PARLIMEN MALAYSIA
BANGUNAN PARLIMEN
JALAN PARLIMEN
50680 KUALA LUMPUR

DOKUMEN SEBUT HARGA

SEBUTHARGA NO : PAR.2/367 SH.25/2024

TAJUK KERJA

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

TARIKH TUTUP : 16 OGOS 2024

Nama Kontraktor :.....

Alamat:.....

.....

.....

Kelas :.....Tempoh Daftar :.....

SENARAI SEMAKAN
(BEKALAN/PERKHIDMATAN/KERJA)

Sila tanda [√] bagi dokumen-dokumen yang disertakan

Bil.	Perkara/Dokumen	Untuk Ditanda Oleh Syarikat	Untuk Ditanda Oleh Jawatankuasa Pembuka Sebut harga
1.	Dokumen No. 3 : Skop Kerja		
2.	Dokumen No.4 : Spesifikasi		
3.	Dokumen No. 5: Jadual Harga		
4.	Dokumen No. 6 : Ringkasan Jadual Harga		
5.	Dokumen No. 7 : Borang Sebut harga Kerja & Surat Akuan Pembida		
6.	Dokumen No. 8 : Keterangan Mengenai Penyebutharga		
7.	Dokumen sokongan:		
	(i) Profil Syarikat beserta rekod pengalaman bekerja yang lepas dan semasa		
	(ii) Salinan Penyata Bank tiga (3) bulan terkini April 2023, Mei 2024 & Jun 2024. ***sila pastikan dokumen tersebut mendapat pengesahan dari bank berkaitan.**		
	(iii) Salinan bukti surat tawaran kerja dan bukti siap kerja yang berkaitan dengan sebutharga ini		
	(iv) Salinan Sijil Perakuan Pendaftaran Kontraktor (PPK)		
	(v) Salinan Sijil Perolehan Kerja Kerajaan (SPKK)		
	(vi) Salinan Salinan Sijil Taraf Bumiputera (STB) dari Pusat Khidmat Kontraktor (Kerja) – jika ada		
	(vii) Salinan Sijil SSM		
	(viii) Brosur Katalog Produk /		
	(ix) Salinan Surat Pendaftaran dengan Jabatan Kastam Diraja Malaysia (JKDM) di bawah Cukai Perkhidmatan / SST (jika ada)		
	(x) Sijil *product and performance warranty* cat daripada pihak pembekal dan kontraktor (*applicator* bertauliah)		

<table>
<tr>
<td colspan="3">PENGESAHAN OLEH SYARIKAT

Dengan ini saya mengesahkan bahawa saya telah membaca dan memahami semua syarat-syarat dan terma yang dinyatakan di dalam dokumen sebut harga. Semua maklumat yang dikemukakan adalah benar.</td>
<td colspan="3">UNTUK KEGUNAAN JABATAN

Jawatankuasa Pembuka Sebut Harga mengesahkan penerimaan dokumen bertanda kecuali bagi perkara bil. ..... (jika ada)</td>
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KERAJAAN MALAYSIA

PARLIMEN MALAYSIA

DOKUMEN SEBUT HARGA

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

JADUAL KANDUNGAN

DOKUMEN NO. 1

ARAHAN KEPADA PENYEBUT HARGA

NO. SEBUT HARGA:

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

1. Tawaran adalah dipelawa Syarikat yang berdaftar dengan Kementerian Kewangan Malaysia dengan Kod Bidang Pendaftaran (Bekalan Dan Perkhidmatan) seperti berikut :-

Gred	**G2**
Kategori	**B DAN CE**
Pengkhususan	**CE21 (Pembinaan Kejuruteraan Awam)** **B14 (Kerja-kerja cat)** **B24 (Kerja Penyenggaraan Bangunan)**

Yang mana pendaftaranya masih lagi berkuatkuasa, mempunyai alamat pendaftaran di **Wilayah Persekutuan Kuala Lumpur dan Selangor** adalah layak membuat tawaran bagi sebut harga berikut :-

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

2. Lawatan tapak adalah sebagaimana yang dinyatakan di dalam iklan sebutharga. Penyebut harga adalah **DIWAJIBKAN** untuk menghadiri lawatan tapak tersebut pada masa dan tempat yang telah ditetapkan. Kegagalan penyebut harga untuk menghadiri lawatan tapak akan menyebabkan penyebut harga gagal untuk memasuki sebutharga tersebut.

3. Penyebut harga hendaklah menyerahkan sampul tawaran sebut harga **secara manual** ke dalam peti sebut harga pada atau sebelum **16hb. Ogos 2024 (Jumaat)** jam **12.00 tengah hari.** Dokumen tawaran yang diterima selepas dari tarikh dan masa akan **ditolak.** Sampul hendaklah dilabelkan dengan nombor sebut harga dan nombor tawaran sebut harga dan hendaklah dimasukkan ke dalam Peti Sebut harga **No.Dua (2)** di Seksyen Kewangan dan Akaun, Aras Aras 4, Blok Ahli Parlimen Dan Pentadbiran, Parlimen Malaysia, Jalan Parlimen, 50680 Kuala Lumpur.

4. Jika Dokumen Sebut Harga tidak diserahkan dengan tangan, Penyebut Harga hendaklah menghantar Dokumen tersebut dengan pos supaya tiba pada atau sebelum masa dan di tempat yang ditetapkan. Kerajaan tidak bertanggungjawab di atas apa-apa kehilangan dokumen semasa perjalanan pos/perkhidmatan hantar cepat *(courier service)* dan sebagainya.

5. Tawaran sebut harga yang dikemukakan adalah diwajibkan mengandungi dokumen-dokumen berikut:-

a)	Skop Kerja	Dokumen No. 3
b)	Spesifikasi	Dokumen No. 4
c)	Jadual Harga	Dokumen No. 5
d)	Ringkasan Jadual Harga	Dokumen No. 6
e)	Borang Tawaran	Dokumen No. 7
f)	Keterangan Mengenai Kontraktor	Dokumen No. 8

g) Dokumen sokongan:

(i) Profil Syarikat;

(ii) Salinan Penyata Bank tiga (3) bulan terkini

(iii) Salinan sijil pendaftaran Kementerian Kewangan, CIDB & BPKU

(iv) Brosur produk yang berkaitan

(vi) Salinan Sijil Perakuan Pendaftaran Kontraktor (PPK);

(vii) Salinan Sijil Perolehan Kerja Kerajaan (SPKK);

(viii) Salinan Sijil Taraf Bumiputera (STB) dari Pusat Khidmat Kontraktor (Kerja);- jika ada

(ix) Salinan Sijil SSM;

(x) Sijil *product and performance warranty* cat daripada pihak pembekal dan kontraktor (*applicator* bertauliah)

Semua borang hendaklah diisi dengan lengkap seperti yang ditentukan dan ditaip dengan kemas dan terang. Jika ruangan yang disediakan tidak mencukupi, penyebut harga dibenarkan menaip maklumat-maklumat di muka surat tambahan.

6. Dokumen tawaran sebut harga hendaklah dikemukakan secara manual sebelum waktu dan tarikh tutup yang ditetapkan.

7. Tawaran sebut harga ini sah selama **sembilan puluh (90)** hari dari tarikh tutup bidaan.

8. Penyebut harga yang enggan menandatangani kontrak yang telah disetuju terima atau yang menarik balik tawaran bidaan sebelum dipertimbangkan atau menolak tawaran setelah tawaran dibuat, akan dikenakan tindakan penggantungan pendaftaran seperti berikut:
   i) Dua (2) tahun bagi kesalahan pertama;
   ii) Lima (5) tahun bagi kesalahan kedua; dan
   iii) Pendaftaran akan dipotong terus bagi kesalahan berikutnya.

9. Penyebut harga yang tawarannya disetujuterima dikehendaki memberi perkhidmatan membekal semua barang tersebut pada tarikh yang ditetapkan oleh Kerajaan atau mana-mana tarikh lain seperti ditentukan oleh Kerajaan. Sekiranya Penyebut harga gagal berbuat demikian, tawaran yang disetujuterima akan dibatalkan dan nama Kontraktor serta nama pengarah-pengarah termasuk pemegang-pemegang saham terbesar akan disenarai hitamkan.

10. Kerja ini hendaklah disiapkan dalam tempoh tidak melebihi **75 hari .**

11. Kerajaan tidak terikat untuk menerima tawaran yang terendah atau mana-mana tawaran. Tiada sebarang alasan perlu diberikan oleh Kerajaan untuk sebarang penolakan tawaran. Keputusan mengenai tawaran yang diterima

adalah muktamad. Sebarang surat menyurat mengenai keputusan tidak akan dilayan.

12. PERINGATAN MENGENAI KESALAHAN RASUAH DALAM DOKUMEN PEROLEHAN KERAJAAN

12.1 Sebarang perubahan atau percubaan rasuah untuk menawar atau memberi, meminta atau menerima apa-apa suapan secara rasuah kepada dan daripada mana-mana orang berkaitan perolehan ini merupakan suatu kesalahan jenayah di bawah Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 (Akta 694).

12.2 Sekiranya mana-mana pihak ada menawarkan atau memberi apa-apa suapan kepada mana-mana anggota pentadbiran awam, maka pihak yang ditawarkan atau diberi suapan dikehendaki membuat aduan dengan segera ke pejabat Suruhanjaya Pencegahan Rasuah Malaysia atau balai polis yang berhampiran. Kegagalan berbuat demikian adalah merupakan suatu kesalahan di bawah Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 (Akta 694).

12.3 Tanpa prejudis kepada tindakan-tindakan lain, tindakan tatatertib terhadap anggota perkhidmatan awam dan menyenarai hitamkan kontraktor atau pembekal boleh diambil sekiranya pihak-pihak terlibat dengan kesalahan rasmi di bawah Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 (Akta 694).

12.4 Mana-mana kontraktor atau pembekal yang membuat tuntutan bayaran berkaitan perolehan ini walaupun tiada kerja-kerja dibuat atau tiada barangan dibekal mengikut spesifikasi yang ditetapkan atau tiada perkhidmatan diberi dan mana-mana anggota perkhidmatan awam yang mengesahkan tuntutan berkenaan adalah melakukan kesalahan dibawah Akta Suruhanjaya Pencegahan Rasuah Malaysia (Akta 694).

13. **PELAKSANAAN CUKAI JUALAN DAN CUKAI PERKHIDMATAN (CJCP) YANG BERKUATKUASA 1 SEPTEMBER 2018**

13.1 Semua tawaran harga oleh Pembekal hendaklah dikemukakan dengan dinyatakan harga tawaran tanpa Cukai Jualan dan Cukai Perkhidmatan (CJCP).

13.2 Senarai yang dikenakan Cukai Perkhidmatan seperti yang terdapat dalam Akta Cukai Perkhidmatan 2018. Sekiranya pembekal yang berjaya berdaftar CJCP dan perkhidmatan tersebut adalah termasuk dalam senarai yang dikenakan Cukai Perkhidmatan, Kerajaan akan menawarkan nilai perolehan termasuk kenaan Cukai Perkhidmatan.

13.3 Pembekal hendaklah memaklumkan pada bila-bila masa setelah berdaftar dengan JKDM kepada Kerajaan supaya Cukai Perkhidmatan boleh dibayar. Kegagalan atau kelewatan syarikat untuk memaklumkan kepada Kerajaan mengenai status pendaftraan dengan JKDM akan menyebabkan syarikat perlu menanggung CJCP dan tidak layak menuntut apa-apa bayaran daripada Kerajaan.

14 PELAKSANAAN PROGRAM *PROFESSIONAL TRAINING AND EDUCATION FOR GROWING ENTREPRENEURS* (PROTEGE) DALAM PEROLEHAN KERAJAAN (1PP/PK1.2)

14.1 Penyebut harga adalah dikehendaki melaksanakan program PROTEGE dalam perolehan kerajaan mengikut had nilai ambang (threshold value) dan sektor seperti berikut :

Bil	Sektor	Nilai Ambang (RM)
1	Pembinaan	10 juta
2	Perkhidmatan / Penyelenggaraan Bangunan / Infrastruktur / Jalan	5 juta
3	Teknologi Informasi dan Komunikasi	10 juta
4	Perkhidmatan Perunding	5 juta
5	Perubatan dan Farmasi	10 juta
6	Perkhidmatan Sokongan Kesihatan	10 juta
7	Perkhidmatan Penyenggaraan, Pembaikan dan Baik Pulih	10 juta
8	Pengangkutan dan Logistik	10 juta

Bil	Sektor	Nilai Ambang (RM)
9	Pertahanan Strategik	10 Juta
10	Perkhidmatan Kawalan Keselamatan	4 juta
11	Sektor Lain	10 juta

14.2 Syarikat hendaklah memperuntukkan sekurang-kurangnya 1% daripada keseluruhan kos projek bagi melaksanakan program PROTEGE.

14.3 Syarikat yang mendapat kontrak Kerajaan di bawah nilai ambang digalakkan untuk melaksanakan program PROTEGE, namun tidak tertakluk kepada penetapan 1% daripada nilai kontrak keseluruhan.

14.4 Penetapan bilangan minimum peserta PROTEGE-RTW bagi sesuatu kontrak dikira berdasarkan formula berikut :

$$\frac{1\% \text{ X Kos Keseluruhan Projek / Prolehan}}{\text{RM24,000*}}$$

* Elaun PROTEGE (RM2,000 seorang X 12 bulan)

14.5 Syarikat yang mengemukakan sijil atau surat pengesahan daripada Sekretariat PROTEGE, akan diberi **keutamaan** tidak kira sama ada program PROTEGE dilaksanakan bagi perolehan Kerajaan atau program PROTEGE dilaksanakan oleh inisiatif syarikat sendiri.

15. BON PELAKSANAAN

(a) Bagi kontrak kerja yang bernilai melebihi RM200,000.00, Kontraktor hendaklah mengemukakan bersama-sama dengan Surat Setuju Terima, Bon pelaksanaan sebanyak 5% daripada jumlah harga kontrak.

(b) Kontraktor yang dilantik hendaklah mengemukakan Bon Pelaksanaan dalam Ringgit Malaysia dalam bentuk :

i. Jaminan Bank/Syarikat Kewangan yang dikeluarkan oleh bank/syarikat kewangan berlesen di bawah Akta Perkhidmatan Kewangan 2013 [Akta 758] yang beroperasi di Malaysia;

ii. jaminan Bank Islam yang dikeluarkan oleh bank berlesen di bawah Akta Perkhidmatan Kewangan Islam 2013 [Akta 759] yang beroperasi di Malaysia;

iii. jaminan Insurans yang dikeluarkan oleh syarikat insurans yang berlesen di bawah Akta Perkhidmatan Kewangan 2013 [Akta 758] yang beroperasi di Malaysia;

iv. jaminan Takaful yang dikeluarkan oleh Syarikat Takaful yang berlesen di bawah Akta Perkhidmatan Kewangan Islam [Akta 759] yang beroperasi di Malaysia; atau

v. jaminan yang dikeluarkan oleh Bank Pembangunan Malaysia Berhad (BPMB) dan Bank Perusahaan Kecil & Sederhana (SME Bank).

Bon Pelaksanaan dalam bentuk yang tidak dilesenkan di bawah akta seperti di Perkara (b) di atas termasuk di bank pesisir pantai dan bank luar negara adalah tidak dibenarkan.

(c) Kontraktor boleh memilih kaedah Wang Jaminan Pelaksanaan. Wang Jaminan Pelaksanaan ialah satu kemudahan bagi memenuhi keperluan Bon Pelaksanaan. Wang Jaminan Pelaksanaan bermaksud sejumlah wang yang dipegang oleh Kerajaan bagi memastikan kontraktor mematuhi dan melaksanakan obligasinya di bawah kontrak yang ditandatangan.

i. Jumlah Wang Jaminan Pelaksanaan adalah 5% daripada harga keseluruhan kontrak. Kemudahan ini hanya dibenarkan kepada kontraktor kerja tempatan sahaja. Walau bagaimanapun, Wang Jaminan Pelaksanaan tidak dibenarkan untuk Sub Kontraktor Dinamakan bagi Kerja.

ii. Kontraktor yang memilih / dikenakan kaedah Wang Jaminan Pelaksanaan akan dikenakan potongan sebanyak 10% daripada bayaran kemajuan pertama dan seterusnya sehingga ia mencapai jumlah 5% peratus daripada nilai keseluruhan kontrak.

(d) Tempoh sah laku Bon Pelaksanaan bagi perolehan kerja adalah berdasarkan nilai projek seperti berikut :

Nilai Projek	**Tempoh Sah Laku Bon Pelaksanaan**
Kos Projek sehingga RM10 juta	• Dari tarikh kuat kuasa kontrak sehingga 12 bulan selepas tamat tempoh Tanggungan Kecacatan (DLP)
Kos Projek melebihi RM10 juta	• Dari tarikh kuat kuasa kontrak sehingga 24 bulan selepas Tempoh Tanggungan Kecacatan (DLP)

(e) *LIQUIDATED & ASCERTAINED DAMAGES* (LAD)

15.1 Sebaik sahaja arahan dikeluarkan untuk memulakan perkhidmatan, syarikat dikehendaki melaksanakan perkhidmatan tersebut mengikut jadual dan spesifikasi yang telah ditetapkan.

15.2 Sebarang kegagalan syarikat dalam mematuhi perkara tersebut (lewat/gagal/kurang kualiti atau lain-lain) boleh mengakibatkan tindakan diambil ke atas syarikat dengan pengenaan LAD, Denda atau Tolakan mengikut formula berikut :

(PR / 365 hari) x nilai kontrak

15.3 Sekiranya syarikat gagal menyempurnakan perkhidmatan yang telah ditetapkan dalam tempoh kontrak yang dipersetujui, maka syarikat dikehendaki membayar denda dalam tempoh 30 hari setelah menerima notis denda daripada Kerajaan dengan menggunakan formula di atas.

16. **HARGA INDIKATIF JABATAN**

16.1 Harga Indikatif Jabatan bagi sebut harga ini adalah Ringgit Malaysia: Empat Ratus Empat Puluh Lapan Ribu Satu Ratus Sepuluh Sahaja (RM448,110.00).

16.2 Harga Indikatif Jabatan ini merupakan suatu anggaran sahaja dan amaun tersebut tidak mengikat Kerajaan atau mana-mana pihak lain juga bagi maksud mengelakkan kekeliruan yang mungkin berbangkit.

16.3 Pihak Kerajaan tidak menjamin bahawa syarikat akan dipilih atau boleh menyiapkan kerja dengan bersandarkan Harga Indikatif Jabatan.

17. **LEVI**

Semua tender/sebut harga yang bernilai RM500,000 ke atas, levi sebanyak 0.25% daripada nilai harga kontrak akan dikenakan ke atas petender yang berjaya, seperti yang ditetapkan di bawah seksyen 34(2) Akta Lembaga Pembangunan Industri Pembinaan Malaysia (CIDB) 1994 (Akta 520).

DOKUMEN NO.2

SYARAT-SYARAT AM

Tertakluk kepada apa-apa syarat khas yang ditetapkan di tempat lain dalam pelawaan ini, syarat-syarat am yang berikut hendaklah dipakai, melainkan setakat mana syarat-syarat am itu ditolak atau diubah dengan khususnya oleh pembida.

1. HARGA

Harga belian yang ditawarkan hendaklah harga bersih termasuk semua diskaun, kos penghantaran, kos pemasangan dan kos membuka.

2. TEMPOH MENGEMUKAKAN TUNTUTAN BAYARAN

Penyebut harga diberi peringatan supaya mengemukakan tuntutan pembayaran yang lengkap dalam tempoh 14 hari daripada tarikh pengesahan siap kerja untuk membolehkan bayaran dibuat dengan segera. Kerajaan tidak akan bertanggungjawab di atas kelewatan pembayaran kepada **Kontraktor** jika tuntutan pembayaran tidak dihantar dengan segera dalam tempoh 14 hari.

3. PERSETUJUAN

Kerajaan tidak terikat untuk setuju terima tawaran harga yang terendah atau mana-mana tawaran daripada mana-mana kontraktor.

4. PEMERIKSAAN

Kerajaan sentiasa berhak melantik seseorang pegawai untuk memeriksa bekalan itu semasa atau sebelum pemasangan dibuat atau pada bila-bila masa lain sebelum pentauliahan dan penyerahan sistem tersebut.

5. PERAKUAN MENYATAKAN SPESIFIKASI TELAH DIPATUHI

Penyebutharga dikehendaki memperakui bahawa bekalan yang dibekalkan oleh mereka adalah mengikut kehendak atau piawai (jika ada) yang dinyatakan di dalam pelawaan ini.

6. KEGAGALAN KONTRAKTOR MEMULAKAN KERJA

Sekiranya kontraktor gagal memulakan kerja selepas tujuh (7) hari dari tarikh akhir tempoh mula kerja yang dinyatakan dalam Inden, tanpa sebab-seba yang munasabah, Inden akan dibatalkan oleh Pegawai Inden dan tindakan tatatertib akan diambil terhadap kontraktor.

7. SUB-SEWA DAN MENYERAHHAK KERJA

Kontraktor tidak dibenarkan mengsubkan-sewakan Kerja kepada kontraktor-kontraktor lain. Kontraktor tidak boleh menyerahhak apa-apa faedah dibawah Inden ini tanpa terlebih dahulu mendapatkan persetujuan bertulis daripada Pegawai Inden.

8. PENOLAKAN BAHAN, BARANG DAN MUTU HASIL KERJA OLEH PEGAWAI INDEN

8.1 Pegawai Inden atau wakilnya berhak menolak bahan, barang dan mutu hasil kerja dan jenis piawaian tidak menepati seperti diperihalkan dalam spesifikasi. Kontraktor hendaklah, apabila diminta oleh Pegawai Inden, memberi kepadanya baucar-baucar dan/atau perakuan ujian pengilang untuk membuktikan bahawa bahan-bahan dan barang-barang itu mematuhi Spesifikasi. Bahan, barang dan kerja-kerja yang ditolak hendaklah diganti dan sebarang kos tambahan yang terlibat hendaklah ditanggung oleh kontraktor sendiri.

8.2 Kontraktor hendaklah dengan sepenuhnya atas perbelanjaan sendiri menyediakan sampel bahan dan barang-barang untuk ujian.

8.3 Tiada penggantian untuk peralatan, bahan dan cara kerja yang telah ditenrtukan didalam spesifikasi atau ditawarkan dan telah diterima, dibenarkan kecuali mendapat persetujuan daripada Pegawai Inden secara bertulis.

9.0 RINGKASAN SEBUT HARGA

9.1 Ringkasan Sebut harga hendaklah menjadi sebahagian daripada Borang Sebut harga ini dan hendaklah menjadi asas Jumlah Harga Sebut harga.

9.2 Harga-harga dalam Ringkasan Sebut harga hendaklah mengambilkira semua kos termasuk pengangkutan, cukai, duti, bayaran dan caj-caj lain yang perlu dan berkaitan bagi penyaiapan Kerja dengan sempurnanya.

9.3 Tiada sebarang tuntutan akan dilayan bagi pelarasan harga akibat daripada perubahan kos buruh, bahan-bahan dan semua duti dan cukai Kerajaan, sama ada dalam tempoh sah sebutharga atau dalam tempoh Kerja.

9.4 Harga-harga dalam Ringkasan Sebut harga yang dikemukakan oleh kontraktor hendaklah tertakluk kepada persetujuan sebelumnya daripada Pegawai Inden tentang kemunahsabahannya. Persetujuan sebelumnya itu dan apa-apa pelarasan kemudiannya kepada harga-harga dalam Ringkasan Sebut harga hendaklah dibuat sebelum Inden Kerja dikeluarkan.

9.5 Apa-apa pelarasan harga dalam Ringkasan Sebut harga dan apa-apa kesilapan hisab dalam Ringakasan Sebut harga hendaklah dilaras dan diperbetulkan sebelum Inden Kerja dikeluarkan. Jumlah amauan yang dilaraskan hendaklah sama dengan amaun jumlah harga pukal dalam Borang Sebut harga. Amaun jumlah harga pukal dalam Borang Sebut harga hendaklah tidak berubah.

9.6 Sekiranya sebut harga berasaskan senarai kuantiti sementara, pengukuran semula hendaklah dibuat dan harga diselaraskan.

10.0 PERCANGGAHAN DAN KECUKUPAN DOKUMEN SEBUT HARGA

10.1 Dokumen Sebut harga adalah dikira sebagai saling jelas-menjelas antara satu sama lain. Kontraktor hendaklah mengadakan segala yang perlu untuk melaksanakan kerja dengan sewajarnya sehinggalah siap mengikut tujuan dan maksud sebenar. Dokumen Sebut harga pada keseluruhannya sama ada atau tidak tujuan dan maksud itu ada ditunjuk atau diperihalkan secara khusus, dengan syarat bahawa tujuan, maksud itu hendaklah difahamkan dengan munasabahnya dari Dokumen Sebut harga itu.

10.2 Jika kontraktor mendapati apa-apa percanggahan dalam Dokumen Sebut harga , maka hendaklah merujuk kepada Pegawai Inden untuk mendapatkan keputusan.

