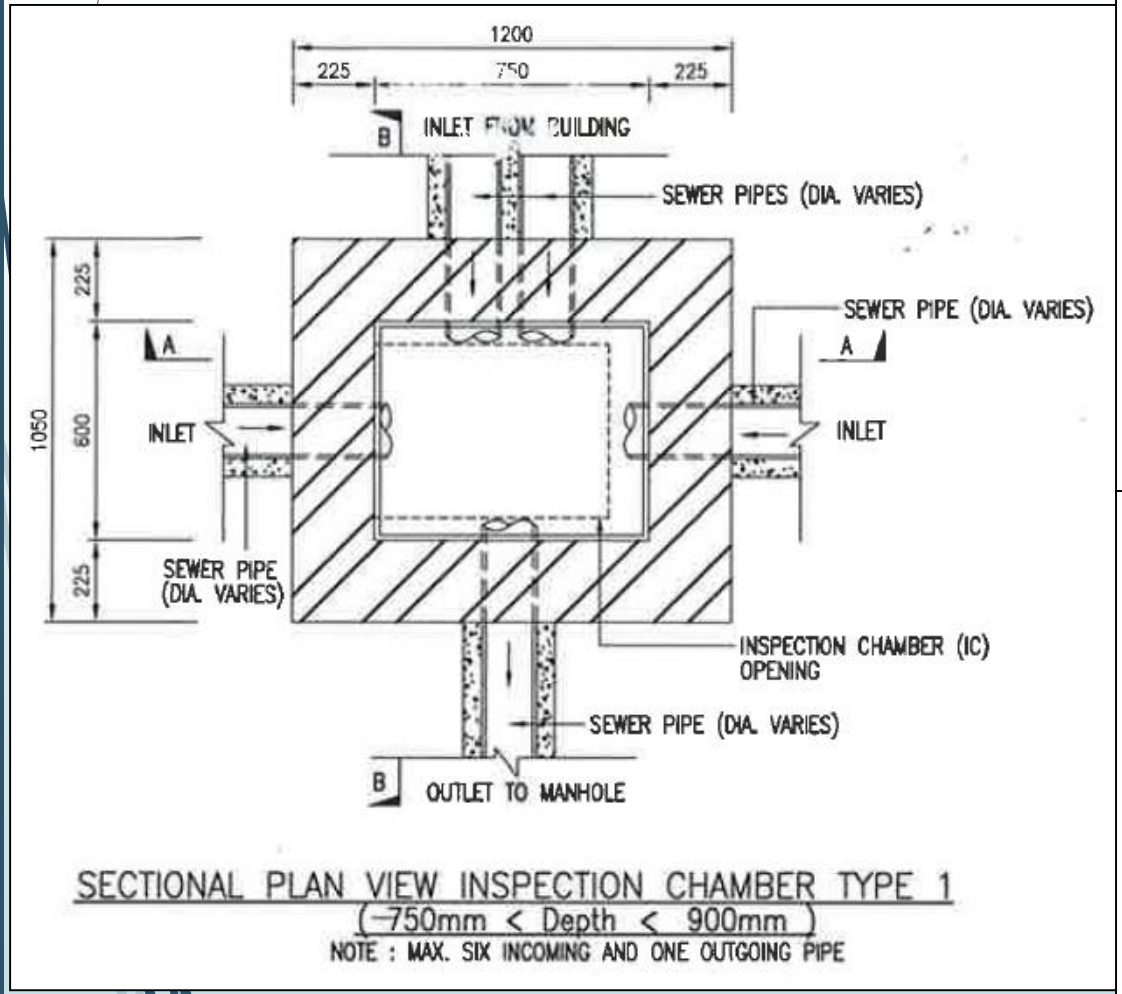
F. Water tightness


IN
IN
29/07/2010 09:07

10. INSPECTION CHAMBER

SPESIFIKASI

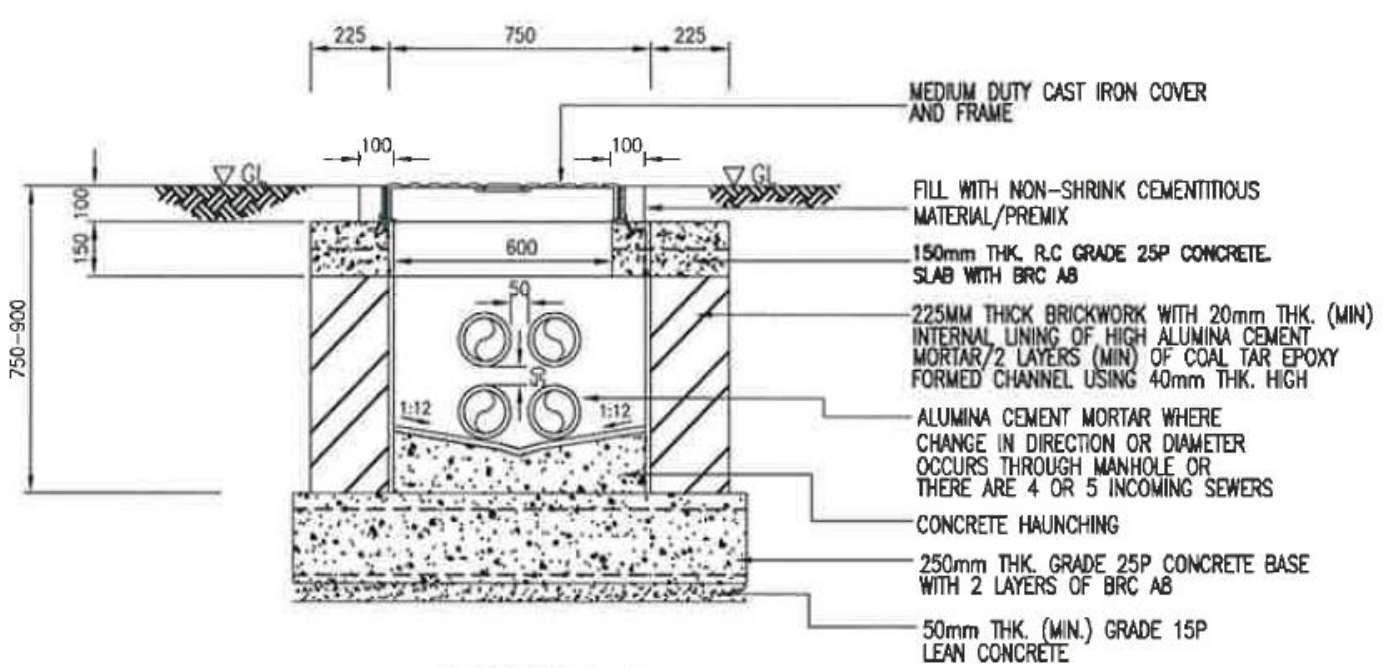
a. Brickwork in cement mortar 1:2
b. Claybricks
c. Gred 25P foundation
d. Include open channel at bottom of IC
e. Concrete Benching gradient 1:6 & Gred 25P finish with water proof cement and sand rendering
f. Internal side – Coated with 20mm thk PVC/HDPE/Epoxy
g. External brick surface – Cement rendered 12mm thk