11.0 KEGAGALAN KONTRAKTOR MENYIAPKAN KERJA DAN PENAMATAN PERLANTIKAN KONTRAKTOR

Pegawai Inden berhak membatalkan Inden sekiranya Kontraktor berada dalam keadaan berikut dan setelah menerima surat amaran daripada Pegawai Inden;

a) Sekiranya kontraktor masih gagal menyiapkan Kerja dalam tempoh yang telah ditetapkan.
b) Kemajuan kerja terlalu lembab tanpa apa-apa sebab yang munasabah.
c) Penggantungan pelaksanaan seluruh atau sebahagian kerja, tanpa apa-apa sebab yang munasabah.
d) Tidak mematuhi arahan Pegawai Inden tanpa apa-apa alasan yang munasabah.
e) Apabila kontraktor diisytiharkan bankrap oleh pihak yang sah.

12.0 PERUBAHAN KERJA

12.1 Perubahan kerja dibenarkan sekiranya perlu tertakluk kepada syarat-syarat berikut;

a.) Peruntukan mencukupi.

b.) Kelulusan Jawatankuasa Sebut harga diperolehi dahulu sebelum perubahan kerja dilaksanakan. Seorang daripada ahli Jawatankuasa Sebut harga hendaklah terdiri daripada Pegawai Teknikal.

c.) Jumlah perubahan kerja terkumpul yang dicadangkan tidak melebihi 20% daripada nilai kontrak atau tidak melebihi RM100,000 mengikut mana yang terendah. Cadangan perubahan kerja terkumpul melebihi 20% daripada nilai kontrak atau RM 100,000 hendaklah dirujuk kepada kelulusan Kementerian Kewangan terlebih dahulu.

12.2 Pegawai Inden hanya boleh mengeluarkan arahan perubahan kerja sekiranya mendapat kelulusan daripada jawatankuasa sebut harga.

13.0 TEMPOH TANGGUNGAN KECACATAN (DLP)

13.1 Tempoh Tanggungan Kecacatan bagi sebut harga hendaklah sekurang-kurangnya dua belas (12) bulan dari tarikh kerja diperakukan siap.

13.2 Kontraktor dipertanggungjawabkan untuk membaiki kecacatan, ketidaksempurnaan, kekecutan atau apa-apa jua kerosakan lain yang mungkin kelihatan dan yang disebabkan oleh bahan atau barang atau mutu hasil kerja yang tidak menepati sebut harga ini apabila diarahkan oleh Pegawai Inden dan dalam masa yang berpatutan. Kontraktor hendaklah membaiki kecacatan, ketidaksempurnaan, kekecutan atau apa-apa jua kerosakan lain atas kos kontraktor sendiri.

13.3 Sekiranya kontraktor gagal membaiki kecacatan, ketidaksempurnaan, kekecutan atau apa-apa jua kerosakan lain seperti yang diarahkan, Pegawai Inden berhak memotong kos membaiki dari baki wang yang akan dibayar kepada kontraktor atau, jika baki itu tiada/tidak mencukupi, mengeluarkan surat pengesyoran kepada Pusat Khidmat Kontraktor untuk menggantungkan pendaftaran kontraktor, dan menghantar salinan-salinan surat tersebut kepada Pengarah Kerja Raya Negeri/ Ketua jabatan, Bahagian Pembangunan Kontraktor Dan Usahawan, Kementerian Pembangunan Usahawan dan Lembaga Pembangunan Industri Pembinaan (CIDB).

14.0 TUNTUTAN BAYARAN KEMAJUAN

Pegawai Inden dibenarkan membuat bayaran interim sehingga 50% kemajuan kerja siap dilaksanakan. Bayaran akhir/muktamad hanya akan dibayar setelah kontraktor menyiapkan kerja dengan sempurnanya dan Perakuan Siap Kerja dikeluarkan. Kontraktor hendaklah mengembalikan Borang-Borang Inden Kerja Asal iaitu Borang Perjanjian Inden Kerja dan Borang Pengesahan Inden Kerja kepada Pegawai Inden.

15.0 PERAKUAN SIAP KERJA

Pegawai Inden hendaklah mengeluarkan Perakuan Siap Kerja sebaik sahaja kerja disiapkan dengan sempurna dan memuaskan. Tarikh siap kerja ini bermulanya Tempoh Tanggungan Kecacatan.

16.0 PERAKUAN SIAP MEMPERBAIKI KECACATAN

Pegawai Inden hendaklah mengeluarkan Perakuan Siap Membaiki Kecacatan sebaik sahaja kontraktor telah membaiki kecacatan, ketidaksempurnaan, kekecutan atau apa-apa jua kerosakan lain.

17.0 PEMATUHAN KEPADA UNDANG-UNDANG OLEH KONTRAKTOR

Kontraktor hendaklah memantuhi segala kehendak Undang-Undang Kecil dan Undang-Undang Berkanun dalam Malaysia semasa pelaksanaan kerja. Kontraktor tidak berhak menuntut sebarang kos dan bayaran tambahan kerana pematuhannya dengan syarat-syarat ini.

18.0 TAFSIRAN

Tawaran ini dan apa-apa kontrak yang timbul daripadanya hendaklah diertikan mengikut dan dikawal oleh undang-undang Malaysia, dan Penyebut harga bersetuju tertakluk hanya kepada bidang kuasa Mahkamah Malaysia sahaja dalam apa-apa pertikaian atau perselisihan jua pun yang mungkin timbul mengenai tawaran bidaan ini atau apa-apa kontrak yang timbul daripadanya.

19.0 CUKAI

Harga yang ditawarkan adalah diertikan sebagai termasuk cukai jika berkenaan.

20.0 MATA WANG

Tawaran bidaan hendaklah dinyatakan dalam Ringgit Malaysia (RM).

DOKUMEN NO. 3

SKOP KERJA

BIL	KETERANGAN
1.	**KERJA-KERJA PEMBAIKAN DI DALAM BLOK UTAMA** a. Kerja-Kerja Penggantian Jubin Dinding Dan Kerja-Kerja Yang Berkaitan Di Dalam Tandas Bilik Di Raja, Blok Utama i. Kerja pemasangan dinding sekatan ii. Kerja memecah jubin lama iii. Kerja pemasangan jubin baru iv. Kerja mengecat siling v. Kerja memasang semula peralatan tandas vi. Kerja pembersihan b. Kerja-Kerja Membaiki Dan Mengganti Pintu Sliding Di Pintu 1 Dan 2, Blok Utama i. Kerja membuka/menanggal pintu dan ukiran sediada ii. Kerja membekal dan memasang pintu *sliding tempered glass automatik* iii. Kerja-kerja membekal dan memasang pintu sliding tempered glass dengan ketebalan 12mm termasuk pemasangan kerangka besi untuk motor automatik c. Kerja-Kerja Penyediaan Longkang Dan Tembok Di Hadapan Pintu 6, Blok Utama i. Kerja-kerja menggali/mengorek tanah sediada bagi mendapatkan aras yang bersesuaian ii. Kerja-kerja membekal dan memasang longkang baru dari jenis clay gliss saiz 6" separuh bulat termasuk tapak asas konkrit serta kerja-kerja yang bersangkutan iii. Kerja-kerja membina tembok tambahan di bahagian tepi longkang dengan dinding batu bata berlepa di kedua belah permukaan termasuk kerja-kerja yang bersangkutan

d. Kerja-Kerja Membaiki Pintu Yang Rosak Di Dalam Blok Utama

i. Kerja-kerja membaiki serta memperelok mana bahagian pintu sediada (dua daun) termasuk menyapu kemasan syelex di permukaan pintu dan frame

ii. Kerja-kerja memasang plate stainless steel di bahagian bawah pintu yang terlibat (dua daun) ukuran 300mm x 900mm

e. Kerja-Kerja Mengecat Dinding, Tiangt Dan Soffit Slab Di Basement Blok Utama

i. Kerja-kerja membersih permukaan dinding, tiang dan siling serta mengikis cat kapur lama, distemper lama dan sebagainya dari permukaan yang dilepa, basuh dan membaiki semua retak dan permukaan lain yang cacat

ii. Kerja-kerja menyapu 1 lapisan cat undercoat pada permukaan yang berlepa

iii. Kerja-kerja menyapu 2 lapisan cat penyudah jenis weathershield di keseluruhan bahagian yang terlibat merangkumi soffit slab, dinding, rasuk, tiang dan tembok

iv. Kerja-kerja memasang railing besi di bahagian lantai bagi mengelak dari bergesel di bahagian dinding saiz 2 diameter serta di skrew dibahagian lantai

Laporan Kerosakan dan Skop Kerja adalah seperti di **Lampiran A**

BIL	KETERANGAN
2.	**KERJA-KERJA PEMBAIKAN DI DATARAN JAM BUNGA** i. Kerja-kerja memotong, memecah dan membersihkan segala ubinan dan skrid dan ratakan semula serta jalur-jalur potongan untuk menerima lepaan baru. ii. Kerja-kerja menyediakan permukaan dengan lepaan 25mm simen dan pasir 1:3 atau skrid di lepa sebelum pemasangan pebble wash stone. iii. Kerja-kerja menyediakan dan menyapu 2 lapisan permukaan kalis air berasaskan simen (cementitious waterproofing) dari jenis PEP-seal 911 atau setanding di keseluruhan permukaan lantai dan tembok yang terlibat. iv. Kerja-kerja membekal dan memasang granite baru di bahagian tembok mengikut kaedah pemasangan (DRY FIX INSTALLATION). Kontraktor dikehendaki mengemukakan perincian lukisan shop drawing, method statement dan tiga rekabentuk konsep bagi keseluruhan sistem bracket, skrew dan granite. v. Kerja-kerja menyapu 2 lapisan sealer jenis stone guard di keseluruhan permukaan lepaan pebble wash. vi. Kerja-kerja membekal dan memasang tanda nama abjad jenis Box up lettering stainless steel 25mm x 230mm tinggi. PARLIMEN MALAYSIA vii. Kerja-kerja membekal dan memasang Logo Jata Negara jenis Box up lettering stainless steel 25mm tebal x 360mm. viii. Kerja-kerja menyapu 1 lapisan cat alas (undercoat) dan 2 lapisan cat penyudah jenis weather sheild di sekeliling tembok jam. Laporan Kerosakan dan Skop Kerja adalah seperti di **Lampiran A**

BIL	KETERANGAN
3.	**KERJA-KERJA PEMBAIKAN JALAN DI SEKITAR TASKA PARLIMEN MALAYSIA** i. Kerja-kerja membersih permukaan jalan ii. Kerja-kerja menyembur 1 (satu) lapisan bitumen tack coat dikeseluruhan permukaan jalan yang terlibat dengan menggunakan spray pump iii. Kerja-kerja membekal dan menurap semula permukaan jalan dengan hot primex (ACW 14) 50mm tebal serta dipadatkan dengan mengguna jentera pemadat 6 tan iv. Kerja-kerja mengecat garisan jalan dan petak parking menggunakan cat thermoplastic a. Garisan jalan b. Petak parking kereta c. Petak parking motosikal Laporan Kerosakan dan Skop Kerja adalah seperti di **Lampiran A**

BIL	KETERANGAN
4.	**KERJA-KERJA PEMBAIKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA** a. Kerja-Kerja Penyediaan Fasiliti Oku Di Sekitar Kompleks Parlimen Malaysia i. Memasang tanda tunjuk arah accessible entrance bagi kemudahan OKU berkerusi roda di sekitar Blok Utama (Sila rujuk cadangan Laporan Audit) ii. Memasang papan tanda arah untuk accessible ramp di setiap ramp OKU di sekitar Kompleks Parlimen iii. Memasang papan tanda arah untuk accessible route di setiap ramp OKU di Kompleks Parlimen iv. Menyediakan signage, symbols dan wayfinding di sekitar Blok Utama. v. Pemasangan handrail di tepi ramp di dalam Dewan Negara vi. Pemasangan handrail di tepi ramp di dalam Dewan Rakyat. vii. Menyediakan signage, symbols dan wayfinding di tempat pemerhati pelawat Dewan Rakyat. viii. Menyediakan tanda amaran strobe light di lobi lif dan surau Blok Utama. b. Kerja-Kerja Penyediaan BRC Kandang Rusa Di Kompleks Parlimen Malaysia i. Kerja-kerja membekal dan memasang pagar dawai hijau (chain link) beserta tiang angle saiz 2” ½ x 2” ½ tebal 4mm,ditanam sedalam 2 kaki,dikonkrit beserta kerja-kerja berkaitan ii. Kerja-kerja membekal dan memasang pintu dari jenis besi dengan lapisan pagar dawai hijau (chainlink) termasuk aksesori seperti selak dan engsel serta kerja-kerja berkaitan iii. Kerja-kerja membuka pintu kecil kandang rusa sediaada yang telah rosak iv. Kerja-kerja membaiki semula jaring cyclone yg rosak,membekal dan memasang aksesori pintu untuk dijadikan pintu dari jenis slidding kepada jenis swing termasuk kerja-kerja berkaitan. v. Kerja-kerja membekal dan memasang tiang jenis hollow galvanized

saiz 2” ½ x 2” ½ , tebal 1.9mm ketinggian 9’ ditanam dan konkrit

vi. Membekal dan memasang BRC R8 saiz lubang 4”x4” ukuran 20’ panjang x 7’ tinggi,dicat,welding termasuk aksesori serta kerja-kerja berkaitan.

vii. Membekal dan memasang plywood ukuran 4’ x 8’tebal ¾ di cat undercoat serta 2 lapisan cat minyak serta besi jenis U channel untuk dislot plywood pada besi U untuk dijadikan laluan rusa.

viii. Membekal dan memasang pintu jenis swing yang baru dari jenis besi galvanised / jaring cyclone ukuran tinggi 7’ x 4’ lebar termasuk aksesori serta kerja berkaitan

c. Kerja-Kerja Pembaikan Kebocoran Kolam Taman Herba

i. Kerja-kerja memecah sebahagian dinding kolam yang retak bagi membolehkan kerja-kerja pembaikan di jalankan

ii. Kerja-kerja membaiki keretakan dan kebocoran dinding dengan menggunakan kaedah pressure grouting atau bahan waterproofing bersesuaian mengikut saranan specialist /pembekal

iii. Kerja-kerja menyapu 2 lapisan bahan kalis air dari jenis cementatious waterproofing di bahagian lantai dan dinding kolam

iv. Kerja-kerja melepa semula dan mengecat batu pabble wash di bahagian yang terlibat

Laporan Kerosakan dan Skop Kerja adalah seperti di **Lampiran A**

DOKUMEN NO. 4

SPESIFIKASI

SILA LIHAT LAMPIRAN B
SPESIFIKASI KERJA BERKAITAN

DOKUMEN NO. 5

JADUAL HARGA

SILA LIHAT LAMPIRAN C

JADUAL HARGA

DOKUMEN NO. 6

RINGKASAN JADUAL HARGA

BIL	BUTIRAN	AMAUN (RM)
A	KERJA-KERJA AWALAN	
B	KERJA-KERJA PEMBAIKAN DI DALAM BLOK UTAMA	
C	KERJA-KERJA PEMBAIKAN DI DATARAN JAM BUNGA	
D	KERJA-KERJA PEMBAIKAN JALAN DI SEKITAR TASKA PARLIMEN MALAYSIA	
E	KERJA-KERJA PEMBAIKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA	
F	WANG PERUNTUKKAN SEMENTARA *(PROVISIONAL SUMS)*	30,000.00
	Jumlah Keseluruhan (RM)	

Ringgit Malaysia :

.....

.....

NILAI INI HENDAKLAH SAMA DENGAN NILAI YANG DITAWARKAN, JIKA TIDAK SEBUT HARGA YANG DIKEMUKAKAN TIDAK AKAN DIPERTIMBANGKAN.

Tempoh kerja yang ditawarkan : ..... **hari**

.....	.....
Tandatangan Kontraktor	Tandatangan Saksi
Nama Penuh:.....	Nama Penuh:.....
Atas Sifat :.....	Atas Sifat:.....
No. Kad Pengenalan:.....	No. Kad Pengenalan:.....
Alamat :.....	Alamat :.....
.....	.....
.....	.....
Tarikh :.....	Tarikh :.....

DOKUMEN NO. 7

Pekeliling Perbendaharaan Malaysia
PK 2 Lampiran 2.6

BORANG SEBUT HARGA KERJA
Sebut Harga No. **PAR.SH.....2024**

Ketua Pentadbir
Parlimen Malaysia
Bangunan Parlimen
Jalan Parlimen
50680 Kuala Lumpur.

Tuan,

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

Di bawah dan tertakluk kepada Arahan Kepada Penyebut Harga, Syarat-syarat Sebut Harga, Spesifikasi Kerja dan pelan-pelan, saya yang bertandatangan di bawah ini adalah dengan ini menawarkan untuk melaksanakan dan menyiapkan kerja-kerja tersebut bagi jumlah harga pukal sebanyak Ringgit Malaysia:-

……..……..…
……
(RM:……)

2. Saya bersetuju menyiapkan kerja-kerja ini dalam masa …….. hari dari tarikh akhir tempoh mula kerja seperti yang diarahkan oleh Pegawai Inden. Bertarikh pada …….. Haribulan ……..... 2023/2024.

.....	.....
Tandatangan Kontraktor	Tandatangan Saksi
Nama Penuh:.....	Nama Penuh:.....
Atas Sifat :.....	Atas Sifat:.....
No. Kad Pengenalan:.....	No. Kad Pengenalan:.....
Alamat :.....	Alamat :.....
.....	.....

.....
Meterai atau Cap Kontraktor

DOKUMEN NO. 8

KETERANGAN MENGENAI PENYEBUT HARGA

1. Nama Syarikat Penyebut harga : ……

1.1 Alamat Pejabat : ……

……

……

1.2 No.Telefon : ……

1.3 No. Pendaftaran Syarikat : ……

1.4 No. Pendaftaran Kementerian Kewangan (sertakan salinan sijil) : ……

2. Modal Dibenar : ……

Modal Berbayar : ……

3. Ahli-ahli Syarikat :

(i) Ahli-ahli Lembaga Pengarah

NAMA	JAWATAN	SAHAM DIPEGANG

(ii) Ahli-ahli Pengurusan

NAMA	JAWATAN

4. Butiran pengalaman firma/syarikat penyebut harga dalam membekalkan perkhidmatan yang serupa dengan apa yang ditawarkan di dalam pelawaan Sebut harga/Tender kepada Kerajaan dalam tempoh lima (5) tahun yang terakhir.

TAHUN	PENGALAMAN PEMBEKALAN PERKHIDMATAN

5. Jika penyebut harga pernah mengikat kontrak dengan mana-mana Jabatan Kerajaan atau Badan-badan Berkanun, nyatakan sama ada Firma/Syarikat

kontraktor pernah atau sedang mengalami penggantungan atau penamatan kontrak dengan Kerajaan oleh kerana pelanggaran syarat-syarat Kontrak.

……
……
……
……
……
……

6. Lain-lain Keterangan Mengenai Penyebut harga :-

……
……
……
……
……
……

Saya perakui bahawa segala keterangan di atas adalah benar.

Tandatangan :……..……..….

Nama :……..……..…..

No. K/P :……..……

Jawatan :…….

Tarikh :…….

Cop Firma/
Syarikat :……..……

Tandatangan Saksi : ……

Nama Saksi :……..……

No. K/P :……..……..

Jawatan :……..……..

Tarikh :……..

Cop Firma/ Syarikat :……..

Nota : Jika didapati keterangan/maklumat di atas adalah tidak benar, pihak Kerajaan berhak menolak/membatalkan tawaran syarikat tuan.

BAHAGIAN B

Senarai Sepuluh (10) Kerja-Kerja Yang **TELAH** Disiapkan

Nama Projek	Jabatan/Agensi/ Perunding Yang Mengawas Projek	Harga	Tempoh	Tarikh Siap Sebenar

BAHAGIAN C

Senarai Kerja Yang **SEDANG** Disiapkan

Nama Projek	Jabatan/Agensi/ Perunding Yang Mengawas Projek	Harga Kontrak	Tempoh Kontrak	Peratusan Kemajuan	Ulasan Pegawai Yang Menilai sebut harga*

BAHAGIAN D

Ahli-ahli Syarikat

1. Ahli-ahli Lembaga Pengarah

Nama	Jawatan	Saham Modal Dipegang

2. Ahli-ahli Pengurusan

Nama	Jawatan	Kelulusan Akedemik/Iktisas

LAMPIRAN 6

(PK 1.6 Lampiran 6)

SURAT AKUAN PEMBIDA

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA BAGI TEMPOH SEPANJANG PELAKSANAAN PROJEK TERMASUK 12 BULAN TEMPOH TANGGUNG KECACATAN - PAR.SH.....2024

Saya, …… No. Kad Pengenalan ……. yang mewakili ……..…… nombor Pendaftaran ……..…… dengan ini mengisytiharkan bahawa saya atau mana-mana orang yang mewakili syarikat ini:

i. tidak akan menawarkan, menjanjikan atau memberikan apa - apa suapan kepada mana-mana orang dalam mana-mana Kementerian/Agensi atau mana-mana orang lain, sebagai suapan untuk dipilih dalam mana-mana perolehan; dan

ii. tidak akan melakukan atau terlibat dengan tipuan bida dalam mana-mana perolehan.

Bersama ini dilampirkan Surat Perwakilan Kuasa bagi saya mewakili syarikat seperti tercatat di atas untuk membuat pengisytiharan ini.

2. Sekiranya saya, atau mana-mana individu yang mewakili syarikat ini didapati terlibat dalam pakatan tipuan bida dengan syarikat lain berkenaan perolehan di atas atau menawarkan, menjanjikan atau memberikan apa-apa suapan kepada mana-mana orang dalam **PARLIMEN MALAYSIA** atau mana-mana orang lain sebagai dorongan untuk dipilih dalam perolehan seperti di atas, maka saya sebagai wakil syarikat bersetuju tindakan-tindakan berikut boleh diambil:

2.1 Hilang kelayakan untuk dinilai dan dilantik bagi perolehan di atas; dan

2.2 Lain-lain tindakan undang-undang/tatatertib mengikut undang-undang/peraturan perolehan Kerajaan yang berkuat-kuasa.

3. Saya sesungguhnya faham bahawa tindakan berikut akan diambil :

3.1 Didakwa bagi kesalahan** di bawah Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 *[Akta 694]* dan Kanun Keseksaan [Akta 574] serta boleh dihukum di bawah undang-undang masingmasing untuk kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara (i); atau

3.2 tindakan boleh dikenakan ke atas syarikat di bawah Akta Persaingan 2010 *[Akta 712]* atas kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara (ii) dalam Surat Akuan ini. Sekiranya syarikat didapati melanggar peruntukan seksyen 4(2)(d) Akta 712, syarikat boleh didenda tidak melebihi sepuluh peratus (10%) daripada pusing ganti (*turn over)* seluruh dunia sepanjang tempoh suatu pelanggaran itu berlaku.

4. Sekiranya terdapat mana-mana orang cuba memperolehi atau meminta apa-apa suapan daripada saya atau mana-mana orang yang berkaitan dengan syarikat ini sebagai dorongan untuk dipilih dalam perolehan seperti di atas, maka saya berjanji akan dengan segera melaporkan perbuatan tersebut kepada pejabat Suruhanjaya Pencegahan Rasuah Malaysia (SPRM) atau balai polis yang berhampiran. Saya sedar bahawa kegagalan saya berbuat demikian adalah merupakan suatu kesalahan di bawah seksyen 25 (1) Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 *[Akta 694]* dan boleh dihukum di bawah seksyen 25 (2) akta yang sama, apabila disabitkan boleh didenda tidak melebihi RM100,000 atau penjara selama tempoh tidak melebihi sepuluh tahun atau kedua-duanya.

5. Saya sesungguhnya faham bahawa syarikat melakukan kesalahan jika seseorang yang bersekutu dengan syarikat*** memberikan, menjanjikan atau menawarkan suapan untuk memperoleh atau mengekalkan perniagaan atau faedah dalam menjalankan perniagaan di bawah Seksyen 17A, Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 *[Akta 694],* apabila disabitkan kesalahan boleh didenda tidak kurang daripada sepuluh kali ganda jumlah atau nilai suapan, atau RM1 juta, atau dipenjarakan selama tempoh tidak melebihi dua puluh tahun atau kedua-duanya.

Yang benar,

Tandatangan
:
Nama :
No.KP :
Tarikh :
Cop Syarikat :

Catatan:

(i) **termasuk kesalahan ditetapkan dalam Jadual (Perenggan 3 (a), takrif "kesalahan ditetapkan") Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [*Akta 694*] yang boleh dihukum di bawah Kanun Keseksaan.

(ii) ***seseorang yang bersekutu dengan syarikat merujuk kepada seksyen 17A (6) Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [*Akta 694*], iaitu seseorang itu bersekutu dengan organisasi komersial jika dia seorang pengarah, pekongsi atau pekerja organisasi komersial itu atau dia ialah orang yang melaksanakan perkhidmatan untuk atau bagi pihak organisasi komersial itu.

(iii) Surat Akuan ini hendaklah dikemukakan bersama surat perwakilan kuasa.

(iv) Takrifan perusahaan di bawah Akta 712 merangkumi syarikat yang terlibat dengan perolehan Kerajaan.

kontraktor pernah atau sedang mengalami penggantungan atau penamatan kontrak dengan Kerajaan oleh kerana pelanggaran syarat-syarat Kontrak.

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6. Lain-lain Keterangan Mengenai Penyebut harga :-

.....

.....

.....

.....

.....

.....

Saya perakui bahawa segala keterangan di atas adalah benar.

Tandatangan :.....

Nama :.....

No. K/P :.....

Jawatan :.....

Tarikh :.....

Cop Firma/
Syarikat :.....

Tandatangan Saksi : .....

Nama Saksi :.....

No. K/P :.....

Jawatan :.....

Tarikh :.....

Cop Firma/ Syarikat :.....

Nota : Jika didapati keterangan/maklumat di atas adalah tidak benar, pihak Kerajaan berhak menolak/membatalkan tawaran syarikat tuan.

BAHAGIAN B

Senarai Sepuluh (10) Kerja-Kerja Yang **TELAH** Disiapkan

Nama Projek	Jabatan/Agensi/ Perunding Yang Mengawas Projek	Harga	Tempoh	Tarikh Siap Sebenar

BAHAGIAN C

Senarai Kerja Yang **SEDANG** Disiapkan

Nama Projek	Jabatan/Agensi/ Perunding Yang Mengawas Projek	Harga Kontrak	Tempoh Kontrak	Peratusan Kemajuan	Ulasan Pegawai Yang Menilai sebut harga*

BAHAGIAN D

Ahli-ahli Syarikat

1. Ahli-ahli Lembaga Pengarah

Nama	Jawatan	Saham Modal Dipegang

2. Ahli-ahli Pengurusan

Nama	Jawatan	Kelulusan Akedemik/Iktisas

LAMPIRAN 6

SURAT AKUAN PENYEBUT HARGA

LAMPIRAN 6

(PK 1.6 Lampiran 6)

SURAT AKUAN PEMBIDA

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA BAGI TEMPOH SEPANJANG PELAKSANAAN PROJEK TERMASUK 12 BULAN TEMPOH TANGGUNG KECACATAN - PAR.SH.....2024

Saya, ...
No. Kad Pengenalan ..... yang mewakili ..... nombor Pendaftaran ..... dengan ini mengisytiharkan bahawa saya atau mana-mana orang yang mewakili syarikat ini:

i. tidak akan menawarkan, menjanjikan atau memberikan apa - apa suapan kepada mana-mana orang dalam mana-mana Kementerian/Agensi atau mana-mana orang lain, sebagai suapan untuk dipilih dalam mana-mana perolehan; dan

ii. tidak akan melakukan atau terlibat dengan tipuan bida dalam mana-mana perolehan.

Bersama ini dilampirkan Surat Perwakilan Kuasa bagi saya mewakili syarikat seperti tercatat di atas untuk membuat pengisytiharan ini.

2. Sekiranya saya, atau mana-mana individu yang mewakili syarikat ini didapati terlibat dalam pakatan tipuan bida dengan syarikat lain berkenaan perolehan di atas atau menawarkan, menjanjikan atau memberikan apa-apa suapan kepada mana-mana orang dalam **PARLIMEN MALAYSIA** atau mana-mana orang lain sebagai dorongan untuk dipilih dalam perolehan seperti di atas, maka saya sebagai wakil syarikat bersetuju tindakan-tindakan berikut boleh diambil:

2.1 Hilang kelayakan untuk dinilai dan dilantik bagi perolehan di atas; dan

2.2 Lain-lain tindakan undang-undang/tatatertib mengikut undang-undang/peraturan perolehan Kerajaan yang berkuat-kuasa.

3. Saya sesungguhnya faham bahawa tindakan berikut akan diambil :

3.1 Didakwa bagi kesalahan** di bawah Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 *[Akta 694]* dan Kanun Keseksaan [Akta 574] serta boleh dihukum di bawah undang-undang masingmasing untuk kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara (i); atau

3.2 tindakan boleh dikenakan ke atas syarikat di bawah Akta Persaingan 2010 *[Akta 712]* atas kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara (ii) dalam Surat Akuan ini. Sekiranya syarikat didapati melanggar peruntukan seksyen 4(2)(d) Akta 712, syarikat boleh didenda tidak melebihi sepuluh peratus (10%) daripada pusing ganti (*turn over)* seluruh dunia sepanjang tempoh suatu pelanggaran itu berlaku.

4. Sekiranya terdapat mana-mana orang cuba memperolehi atau meminta apa-apa suapan daripada saya atau mana-mana orang yang berkaitan dengan syarikat ini sebagai dorongan untuk dipilih dalam perolehan seperti di atas, maka saya berjanji akan dengan segera melaporkan perbuatan tersebut kepada pejabat Suruhanjaya Pencegahan Rasuah Malaysia (SPRM) atau balai polis yang berhampiran. Saya sedar bahawa kegagalan saya berbuat demikian adalah merupakan suatu kesalahan di bawah seksyen 25 (1) Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 *[Akta 694]* dan boleh dihukum di bawah seksyen 25 (2) akta yang sama, apabila disabitkan boleh didenda tidak melebihi RM100,000 atau penjara selama tempoh tidak melebihi sepuluh tahun atau kedua-duanya.

5. Saya sesungguhnya faham bahawa syarikat melakukan kesalahan jika seseorang yang bersekutu dengan syarikat*** memberikan, menjanjikan atau menawarkan suapan untuk memperoleh atau mengekalkan perniagaan atau faedah dalam menjalankan perniagaan di bawah Seksyen 17A, Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 *[Akta 694],* apabila disabitkan kesalahan boleh didenda tidak kurang daripada sepuluh kali ganda jumlah atau nilai suapan, atau RM1 juta, atau dipenjarakan selama tempoh tidak melebihi dua puluh tahun atau kedua-duanya.

Yang benar,

Tandatangan :

Nama :

No.KP :

Tarikh :

Cop Syarikat :

Catatan:

(i) **termasuk kesalahan ditetapkan dalam Jadual (Perenggan 3 (a), takrif "kesalahan ditetapkan") Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [*Akta 694*] yang boleh dihukum di bawah Kanun Keseksaan.

(ii) ***seseorang yang bersekutu dengan syarikat merujuk kepada seksyen 17A (6) Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [*Akta 694*], iaitu seseorang itu bersekutu dengan organisasi komersial jika dia seorang pengarah, pekongsi atau pekerja organisasi komersial itu atau dia ialah orang yang melaksanakan perkhidmatan untuk atau bagi pihak organisasi komersial itu.

(iii) Surat Akuan ini hendaklah dikemukakan bersama surat perwakilan kuasa.

(iv) Takrifan perusahaan di bawah Akta 712 merangkumi syarikat yang terlibat dengan perolehan Kerajaan.

LAMPIRAN A

LAPORAN KEROSAKAN DAN SKOP KERJA

LAPORAN KEROSAKAN

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

BAHAGIAN SENGGARA FASILITI DAN LANDSKAP

SENARAI KEROSAKAN

A. PEMBAIKAN DI DALAM BLOK UTAMA

1. KERJA-KERJA PENGGANTIAN JUBIN DINDING DAN KERJA-KERJA YANG BERKAITAN DI DALAM TANDAS BILIK DI RAJA, BLOK UTAMA
2. KERJA-KERJA MEMBAIKI DAN MENGGANTI PINTU SLIDING DI PINTU 1 DAN 2, BLOK UTAMA
3. KERJA-KERJA PENYEDIAAN LONGKANG DAN TEMBOK DI HADAPAN PINTU 6, BLOK UTAMA
4. KERJA-KERJA MEMBAIKI PINTU YANG ROSAK DI DALAM BLOK UTAMA
5. KERJA-KERJA MENGECAT DINDING, TIANGT DAN SOFFIT SLAB DI BASEMENT BLOK UTAMA

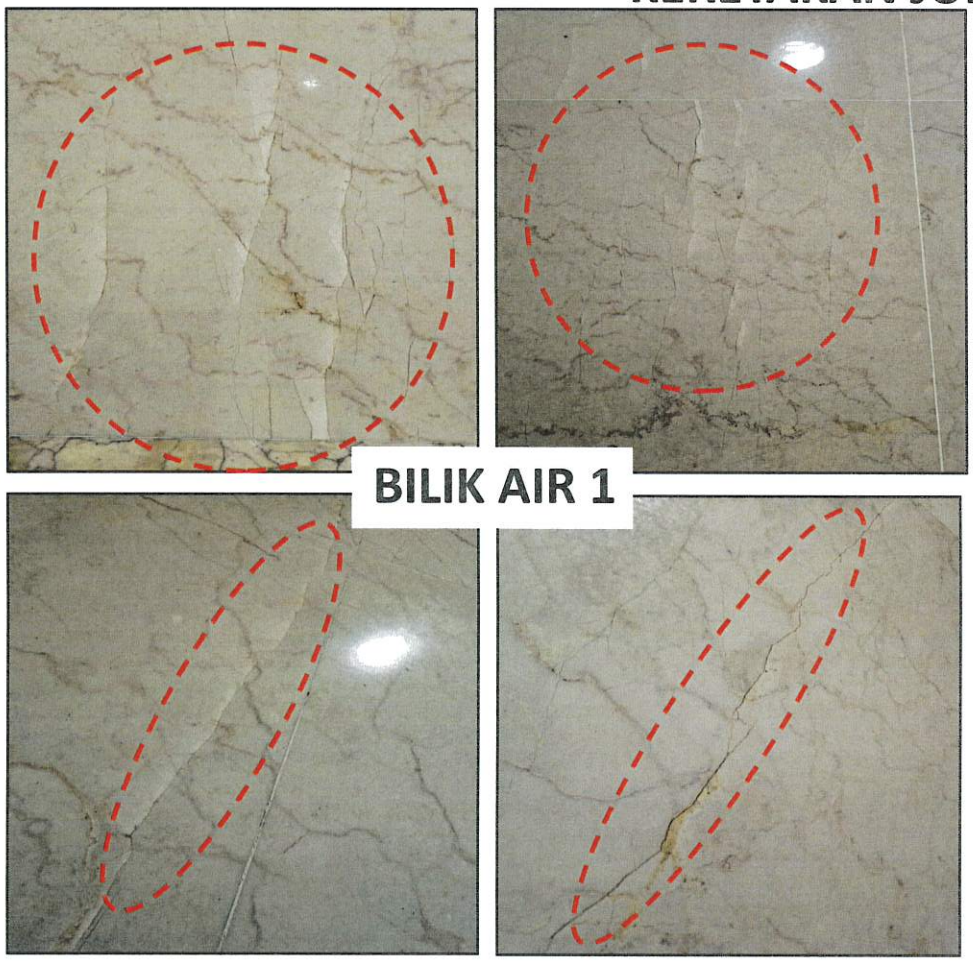
B. PEMBAIKAN DI DATARAN JAM BUNGA

C. PEMBAIKAN JALAN DI SEKITAR TASKA PARLIMEN MALAYSIA

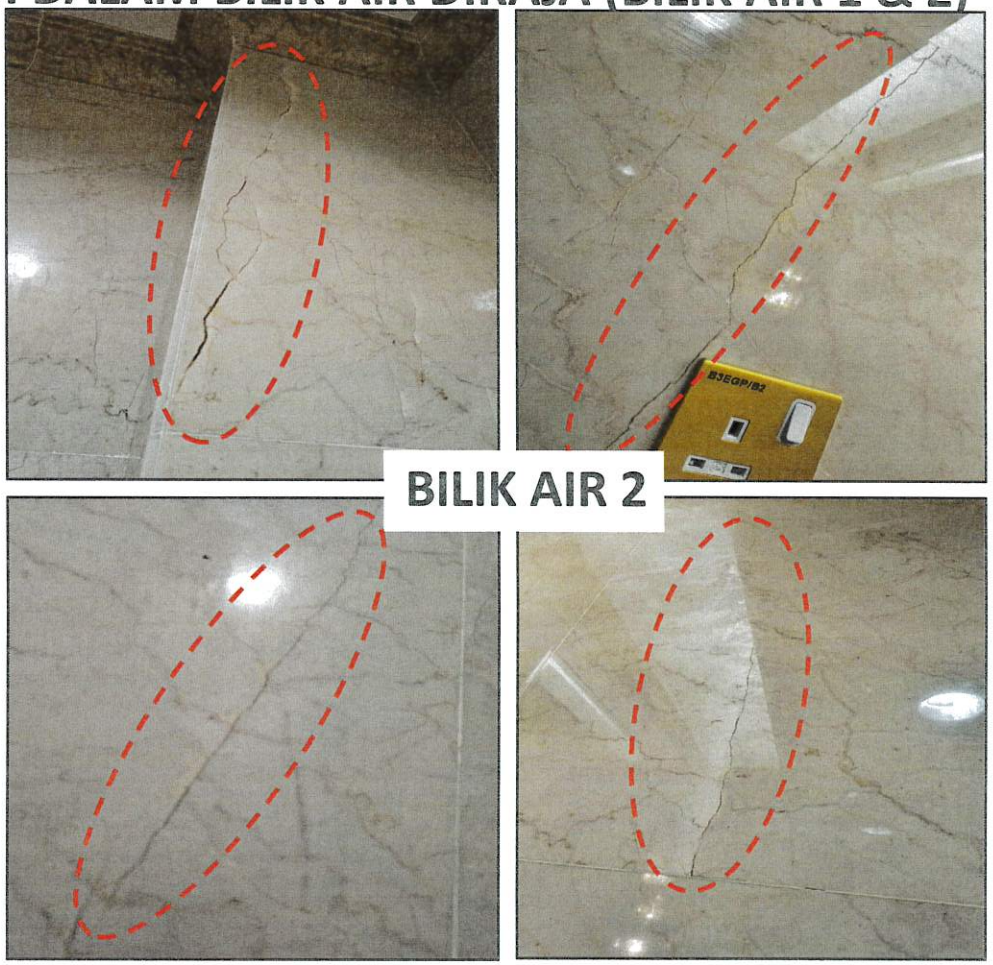
D. PEMBAIKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

1. KERJA-KERJA PENYEDIAAN FASILITI OKU DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA
2. KERJA-KERJA PENYEDIAAN BRC KANDANG RUSA DI KOMPLEKS PARLIMEN MALAYSIA
3. KERJA-KERJA PEMBAIKAN KEBOCORAN KOLAM TAMAN HERBA

KERETAKAN JUBIN DI DALAM BILIK AIR DIRAJA (BILIK AIR 1 & 2)



BILIK AIR 1

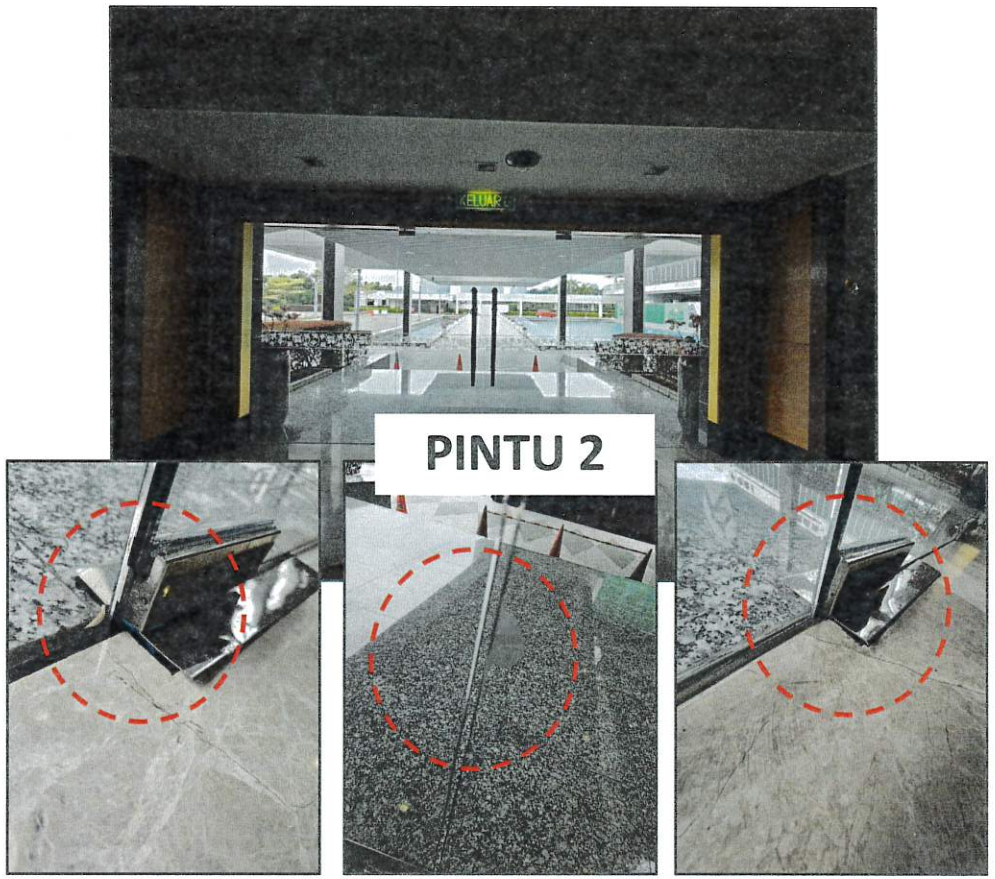


BILIK AIR 2

Kerosakan:
Terdapat beberapa jubin di dalam bilik air 1 dan 2 yang retak dan mencacatkan pemandangan bilik air diraja

Pembaikan :
Menggantikan jubin yang baharu

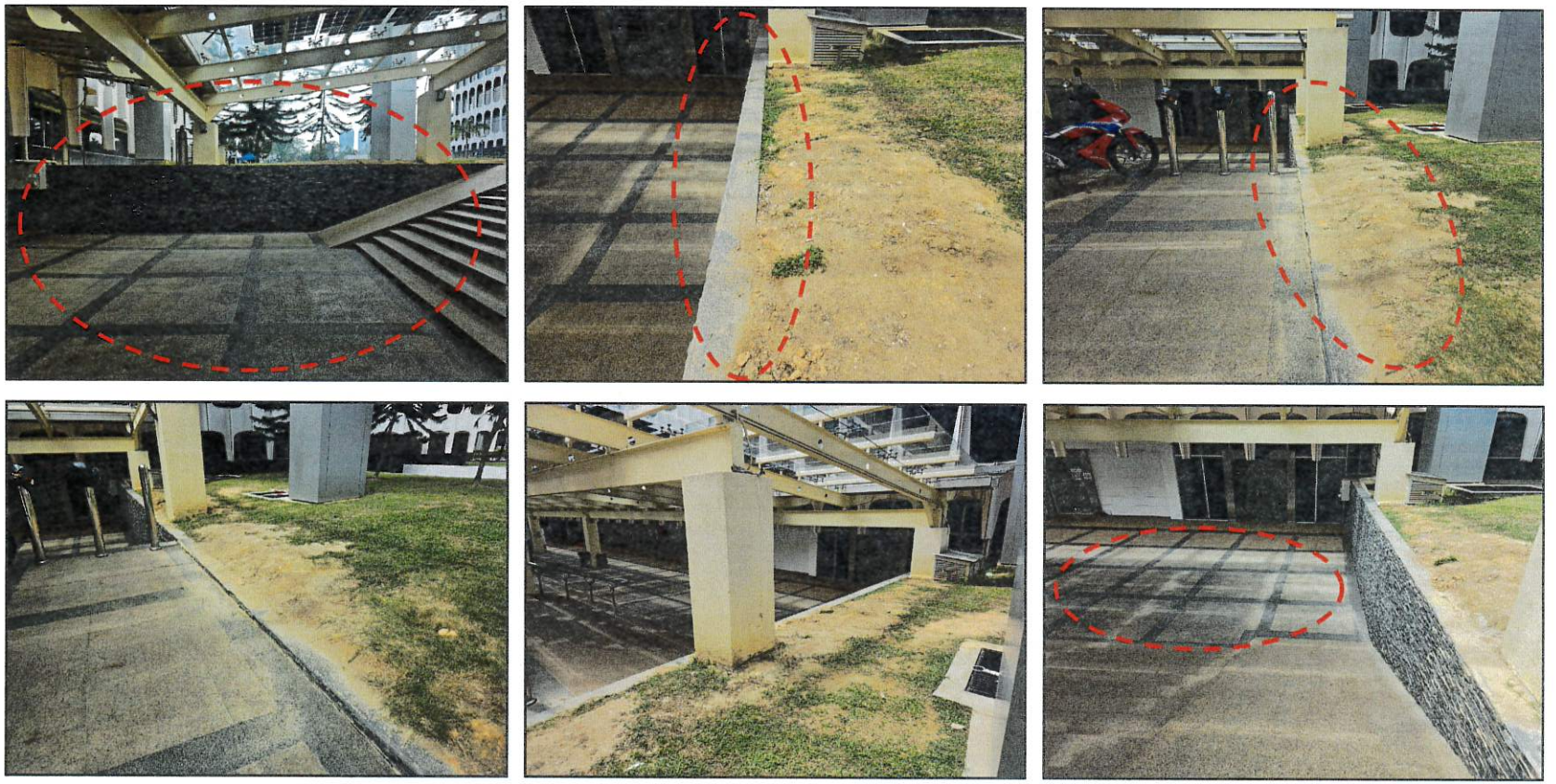
MEMBAIKI DAN MENGGANTI PINTU SLIDING DI PINTU 1 DAN 2, BLOK UTAMA



Kerosakan:
Keadaan pintu kaca di Pintu 1 dan 2 di Blok utama yang telah lama dan terdapat beberapa cermin telah sumbing dan besi pintu yang rosak.

Pembaikan :
Menggantikan pintu yang baharu jenis *sliding door*

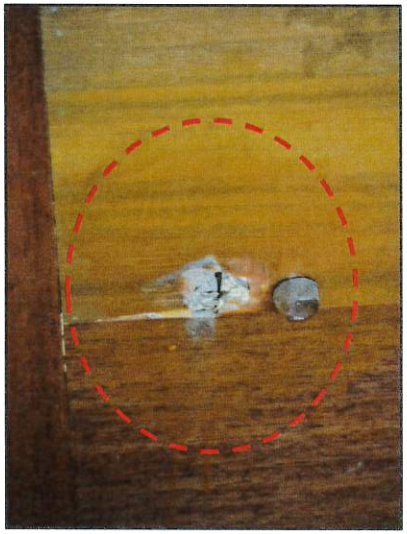
KERJA-KERJA PENYEDIAAN LONGKANG DAN TEMBOK DI HADAPAN PINTU 6, BLOK UTAMA

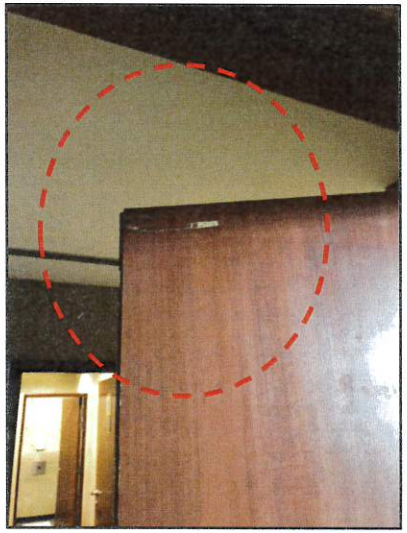


Kerosakan:
Air tanah akan melimpahi kawasan lantai di hadapan Pintu 6, Blok Utama ketika hujan lebat dan mencacatkan pandangan

Pembaikan :
Menyediakan tembok, lantai simen dan longkang yang baharu di sekeliling kawasan yang terlibat bagi mengelakkan limpahan air tanah memenuhi lantai di hadapan Pintu 6

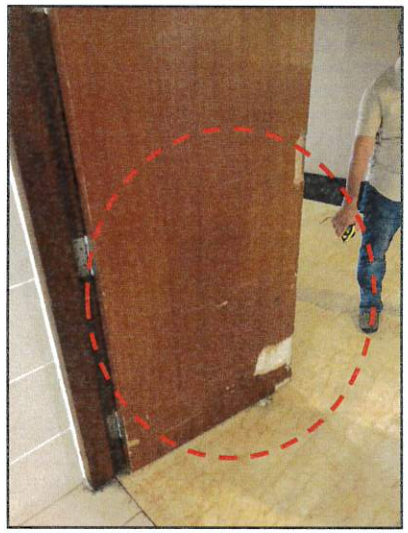
KERJA-KERJA MEMBAIKI PINTU YANG ROSAK DI DALAM BLOK UTAMA



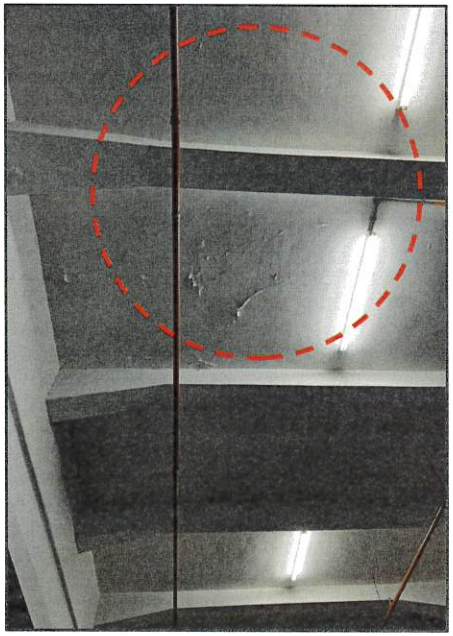


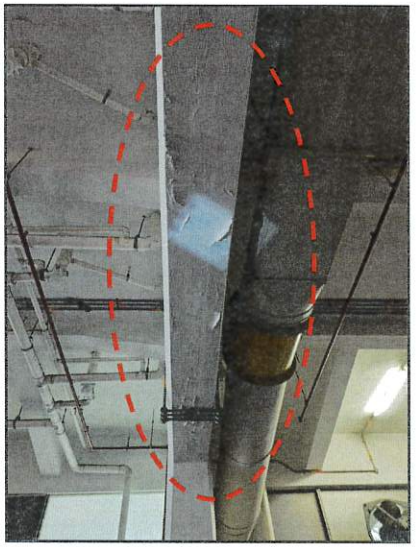
Kerosakan:
Terdapat beberapa pintu di dalam Blok Utama telah rosak

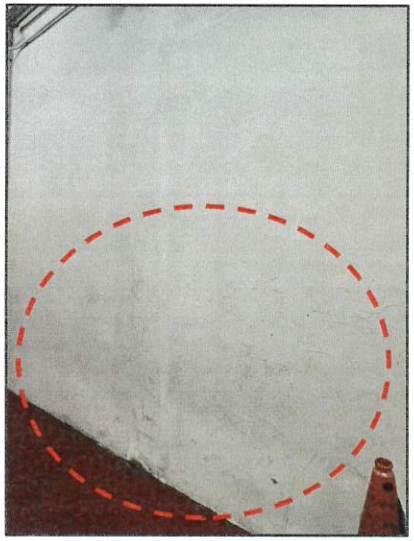
Pembaikan :
Menggantikan pintu yang baharu dan melekatkan kepingan *stainless steel* sebagai *protection* kepada pintu

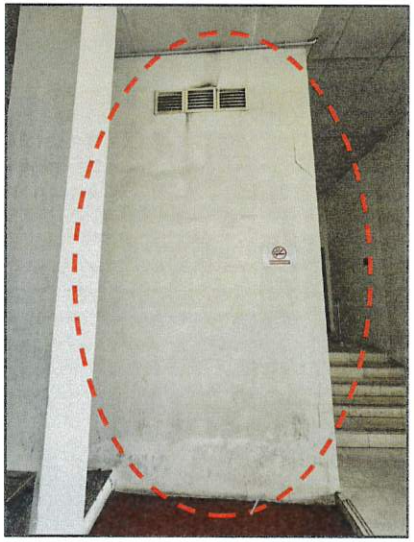


KERJA-KERJA MENGECAT DINDING, TIANG DAN SOFFIT SLAB DI BASEMENT BLOK UTAMA









Kerosakan:
Kedaan kemasan cat yang telah kotor dan rosak di basement Blok Utama

Pembaikan :
Mengecat semula keseluruhan dinding, tiang dan soffit slab dengan menggunakan *weathershield paint* (5 years warranty)

KERJA-KERJA NAIKTARAF DATARAN JAM BUNGA

Kerosakan:
Keadaan lantai dan tembok signage telah rosak dan mencacatkan pandangan setiap pelawat yang datang ke Parlimen Malaysia.