h. Cover – Medium duty 450mm X 600mm Cast Iron



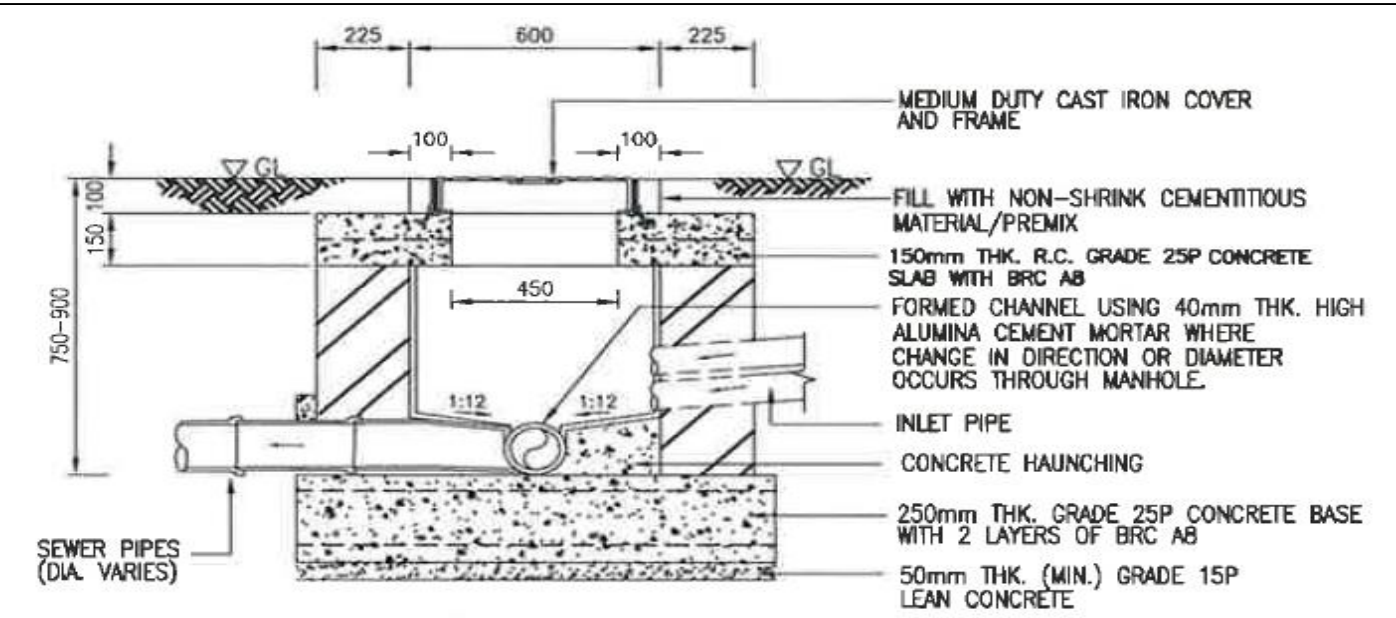
SECTIONAL PLAN VIEW INSPECTION CHAMBER TYPE 1

(-750mm < Depth < 900mm)

NOTE : MAX. SIX INCOMING AND ONE OUTGOING PIPE



SECTION A-A



SECTION B-B

11. Septic Tank & Sewage Treatment System

- Lokasi seperti **lukisan & disahkan** oleh SO
- Pembekal **dilulus SPAN. Berdaftar dengan MOF – Sistem Pembekal Berpusat**
- Kualiti effluent **STANDARD A**