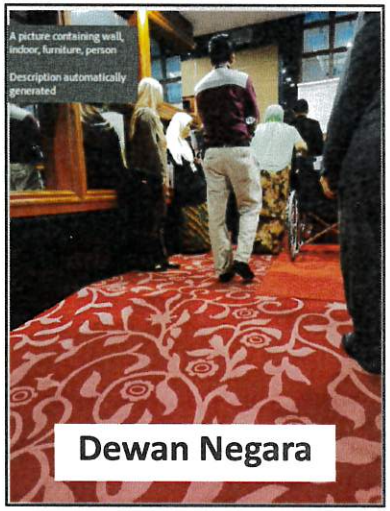
Pembaikan :
Menggantikan lantai yang dan tembok signage yang baharu

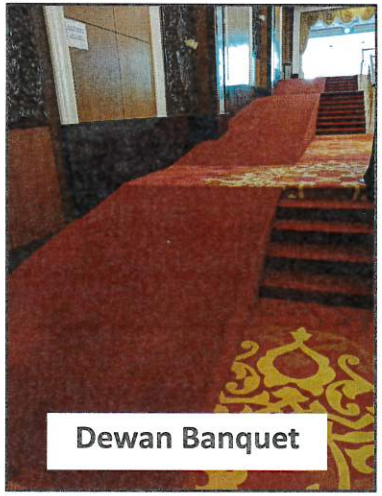
KERJA-KERJA NAIKTARAF JALAN DI SEKITAR TASKA PARLIMEN MALAYSIA

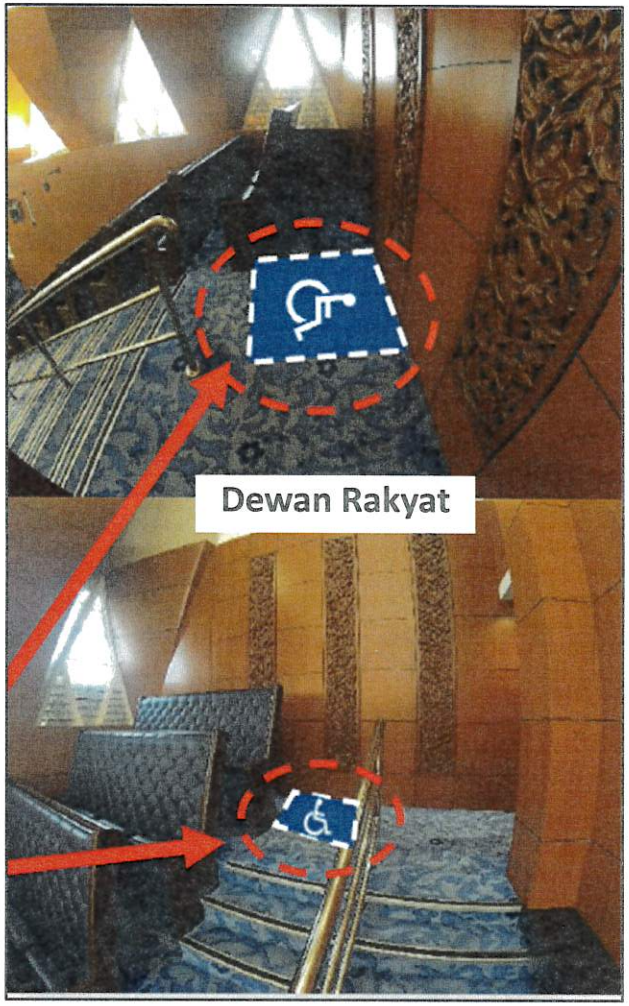
Kerosakan:
Keadaan permukaan jalan di sekitar Taska Parlimen telah rosak dan berlubang boleh membahayakan pengguna taska

Pembaikan :
Menurap jalan yang baharu

KERJA-KERJA PENYEDIAAN FASILITI OKU DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA



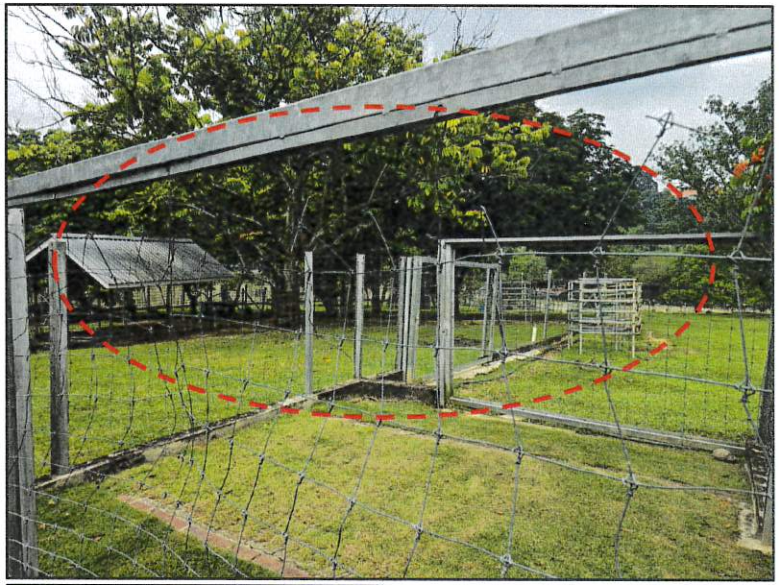


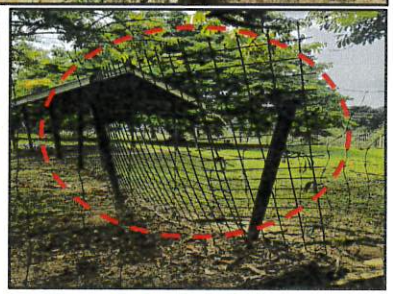


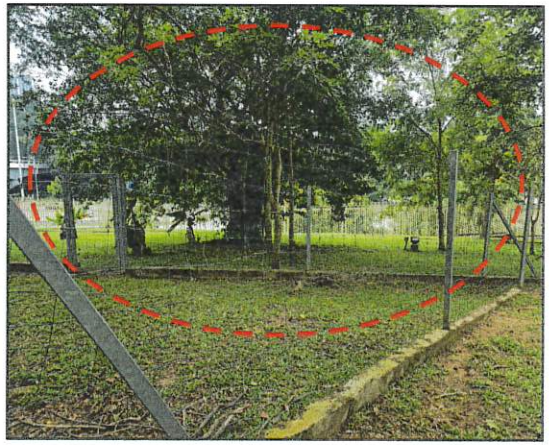
Kerosakan:
Hasil dapatan Laporan Audit AKSES untuk Jabatan Pembangunan Orang Kurang Upaya (JPOKU), Jabatan Kebajikan Masyarakat mendapati terdapat beberapa kawasan di dalam Kompleks Parlimen yang tidak mengikut spesifikasi fasiliti OKU

Pembaikan :
Menyediakan fasiliti OKU seperti yang disarankan oleh Laporan Audit AKSES

KERJA-KERJA PENYEDIAAN BRC PAGAR KANDANG RUSA DI KOMPLEKS PARLIMEN MALAYSIA

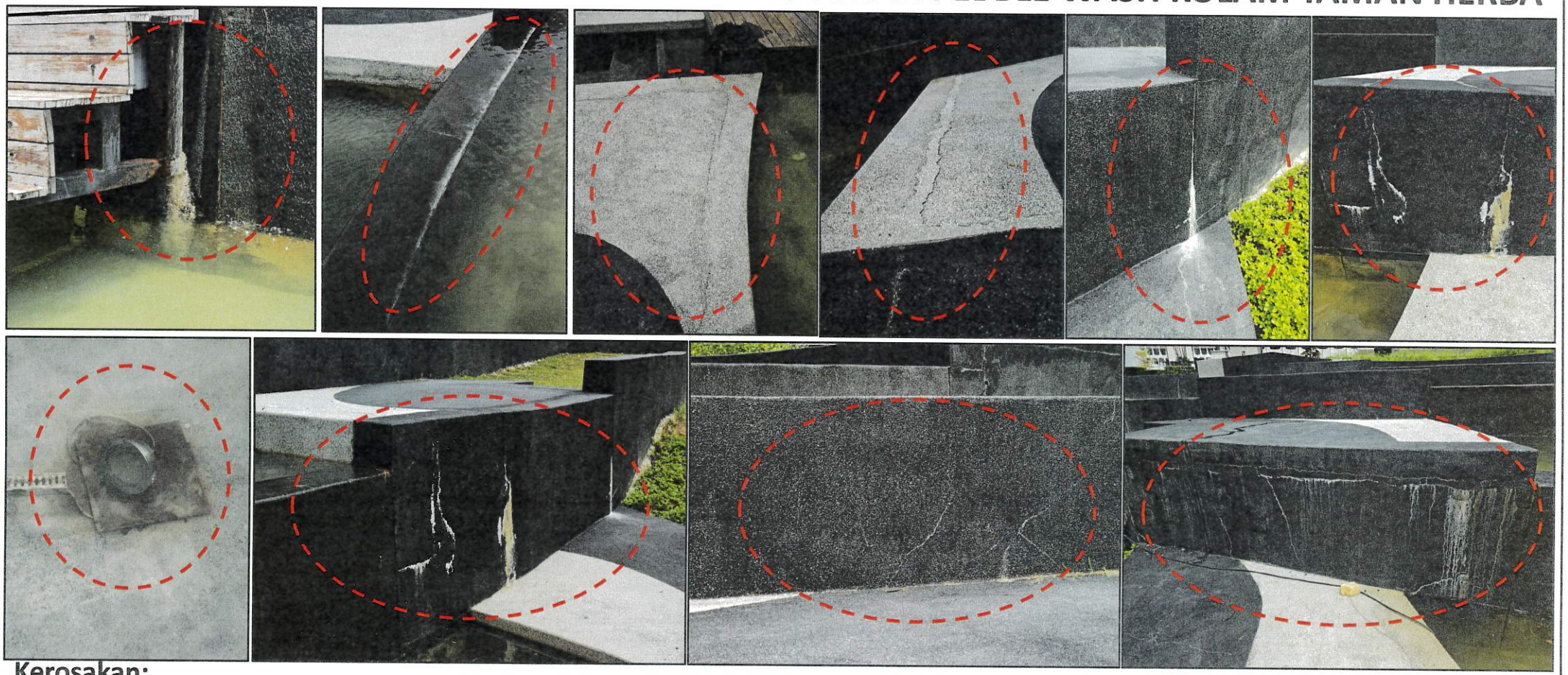
Kerosakan:

Pagar BRC kandang rusa telah rosak dan membahayakan rusa-rusa yang ada di dalam kendang.

Pembaikan :

Membekal dan memasang BRC R8,dicat,welding termasuk aksesori serta kerja-kerja berkaitan.

KERJA-KERJA PEMBAIKAN KEBOCORAN PEBBLE WASH KOLAM TAMAN HERBA



Kerosakan:
Pebble wash kolam sedia ada di taman herba telah rosak dan berlaku kebocoran air

Pembaikan :
Membaiki keseluruhan pebble wash di seluruh kawasan kolam dan menyapu lapisan waterproofing serta kerja-kerja berkaitan

LAMPIRAN B

SPESIFIKASI KERJA BERKAITAN

SPESIFIKASI

PAINTING

TABLE OF CONTENTS

1. General

1.1. All paints to be used shall be those supplied by approved manufacturers. The quality of paints shall comply with MS 125 in respect of oil/enamel paints and MS 134 in respect of emulsion paints/acrylic paint.

1.2. Prior to commencing painting work, the Contractor shall submit the following to the S.O.:

1.2.1. Name of the paint manufacturer and the manufacturer's certification that the paint conform to the relevant standard as specified in sub-section 1.1 hereof together with the proof that such certification have been verified by tests carried out by SIRIM or ISO in the last three (3) years.

1.2.2. The performance warranty by the manufacturer to the Government on the performance of the paint against any peeling, cracking, fungus/ algae growth and discoloration which may arise during a period of five (5) years or more from the date of practical completion due to insufficiency in material or workmanship. The terms of the performance warranty shall be as stipulated in APPENDIX O/1 and as approved by the S.O..

1.2.3. Name of the painting applicator as approved by the paint manufacturer including written evidence of the current approval.

1.2.4. A copy of the method statement including procedure for the painting works in accordance with these specification and manufacturer's instructions.

1.3. All paints shall be delivered to the Site in the manufacturer's original sealed containers unopened and shall be used strictly in accordance with the manufacturer's instructions.

1.4. Paints shall not be adulterated and any paint that has deteriorated shall not be used and shall be removed from the Site forthwith.

1.5. Unless otherwise specified in the Drawings, the types of paints to be sued for the work on exposed surfaces shall be as stated in the `Schedule of Paint Finish' attached hereinafter.

1.6. The colours and tints of paints shall be selected by the S.O. and the priming, undercoats and finishing coats shall be of approved differing tints and shall be obtained from the same manufacturer.

1.7. No painting shall be done under conditions which may jeopardize the quality of finish paintwork.

1.8. During painting, care shall be taken to prevent stain or damage to other works.

1.9. Surfaces to be painted shall be dry, free from dirt, oil, grease, old loose paint and other deleterious matter. All cracks shall be raked out and stopped and all holes and dents shall be filled.

1.10. Unless otherwise specified in the manufacturer's instructions, each coat of paint applied on timber or metal surfaces shall be allowed to dry and subsequently rubbed down lightly with sandpaper before the next coat is applied. Any dirt or dust shall be removed from preceding coats immediately before proceeding with application of the next coat.

1.11. All priming to shop fabricated components shall be done at shop.

1.12. All prime surfaces shall be inspected and approved by the S.O. before commencement of painting works.

1.13. Finish surfaces shall be uniform in finish and colour and be free from brush marks or other defects.

1.14. Sample areas showing all tints of paints to be used shall be prepared by the Contractor as and when required by the S.O..

2. Painting to Timber Work

2.1. Painting to New Timber Work

2.1.1. Unless otherwise as shown on the Drawings, all exposed wrot surfaces of timber shall be painted as specified hereinafter.

2.1.2. Before painting to new timber work, all knots shall be covered with knotting and all nail holes, cracks, et cetera shall be stopped with white lead and putty (1:3) and shall be primed with aluminium wood primer well brushed in.

2.1.3. Unless otherwise specified, the prepared surface shall be painted with one undercoat (alkyd undercoat) and shall be finished with two coats of premium semi-gloss fungus resisting alkyd paint or three (3) coats UV protection, low odour alkyd wood finish.

2.1.4. Timber decks shall be applied with three coats of scratch resistant, UV protection, fast drying urethane alkyd wood finish. Each preceding coat shall be allowed to dry thoroughly and rubbed down lightly with fine sand paper and thoroughly cleaned before applying the next coat.

2.1.5. All timber surfaces abutting concrete or brickwork shall be primed before fixing or assembling.

2.1.6. All ironmongeries except hinges shall be removed before painting begins and shall be carefully re-fixed.

2.2. Repainting Existing Timber Work

Where repainting to existing timber work is specified, the following procedure shall be adhered to. If the surface is intact, it shall be rubbed down with fine sand paper to the approval of the S.O.. Then one coat of undercoat shall be applied followed by two (2) coats of gloss enamel paint unless otherwise specified. Where cracking and flaking have occurred, the entire existing paint shall be removed by burning off or by use of paint remover as approved by the S.O.. The surfaces shall then be thoroughly cleaned and shall be applied with minimum one coat aluminum wood primer followed by one (1) undercoat and unless otherwise specified in the Drawings, shall be finished with two (2) coats of gloss enamel paint.

3. Painting to Metal Work

3.1. Painting New Steel and Ironwork

The areas to be painted shall be cleaned down and be free from rust, scale, oil, grease, dirt and dust. One (1) coat of approved metallic primer shall be applied followed by one (1) coat of premium alkyd undercoat unless specified and shall be finished with two (2) finishing coats of gloss/semi-gloss fungus resisting alkyd paint.

Soil and vent pipes shall be primed as above and given two (2) coats of approved bituminous paint.

3.2. Repainting Existing Steel and Ironwork

3.2.1. Where repainting to existing steel or ironwork is stated in the Drawings, the following procedure shall be adhered to. Where a firm surface exists, it shall be scuffed with fine sand paper to the approval of the S.O. and spot primed if necessary, before the application of by one (1) coat of premium alkyd undercoat unless specified and shall be finished with two (2) finishing coats of gloss/semi-gloss fungus resisting alkyd or gloss enamel paint.

3.2.2. If the old paint is in a bad, deteriorated condition the whole paint shall be removed by the use of approved paint remover or by scraping as approved by the S.O.. The surface shall be thoroughly cleaned and shall be applied with one coat approved metallic primer, by one (1) coat of premium alkyd undercoat unless specified and shall be finished with two (2) finishing coats of gloss/semi-gloss fungus resisting alkyd or gloss enamel paint.

3.3. Painting New Galvanized Ironwork

Where painting to new galvanized ironwork is specified, the surfaces shall be applied with one coat of approved self-etching quick drying metallic primer unless otherwise specified and shall be finished with two finishing coats of gloss/semi-gloss fungus resisting alkyd paint or gloss enamel paint.

3.4. Repainting Existing Galvanized Ironwork

3.4.1. Where repainting to existing galvanized ironwork is specified, the following procedure shall be adhered to. If the surface is not corroded, it shall be slightly sanded and all dirt's, oil, and grease removed by washing with an approved solvent and applied with one (1) coat of approved metallic primer unless otherwise specified, shall be finished with two (2) finishing coats of gloss/semi-gloss fungus resisting alkyd paint or gloss enamel paint. If the surface has corroded, the whole paint shall be removed by the use of approved paint remover or by scraping as approved by S.O..

3.4.2. When the surface is completely clean, it shall be applied with one coat approved metallic primer, unless otherwise specified, shall be finished with two finishing coats of gloss/semi-gloss fungus resisting alkyd paint or gloss enamel paint.

4. Painting to Masonry Work

4.1. Painting New Plastered/Masonry Surfaces

4.1.1. The new plastered or masonry surfaces shall be allowed to dry completely and shall be cleaned down to remove dust, dirt, plaster splashes, and the like. In case of old unpainted walls, all fungus, mosses, lichens and vegetative growth shall also be removed.

4.1.2. The cleaned surfaces of the external walls shall be applied with one coat of approved alkaline resisting primer and unless otherwise specified in the Drawings, followed with two (2) coats of ultra-violet (UV) weather resistant emulsion paint.

4.1.3. The external wall surfaces shall be applied with one (1) coat of approved alkaline resisting primer, unless otherwise stated in the Drawings, followed with two (2) coats of 100% acrylic with heat reflective and UV protected, and temperature reduction weather resistant acrylic emulsion paint for Green Ratings Certification as approved by the S.O..

4.1.4. The internal wall surfaces shall be applied with one (1) coat of approved modified acrylic sealer, and unless otherwise as shown on the Drawings, followed with two (2) coats of low VOC acrylic paint.

4.2. Repainting Existing Plastered or Masonry Surfaces

4.2.1. Where repainting to existing plastered or the masonry surface is specified, the following procedure shall be adhered to. All existing paint shall be removed by scraping and the surface shall be washed with high pressure water jet (for Non-Conservation Projects). All cracks and other imperfections shall be made good and the surface should be allowed to dry completely.

4.2.2. The surface shall then be applied with two (2) coats of any other type of water base emulsion paint as described hereinbefore for Painting New Plastered/Masonry Surfaces and as approved by the S.O..

4.2.3. However, for buildings which fall under heritage status, repainting works shall refer to *Garis panduan Pemuliharaan Bangunan Warisan 2016* (or latest version).

4.3. Textured Wall

4.3.1. Natural Spray Granite textured wall shall be applied with one (1) coat of approved alkaline resisting acrylic primer, unless otherwise stated in the Drawings, followed with two (2) layers natural fine stone and ceramic chips texture with high build acrylic resin and two (2) clear finish coats.

4.3.2. Spray Tile textured wall shall be applied with one (1) coat of approved alkaline resisting acrylic primer, unless otherwise specified in the Drawings, followed with one (1) coat of spray tiles texture and two (2) coats of pure acrylic based premium weather paint.

5. Treatment to Fair Face Surfaces

Surfaces that are to be left bare such as fair-face brickwork, fair-face concrete or stones and the like shall be thoroughly clean, dry and free from grease, dust and loose or flaking

materials. The surfaces shall then be treated with an approved colourless silicon-based water repellent liquid applied in accordance with the manufacturer's instructions. The solution shall be applied in two (2) coats over the entire area and crevices by brushing.

6. Epoxy Coatings

Epoxy coatings shall be applied with one (1) coat of approved penetrative epoxy sealer, followed with two (2) coats epoxy topcoat.

7. Silicone Paint

Silicone paint for external walls and ceiling shall be applied with one (1) coat of Pigmented Water Base Penetration Water Repellent and two (2) finishing coats of Breathable Silicone Paint of approved colour applied strictly in accordance with manufacturer's instruction.

8. Painting on Floor Surfaces

8.1. Painting on concrete drive way shall be applied with one (1) coat of floor primer at 100 µm DFT, followed by one (1) coat of floor glass flake at 300 µm DFT or floor non-slip aggregate (fine/medium) and followed with two (2) coats of floor polyurethane (PU) topcoat at 50 µm DFT per coat.

8.2. Painting on car park parking bay floors shall be applied with one (1) coat of floor primer at 100 µm DFT, then followed with two (2) coats of floor polyurethane (PU) topcoat at 50 µm DFT per coat.

8.3. Painting on TNB sub-station internal floors shall be applied with one (1) coat of approved two-pack epoxy sealer, followed with two (2) coats of two pack epoxy floor coating at 50 µm DFT per coat, unless otherwise stated in the drawings.

9. Painting to Timber-based Products

9.1. Chipboard Surfaces

9.1.1. Before painting, all nail holes, crevices and the like shall be stopped with white lead and putty (1:3). The surface shall then be smoothened by rubbing down with fine sand paper and finally cleaned to remove dust. Where the board is to be finished with enamel paint, one (1) undercoat and two (2) finishing coats of gloss enamel paint shall be applied. If the board is to be finished with emulsion paint, one (1) undercoat and two (2) coats of emulsion paint shall be applied.

9.1.2. Where repainting to existing enamel paint finished chipboard is required, the following procedure shall be adhered to. If the paintwork is still intact, it shall be rubbed down with fine sand paper to the approval of the S.O.. Then one (1) coat of undercoat shall be applied followed by one (1) coat of gloss enamel paint.

9.1.3. Where cracking and flaking has occurred, the entire existing paint shall be removed by burning off, as approved by the S.O.. The surfaces shall then thoroughly clean and shall be applied with one (1) undercoat and finished with two (2) coats of gloss enamel paint.

9.1.4. Where repainting to existing emulsion paint finished chipboard is required, the surface shall then be thoroughly cleaned and applied with two (2) coats of emulsion paint.

9.2. Hardboard Surfaces

Before painting to hardboard, all nail holes, crevices and the like shall be filled with approved putty. The surface shall then be applied with one (1) undercoat and two (2) coats of emulsion paint unless otherwise specified.

9.3. Wood Cement Board Surfaces

Before painting to wood cement board, all nail holes, crevices and the like shall be filled with approved filling compound of alkali resistant type. The surface shall then be lightly sanded, and any dust should be removed from the surface with a piece of clean, coarse cloth. The surface shall then be applied with one (1) undercoat and two (2) coats of emulsion paint unless otherwise specified.

10. Painting to Gypsum Board and The Like

10.1. Before painting the surfaces shall be clean and free from dirt. The surfaces shall then be applied with one (1) undercoat and two (2) coats of emulsion paint. Similar procedure shall be followed where repainting to existing painted surfaces is required.

11. Painting to Laboratory Bench Tops

11.1. Timber tops of benches in laboratories that are required to be painted shall be prepared as described hereinbefore for timber work. The surfaces shall then be applied with one (1) coat aluminum wood primer followed by one (1) coat approved chemical resistant primer and finished with two (2) coats of approved chemical resistant gloss enamel paint in accordance with manufacturer's instructions.

11.2. Where repainting to existing timber tops laboratory benches is required, the surfaces shall be rubbed down lightly with fine sand paper. The surfaces shall then be thoroughly cleaned and shall be applied with one (1) coat of approved chemical resistant primer followed by one (1) coat of approved chemical resistant gloss enamel paint.

12. Varnishing

12.1. Varnishing to New Timberwork

12.1.1. The surfaces to be varnished shall be smoothened with fine sand paper and all crevices, holes and the like, if any, shall be filled with approved whiting. It shall be clean, dry, free from dust, dirt and wax before the application of varnish. Unless otherwise approved by the S.O., the surfaces shall be applied with three (3) coats of approved UV protection, low odour alkyd wood finish or varnishing mixture used strictly in accordance with the manufacturer's instructions.

12.1.2. Where non patented products are allowed to be used, the varnishing mixture shall consist of methylated spirit, shellac and approved stain

forming the first coat followed by one (1) coat of an approved mixture consisting of thinner and lacquer. The mixtures shall be of uniform consistency throughout. Unless otherwise specified in the Drawings, the finish shall be gloss and as approved by the S.O..

12.1.3. Timber deck surfaces shall be applied with three (3) coats of approved scratch resistant, UV protection, fast drying low odour urethane alkyd wood finish.

12.2. Re-varnishing To Existing Timberwork

Where re-varnishing to timberwork is specified in the Drawings or described in the B.Q., the surface shall first be thoroughly scuffed to remove the existing varnish. The surface shall then be smoothened with fine sand paper, cleaned, dried and free from dust, dirt and wax. It shall then be varnished as described hereinbefore for new timberwork.

13. Painting Works for Buildings in Coastal Areas.

13.1. External walls shall be applied with one (1) coat of approved pliolite based alkaline resisting primer sealer, unless otherwise specified in the Drawings, followed with two (2) coats of elastomeric weather resistant paint of approved colour applied strictly in accordance to manufacturer's instruction.

13.2. Unless otherwise specified in the Drawings, the internal walls shall be applied with one (1) coat of approved water based alkaline resisting acrylic wall sealer, followed with two (2) coats of low volatile organic compounds (VOCs), alkylphenolethoxylate (APEO) free, formaldehyde free acrylic premium emulsion paint of approved colour applied strictly in accordance to manufacturer's instruction.

13.3. Mild steel shall be applied with one (1) coat of zinc rich epoxy, one (1) coat of surface tolerance epoxy mastic and followed with two (2) coats of polyurethane topcoat.

13.4. Galvanized steel shall be applied with one (1) coat of surface tolerance epoxy mastic and followed with two (2) coats of polyurethane topcoat.

13.5. Roofing sheet coatings for marine environment shall refer to SECTION G: ROOFING.

13.6. Coatings of fasteners used shall comply with AS 3566 Class 4 and be certified as such by the supplier of fasteners and as approved by the S.O..

14. Painting Works to Clinical Areas (Hygienic Areas)

14.1. All external walls shall be applied with one (1) coat of approved siloxane primer sealer, unless otherwise stated in the Drawings, followed with two (2) coats of silicone emulsion water repellent paint applied strictly in accordance to manufacturer's instruction.

14.2. Internal walls shall be applied with one (1) coat of approved ultra-low VOCs alkaline resisting primer sealer, followed with two (2) coats of anti-bacteria, anti-fungus, low VOCs, 100% APEO free, formaldehyde free acrylic premium emulsion paint.

14.3. Internal walls (clinical areas) shall be applied with one (1) coat of approved ultra-low VOCs epoxy primer sealer, followed with two (2) coats of anti-bacteria, anti-fungus, low VOCs, 100% APEO free, formaldehyde free epoxy paint.

14.4. Internal walls (clinical areas with 24 Hours Air-Conditioning) shall be applied with one (1) coat of approved ultra-low VOCs acrylic water-based primer sealer, followed with two (2) coats of anti-bacteria, anti-fungus, low VOCs, 100% APEO free, formaldehyde free Polyurethane paint.

14.5. Painting to Health Facility (Ministry of Health) Buildings shall also adhere to *Garis Panduan Skema Warna Luaran Bangunan Fasiliti Kesihatan* KKM.

15. Completion of Painting Works

On completion of paintwork, all paint marks inadvertently left on glass, floors, tiles and other surfaces shall be removed. Any stain or marking on finished paintwork shall be removed and touched up to the approval of the S.O..

APPENDIX O/1

PAINT PERFORMANCE WARRANTY (SPECIMEN)

1. Coverage of Performance Warranty

We ..... the paint Manufacturer hereby warrants that for a period of **five (5) years** from the date of Practical Completion, the paint system shall not be affected by the following defects:

(i) Peeling
This condition is manifested when the paint film peels away or detaches from the substrate.

(ii) Cracking
This condition is manifested by any visible cracking on the paint film other than that caused by plastering cracks and structural defects.

(iii) Fungus/Algae Growth
This condition is established when there is a growth of micro-organisms on the surface of the paint films which would result in the marring of the appearance of the paint film through discoloration.

(iv) Discoloration
This condition occurs when the coating loses its original colour in patches and excessive discoloration appears.

2. Procedure for Claims

(i) Any defect claims shall be made in writing and delivered by post or by hand to the Manufacturer.
(ii) A technical team from the Manufacturer will be dispatched to evaluate the nature of the claim. Should our findings conclude the defects as within the scope of warranty, then the Manufacturer shall make good such defects.
(iii) Should the Manufacturer's technical team conclude that the defects falls outside the scope of the warranty, the Manufacturer shall not be held responsible for the claim.
(iv) Should the Government disagree with the conclusion of the technical team pertaining to the defects in particular, then an independent third party competent in such technical evaluation shall be appointed to investigate the disputed defects.
(v) The appointment of independent third party competent in such technical evaluation shall only be appointed upon the mutual agreement between the Government and the Manufacturer.
(vi) The findings of the third party shall be conclusive and mutually accepted by the Government and the Manufacturer.
(vii) If the findings of the independent third party are within the coverage of this performance warranty, all cost shall be borne by the Manufacturer or otherwise such cost shall be borne by the Contractor.
(viii) All claims for the defects must be received by the Manufacturer not later than fourteen (14) days from the expiry of the warranty period.

MANUFACTURER

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Company Stamp

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Signature

Name:
Date:

WITNESS

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Company Stamp

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Signature

Name:
Date:

SPESIFIKASI
ROADS AND HARDSTANDING

TABLE OF CONTENTS

1. General

1.1. The construction of roads and hardstanding shall generally be carried out only after completion of all drainage systems, services and ducts which may affect the Works, unless otherwise agreed by the S.O..

2. Flexible Pavement

2.1. Subgrade

2.1.1. Subgrade means that part of the embankment or existing ground in cutting which is immediately below the sub-base or lower sub-base of the road pavement and shoulders.

2.1.2. Material for the top 300mm of subgrade shall have a minimum soaked laboratory California Bearing Ratio (CBR) as shown on the Drawing when compacted to 95% of the maximum dry density determined in the *MS 1056* Compaction Test (4.5kg Rammer Method). In the event CBR value not mentioned on the Drawing, a minimum CBR value of 10% shall be adopted.

2.1.3. Throughout the top 300mm of subgrade, the materials shall be compacted to not less than 95% of the maximum dry density determined in the *MS 1056* Compaction Test (4.5kg Rammer Method).

2.1.4. In cut area, the top 300mm of the subgrade shall be scarified and recompacted to 95% of the maximum dry density determined in the *MS 1056* Compaction Test (4.5kg Rammer Method). If the S.O. is fully satisfied that the subgrade in its natural state possesses a density exceeding the requirements, then the surface of the subgrade shall be trimmed and rolled to obtain a smooth finish.

2.1.5. Where the material in cut area is found to be unsuitable for use in the top 300mm of subgrade or to a suitable level to be determined by the S.O., it shall be removed and replaced with suitable material which shall be compacted as indicated above. Alternatively, stabilizing agent may be used subjected to the S.O.'s approval.

2.1.6. The subgrade shall be finished in a neat and workmanlike manner, and the widths of embankments and cuts shall be everywhere at least of those specified or shown in the Drawings on both sides of the centre line. The top surface of the subgrade shall have the required shape, superelevation, levels and grades and shall be finished everywhere to within + 10mm and - 30mm of the required level.

2.1.7. Where subgrade construction encounters rock surfaces:

2.1.7.1. Rock surfaces extend over the whole width of the formation:

The rock surface shall be trimmed to a free draining profile, at or below formation levels. No high spot shall protrude above the formation level. Any voids or cavities more than 0.5m below the formation level shall be filled up with approved crusher run, gravel or lean concrete having cube strength greater than C8/10N/mm^2. The rock surface shall then be brought up to the formation levels with approved crushed rock or gravel, regulated and blinded.

2.1.7.2. Rock outcrop occurs over part of the formation only:

The rock outcrop shall be cut down to a level not less than 300mm below the formation level. The surface shall then be brought up to level with suitable subgrade material.

2.2. Drainage Layer

2.2.1. This work shall consist of furnishing, placing, compacting and shaping drainage layer on a prepared and accepted subgrade in accordance with this Specification and the lines, levels, grades, dimensions and cross-sections as shown on the Drawings and/or as directed by the S.O..

2.2.2. Coarse aggregate shall be screened crushed hard rock and fine aggregate shall be screened quarry dust or sand. The aggregate shall be well graded and lie within the limits as shown in **Table P1.**

Table P1. Gradation Limits for Drainage Layer

B.S. Sieve Size (mm)	Percentage Passing by Weight
75.0	100
37.5	75 - 100
20.0	60 - 90
10.0	25 - 75
5.0	10 - 45
2.00	0 - 20
1.18	0 - 10

2.2.3. Notwithstanding any earlier approval of finished subgrade, the surface of the subgrade shall be, on completion of compaction and immediately before placing drainage layer, well closed and free from movement under the compaction plant and from ridges, cracks, loose material, pot holes, ruts or other defects. Any damage to or deterioration of the subgrade shall be made good in accordance with sub-section 2.1..

2.2.4. The material shall be transported, laid and compacted at a moisture content within the range + 1% to - 2% of the optimum moisture content determined in compliance with *BS 5835* and without drying out or segregation.

2.2.5. The drainage layer shall be placed and compacted to the required width and thickness as shown on the Drawings, in one single layer.

2.2.6. The material shall be spread and lightly compacted with tracked spreading plant or other approved equipment with consideration given to the protection of the subgrade.

2.3. Sub-base

2.3.1. This work shall consist of furnishing, placing, compacting and shaping sub-base material on a prepared and accepted subgrade in accordance with this Specification and the lines, levels, grades, dimensions and cross-sections as shown on the Drawings and/or as directed by the S.O..

2.3.2. Sub-base shall be a natural or artificial mixture of locally available materials such as sand, gravel, crushed aggregate, et cetera, free from organic matter, clay lumps and other deleterious materials. It shall be well

graded and conform to **Table P2** and the following quality requirements:

2.3.2.1. The CBR of the sub-base shall not be less than 30% or as shown on the Drawings when compacted to 95% of the maximum dry density determined in the *BS 1377* Compaction Test (4.5kg rammer method) and soaked for 4 days under a surcharge of 4.5kg. This shall involve carrying out a series of CBR tests at various dry densities, using the field moisture content. The field density must then be measured at a number of points using the sand replacement method and the CBR deduced from the mean of the field density measurements.

2.3.2.2. If more than 10% of the material is retained on the BS Sieve Size 20.0mm, the whole material can be assumed without test to have a CBR value of 30% or more.

2.3.2.3. The plasticity index when tested in accordance with *BS 1377* shall be not more than 12.

2.3.2.4. The 10% fines value when tested in accordance with *MS 30* shall be not less than 30kN.

2.3.2.5. The sand equivalent of aggregate fraction passing the No. 4 (4.75mm) sieve when tested in accordance with *ASTM D 2419* shall be not less than 45%.

Table P2. Gradation Limits for Sub-Base

BS Sieve Size (mm)	Percentage Passing by Weight
75.0	100
37.5	85 - 100
20.0	65 - 100
10.0	45 - 100
5.0	25 - 85
0.600	8 - 45
0.075	0 - 10
The particle size shall be determined by the washing and sieving method of *BS 1377*.	

2.3.3. Prior to placing any sub-base material, the underlying subgrade (particularly the top 300mm of the subgrade) shall have been shaped and compacted in accordance with the provisions of sub-section 2.1. or sub-section 2.2. as appropriate. Notwithstanding any earlier approval of finished subgrade, the surface of the subgrade shall be, on completion of compaction and immediately before placing sub-base layer, well closed and free from movement under the compaction plant and from ridges, cracks, loose material, potholes, ruts or other defects. Any damage to or deterioration of the subgrade shall be made good in accordance with sub-section 2.1..

2.3.4. Sub-base material shall be transported, laid and compacted at a moisture content within the range + 1% to - 2% of the optimum moisture content without drying out or segregation.

2.3.5. Sub-base material shall be placed over the full width of the formation to the required thickness as shown on the Drawings or directed by the S.O. in one layer or more, each layer not exceeding 200mm compacted thickness. Where two or more layers are required, they shall be of

approximately equal thickness and none shall be less than 100mm compacted thickness.

2.3.6. Each layer of sub-base shall be processed as necessary to bring its moisture content to a uniform level throughout the material suitable for compaction and shall then be compacted using suitable compaction equipment approved by the S.O. to not less than 95% of the maximum dry density determined in the *BS 1377* Compaction Test (4.5kg rammer method). Compaction shall be carried out in a longitudinal direction along the roadbed, and shall generally begin at the outer edge and progress uniformly towards the crown on each side in such a manner that each section receives equal compactive effort, all to the satisfaction of the S.O..

2.3.7. All loose, segregated or other defective areas shall be removed to the full thickness of the layer, and new sub-base material laid and compacted.

2.3.8. The sub-base shall be finished in a neat and workmanlike manner and shall have an average thickness over any 100m length not less than the required thickness. The top surface of the sub-base shall have the required shape, superelevation, levels and grades, and shall be everywhere within the tolerances as specified in sub-section 3.2..

2.4. Crushed Aggregate Roadbase

2.4.1. This work shall consist of furnishing, placing, compacting and shaping crushed aggregate roadbase material on a prepared and accepted subgrade or sub-base in accordance with this Specification and the lines, levels, grades, dimensions and cross-sections as shown on the Drawings and/or as directed by the S.O..

2.4.2. Crushed aggregate roadbase material shall be crushed rock, crushed gravel or a mixture of crushed rock and gravel, which shall be hard, durable, clean and essentially free from clay and other deleterious materials. The material shall conform to the following physical and mechanical quality requirements:

2.4.2.1. The plasticity index when tested in accordance with *BS 1377* shall be not more than 6.

2.4.2.2. The aggregate crushing value when tested in accordance with *MS 30* shall be not more than 25%.

2.4.2.3. The flakiness index when tested in accordance with *MS 30* shall be not more than 25%.

2.4.2.4. The weighted average loss of weight in the magnesium sulfate soundness test (5 cycles) when tested in accordance with *AASHTO Test Method T 104* shall be not more than 18%.

2.4.2.5. The material shall have a CBR value of not less than 80% when compacted to 95% of the maximum dry density determined in the *BS 1377* Compaction Test (4.5kg rammer method) and soaked for 4 days under a surcharge of 4.5kg.

2.4.2.6. The sand equivalent of aggregate fraction passing the No. 4 (4.75mm) sieve when tested in accordance with *ASTM D 2419* shall be not less than 45%.

2.4.2.7. The gradation shall comply with the envelope as shown in **Table P3.**

Table P3. Gradation Limits for Crushed Aggregate Roadbase

B.S. Sieve Size (mm)	Percentage Passing by Weight
50.0	100
37.5	85 - 100
28.0	70 - 100
20.0	60 - 90
10.0	40 - 65
5.0	30 - 55
2.00	20 - 40
0.425	10 - 25
0.075	2 - 10
The particle size shall be determined by the washing and sieving method of *BS 1377.*	

2.4.3. Prior to placing any crushed aggregate roadbase material, the subbase shall have been constructed in accordance with the provisions of sub-section 2.3..

2.4.4. Crushed aggregate roadbase shall be placed to the required width and thickness as shown on the Drawings or directed by the S.O. in one layer or more, each layer not exceeding 200mm compacted thickness.

2.4.5. Where two or more layers are required, each layer shall be of approximately equal thickness and none shall be less than 100mm compacted thickness.

2.4.6. The material shall be spread using a motor grader of sufficient capacity or other approved mechanical spreader, at the optimum moisture content ± 1%.

2.4.7. Compaction shall be carried out using suitable approved equipment, in a longitudinal direction, and begin at the lower edges and progress towards the crown, or in the case of superelevation towards the upper edge, in such a manner that each section receives equal compactive effort, sufficient to produce a density of not less than 95% of the maximum dry density as determined by *BS 1377: Test 13.*

2.4.8. Throughout the placing, adjustment of moisture content and compaction of crushed aggregate roadbase material, care shall be taken to maintain a uniform gradation of the material and prevent its separation into coarse and fine parts, all to the satisfaction of the S.O..

2.4.9. The crushed aggregate roadbase width shall be everywhere at least that specified or shown on the Drawings on both sides of the centre-line; and its average thickness over any 100m length shall be not less than the required thickness.

2.4.10. The surface of the roadbase shall on completion of compaction and immediately before placing bituminous surfacing be well closed and free from movement under the compaction plant and from ridges, cracks, loose material, pot holes, ruts other defects.

2.4.11. All loose, segregated or otherwise defective areas shall be removed to the full thickness of the layer, and new material laid and compacted. The

addition of fine material will not be permitted.

2.4.12. The surface shall be to the required level and grade and comply with the tolerances as specified in sub-section 3.2..

2.5. Wet-Mix Roadbase

2.5.1. This works shall consist of furnishing, placing, compacting wet-mix roadbase on a prepared and accepted sub-base in accordance with this Specification and the lines and levels as shown on the Drawings and/or as directed by the S.O..

2.5.2. Aggregate for wet-mix roadbase shall be crushed rock, crushed gravel or a mixture of crushed rock and gravel, which shall be hard, durable, clean and essentially free from clay and other deleterious materials.

2.5.3. The aggregate shall conform to the following physical and mechanical quality requirements:

2.5.3.1. The flakiness index when tested in accordance with *MS 30* shall be not more than 25%.

2.5.3.2. The aggregate crushing value when tested in accordance with *MS 30* shall be not more than 25%.

2.5.3.3. The weighted average loss of weight in the magnesium sulfate soundness test (5 cycles) when tested in accordance with *AASHTO Test Method T 104* shall be not more than 18%.

2.5.3.4. The sand equivalent of aggregate fraction passing the No. 4 (4.75mm) sieve when tested in accordance with *ASTM D 2419* shall be not less than 45%.

2.5.3.5. The gradation shall comply with the limits shown in **Table P4.**

Table P4. Gradation Limit for Wet-Mix Roadbase

B.S. Sieve Size (mm)	Percentage by Weight Passing
50.0	100
37.5	95 - 100
20.0	60 - 80
10.0	40 - 60
5.0	25 - 40
2.36	15 - 30
0.060	8 - 22
0.075	0 - 8
The particle size shall be determined by the washing and sieving method of *BS 1377*.	

2.5.4. Notwithstanding any earlier approval of finished sub-base, prior to placing wet-mix roadbase material, any damage to or deterioration of the sub-base shall be made good in accordance with sub-section 2.3..

2.5.5. Wet-mix roadbase material shall be placed to the required width and thickness as shown on the Drawings or as directed by the S.O. in one layer or more, each layer not exceeding 200mm compacted thickness. Where two or more layers are required, they shall be of approximately

equal thickness and none shall be less than 100mm compacted thickness.

2.5.6. The material shall be laid using a paving machine at moisture content + 0.5% of the optimum which shall be maintained during the compaction operation.

2.5.7. Compaction shall be carried out using suitable approved equipment in a longitudinal direction, and begin at the lower edges and progress towards the crown, or in the case of superelevation towards the upper edge, in such a manner that each section receives equal compactive effort, sufficient to produce a density of not less than 95% of the maximum dry density as determined by *BS 1377: Test 13.*

2.5.8. Throughout the placing, and compaction of wet-mix roadbase material, care shall be taken to maintain a uniform gradation of the material and prevent its separation into coarse and fine parts.

2.5.9. All loose, segregated or otherwise defective areas shall be removed to the full thickness of the layer, and new wet-mix roadbase material laid and compacted, the addition of fine aggregate only shall not be permitted.

2.5.10. The wet-mix roadbase width shall be everywhere at least that specified or shown on the Drawings on both sides of the centre-line. The average thickness measured over any 100m length shall be not less than shown on the Drawings or specified and the minimum thickness measured at any one point shall be not less than the thickness shown on the drawing or specified **Table P5.**

2.5.11. The surface of the wet-mix roadbase shall, on completion of compaction and immediately before placing bituminous surfacing, be well closed and free from movement under the compaction plant and from ridges, cracks, loose material, pot holes, ruts or other defects.

2.5.12. The surface shall be to the required level and grade and comply with the tolerances specified in sub-section 3.2..

2.6. Bituminous Pavement Courses

2.6.1. Bituminous Prime Coat

2.6.1.1. This work shall consist of the careful and thorough cleaning of the surface of a prepared and accepted unbound roadbase and cement-treated base (CTB), and the furnishing and application to the cleaned roadbase and CTB surface of a bituminous prime coat, all in accordance with this Specification and the lines, dimensions and cross-sections as shown on the Drawings and/or as directed by the S.O..

2.6.1.2. The materials, equipment and construction methods shall be in accordance with *Standard Specification for Roadworks Section 4: Flexible Pavement JKR Specification No. JKR/SPJ/2008-S4.*

2.6.2. Bituminous Tack Coat

2.6.2.1. This work shall consist of the careful and thorough cleaning of the surface of a prepared and accepted bituminous or bitumen primed pavement course, and the furnishing and application to the cleaned surface of a bituminous tack coat prior to the

construction of an overlying bituminous pavement course, all in accordance with this Specification and the lines, dimensions and cross-sections as shown on the Drawings and/or as required by the S.O..

2.6.2.2. The materials, equipment and construction methods shall be in accordance with *Standard Specification for Roadworks Section 4: Flexible Pavement JKR Specification No. JKR/SPJ/2008-S4.*

2.6.3. Asphaltic Concrete

2.6.3.1. This work shall consist of furnishing, placing, shaping and compacting asphaltic concrete binder course and/or wearing course on a prepared and accepted bituminous or bitumen primed pavement course, and shall include the careful and thorough cleaning of surfaces which are to be covered prior to the application of bituminous prime coat and tack coat. The work shall be carried out all in accordance with this Specification and the lines, levels, grades, dimensions and cross-sections as shown on the Drawings and/or as required by the S.O..

2.6.3.2. The materials, mix design, equipment and construction methods shall be in accordance with JKR Specification No. *JKR/SPJ/2008-S4.*

3. Horizontal Alignment, Surface Levels and Surface Regularity Of Pavement Courses

3.1. Horizontal Alignment

3.1.1. The horizontal alignment shall be determined from the centerline of the pavement surface shown on the Drawings. The edges of the pavement as constructed and all other parallel construction lines shall be correct within a tolerance of + 50mm and - 0mm from the centre-line, except for kerbs, channel blocks and edge lines which shall be laid with a smooth alignment within a tolerance of + 25mm and - 0mm from the centre-line.

3.2. Surface Levels of Pavement Courses

3.2.1. The design levels of pavement courses shall be calculated from the vertical profile, crossfall and pavement course thicknesses shown on the Drawings. Crossfall for hardstanding shall be constructed at a minimum of 2.5% gradient from the highest point of the area or as approved by S.O.. The level of any point on the constructed surface of a pavement course shall be the design level subject to the appropriate tolerances given in **Table P5.**

Table P5. Tolerances in Surface Levels of Pavement Courses

Pavement Course	Tolerance
Wearing Course	± 5mm
Binder Course	± 5mm
Roadbase	+ 0mm to - 20mm
Sub-base	+ 10mm to - 20mm

3.2.2. The combination of permitted tolerances in the levels of different pavement courses shall not result in a pavement thickness less than that shown on the Drawings. Each pavement course shall have an average thickness not less than that shown on the Drawings.