11. Sewage Treatment System

Kepeluan dokumen utk KELULUSAN SO

a. Rekabentuk Sistem Rawatan

b. Lukisan

c. Method Statement termasuk struktur, asas, kerja luaran & M&E

e. Bertandatangan PE, daftar dengan SPAN

f. Kelulusan IWK

DOKUMEN PENYERAHAN

a. Warranty 5 tahun dari tarikh CPC merangkumi defect, fault & insufficiency in design, material & workmanship, failure

b. Warranty approved by SO

c. As Built drawing & OMM – Di cop PE, berdaftar SPAN

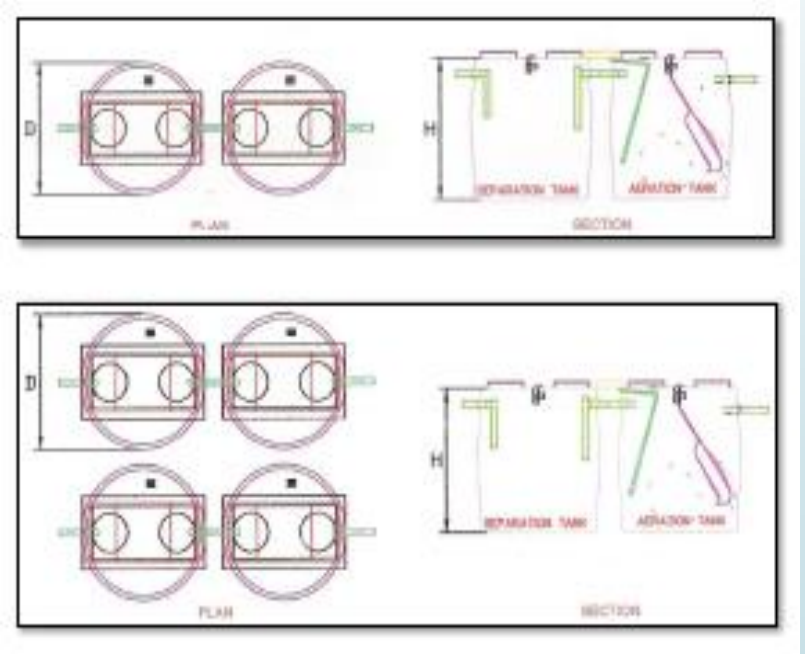
SEPTIC TANK

Small Sewerage Treatment System (SSTS)