4. Shoulders

4.1. This work shall consist of furnishing, compacting and shaping earth, gravel or paved shoulder material on a prepared and accepted sub-base or subgrade, all in accordance with this Specification and the lines, levels, grades, dimensions and cross-sections as shown on the Drawings and/or as required by the S.O..

4.2. Materials

4.2.1. Paved Shoulders

The bituminous surfacing and underlying pavement courses shall be constructed as described in the appropriate sections of this Specification.

4.2.2. Gravel Shoulders

Gravel shoulder material shall conform to the requirements for gravel surfacing material set forth in *Standard Specification for Roadworks Section 4: Flexible Pavement JKR Specification No. JKR/SPJ/2008-S4.*

4.2.3. Earth Shoulders

Earth shoulder material shall be suitable material as described in *Standard Specification for Roadworks Section 2: Earthworks JKR Specification No. JKR/SPJ/2013-S2.*

4.2.4. Construction

4.2.4.1. Shoulders shall be constructed in stages or in one operation as directed or approved by the S.O., but in no instance shall a shoulder be built up to a level higher than that part of the abutting carriageway structure which has been completed and accepted.

4.2.4.2. Prior to placing any shoulder material, the underlying sub-base or subgrade shall have been shaped and compacted in accordance with the provisions of *Standard Specification for Roadworks Section 2: Earthworks JKR Specification No. JKR/SPJ/2013-S2.* respectively, and the abutting carriageway structure course or courses shall likewise have been shaped and compacted in accordance with the provisions of the appropriate sub-sections of this Specification. Notwithstanding any earlier approval of the underlying and abutting pavement courses, any

damage to or deterioration of these underlying and abutting pavement courses shall be made good to the satisfaction of the S.O. before shoulder construction proceeds.

4.2.4.3. Shoulders shall be placed to the required width and thickness as shown on the Drawings or as directed by the S.O. in one layer or more, each layer not exceeding 200mm compacted thickness at the point of maximum thickness. Where two or more layers are required, they shall be of approximately equal shape and thickness, and none shall be less than 100mm compacted thickness at the point of maximum thickness.

4.2.4.4. Each layer of shoulder material shall be processed as necessary to bring its moisture content to a uniform level throughout the material suitable for compaction and shall then be compacted using suitable compaction equipment approved by the S.O. to not less than 95% of the maximum dry density determined in the *BS 1377* Compaction Test (4.5kg rammer method). Compaction shall be carried out in a longitudinal direction along the shoulder and shall generally begin at the outer edge and progress uniformly towards the carriageway, except on super-elevated curves where rolling shall begin at lower edge and progress uniformly towards the higher edge. In all cases, compaction shall be carried out in such a manner that each section receives compactive effort appropriate to its thickness, all to the satisfaction of the S.O..

4.2.4.5. Throughout the placing, adjustment of moisture content and compaction of shoulder material, care shall be taken to maintain a uniform gradation of the material and prevent its separation into coarse and separate parts, all to the satisfaction of the S.O..

4.2.4.6. Where shown on the Drawings or directed by the S.O., earth shoulders shall be turfed in accordance with *Standard Specification for Roadworks Section 2: Earthworks JKR Specification No. JKR/SPJ/2013-S2.*

4.2.4.7. Shoulders shall be finished in a neat and workmanlike manner. The total width of carriageway and shoulder shall throughout be at least as specified or shown on the Drawings on both sides of the centre-line. The top surface of each shoulder shall throughout have the required shape, super-elevation, levels and grades, within 10mm of the required plane, and shall provide a flush joint with the carriageway surface and shall be uniformly free draining away from the carriageway, all to the satisfaction of the S.O..

5. Concrete Pavement

Concrete Pavement works shall be in accordance with *Standard Specification for Road Works JKR Specification No. JKR/SPJ/1988 Section 5: Portland Cement Concrete Pavement.*

6. Road Furniture

6.1. Corrugated Sheet Steel Beam Guardrail

The supply and method of installation of guardrails shall be in accordance with *Standard Specification for Road Works Section 6: Road Furniture JKR Specification No. JKR/SPJ/2017-S6.*

6.2. Traffic Signs

The supply and method of installation of traffic signs shall be in accordance with *Standard Specification for Road Works Section 6: Road Furniture JKR Specification No. JKR/SPJ/2017-S6.*

6.3. Road Markings

The supply and application of road markings shall be in accordance with *Standard Specification for Road Works Section 6: Road Furniture JKR Specification No. JKR/SPJ/2017-S6.*

6.4. Concrete Kerb

The supply and installation of concrete kerb shall be in accordance with *Standard Specification for Road Works Section 6: Road Furniture JKR Specification No. JKR/SPJ/2017-S6.*

7. Street Lighting

The supply and installation of street lighting shall be in accordance with *Standard Specification for Road Works Secgtion 7: Street Lighting JKR Specification No. JKR/SPJ/2011-S7.*

8. Traffic Signal System

The supply and installation of traffic signal system shall be in accordance with *Standard Specification for Road Works Section 8: Traffic Signal System JKR Specification No. JKR/SPJ/2008-S8.*

SPESIFIKASI

SIGNAGE

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1. General

1.1. All interior architectural signage shall be of acrylic plastic as approved by the S.O. unless otherwise specified in the Drawings. All panel sign surfaces shall be flat and smooth, constructed to remain flat under installed conditions within tolerance of plus or minus 1mm measured diagonally.

1.2. All external architectural signage shall be aluminium panel fabricate as approved by the S.O. unless otherwise specified in the Drawings. All panel sign shall be off corrosion free material.

1.3. All road signage shall be well coordinated and in accordance with *Arahan Teknik (Cawangan Jalan JKR)* latest edition.

1.4. All fire signages shall be complied to the *requirements of Jabatan Bomba dan Penyelamat Malaysia.*

1.5. All signage works shall comply with the regulatory requirements currently enforced and shall comply with MS 1184: *Universal Design and Accessibility in The Built Environment - CP* and *Government Immoveable Asset Code System (Sistem Kod Aset Tak Alih - SKATA)* as referred to sub-section 10.

1.6. Unless otherwise stated in the Drawings, the panel and lettering size, profiles and dimensional requirements of interior panel signage shall be as follows:

1.6.1. The standard thickness of cast-acrylic matt clear sheets shall be not less than 4mm.

1.6.2. Raised lettering and graphic symbols shall be of 0.8mm thickness obtained by using acrylic applique and chemically welded to sign panels.

1.6.3. The type of panel material and size of letterings shall be as indicated in the Schedule of Signage prepared by the manufacturer to the S.O.'s approval.

1.7. Graphic content and style of signage shall be in accordance with the Schedule of Signage, Shop Drawings and comply with the requirements indicated below:

1.7.1. Panel material shall be acrylic with machine-routed raised copy applied to surface of panel, along with "raster-method" Grade 2 braille beads, or pictograms and other artwork to be reverse applied vinyl or silk-screened process in colours as indicated.

1.7.2. For background colours, provide Pantone Matching System (PMS) coloured coatings, including inks and paints, that are recommended by acrylic manufacturer for optimum adherence to surface, and that are non-fading for application intended.

1.7.3. Raised copy shall be machine routed copy, provide manufacturer's full range of solid to applique colours to the S.O.'s approval.

1.8. Pictogram/Symbol shall be provided where required with S.O.'s approval.

1.9. Visual scale shall apply to the signages based on distances, colours used and font types. Consideration shall be given to legibility and vividness to aid the visually impaired visitors.

1.10. Location, accessories and mounting positions of signs shall comply with MS 1184, manufacturer's recommendations and as approved by the S.O..

1.11. Wall mounted panel signs shall be mounted to wall surfaces using methods indicated below:

1.11.1. Vinyl-tape mounting: use double-sided very high bond (VHB) tape to adhere signs to smooth, non-porous surfaces.

1.11.2. Silicone-adhesive mounting: Use liquid-silicone adhesive recommended by manufacturer to attach signs to porous, irregular, or vinyl-coated surfaces. Use double-sided foam tape to hold sign in position until silicone adhesive has fully cured.

1.11.3. Mechanical fasteners: Use non-removable mechanical fasteners placed through pre-drilled holes in sign face, or through shim plate. Use proper anchors at masonry walls as recommended by manufacturer. Attach sign panel to shim plate using vinyl-tape method as described above.

1.11.4. Where signs are scheduled or indicated to be mounted on glass, to provide matching acrylic back plate at reverse-side of glass to conceal mounting materials.

1.11.5. After installation, soiled sign surfaces shall be cleaned and protected from damage.

1.12. All suspended signages shall be 2-sided with metal frame of 5mm clear acrylic and spray-painted with silkscreen finish or equivalent. The size of the panel signage shall be not less than 120mm (height) x 600mm (width) unless otherwise specified in the Drawings. Suspended panel signs shall be hung to soffit of slab or others approved structure using stainless steel rod or cable.

1.13. During the Contractor's drawings preparation phase, the Contractor shall provide full size mock-up samples of each type as required for inspection and subsequent approval by the S.O..

2. Copper Plating

2.1. Surface preparation of the copper plate is to be done before plating process. Cleaning process should include, degreasing, spray washing, immersion washing, stripping and or coating removal. Copper plate is to be pre-treated to receive plating treatment. Thickness of copper plating is to be of minimum 3-5µm. All copper plating should be a thick film coating with excellent levelling to cover all surface irregularities to improve the general aesthetics.

2.2. Where grainy texture is required, the copper plate should be allowed to run in copper sulphate bath or copper cyanide-based solution bath for a longer period.

3. Aluminium

3.1. Aluminium sign panels shall be preferably supported by extruded aluminium extrusions for both internal and external signs complying with the requirements of MS 2289: Aluminium and Aluminium Alloy - Extruded Shapes.

3.2. Aluminium sheets where otherwise stated for construction shall be of minimum 3mm thick with welded angles for support. The sub-contractor is to ensure that no tin-canning or deflection effect on the sign-face. Where tin-canning effect appears on the sign face, the nominated sub-contractor is to remove and replace the sign panel.

3.3. Aluminium sheets used shall comply with the requirements of MS 2040: Aluminium and Aluminium Alloys - Sheets and Coiled Sheets - Specification. The alloy selected will be of a temper suitable for cutting.

3.4. Where signs required more than one standard size aluminium panel, the jointing shall be performed in accordance to BS 1473 by using rivets or screws with welded angles to the main panels. The joint shall than be fine sand, smoothen to be flushed to be seen as one and no butt-line joint, division or separation is to be seen.

3.5. All aluminium sections shall be fabricated from aluminium alloy B6063-T5 complying with the requirements of MS 2289: Aluminium and Aluminium Alloy-Extruded Shapes.

3.6. The aluminium shall be electronically anodized in matte finish for etched aluminium required for the fire door sign.

4. Paint Finish

Unless otherwise specified, all painting works shall be carried out as specified in SECTION O: PAINTING.

5. Screen Printing Works

5.1. Applications of screen-printing works shall be in accordance with the Drawings. The Contractor shall ensure high accuracy in printing registration and workmanship.

5.2. Silkscreen ink shall be of two (2) pack-serical poly-screen with Ultra Violet protective agents against colour fading. All finished screen-printed text or graphics shall be coated with a layer of 2-pack polyurethane clear coat matte finish.

6. Vinyl Graphic Stickers

6.1. Unless otherwise specified in the Drawings, vinyl graphic stickers shall be used as recommended by the manufacturer and approved by the S.O..

6.2. Unless otherwise specified in the Drawings, all illuminated graphics shall be of translucent graphic films and non-illuminated signs shall be translucent opaque graphic films as approved by the S.O..

6.3. All vinyl graphics shall be precision cut by computers with no jagged edge. Minimum performance of vinyl stickers shall be to the approval of the S.O..

7. Stainless Steel

7.1. Stainless steel shall be austenitic, non-magnetic, using grade 304 or 316 to BS EN 10088 and BS 1449 Part 2 for plate, sheet and strip and BS 970 where relevant. Stainless steel plate and component with hairline finish for all internal signs shall be of grade 304 4B.

7.2. Stainless steel plate and component for all external signs shall be of marine grade 316 with alloy addition of molybdenum to prevent specific forms of corrosion.

7.3. Stainless steel fasteners, bolts, screws, bolts, washers and other fixing components shall be of Grade A2 or Grade A4 to BS EN ISO 3506.

8. Acrylic

Acrylic used for the external signage shall be of high impact acrylic. Extruded acrylic shall not be acceptable. The Contractor shall comply with the required thickness of the acrylic as shown on the Drawings.

9. Installation and Fixing Works

9.1. The Contractor shall submit a works programme and method statements for the installation of all internal and external signs. The Contractor is to include in their method statement on safety processes, measures to be taken and procedures while erecting the external signs.

9.2. Unless otherwise shown on the Drawings, all base plates for external signs shall be galvanized steel plates with drawings and calculation certified by P.E.

10. Labeling For Registration of Immoveable Asset Components

10.1. The code and format for labelling of components shall be as stipulated in the Government's:

10.1.1. Asset Code System (*Sistem Kod Aset Tak Alih – SKATA*) and

10.1.2. Asset Data Collection Guidelines *(Garis Panduan Pengumpulan Data Aset Tak Alih – PeDATA).*

10.2. All labels for the registration of the asset components shall comply with the regulatory requirements currently enforced and shall comply with the relevant International and/or Malaysian Standards.

10.3. Labels for the assets must be durable and withstand exposure to extreme conditions such as chemicals, temperature, weather, oils and detergents. The labels must also be able to withstand the rigour of cleaning schedule, maintenance and repairs.

10.4. Unless otherwise stated in the Drawings, minimum requirements for asset component labels shall be as follows:

10.4.1. Normal Condition – vinyl stickers.

10.4.2. Extreme Condition - steel / aluminium plate.

10.5. Asset component labels shall be affixed to the asset in a position that is easily accessible for readability while the asset is in normal operating position (*Refer to PeDATA).*

10.6. Labels shall be located on clean, smooth, flat surfaces where possible, and on surfaces that provide direct visual access to a label scanner and its operator.

SPESIFIKASI

FENCING AND GATES

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1. General

1.1. Unless otherwise as shown on the Drawings, fencing shall be of chain link type as specified hereunder.

1.2. Unless otherwise as shown on the Drawings, the height of the fence shall be 1500mm from the ground up to the full height of the chain link.

1.3. The fence shall be erected to the extent and location as shown on the site plan. Where fencing is to be located on the boundary of the Site, the Contractor shall ensure that its construction shall not infringe the adjoining properties.

1.4. All trees, bushes, or other obstacles which interfere with the construction of the fence shall be removed prior to commencing fence construction.

2. Post and Bracings

2.1. Mild Steel Post

2.1.1. Unless otherwise as shown on the Drawings, mild steel angle posts and bracings shall be of size 60mm x 60mm x 6mm. All steel members for fencing and gates shall be free from rust, scales and other defects and shall be to the approval of the S.O.. Previously used steel members shall not be used in the construction of new fencing and gates. Before delivery to the Site, the steel members for fencing and gates shall be pre-cut and assembled at the Contractor's workshop and painted with one coat of approved metallic primer.

2.1.2. Where three strands of barbed wires are required, a mild steel angle arm 430mm long, of the same cross-sectional dimension as the post shall be welded at the top of the post at 450 inclinations. Where six strands of barbed wires are required, two pieces of mild steel angle arms as specified hereinbefore shall be welded to the top of each post forming the shape Y with each arm having three strands of barbed wires. The welding used shall be of continuous fillet welds. Necessary holes shall be made in the posts, arms and bracings for insertions of fixing bolts and clips.

2.2. Concrete Post

2.2.1. Concrete post and struts for fencing shall be of size 150mm x 150mm precast using Prescribed Mixes Grade 25P and shall be erected at 3000mm centres commencing from the gate post and the posts shall be embedded plumb in Prescribed Mixes Grade 25P concrete footings of size 250mm x 250mm x 600mm deep. The finish to the formed surfaces shall be Class F2 and the finish to the unformed surfaces shall be Class U2. The tops of the posts and all arises shall be rounded of chamfered.

2.2.2. Reinforcement for concrete posts and struts shall be Grade 250 plain round steel bars.

2.2.3. Post should be holed to allow the fixing of line wires, etc. the hole for top line wire shall be approximately 75mm below the top of the post. Holes for bolts shall allow the bolt to be freely inserted. All holes shall be free from obstructions and accurately positioned within ± 5mm.

3. Chain Link Fencing

3.1. Chain Link Mesh, Straining

3.1.1. Chain link fences shall comply with *BS 1722: Part 1 Specification for Chain Link Fences.*

3.1.2. Chain link mesh, straining wires and barbed wires shall be made of galvanized steel and of approved quality. The mesh shall be of size 64mm made up of 3.25mm (10 gauges) diameter wire. Straining wires shall be of 4.06mm (8 gauges) diameters and barbed wires shall be of 2.64mm (12 gauges) diameters.

3.2. Fencing

3.2.1. Unless otherwise as shown on the Drawings, the mild steel angle posts shall be erected at 3000mm centres commencing from the gate post and the posts shall be embedded plumb in Prescribed Mixes Grade 25P concrete footings of size 250mm x 250mm x 600mm deep. Mild steel angle bracings of the same cross-sectional dimensions as the post shall be fixed at all corners, bends, junctions, gate posts and at every five bays of straight fencing.

3.2.2. The posts shall be set in holes to the required depth and stamped in a plumb and firm position to the line and spacing shown on the drawings or as directed by the S.O.. Post holes shall be large enough to allow for proper tamping. Backfill shall be placed in layers not exceeding 150mm, and compacted by hand tampers, machine tampers or other suitable equipment. Compacted backfill shall be crowned slightly to permit drainage away from the post.

3.2.3. The bracings shall be fixed at an inclination of 45^0 to the horizontal with top end bolted to the post, 300mm below the top of the post and the bottom end encased in concrete footing as described hereinbefore.

3.2.4. The chain link mesh shall be stretched or pulled tightly across the post with hand stretcher, or tensioning apparatus capable of adjustment and secured in place using approved fencing clips. The end of chain link fencing abutting mild steel gate posts shall be fixed by means of 19mm x 3mm mild steel flat straps drawn through the mesh and bolted using 10mm diameter mild steel bolts to 25mm x 25mm x 6mm mild steel plates welded to the posts at equal intervals of 300mm. Where gate posts are non-metal, the termination of the fencing at the gate shall be by means of another mild steel angle post fixed to one side of the gate post and strengthened by bracing as described hereinbefore. The chain link mesh shall then be strained by three strands of 4.06mm (8 gauges) diameter galvanized steel straining wires threaded through the mesh and fixed to the posts.

3.2.5. Each line wire and each line of barbed wire shall be secured to each intermediate post by one of the following methods;

3.2.5.1. A hairpin staple shall be passed through a hole in the post and secured to the wire by three complete turns on each side of the post.

3.2.5.2. The wire shall be threaded through a hole in the post.

3.2.6. Where shown on the Drawings, the bottom of the chain link mesh shall be buried in continuous Prescribed Mixes Grade 25P concrete curbs. Unless otherwise detailed in the Drawings, the cross-sectional dimension of curbs shall be 125mm wide x 375mm high with 150mm protruding above the ground. The portion of the curb above the ground shall be rendered with 13mm thick 1:6 cement render to a wood float finish.

3.2.7. The ground surface around post shall be made good with the same material as the adjoining area.

4. Security Fencing

4.1. The security fencing shall be constructed and/or installed as shown on the Drawings and comply to requirement of relevant Authority.

4.2. All components shall be manufactured only by reputable licensed suppliers and approved by the S.O.. The supplier shall include special requirement such as mount CCTV Camera, lighting, barbed wire, razor wire etc. (if any) and responsible for the analysis, design, detailing, drawing, manufacture, material, handling and erection of the fence members and their ancillary fixing components.

4.3. All component shall be of hot dipped galvanised comply to *BS EN ISO 1461*.

5. Sports Fencing

5.1. The sports fencing shall be constructed and/or installed as shown on the Drawings and comply to requirement of Certified Body.

5.2. All components shall be manufactured only by reputable licensed suppliers and approved by the S.O.. The supplier shall include special requirement such as mount CCTV Camera, lighting, barbed wire, razor wire etc. (if any) and responsible for the analysis, design, detailing, drawing, manufacture, material, handling and erection of the fence members and their ancillary fixing components.

6. Gates

The gates shall be constructed and/or installed as shown on the Drawings.

7. Storage of Fencing

7.1. Gates, steel post and struts for fencing shall be stored off the ground on level supports and in manner which will not result in damage or deformation to the materials.

7.2. Fencing shall be protected from damage and damaged fencing shall not be use in the permanent works.

8. Painting of Fence and Gates

The metallic primer previously applied to the steelwork at the workshop shall be touched up where necessary. Unless otherwise specified, the posts, bracings and gates shall be finished with two (2) coats of approved aluminium paint.

9. Re-erecting, salvage and dispose of existing fencing.

9.1. Taking Down and Re-Erecting of Existing Fencing

Where specified, existing fences shall be taken down, the materials carefully salvaged, and the fence re-erected, to the satisfaction of the S.O..

9.2. Remove and Salvage of Existing Fencing

Where removal and salvage of existing fences is specified, the Contractors shall carefully take down the fence, roll the wire, and place the material at locations as directed by the S.O.. Material that are not suitable for salvage shall be disposed of at locations as directed or acceptable to the S.O..

9.3. Remove and Dispose of Existing Fencing

Where removal and disposal of existing fences is specified, the Contractor shall completely remove the fence and dispose of all materials at locations acceptable to the S.O..

SPESIFIKASI

PLASTERING, PAVING, TILING AND CARPET

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1. General

1.1. Cement

1.1.1. The cement, unless otherwise described shall be Ordinary Portland Cement, complying with MS EN 197-1 as specified in SECTION D: CONCRETING or Masonry Cement complying with MS EN 413-1.

1.1.2. White and coloured cement shall be of approved manufacture.

1.2. Plasticiser

The plasticizer shall be of approved manufacture and used strictly in accordance with the manufacturer's recommendation.

1.3. Plasterlime

The plasterlime shall be of approved manufacture and shall comply with BS 890 and shall be applied strictly in accordance with the manufacturer's recommendation.

1.4. Sand

The sand for external rendering, internal plastering and floor screeding shall comply with MS 30 for fine aggregates. Sand for plastering using gypsum shall comply with MS 701.

1.5. Water

Water for mixing shall be clear and free from harmful matter as specified in SECTION D: CONCRETING.

1.6. Mixing

1.6.1. All mixing of mortar for plaster and screed shall be done by machine. Hand mixing shall only be allowed for small quantities and with the approval of the S.O.. Hand mixing shall be done on a clean platform. The water content of the mix shall be only the minimum required to give a workable mix.

1.6.2. Mortar for plaster and screed shall be used up within forty five (45) minutes after mixing.

1.6.3. For gypsum plaster, mixes shall be used up within one (1) hour after mixing.

1.6.4. No remaking of the mix shall be permitted thereafter.

1.7. Surface Preparation

1.7.1. Where possible cement paving, screeding and rendering on concrete surface shall be laid while the concrete is still green that is after the final set but not later than twenty-four (24) hours of laying concrete. The concrete surfaces shall be brushed with a stiff broom before it has hardened to remove laitance and give a roughened surface. Hardened concrete surfaces shall be thoroughly hacked to form a key to the approval of the S.O..

1.7.2. Before any paving, screeding or rendering is applied, all surfaces shall be thoroughly cleaned and wetted and be in damp state at the time the paving, screeding or rendering is applied.

1.7.3. Where plastering and rendering are to be applied in several coats, the surface of each preceding coat shall be scratched while still green to form key for the subsequent coat.

1.8. Bay

Paving and screeding shall be laid in alternate bays. On hardened concrete bases, each bay shall not exceed 15m^2. On the surface where the concrete is still green, each bay shall not exceed 30m^2. Where bays are not square, the ratio of the length between adjacent sides of each bay shall be approximately 1:1.5. The joints in paving screed shall coincide as nearly as possible with joints in the base.

1.9. Curing and Protection

Unless otherwise specified hereinafter, the screeds shall be cured for three (3) to seven (7) days after laying, and protected from rapid drying by covering with polyethylene sheets or tarpaulins and shall also be protected from any damage.

1.10. Making Good

1.10.1. Defective screeds shall be cut out and made good with fresh screed and sufficient time shall be allowed for the screed to dry prior to the laying of the floor finish.

1.10.2. Defective plastering and rendering shall be made good by cutting out the defective part to a rectangular shape, and the edges shall be undercut to form dovetail-key and finished flush with the surrounding work.

1.11. Samples

The Contractor shall supply the S.O. with samples of materials and/or sample of finished work for approval. Approved samples shall be kept at site for reference.

1.12. Tools

Proper tools shall be used for all scribing, scoring, splicing, smoothing edges, making angles et cetera of tiles, bricks and others so as to produce neat and fit joints.

1.13. Types of Finishes

The appropriate type of finishes to be used in the various locations of the works shall be as shown on the Drawings or as tabulated in the schedule of finishes. Unless otherwise shown on the Drawings or described in the B.Q., the finishes and their dimensions shall be as specified hereinafter.

1.14. Cornices and Angles

1.14.1. The cornices and moulded work shall be clean and accurately formed to the section shown on the Drawings. All mitres, stops and enrichments and moulding shall follow the details as shown on the Drawings, all to the approval of the S.O..

1.14.2. All rounded and moulded angles shall be of the same material mix as the adjacent finish. For narrow reveal, splays and returns under 30mm wide, Class D plaster to BS 1991 shall be used.

2. Plaster Work

2.1. Plain Plaster

2.1.1. Plain plaster shall consist of one (1) part masonry cement to six (6) parts sand by volume. Where CEM 1 is used, plasticizer or plasterlime shall be added to the mix in accordance with the manufacturer's instruction.

2.1.2. The plaster shall be applied in two coats generally to a total thickness of 20mm to brickwall and 12mm to soffits, beams, columns, brick-walls and other smooth surfaces.

2.1.3. The first coat shall consist of rough plastering to a thickness of 10mm for 20mm plainface, and 6mm for 12mm plainface. The second coat shall be finished with a steel trowel for internal surfaces and with a straight-edged wood float for external surfaces.

2.1.4. All external walls, unless otherwise specified shall be finished with rough surface cement plastering.

2.1.5. All internal walls, unless otherwise specified shall be finished with smooth skimmed surface cement plastering.

2.2. Granolithic Plaster

2.2.1. Granolithic plaster shall consist of by volume, two (2) parts cement, one (1) part sand, five (5) parts granite chipping passing 6mm mesh and retaining upon 3mm mesh, applied in two (2) coats to a total thickness of 10mm to a backing coat, finished smooth with wood float.

2.2.2. The backing coat shall consist of 12mm thick plain plaster as described herein before. The finished surface shall be brushed lightly to achieve the required texture after it has reach initial set.

2.2.3. Shanghai plaster shall consist of two (2) parts approved coloured cement, one (1) part sand and five (5) parts of selected lime-stone chipping passing 6mm mesh and retaining upon 3mm mesh by volume applied in two (2) coats to a total thickness of 10mm to the backing coat, finished smooth with wood float.

2.2.4. The backing coat shall consist of 12mm thick plain plaster as described hereinbefore. The finished surface shall be brushed lightly to achieve the required texture after it has reached initial set.

2.3. Shanghai Plaster

2.3.1. Shanghai plaster shall consist of two (2) parts approved coloured cement, one (1) part sand and five (5) parts of selected lime-stone chipping passing 6mm mesh and retaining upon 3mm mesh by volume applied in two (2) coats to a total thickness of 10mm to the backing coat, finished smooth with wood float.

2.3.2. The backing coat shall consist of 12mm thick plain plaster as described hereinbefore. The finished surface shall be brushed lightly to achieve the required texture after it has reached initial set.

2.4. Textured Finish Plaster

2.4.1. Textured finish plaster shall consist of a 20mm thick backing coat of plain plaster as described hereinbefore ruled into a plain and even surface and a finishing coat as on the Drawings and described hereinafter.

2.4.2. For rough cast finish, the mix shall consist of selected cement, sand and aggregate in the proportion to give the required finish to the approval of the S.O..

2.4.3. For Tyrolean finish, the mix shall consist of one (1) part selected coloured cement, and two (2) parts sand by volume applied to the backing coat by means of a Tyrolean machine in accordance with the manufacturer's recommendation. The finish shall be built up in three (3) layers to a total thickness of not exceeding 6mm. Each coat shall be allowed to dry before the application of a subsequent coat.

2.4.4. For pebble-dash finish, the dry pebble for the finish shall be thrown onto the backing coat while the latter is still wet. The pebbles to be used shall be clean and of size and quality approved by the S.O..

2.4.5. For pebble-wash finish, the selection of pebbles shall be clean and of size, colour and quality approved by the S.O.. The selected pebbles shall be mixed with plain plaster and applied while it is still wet in a single coat generally to a total thickness of 12mm to a backing coat. The applied surface is tapped to set the pebbles in position. The pebbles shall be brushed and washed lightly to achieve the required texture after it has reached the initial set. Loose pebbles shall be placed back in position and by tapping the surface to set.

2.5. Gypsum Plaster

2.5.1. Gypsum plaster, or plaster of Paris, is produced as a proprietary dry plaster powder and when it is mixed with water, it re-forms into gypsum. The ratio of the gypsum powder mix to the amount of water shall be as recommended by the manufacturer.

2.5.2. The setting of unmodified plaster starts about ten (10) minutes after mixing and is complete in about forty-five (45) minutes; but not fully set for seventy two (72) hours. The total gypsum plaster thickness for vertical and horizontal masonry and concrete surfaces shall be 16mm.

2.5.3. The resulting paste hardens as it cools, forming a relatively soft, pliable finished product. Unlike mortar or cement, which dries much harder, gypsum plaster can be sanded or otherwise manipulated once cured, making it a good option for aesthetic, non-load bearing purposes.

2.5.4. Gypsum plaster is renowned for its use as an art medium and is often use in conservation works especially for decorative embellishment. It is also used to simulate the appearance of surfaces of wood, stone or metal.

2.6. Lime Plaster

2.6.1. Typical lime plaster mix shall consist of one (1) part lime putty to three (3) parts of washed, well graded sand. The lime putty is mixed at one (1) to three (3) ratios, creates a compact plaster.

2.6.2. Water is added to produce slaked lime (calcium hydroxide), which is sold as a wet putty or white powder. Water is added to the white powder mix as per the manufacturer's recommendation.

2.6.3. Water is added to the proprietary lime plaster mix as per the manufacturer's recommendation to form a workable paste prior to use. Lime plaster is used as an alternative to or in combination with ordinary Portland cement. It is commonly used for decorative works such as mural paintings on walls, ceilings or any type of flat surface.

2.6.4. Once the water is mixed it shall be stored in an air-tight container. Once exposed to the atmosphere, the calcium hydroxide turns back into calcium carbonate, causing the plaster to set.

2.7. Barium Plaster

The plastering of internal surfaces of X-Ray room walls shall be of barium plaster consisting of one (1) part cement, one (1) part barytes (barium sulphate) fines and three (3) parts barytes sand by volume.

2.8. Plaster to Sides of Manholes, Inspection Chambers and Septic Tanks

Plastering to sides of manholes, inspection chambers and septic tanks shall be as specified under SECTION F: SEWERAGE.

3. Paving Work

3.1. Cement Paving

3.1.1. Unless otherwise shown on the Drawings or described in the B.Q., cement paving shall be 20mm thick consisting of one part cement to three parts sand by volume. The paving shall be thoroughly rammed within 30 minutes of laying and trowelled smooth after it has stiffened sufficiently to prevent laitance being brought to the surface. Paving to apron shall finish to a slight fall towards surface drains.

3.1.2. Unless otherwise shown on the Drawings or described in the B.Q., skirtings shall be formed to a height of 150mm and thickness of 20mm, coved at bottom and rounded at top.

3.2. Granolithic Paving

3.2.1. Granolithic paving shall be 20mm thick, consisting of two (2) parts cement and five (5) parts granite chipping passing 6mm mesh and retained upon 3mm mesh by volume.

3.2.2. The chipping shall be washed and free from dust. The paving shall be trowelled smooth to proper level or fall where appropriate. After initial set the surface shall be brushed lightly to achieve the required textured finish.

3.2.3. Unless otherwise shown on the Drawings, granolithic skirting shall be 100mm high and 20mm thick, coved at bottom and slightly rounded at top.

3.2.4. Unless otherwise shown on the Drawings or described in the B.Q., the edge of threshold and treads of concrete stairs shall be finished with 150mm x 75mm x 12mm thick vitreous non-slip nosing tiles laid lengthwise bedded and pointed in 1:3 cement and sand mortar. The sides of open stringers shall be finished with granolithic plaster worked to profile of treads and risers to the approval of the S.O..

3.3. In-situ Terrazzo

3.3.1. In-situ terrazzo shall consist of one (1) part approved coloured cement and three (3) parts selected limestone chipping passing through 12mm mesh and retained upon 3mm mesh by volume.

3.3.2. The terrazzo topping shall be 20mm thick laid on 20mm thick cement and sand (1:3) screed. The concrete base to receive the screed shall be thoroughly cleaned and wetted.

3.3.3. While laying the screed, aluminium or brass strips of size 32mm wide x 3mm thick shall be set in vertically on edge into the screed to form panels. Each panel shall not exceed $4m^2$ with top edges of the strips standing sufficiently high to finish flush with the finished terrazzo floor level. The terrazzo shall be trowelled to a dense even finish.

3.3.4. When sufficiently hard but not less than two (2) days after being laid it shall be rubbed down to a smooth surface by means of carborundum stone.

3.3.5. Tile impregnator then shall be applied strictly in accordance to the manufacturer's recommendation onto the terrazzo surface to prevent future staining.

3.3.6. Unless otherwise shown on the Drawings or described in the B.Q., the edge of the threshold and treads of concrete stairs shall be finished with 150mm x 76mm x 12mm vitreous non-slip nosing tiles of approved colour laid lengthwise bedded and pointed. The sides of open stringers shall be finished with in-situ terrazzo working to profile of treads and risers to the approval of the S.O..

3.4. Waterproof Paving to Roof Slabs

Waterproof paving to roof slabs shall be as specified under SECTION D: CONCRETING.

3.5. Precast Concrete Paving

3.5.1. Unless otherwise shown on the Drawings or described in the B.Q., precast concrete paving slabs shall be of size 600mm x 600mm x 50mm thick each and made of 1:2:4-20mm concrete reinforced with `A6' fabric reinforcement to MS 145. The top surfaces of slab shall be brushed with stiff broom or wire brush after the initial set to give a rough finish.

3.5.2. Paving slabs shall be laid to the pattern as shown on the Drawings or approved by the S.O.. The slabs shall be bedded on 25mm thick semi-dry cement and sand (1:3) screed laid on 100mm thick properly compacted and blinded hardcore.

3.5.3. The joints between the paving slabs shall be 20mm wide filled with cement mortar (1:3) and raked to a depth of 6mm.

3.6. Interlocking Concrete Paving

3.6.1. Taking the existing sub-grade/soil conditions and the anticipated traffic loading into consideration, an adequate thickness of well compacted base course must be provided to ensure good pavement performance. Unless otherwise specified, existing bitumen or concrete surfaces need not be removed and can act as good sub-grade.

3.6.2. Interlocking concrete paving blocks shall comprise of segmental interlocking concrete paving units laid on minimum 30mm thick sand bedding course.

3.6.3. A layer of sand should be loosely spread and screed to a uniform thickness such that its compacted thickness would be approximately 30mm thick. It is important that the sand layer remains undisturbed prior to the laying of blocks.

3.6.4. The grade of the concrete and thickness of the paving blocks shall be as detailed in the Drawings.

3.6.5. Concrete edge restraints shall be provided at the perimeter of the pavement to ensure the paving blocks are tightly abutted and to separate areas of different laying pattern.

3.6.6. The paving blocks are placed side by side on the sand bed with gaps of approximately 2mm between adjoining blocks. The gap between the paving blocks shall be filled with fine sand of different grading to that required for the bedding sand.

3.6.7. The paving blocks can be cut to fit edges and awkward corners. The pavement which has been laid shall be compacted with a hand-guided plate vibrator until it is firmly embedded in the sand layer.

3.6.8. The general specification of the precast concrete paving blocks shall comply with MS 1380.

3.7. In-situ Concrete Paving Footpath

3.7.1. In-situ concrete paving shall consist of 75mm thick concrete of 1:3:6-20mm mix by volume as specified in Section D: CONCRETING, laid on 100mm thick properly compacted and blinded hardcore to panels as shown on the Drawings or as approved by the S.O..

3.7.2. The concrete shall be well compacted and floated with a wooden float to smooth and even finish. After the concrete has achieved the initial set, the surface shall be brushed with stiff broom or wire brush to give a rough finish.

3.7.3. The joints between the panels shall be filled with approved cold-poured polyurethane joint filler.

3.8. Brick Paving

3.8.1. Bricks for paving shall be of semi-vitreous bricks 225mm x 75mm x 50mm thick of approved quality and colour.

3.8.2. The bricks shall be soaked as specified in SECTION E: WALL SYSTEM before laying and shall be laid flat on 25mm semi-dry cement and sand (1:3) screed with 6mm spacing to the pattern as shown on the Drawings or as approved by the S.O..

3.8.3. The screed shall be laid on 75mm thick concrete (1:3:6-19mm) base founded on properly compacted and blinded 100mm thick hardcore. The joints shall be filled with cement mortar (1:2) and finish flush.

4. Tiling Work

4.1. Ceramic Tile

4.1.1. In general, all ceramic tiles manufactured locally are using the `dry-pressed' manufacturing process and the ceramic tiles are categorized based on their water absorption rate as defined in the MS 1294, MS ISO 13006 or the International Standard Organization (ISO) Standards (ISO 13006).

4.1.2. The methods and materials used in the installation of ceramic tiles under normal internal conditions shall comply with MS 1294-1 and the installation of ceramic tiles under normal external conditions shall comply with MS 1294-2.

4.1.3. The installation of tiling works requires skilled operatives working safely using protective clothing and equipment where appropriate; workmanship shall comply with BS 8000-11 for ceramic tiles.

4.1.4. Unless otherwise shown on the Drawings, ceramic tiles to internal and external floor for heavy duty areas shall be vitrified with water absorption less than 0.5% [Classification Group BIa] also referred to as heavy duty tiles shall comply with MS ISO 13006 and the size shall be tiles 300mm x 300mm.

4.1.5. Unless otherwise shown on the Drawings, ceramic tiles to internal floor areas under normal condition shall be vitrified with water absorption less than 3% [Classification Group BIa or, BIb] shall be vitreous hard wearing non-slip glazed complying with MS ISO 13006 and the tile size shall be 300mm x 300mm.

4.1.6. Unless otherwise specified in the Drawings or described in the B.Q., ceramic tile skirting shall match the flooring tiles and shall be 300mm x 100mm laid lengthwise on cement and sand (1:3) screed as described. All angles to skirting shall be neatly cut to fit all abutments.

4.1.7. Unless otherwise specified in the Drawings, accessories such as skirting (bull nose or cove base), step tiles, step nosing, edging strips, angle tiles (internal and external), etc. shall be of an approved type standard manufacture from the same material to match flooring. Unless otherwise shown on the Drawings, skirting shall be 100mm high, stair nosing shall be minimum 20mm wide laid full length of the treads and of bull nose profile, and edging strips 25mm wide.

4.1.8. Unless otherwise shown on the Drawings, ceramic tiles for internal walls shall be scuff-resistant glazed vitrified tiles with water absorption less than 6% [Classification Group BIb or BIIa] shall comply with MS ISO 13006. Unless otherwise specified, the minimum tile size shall be of 300mm x 300mm.

4.1.9. Unless otherwise shown on the Drawings, ceramic tiles for external walls up to first floor height shall be scuff-resistant glazed vitrified tiles with water absorption less than 3% [Classification Group BIa or BIb] and shall comply with MS ISO 13006. The tiles maximum size shall be of 300mm x 300mm.

4.1.10. Unless otherwise shown on the Drawings, ceramic tiles for external walls used above first floor height shall be scuff-resistant glazed vitrified tiles with water absorption less than 0.5% [Classification Group BIa] shall comply with MS ISO 13006. The tiles maximum size shall be of 300mm x 300mm.

4.1.11. Unless otherwise specified in the Drawings, all ceramic tiles for walls and floors shall be of 1st Grade or Grade A with approved surface finish & texture, colour and manufacture.

4.1.12. Ceramic tiles used for walls which have high water absorption characteristics shall be bedded with approved tile adhesive to the manufacturer's specification on 20mm thick cement and sand (1:3) render which has sufficiently cured. The tiles shall be laid with 2mm to 3mm gap and all joints shall be filled with approved tile proprietary grout to match. Exposed edges of tiling shall be finished with rounded on edge tiles. Ceramic tiles of Classification Group BIII with water absorption >10% shall not be used under any conditions.

4.1.13. Porous tiles shall be soaked before fixing to prevent rapid suction and subsequent failure in bonding with the mortar bed. Tiles should be removed from their cartons and completely immersed in clean water for at least thirty (30) minutes. After soaking, they should be stacked tightly together, with the end tiles face outwards, on a clean surface and allowed to drain. Tiles classified in MS ISO 13006 in Groups BIIb and BIII require this saturation treatment; soaking of tiles of Group BIa, BIb and BIIa is unnecessary, refer to MS 1294-1.

4.1.14. Unless otherwise instructed by the manufacturer, the tiles should be fixed dry. All tile installation shall use approved type cementitious adhesives. The selection and application of ceramic tile adhesives for internal and external tile installations on walls and floors shall comply with MS ISO 13007-1 and MS 1294.

4.1.15. Grouts used shall be of proprietary grout with good working characteristics, low shrinkage and good adhesion to edges of the tiles complying with MS ISO 13007-3. The selection of the type of grout shall be to the manufacturer's recommendation. Sanded grout shall be used for tile joint width of 4mm or more. Non-sanded grouts shall be used for installation in joints of 4mm width or less. The application of ceramic tile grouts for internal and external tile installations on walls and floors shall comply with MS 1294.

4.1.16. Tiles shall be laid with joints not exceeding 3mm wide to be filled with coloured grout. Admixtures shall be used in accordance with the manufacturer's recommendation and they shall not be added to the proprietary grout unless approved by the grout manufacturer. Admixtures

are added for improving the resilience and reducing the water permeability of the hardened grout mortar.

4.1.17. Unless otherwise shown on the Drawings, movement joints should be located in the tiles installation to coincide and be continuous with all existing structural movement joints, although they are actually formed as separate joints isolated by suitable thickness of back-up material.

4.1.18. Unless otherwise shown on the Drawings, the movement joints with consultation with the designers shall be positioned at the following locations:

4.1.18.1. Over existing and/or structural movement joints;

4.1.18.2. Where tiling abuts other materials;

4.1.18.3. Where tiling is continuous across junctions of different background materials;

4.1.18.4. In large tile areas, at internal vertical corners and at 3m to 4.5m centers horizontally and vertically; and

4.1.18.5. Where stresses are likely to be concentrated, for example at changes of alignment.

4.1.19. Unless otherwise specified in the Drawings, joint sealant materials for movement joints shall be selected and applied in accordance with the guidance given BS 6213.

4.1.20. Where large format ceramic tiles are required for walls and to be fixed above first floor height, they shall be secured by mechanical means. When the thickness of tile exceeds 12.5mm and the weight of tile is more than 32kg/m^2, mechanical fixing is recommended. All mechanical fixing methods shall be certified by a competent Professional Engineer and to the approval of the S.O..

4.1.21. Pull-out test shall be carried out after twenty-eight (28) days installation for every maximum area 500m^2 or on the tiles that are suspected of hollowness, at the instruction of the S.O..

4.1.22. Adhesion strength of the pull-out test shall exceed 0.5 N/mm^2 for walls with cement: sand mortar bedding or 1.0N/mm^2 with adhesive bedding. Pull-out test shall be carried out in accordance to MS ISO 13007-2 and as recommended by the tile adhesive manufacturer. Location and number of test point for the pull-out test shall be as requested by the S.O..

4.2. Precast Terrazzo Tiles

4.2.1. Unless otherwise shown on the Drawings, precast terrazzo tiles of an approved manufacture shall be 100mm x 300mm x 20mm thick machine-pressed tiles comprising of 6mm limestone aggregate and coloured cement.

4.2.2. The tiles shall be soaked prior to laying and shall be laid butt jointed on 20mm thick semi-dry cement and sand screed. The laying shall be done while the screed is still green. All joints between the tiles shall be grouted with coloured cement to match.

4.2.3. The tiles shall be rubbed down to a smooth surface after a minimum of two days or laying by means of Carborundum stone. Tile impregnator shall then be applied strictly in accordance with the manufacturer's recommendation on to the terrazzo surface to prevent future staining.

4.2.4. Unless otherwise stated in the Drawings, nosing and edging tiles to edges of flooring and treads of concrete stairs shall be of an approved type and to match with the flooring accessories such as skirting (bull nose or cove base), step tiles, step nosing, edging strips, angle tiles (internal and external), etc. shall be of an approved type from the same material to match flooring.

4.2.5. Unless otherwise shown on the Drawings, skirting shall be 100mm high, stair nosing shall be minimum 20mm wide laid full length of the treads and of bull nose profile, and edging strips 25mm wide.

4.3. Mosaic

4.3.1. Unless otherwise shown on the Drawings, mosaic tiling to floors shall be semi-glazed tiles and shall be of an approved colour and manufacture.

4.3.2. Unless otherwise shown on the Drawings, mosaic tiling to walls shall be fully glazed tile and shall be of approved colour and manufacture.

4.3.3. Unless otherwise shown on the Drawings or described in the B.Q., all skirting shall be 100mm high to match floor tiling. The tiles at the bottom of the skirting shall be set at 45^0 to the horizontal and the top finished with cove tiles or edging strips to manufacturer's recommendation. The tiles required to form angles to skirting shall be neatly cut and fit to all abutments.

4.3.4. Mosaic tiling to floors shall be bedded on 20mm thick semi-dry cement and sand (1:3) screed, laid on the concrete base which has been thoroughly cleaned and wetted.

4.3.5. Mosaic tiling to walls shall be evenly buttered with cement:sand mortar before bedding on 20mm thick cement and sand (1:3) screed which has sufficiently cured. Alternatively the tiling shall be bedded with approved proprietary adhesive to manufacturer's recommendation onto the cement screed.

4.3.6. During bedding, the surface of the mosaic shall be checked and any unevenness shall be made good. Any misaligned or defective tiles shall be adjusted or replaced. All joints shall be grouted with approved proprietary grout or coloured cement and sand grout to match. The tiling shall be allowed to mature under damp condition for at least four (4) days before cleaning down.

4.3.7. The selection and application of tile adhesives for internal and external mosaic installations on walls and floors shall comply with MS ISO 13007-1. The selection and application of tile grouts for mosaic installations on walls and floors shall comply with MS ISO 13007-3.

4.4. Quarry Tiles

4.4.1. Quarry tiles shall be of non-slip type 150mm x 150mm x 12mm thick complying with MS 1091. The tiles shall be bedded on 20mm thick semi-dry cement and sand (1:3) screed with joints about 2mm wide, laid on the

concrete base which has been thoroughly cleaned and wetted. All tiles shall be soaked overnight before laying.

4.4.2. All skirting shall be 100mm high with rounded top edge to match the tiles flooring. The tiles required to form angles to skirting shall be neatly cut and fit to all abutments.

4.5. PVC Tiles/Sheets

4.5.1. PVC tiles or sheets shall be of approved type, pattern and colour. PVC tiles or sheets are to be of non-slip type and shall comply with MS 602. Tiles shall be 250mm x 250mm x 2mm thick minimum. Sheets shall be 2 m roll width x 2mm thick minimum.

4.5.2. Accessories such as skirting, stair nosing, edging strips etc. shall be of the same manufacture from similar material to match flooring. Unless otherwise described skirting shall be 100mm high; stair nosing shall be 60mm wide laid full length of the treads and of bullnose profiles; and edging strips shall be 25mm wide.

4.5.3. The final appearance and performance of the floor covering will be determined and affected, in part, by the condition of the subfloor. It is essential that all subfloors are solid, smooth, flat, even, permanently dry, clean and free from all foreign materials such as dust, paint, grease, oils, solvents, curing and hardening compounds, sealers, asphalt and old adhesive residue. The dryness of the subfloor is of the utmost importance and it must be determined by testing the moisture level in the subfloor. Enough drying time must be allowed in the building program to achieve a relative humidity (RH) reading of below 75% or in compliance to the manufacturer's RH recommendation.

4.5.4. Installation area for the flooring must be clean, fully enclosed, weathertight and maintained at uniform temperature at least forty-eight (48) hours prior to, during and after the installation is completed.

4.5.5. The tiles or sheet shall be laid and jointed on 20mm thick cement and sand (1:3) screed subfloor with an approved proprietary waterproof adhesive strictly in accordance with manufacturer's recommendation. The screed shall be finished smooth with a steel trowel to an even surface and shall be dry, clean and free from dust and sand before laying the tiles and sheets. A self-leveling sub-floor smoothing compound shall be applied on uneven surfaces to provide a quality finish to receive the floor coverings or as recommended by the manufacturer.

4.5.6. For ground floor or basement areas, an approved damp proof membrane shall be installed prior to the application of sand/cement screeds.

4.5.7. Adhesive; when not specified otherwise, type to be as recommended and approved by the PVC tile/sheet covering manufacturer. Use acrylic adhesive/solvent based adhesive on dry, dustless sub floors in areas not subjected to spillages. Use two parts polyurethane adhesive on the sub-floors in areas subject to excessive spillage of water. Floors must be kept free of traffic until the PU adhesive is fully set, recommended minimum eight (8) hours.

4.5.8. The floor coverings should be adhered in acrylic adhesive or approved equivalent. All joints on the floor must be cut in, grooved and hot welded. Cove up skirting shall be 100mm height, to enable the self-coving of the floor covering. In areas that are not subjected to spillages of water onto

the wall surfaces, the top of the covering is to be finished with PVC capping seal. This should be adhered to the wall surface approximately 100mm-150mm high prior to self-coving floor covering. The material is than cut and fitted into the capping seal, capping seal should be adhered with contact adhesive.

4.5.9. In areas that are subjected to spillages of water onto the wall surfaces, the top of the covering is finished with aluminium trimming, a specially designed section for forming water-tight joint in conjuction with the surface of the wall finishes. It is recommended that the aluminium trim to be screwed on the wall surface.

4.5.10. Where area of excessive spillages of water, it is important that a watertight joint be achieved at junction of drains, gratings, access covers etc.

4.5.11. On completion, the flooring shall be well-cleaned and treated or polished in accordance with the manufacturer's recommendation.