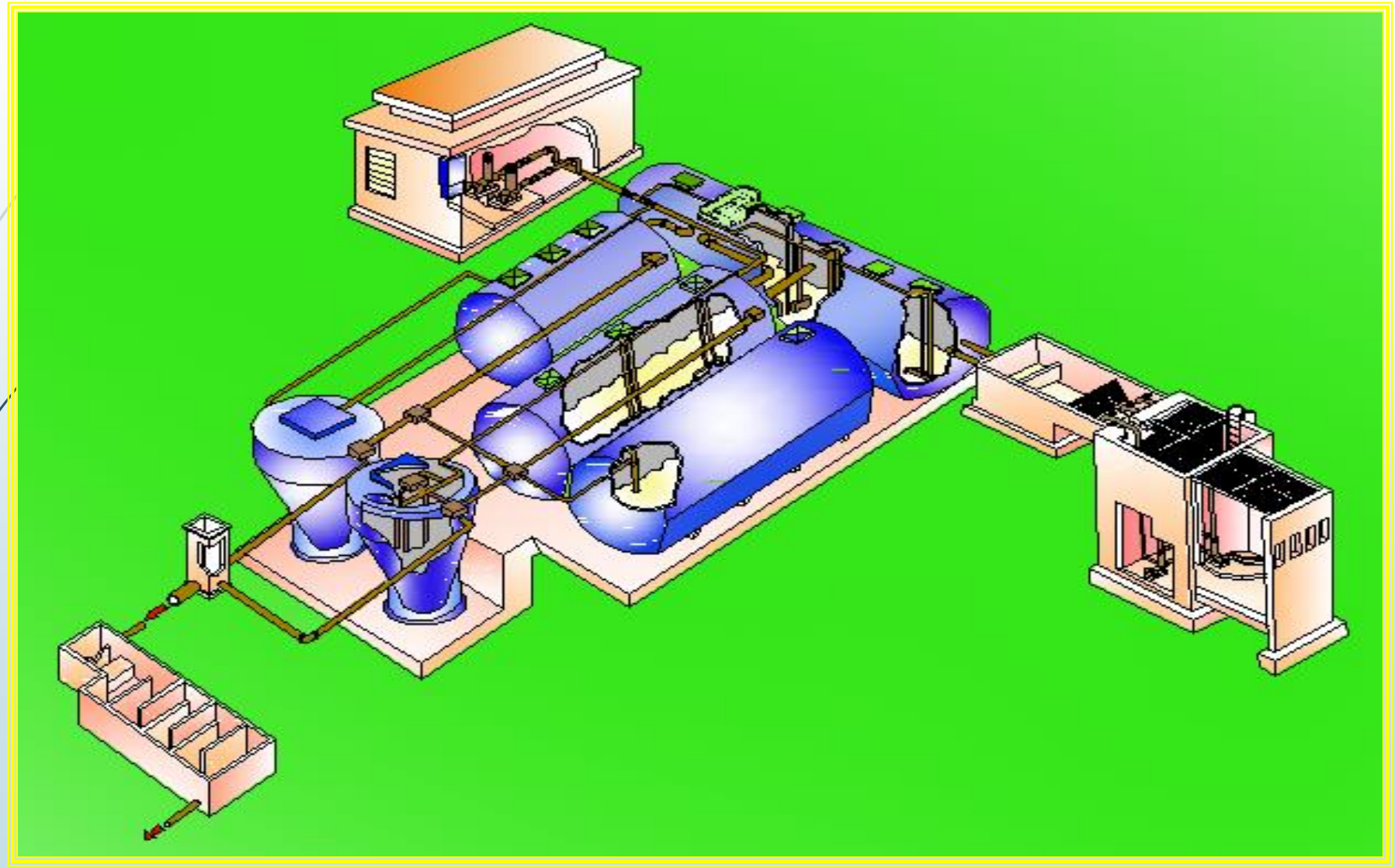
Separation Tank

Aeration Tank

LAYOUT



Sewerage Treatment Plant (STP)



12. Connection to Public Sewerage Line

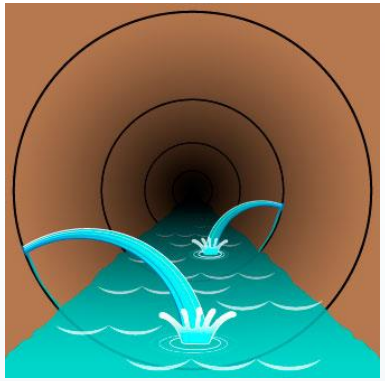
a. Perlu kelulusan SPAN/IWK

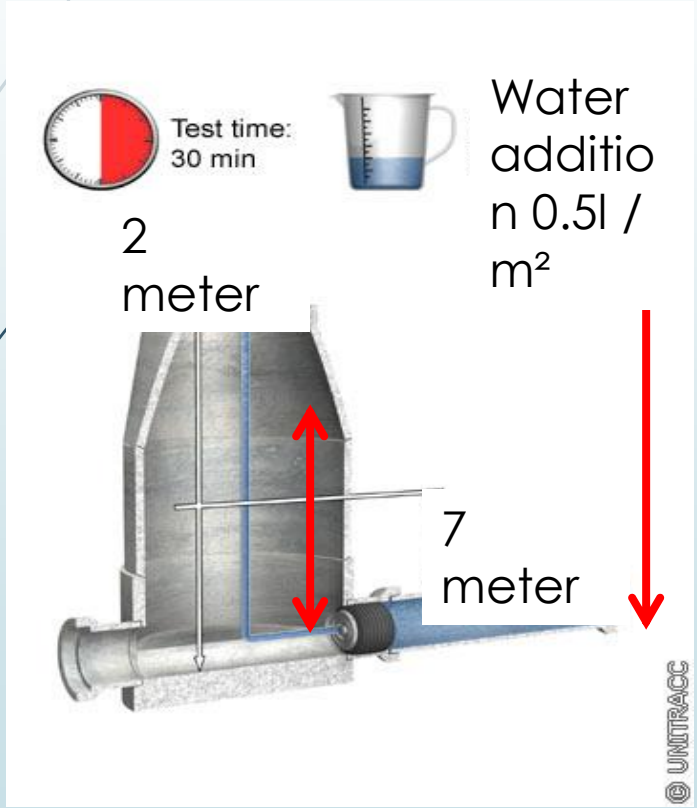
b. Di semak & sah oleh SO

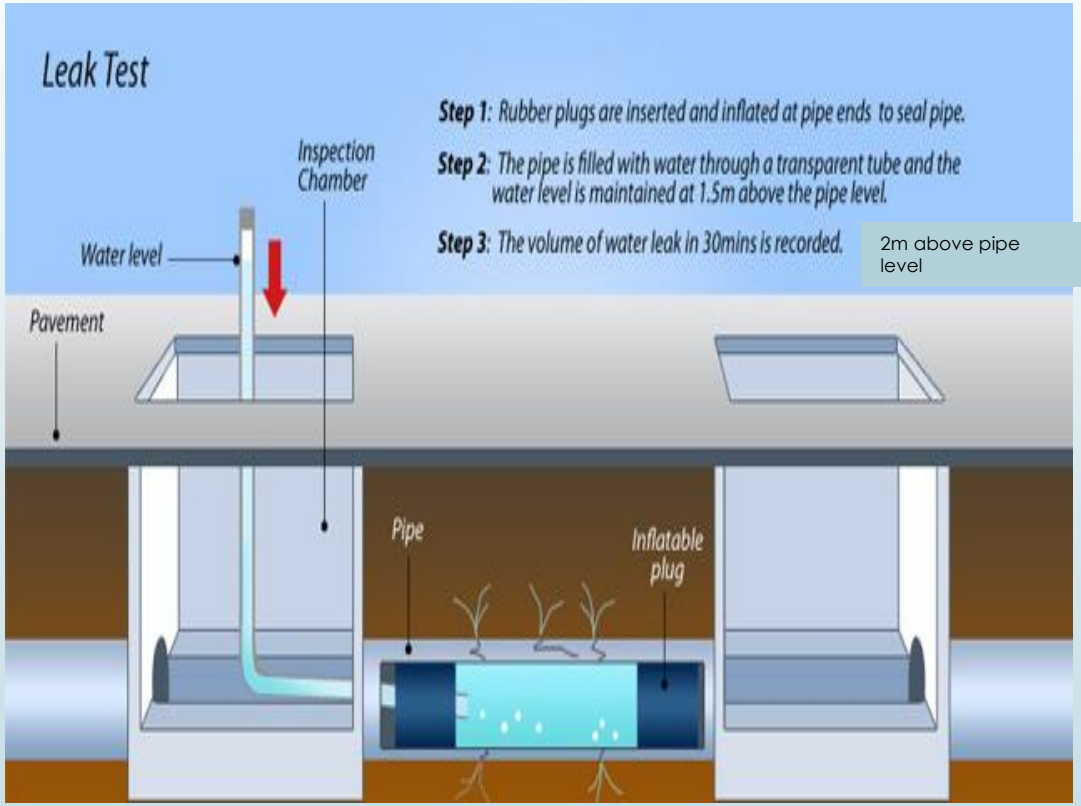
13. Testing for Sewer Pipes

- Method Statement di lulus SO
- Ujian – Low water pressure test / CCTV test

LOW WATER PRESSURE TEST







PIC

LULUS UJIAN JIKA?

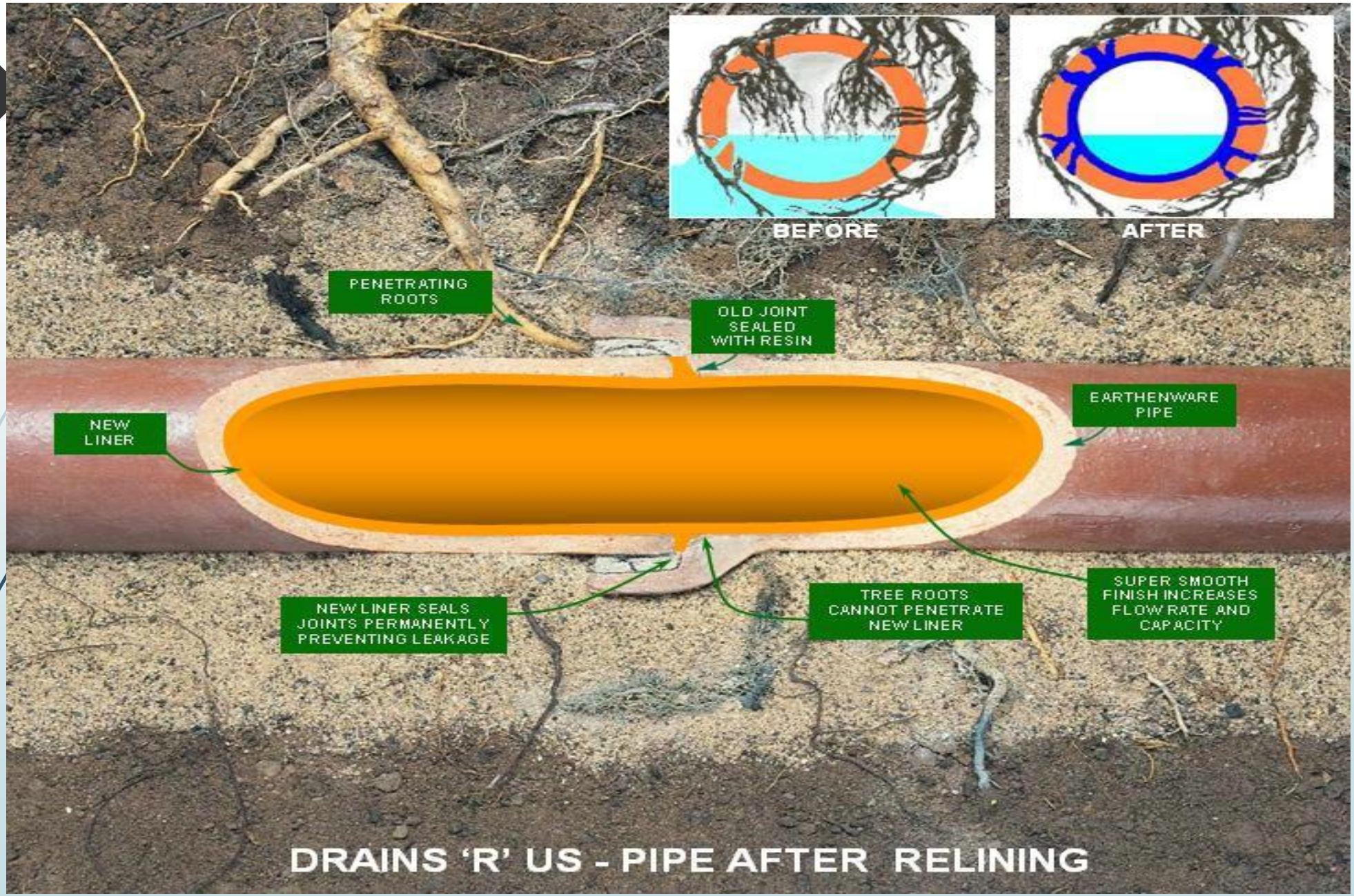
1. Kehilangan air tak lebih 1 L per Jam linear meter per meter internal dia. For VCP pipe or RCP
2. NO LOSS of water for pipe other than VCP or RCP
3. NO VISIBLE LEAKAGE at joint

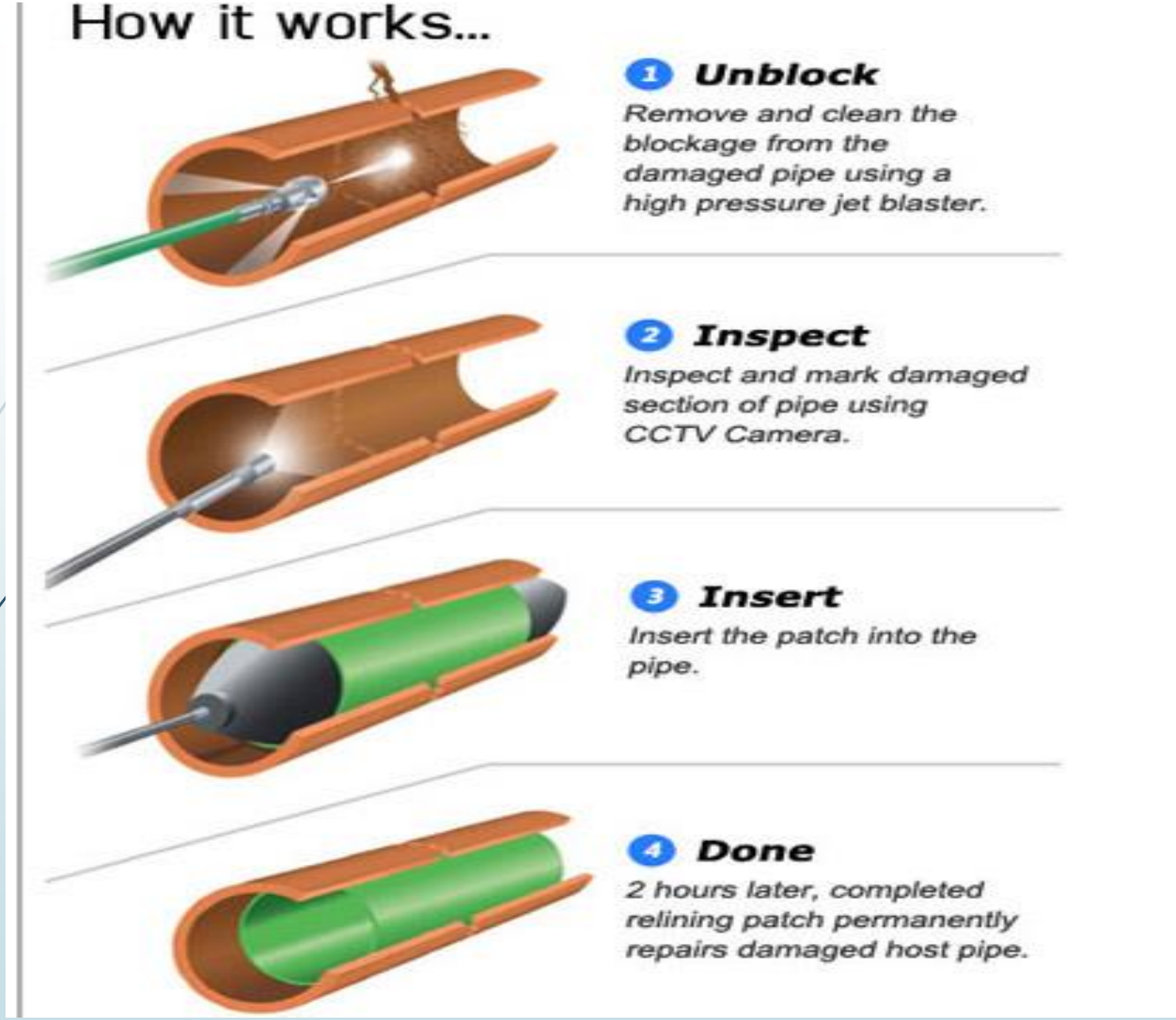
CCTV

- Untuk mengesan kerosakan dalam paip – Retak, patah, berubah kedudukan, melendut
- KONTARKTOR CCTV – Daftar dengan SPAN
- Lokasi ujian secara rawak – 10% daripada keseluruhan panjang paip kumbahan
- Ujian CCTV Kawasan risiko tinggi – pipe jacking, bwah jalan, sungai, landasan, tasik
- Ujian disaksikan oleh wakil IWK/SPAN, SO, perunding dan kontraktor

Dokumentasi

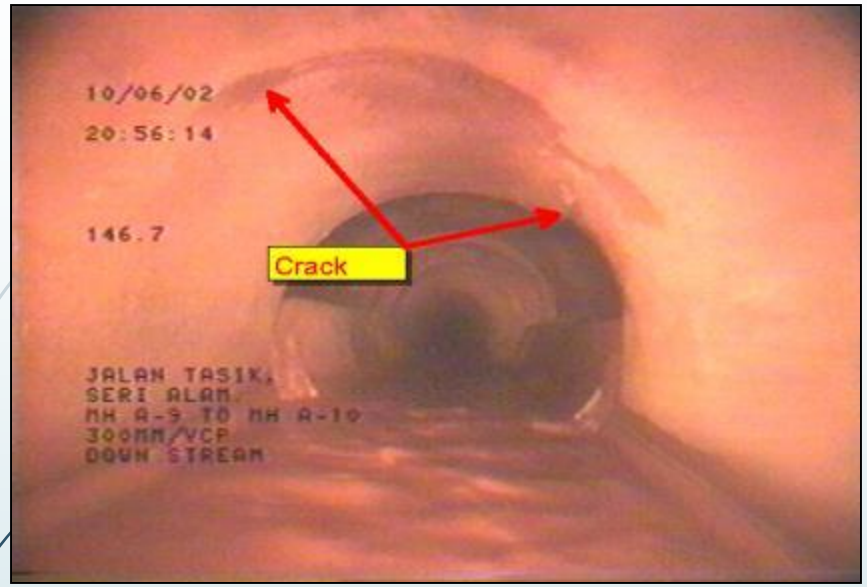
1. Selepas 7 hari ujian, perlu serahkan:
    a. 2 set video ujian
    b. 1 set laporan dan cadangan pembaikan (jika ada kerosakan)
2. Laporan di sedia dan disahkan oleh wakil berdaftar dengan SPAN
3. Jika ada kerosakan/sumbat/bocor semasa tempoh DLP, SO boleh arah kontraktor pada bila-bila masa untuk buat ujian CCTV semula


BEFORE
AFTER
PENETRATING ROOTS
OLD JOINT SEALED WITH RESIN
NEW LINER
EARTHENWARE PIPE
NEW LINER SEALS JOINTS PERMANENTLY PREVENTING LEAKAGE
TREE ROOTS CANNOT PENETRATE NEW LINER
SUPER SMOOTH FINISH INCREASES FLOW RATE AND CAPACITY
DRAINS 'R' US - PIPE AFTER RELINING



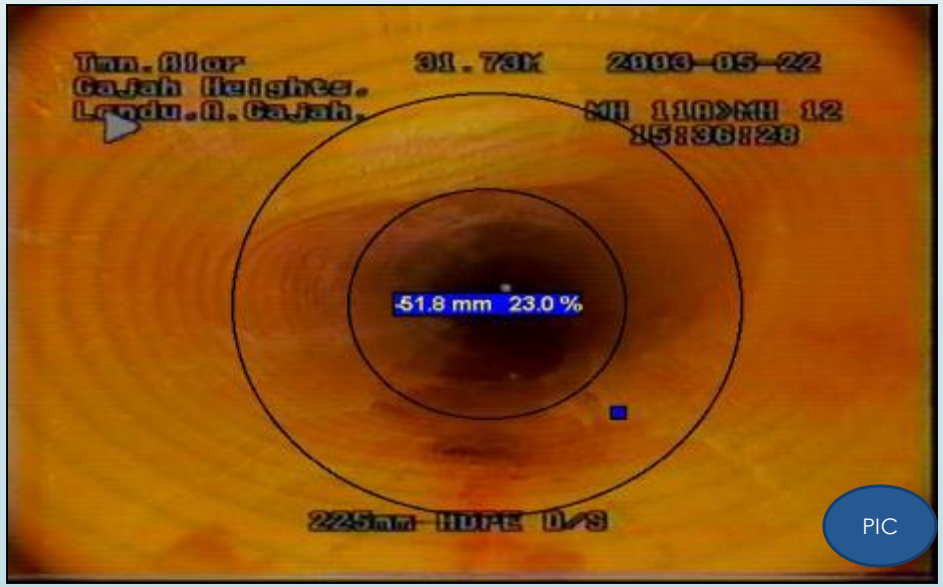
Trenchless pipe relining

Cracks in pipe



- to ensure sewers are properly constructed and laid so that deformation, gap, sag or other defects which could not be detected by means of normal inspection.

Deformation



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Tel.: 6842 0616
Fax: 6469 6483
Email: bktchee@gmail.com

Manhole Pictures / Inspection: Manhole ID: 244988

Survey Date :	Type of Survey:	Weather :	Manhole GIS-ID :	Operator :	Team Supervisor :
04/24/15	Post-construction	Dry	244988	FONG FATT CHEE	FONG FATT CHEE
Start Time :	Year commissioned:	Camera :	WRC Certified :	Requested by :	Cleaned :
09:37:00		IBAK Orion-L	FONG FATT CHEE		Yes

Photo: 244988-042415-M4.JPG
General photograph, shaft wall (detail)

Pipe Rehabilitation Pte Ltd
Blk 3014 Ubi Road 1
#01-292
Tel.: 6842 0616
Fax: 6469 6483
Email: bktchee@gmail.com

Manhole Pictures / Inspection: Manhole ID: 244988

Survey Date :	Type of Survey:	Weather :	Manhole GIS-ID :	Operator :	Team Supervisor :
04/24/15	Post-construction	Dry	244988	FONG FATT CHEE	FONG FATT CHEE
Start Time :	Year commissioned:	Camera :	WRC Certified :	Requested by :	Cleaned :
09:37:00		IBAK Orion-L	FONG FATT CHEE		Yes

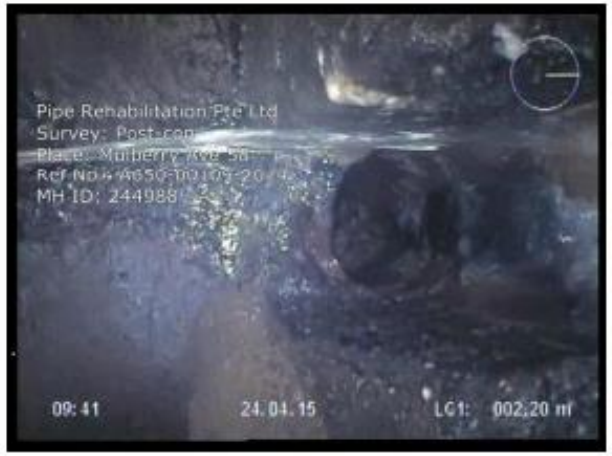


Photo: 244988-042415-M10.JPG
General photograph, incoming pipe 1

Photo: 244988-042415-M11.JPG
General photograph, incoming pipe 2

Closed-circuit Television (CCTV) Testing

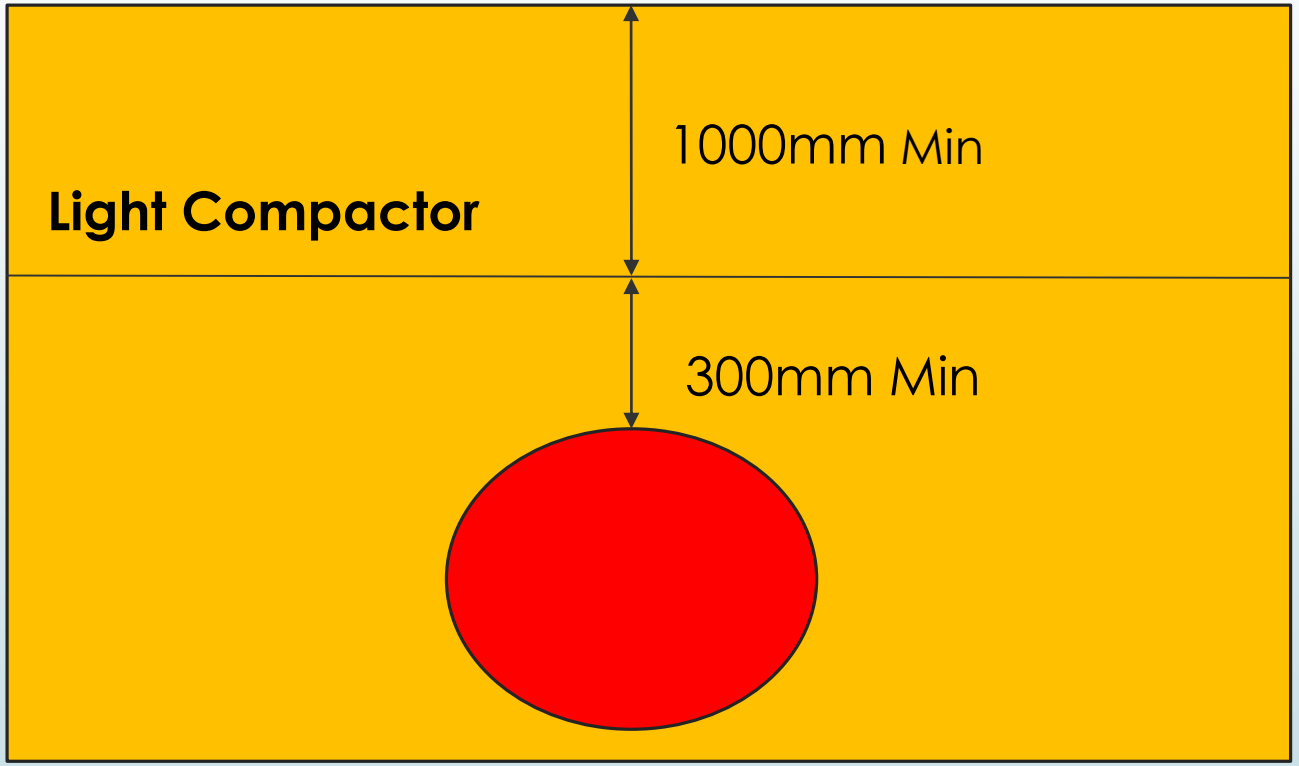
Grade	Implication
1	Acceptable structural condition
2	Minimal collapse likelihood in short term but potential for further deterioration
3	Collapse unlikely in near future but further deterioration likely
4	Collapse likely in foreseeable future
5	Collapsed or collapse imminent

Internal Condition Grades

14. Backfilling

1. Dibuat **SELEPAS** selesai ujian
2. Ditambun dengan bahan bebas batu/hard material
3. Bahan dipadatkan setiap 300mm thk sehingga mencapai aras paip di atas
4. Selepas itu, boleh menggunakan ‘light mechanical compactor’ utk pemadatan
5. Selepas 1000mm cover, boleh gunakan ‘heavy mechanical compactor’

Heavy Compactor



TERIMA KASIH