4.6. Timber Strip Flooring

4.6.1. Unless otherwise shown on the Drawings, timber strip flooring shall be ready-made, laminated three (3) ply timber strips or floorboards of approved manufacture. The timber species for use in timber strip flooring shall be as specified in SECTION H: TIMBER, JOINERY AND IRONMONGERY.

4.6.2. The flooring shall be laid to the pattern as approved by the S.O., on 20mm thick cement and sand (1:3) screed with an approved waterproof adhesive applied in accordance with manufacturer's recommendation. The screed shall be finished smooth with a steel trowel to an even surface and it shall be dry, clean and dust free before laying the timber strip flooring. After the adhesive has set, the timber strip flooring shall be sanded to a true smooth and even surface using suitable sanding machine. Any misaligned or defective timber strip shall be adjusted or replaced.

4.6.3. Unless otherwise shown on the Drawings or described in the B.Q., skirting to timber strip flooring shall consist of 100mm x 12mm thick wrot timber skirting rounded at the top, and fixed to the wall or column using 38mm masonry nails spaced approximately at 600mm centres in two (2) rows 26mm away from the top and bottom edges. The nails shall be punched below the surface and the holes filled with approved putty. Any jointing of the skirting shall use splayed butt joints.

4.6.4. The face edges of the flooring shall be lined with wrot timber edging to match. The edging strips shall be 38mm wide approximately x 12mm thick fixed to the base using adhesive as specified hereinbefore, projecting 12mm from the finished sides of floor slabs. Edging strips shall be jointed using glued splayed butt joints.

4.6.5. After sanding the flooring shall be cleaned, any gap sealed with approved sealer, stained and finished with three (3) coats of approved polyurethane paint. Each coat shall be applied strictly in accordance with the manufacturer's recommendation.

4.7. Parquet Tile Flooring

4.7.1. Unless otherwise shown on the Drawings, parquet tiles shall be ready-made 120mm x 120mm x 10mm thick consisting of 120mm x 25mm x 10mm pressure treated kempas, keruing or other approved medium hardwood timber battens. The timber species for use in parquet flooring shall be as specified in SECTION H: TIMBER, JOINERY AND IRONMONGERY WORKS.

4.7.2. The flooring shall be laid to the pattern as approved by the S.O., on 20mm thick cement and sand (1:3) screed with an approved waterproof adhesive applied in accordance with manufacturer's recommendation. The screed shall be finished smooth with a steel trowel to an even surface and it shall be dry, clean and dust free before laying the parquet flooring. After the adhesive has set, the parquet flooring shall be sanded to a true smooth and even surface using suitable sanding machine. Any misaligned or defective parquet shall be adjusted or replaced.

4.7.3. Unless otherwise shown on the Drawings or described in the B.Q., skirting to parquet flooring shall consist of 100mm x 12mm thick wrot timber skirting rounded at the top, and fixed to the wall or column using 38mm masonry nails spaced approximately at 600mm centres in two (2) rows 26mm away from the top and bottom edges. The nails shall be punched below the surface and the holes filled with approved putty. Any jointing of the skirting shall use splayed butt joints.

4.7.4. The face edges of the flooring shall be lined with wrot timber edging to match. The edging strips shall be 38mm wide approximately x 12mm thick fixed to the base using adhesive as specified hereinbefore, projecting 12mm from the finished sides of floor slabs. Any edging strips shall be jointed using glued splayed butt joints.

4.7.5. After sanding the flooring shall be cleaned, any gap sealed with approved sealer, stained and finished with three (3) coats of approved polyurethane paint and sanding between coats. Each coat shall be applied strictly in accordance with the manufacturer's recommendation. The required type of flooring finish shall be to S.O.'s approval.

4.8. Granite Slabs

4.8.1. Unless otherwise shown on the Drawings, granite slabs for flooring shall be 600mm x 600mm x 25mm thick shall be bedded with cement: sand mortar or alternatively with 9mm thick approved proprietary tile adhesive onto 25mm thick cement and sand (1:3) screed as described hereinbefore. The slabs shall be laid butt-joint. Any gap shall be filled with approved mixture of adhesive and grout powder. After grouting, the surface then shall be polished, buffered and finished with a layer of impregnator.

4.8.2. If used in wet or exposed areas, or on ground floor, waterproofing system shall be installed prior to the laying of granite slabs. The floors or the exposed wet areas shall be applied with two coats of approved waterproof coating.

4.8.3. The reverse side of granite slabs in contact with the ground floor or exposed wet wall surface shall be applied with approved waterproof coating.

4.9. Marble Slab

4.9.1. Unless otherwise shown on the Drawings, marble slabs for flooring shall be 600mm x 600mm x 25mm thick shall be bedded with cement: sand mortar or alternatively with 9mm thick approved tile adhesive onto 25mm thick cement and sand (1:3) screed. The slabs shall be laid butt-joint. Any gap shall be filled with approved mixture of the adhesive and grout powder. After grouting, the surface then shall be polished, buffered and finished with a layer of impregnator.

4.9.2. If used in wet or exposed areas, or ground floor, waterproofing system shall be installed prior to the laying of marble slabs. The floors or the exposed wet areas shall be applied with two coats of approved waterproofing coating.

4.9.3. The reverse side of marble slabs in contact with the ground floor or exposed wet wall surface areas shall be applied with approved waterproof coating.

4.10. Vinyl

4.10.1. Vinyl sheet or vinyl tile flooring shall be high performance homogenous-heterogeneous type and specified in accordance to the following type and performances:

4.10.1.1. Vinyl Type 1: Heavy duty to withstand heavy traffic of trolleys.

4.10.1.2. Vinyl Type 2: Anti-static to cater for aseptic and dust free environment.

4.10.1.3. Vinyl Type 3: Anti-slip to cater for wet areas as well as slippery areas.

4.10.1.4. Vinyl Type 4: Heavy duty, fully flexible and resilient for sports flooring and children play areas (Designed specially that combines tough wear layer with a resilient backing for comforts and under floor sound deadening properties and attractive good looks).

4.10.1.5. Vinyl Type 5: High Resistant to Chemical.

4.10.2. All joints to be hot welded and matching coloured. The skirting to the vinyl floor must be of the same vinyl to 150mm high with approved cove former and finished with matching coloured UPVC capping strips with approved recommended acrylic adhesive strictly to manufacturer's method of installation.

4.10.3. Vinyl sheet shall have Polyurethane Reinforced (PUR) surface treatment for easy maintenance.

4.10.4. Colours and patterns of vinyl flooring shall be to the PD's concurrence. Approved metal dividing clips shall be installed when vinyl flooring meets with other floor finishes.

4.10.5. Prior to the application of vinyl floor covering, the contractor shall ensure that the floor substrate has a perfectly even surface, dry and free from. Vinyl sheets shall be installed onto floor flatness tolerance of not more than $\pm$ 3mm for every 3 m length floor area ready to receive vinyl flooring. Self-levelling compound of approved quality to be installed before

finishing with vinyl flooring. The flatness tolerance shall strictly adhere to manufacturer's method of installation.

4.10.6. Types of adhesive with low VOC shall be used strictly in accordance with the recommendation of the manufacturer of the proposed type of vinyl flooring.

4.10.7. Laying of all type's vinyl flooring shall only be carried out by specialists from the approved supplier of the material.

4.10.8. The contractor shall incorporate damp proof treatment before laying the vinyl flooring to ensure that the floor slab/ or base screed is free from rising damp.

4.10.9. For waiting areas, corridors and other specific areas, the vinyl floors shall be completed with designed motifs, graphics and interplay of colours to the P.D.'s concurrence.

4.10.10. Stainless steel floor trap and gratings provided in vinyl flooring area shall be of special approved type that is suitable for vinyl flooring and shall be installed to manufacturer's specification and instructions.

4.10.11. Approved anti-slip nosing strips shall be used wherever vinyl is being laid on steps or staircases. Special approved type of metal grating suitable for vinyl flooring shall be used.

4.11. Indoor Sport Floors - Cushion PVC Sport Flooring

4.11.1. Unless otherwise specified on the Drawings, multi purposed game court surfaces shall be finished with Cushion PVC Sport Flooring sheets endorsed and recommended surfacing systems with excellent shock absorption, elasticity, flexibility, strong protective membrane, waterproof, resilience and slip resistance to ensure great sports performance.

4.11.2. Cushion PVC Sport Flooring sheets shall be minimum overall thickness of 7.5mm comprising of surface layer with protecsol treated, calendered and grained 100% PVC sheet.

4.11.3. Its reinforced by double layer of non-woven fiberglass grid and double density closed cell foam. Shall undergone Sanosol treatment for fungistatic and bacteriostatic, surface treated with Protecsol cross-linked dirt protection treatment.

Weight: 4.7kg/m2,
Shock Absoprtion (EN 14808): P1
Impact Protection Index (IPI) (AC-P90-205) =76%,
Vertical Deformation (EN 14809): < 2mm,
Energy Return (pr EN WI 217): 0.4 m/s,
Abrasion Resistance (EN ISO 5470-1):<350mg,
Sliding Coefficient (EN 13036-4): 80-100,
Indentation Resistance (EN1516) : < 0.5mm,
Abrasion resistance EN ISO 5470-1) < 350mg.
Ball bounce (EN12235) >90%
Fire (EN13501-1): Cfl-S1
Complied to GREEN Label/ Certificate
Low VOC

4.11.4. Cushion PVC flooring sheets shall comply with approved or accredited by major sport federations, namely BWF, FIBA, ITTF, AFC, FIVB, IFF.

4.11.5. The final appearance and performance of the floor covering will be determined and affected, in part, by the condition of the subfloor. The general requirement for the subfloor must be absolutely hard, smooth finished level, dry, structurally sound, free from cracks and other irregularities, free from contaminated with paint, plaster, oil, grease or any substances that could affect the adhesion. A damp proof membrane must be laid under the concrete to act as a barrier against underlting hydrostatic pressure and moisture (for ground floor only). Cracks or hollowness must be repaired and filled with an appropriate material. The subfloor must be level with a tolerance of 3mm over 2 meter straight edge.

4.11.6. The floor covering should be underlayment 5mm self levelling compound (eg. CL 11 or NC146) with Primer and applied in accordance with manufacturer's instruction. The tensile Bending strength after 28 days is 6N/mm2 and Compressive Strenght after 28 days is 30N/mm2. Self levelling compound shall complied with green label certification.

4.11.7. The top of the covering is finished with Damp Proof Membrane (For Ground floor only) (eg. HydroEpoxy 300 or PE146), a 2 component water based epoxy polyamide membrane/barrier coating. The cured membrane shall withstand 250kPa hydrostatic pressure which is equivalent to a 25m head of water. Application is in accordance with manufacturer's instruction.

4.11.8. Cushion PVC Sport Flooring sheets installation shall only use low VOC adhesives.

5. Carpet

5.1. Carpet Tiles

5.1.1. Unless otherwise specified on the Drawings, all carpets shall be of high quality, durable, loop pile type of 100% Nylon type 6 fibre (ASTM D 629-72/ANSI), 1/12 gauge, minimum 7mm overall thickness of pile height and cushion backing, 16 oz per sq yard pile weight (normal traffic area), 24 oz per sq yard pile weight (heavy traffic area).

5.1.2. Carpets shall be coated with protective coating (eg. 3M Scotchgard™) for stain resistant and easier cleaning.

5.1.3. All ground floor areas, which are specified using carpet tiles, shall have approved damp-proof membrane on the ground floor slabs.

5.1.4. Unless otherwise specified on the Drawings, wall edges shall be with approved minimum 100mm height timber skirting.

5.1.5. The contractor shall be required to submit samples of the various colours/patterns and SIRIM Eco-Label certification.

5.1.6. Aluminium dividing strips or other suitable rust proof metal gripper strips shall be laid at junctions of different floor finishes and finishing flushed with flooring.

5.1.7. Carpet tiles can be laid over any smooth, hard floor like parquet, laminated flooring and stone. Ensure the surface is clean, level and dry before installation.

5.1.8. All floor areas, which are specified using carpets, must be dry, level, and free from dirt, grease, oil, paint, sealer, old adhesives, and other residues.

5.1.9. Carpet tiles installation shall only use low formaldehyde water-based adhesive.

5.1.10. Carpet tiles used shall be laid with close butt joints, stretched and balanced so that all seams are parallel with minimum bows with suitable rustproof metal gripper strips securely installed. The carpets shall be installed in largest practical pieces and salvage shall be trimmed as required to assure color uniformity and pattern match at seams. All carpet shall have its edges trimmed and neatly fitted around all perimeters, openings and obstructions.

5.1.11. The carpets shall be installed in largest practical pieces and salvage shall be trimmed as required to assure color uniformity and pattern match at seams. All carpet shall have its edges trimmed and neatly fitted around all perimeters, openings and obstructions.

5.1.12. Warranty minimum 2 years on manufacturing defect. Supply and install by approved installer by manufacturer.

5.2. Broadloom Carpet (Roll Carpet / wall to wall carpet)

5.2.1. Machine Tufted Carpet

5.2.1.1. Unless otherwise specified on the Drawings, the machine tufted carpet shall be of high quality, durable, loop pile type or cut pile type or combination of both of 100% Nylon type 6 fibre (ASTM D 629-72/ANSI), 1/12 gauges, minimum 7mm overall thickness of pile height and PVC backing underlay, minimum 18 oz per sq yard pile weight (normal traffic area), minimum 24 oz per sq yard pile weight (heavy traffic area).

5.2.1.2. Broadloom carpets shall be coated with protective coating (eg. 3M Scotchgard™) for stain resistant and easier cleaning.

5.2.1.3. All ground floor areas, which are specified using carpets, shall have approved damp-proof membrane applied on the floor slabs. Unless otherwise specified on the Drawings, all carpets shall be laid with 6mm thick rubber-crumb underlay.

5.2.1.4. Unless otherwise specified on the Drawings, wall edges shall be with approved minimum 100mm height timber skirting.

5.2.1.5. All floor areas, which are specified using carpets, must be dry, level, and free from dirt, grease, oil, paint, sealer, old adhesives, and other residues.

5.2.1.6. The contractor shall be required to submit samples of the various colours/patterns and SIRIM Eco-Label certification.

5.2.1.7. Aluminium dividing strips or other suitable rust proof metal gripper strips shall be laid at junctions of different floor finishes and finishing flushed with flooring.

5.2.1.8. Broadloom carpets used shall be laid with close butt joints with underlay, stretched and balanced so that all seams are parallel with minimum bows with suitable rustproof metal/ wood gripper gripper strips securely installed. The carpets shall be installed in largest practical pieces and salvage shall be trimmed as required to assure color uniformity and pattern match at seams. All carpet shall have its edges trimmed and neatly fitted around all perimeters, openings and obstructions.

5.2.1.9. The carpets shall be installed in largest practical pieces and salvage shall be trimmed as required to assure colour uniformity and pattern match at seams. All carpet shall have its edges trimmed and neatly fitted around all perimeters, openings and obstructions.

5.2.1.10. Warranty minimum 2 years on manufacturing defect. Supply and install by approved installer by manufacturer.

5.2.2. Axminster Carpet

5.2.2.1. Unless otherwise specified on the Drawings, the axminster carpet shall be of high quality, durable, cut pile type of 80% Wool 20% Nylon type 6 fibre (ASTM D 629-72/ANSI), 1/12 gauges 7/7 rows and pitch, minimum 7mm overall thickness of pile height and jute backing, minimum 32 oz per sq yard pile weight (normal traffic area), minimum 42 oz per sq yard pile weight (heavy traffic area).

5.2.2.2. Broadloom carpets shall be coated with protective coating (eg. 3M Scotchgard™) for stain resistant and easier cleaning.

5.2.2.3. All ground floor areas, which are specified using carpets, shall have approved damp-proof membrane applied on the floor slabs. Unless otherwise specified on the Drawings, all carpets shall be laid with 6mm thick rubber-crumb underlay.

5.2.2.4. Unless otherwise specified on the Drawings, wall edges shall be with approved minimum 100mm height timber skirting.

5.2.2.5. All floor areas, which are specified using carpets, must be dry, level, and free from dirt, grease, oil, paint, sealer, old adhesives, and other residues.

5.2.2.6. The contractor shall be required to submit samples of the various colours/patterns and SIRIM Eco-Label certification.

5.2.2.7. Aluminium dividing strips or other suitable rust proof metal gripper strips shall be laid at junctions of different floor finishes and finishing flushed with flooring.

5.2.2.8. Broadloom carpets used shall be laid with close butt joints with underlay, stretched and balanced so that all seams are parallel with minimum bows with suitable rustproof metal/ wood gripper gripper strips securely installed. The carpets shall be installed in largest practical pieces and salvage shall be trimmed as required to assure color uniformity and pattern match at seams. All carpet shall have its edges trimmed and neatly fitted around all perimeters, openings and obstructions.

5.2.2.9. The carpets shall be installed in largest practical pieces and salvage shall be trimmed as required to assure colour uniformity and pattern match at seams. All carpet shall have its edges trimmed and neatly fitted around all perimeters, openings and obstructions.

5.2.2.10. Warranty minimum 5 years on manufacturing defect. Supply and install by approved installer by manufacturer.

SPESIFIKASI

TIMBER, JOINERY AND IRONMONGERY

TABLE OF CONTENTS

1. General

1.1. Unless otherwise specified or shown in the Drawings, the timber species used for the Works shall be as stated hereinafter in the **TABLE H1**: Schedule of Timber Grouping and Usage. The strength grouping for timber shall be in accordance with MS 544 as shown hereinafter in the **TABLE H2**: Schedule of Timber Species in Accordance with Strength Grouping.

1.2. All carpentry and joinery work shall include all necessary notching, halving, morticing and tenoning, wedging, scarfing, dovetailing, sinking for heads of bolts and nuts and trimming for opening.

1.3. All carpentry work shall be left with a sawn surface except where particularly described to be wrot. All joinery shall be wrot and finished with sand paper as required and all sizes stated are the finished sizes. Sizes for carpentry shall be within the tolerances stated in sub-section 2.1. and sizes for joinery shall be within the tolerances stated in sub-section 2.2..

1.4. Unless otherwise indicated in the Drawings, all fire protection materials and systems must show evidence that they have been subjected to the fire resistance test in accordance with BS 476 or other approved equivalent standards.

2. Timber Grades And Size Tolerances

2.1. Unless otherwise specified, sawn timber for carpentry work shall be as stated hereunder:

2.1.1. Select Structural Grade - for roof truss

2.1.2. Standard Structural Grade - for structural work

2.1.3. Sound Grade - for General Market Specification (GMS) and strips

2.1.4. Serviceable Grade - for scantling

2.2. Grading shall be carried in accordance with the Malaysian Grading Rules (MGR) by timber graders registered with the MTIB. Every timber consignment shall be accompanied by the Grading Summary and Certificate of Compliance certified by registered timber grader. The sample of Certificate of Compliance is shown in **Appendix H/2** as stipulated in MS 1714. Notwithstanding the certificate, the S.O. reserves the right to carry out independent tests at Makmal Anatomi Kayu, FRIM or Fibre and Biocomposite Centre (FIDEC), MTIB to determine the species and Strength Group (SG). The sizes of sawn timber, except where otherwise specified, shall be within the margin of permissible variations stated hereunder:

2.2.1. For widths, depths or thicknesses not exceeding 75mm - within 3mm of the specified size.

2.2.2. For widths, depths or thicknesses exceeding 75mm - within 5mm of the specified size.

2.3. The Contractor shall provide any necessary blocks, wedges or battens to compensate for irregular surfaces caused by any variations in size of timbers hereby permitted.

2.4. Unless otherwise specified or shown in the drawing, sawn timber for joinery work shall be of Sound Grade (General Market Specification (GMS) and Strips) and

Serviceable Grade (Scantlings). The finished size for joinery, unless otherwise specified, shall be within the margin of permissible variation stated hereunder:

2.4.1. For widths, within 3mm of the specified finished size.

2.4.2. For thicknesses, within 2mm of the specified finished size.

2.5. Unless otherwise specified or shown in the drawing, the required actual dimensions shall be referred to the common commercial timber sizes given in **Table H6.**

3. Treatment of Timber

3.1. All timber except the heartwood of the naturally durable timbers as scheduled in **TABLE H2** hereinafter and timber for formwork, scaffolding, and other temporary works shall be impregnated by means of vacuum pressure processes in accordance with MS 360 using copper/chrome/arsenic (CCA) wood preservatives conforming to MS 733 in the treatment plant registered with the MTIB.

3.2. If a timber component has sufficient natural resistance to decay and insect attack by virtue of the natural durability of its heartwood, it may be used without treatment even where the hazard exists. The natural durability classification of Peninsular Malaysia and Sabah and Sarawak timbers for ground contacts can be found in MS 360 and as shown in **TABLE H4** and **TABLE H5.** Sapwood should not be used without preservative treatment.

3.3. All preservatives timber component for internal use and direct contact with humans shall be coated with a minimum of two coats of protective coating and shall be applied in accordance with the manufacturers' specification to S.O.'s approval.

3.4. Unless otherwise specified, the average moisture content for all timber shall not exceed 25% in accordance with MS 360. The moisture content shall be determined in accordance with one of the methods given in MS 837.

3.5. All timber shall be sawn or planed before treatment to achieve the finished cross-section required. As far as possible, all cross-cutting, boring, drilling or other processing should be carried out before treatment.

3.6. The pH value of the treating solution shall not be higher than 3.0 when determined by a glass electrode or pH paper at ambient temperature in accordance with MS 360.

3.7. The net dry salt retention shall be determined in accordance with one of the methods given in MS 360 and MS 821. The minimum salt penetration shall be determined by one the test methods given in MS 833.

3.8. The material shall be collected by drilling to the required depth as recommended and shown in MS 360 -**TABLE 4.** It can also be collected by sawing to the required depths, and then chipped to the small size. Either sawdust or chipped materials shall be ground to fine powder.

3.8.1. The minimum net dry salt retention for CCA shall be as shown in the table below.

No	Use	Minimum Net Dry Salt Retention For CCA
i)	Interior and above the ground	5.6 kg/m³
ii)	Exterior and above the ground	8.0 kg/m³
iii)	Exterior and in contact with the ground (other than foundation piles)	12.0 kg/m³

3.8.2. All sapwood shall be fully penetrated by the preservative and for heartwood, the depth of penetration shall be at least 6mm for the surface of the specimen and any cracked section which may appear.

3.9. The Contractor, when required by the S.O. shall produce a certificate from a preservative treatment plant which certifies that timber required to be impregnated by means of vacuum pressure processes has been impregnated and has achieved the necessary nett dry salt retention. Notwithstanding the certificate, the S.O. reserves the right to carry out independent tests to determine the nett dry salt retention and the result so obtained shall be conclusive.

3.9.1. Treatment certificate

3.9.2. A treatment certificate shall be produced for each batch of timber delivered from the treatment plant. The relevant charge sheets shall be attached with each treatment certificate. The following information shall appear on the certificate:

3.9.2.1. Name and address of buyer;

3.9.2.2. Project title/reference;

3.9.2.3. Name of treating company;

3.9.2.4. Name of preservative(s) used;

3.9.2.5. Average retention of preservative obtained;

3.9.2.6. Charge sheet number and date of treatment;

3.9.2.7. Species of timber treated together with sizes and volume;

3.9.2.8. Commodity and hazard class; and

3.9.2.9. Other registration number (where applicable)

3.9.3. The certificate shall be signed by authorized personnel of the treating company, certifying that the timber has been treated in accordance with MS 360.

3.9.4. Timber treatment with other type such as heat treatment are allowed in accordance to relevant standard.

4. Moisture Content And Storage

4.1. At the time of installation, the moisture content of the timber for the various applications shall not exceed that as specified in **TABLE H3** in accordance with MS 544: Part 1.

4.2. Moisture content for foundation piles, formworks and temporary works is not critical for these applications and therefore is not specified.

4.3. Moisture content of timber shall be determined as follow as in accordance with MS 837. The summary of standard procedure are as follows:

4.3.1. For determination of the average moisture content of test specimens, immediately weigh each of the test specimens or sections which are required to be free from saw dust and any loose splinters.

4.3.2. In cases when it is not possible to weigh the test specimens or sections immediately after cutting, place them in previously tared packets of moisture-proof plastic films and tightly sealed.

4.3.3. Dry the weighed test specimens or sections at a temperature of 103°C ± 2°C for at least 24 hours. To ensure that the test specimens or sections have attained approximately constant mass, a repeated weighing of two or three control pieces is required after further 2 hours. The difference in mass between the two successive weighing shall be less than 0.2%.

4.4. On delivery to the site, all timber other than timber for foundation piles, formworks and temporary works shall be properly open-stacked, under cover. Kiln dried timber shall be properly wrapped and stored under cover if it is not used immediately.

4.5. Care should be taken on site to ensure that the timber is adequately protected from the weather. This is particularly important with material dried to below 19% moisture content, since the full design load should not be applied if the moisture content rises above 19%.

5. Structural Assemblies Of Timber

5.1. The workmanship and method of assembly of structural timber shall generally be in accordance with MS 544 and in particular, the following requirements:

5.1.1. The quality of the surface, as finished, shall be appropriate to the position and use of the timber.

5.1.2. When grade or other necessary marks are removed, provisions shall be made for remarking in accordance with *Malaysian Grading Rules.* Surfaces at any joint in an assembly shall be such that the parts may be brought into contact over the whole area of the joint before connectors are inserted or any pressure or restraint from the fastening is applied. These surfaces shall have a good sawn or planed finish.

5.1.3. Bearing surfaces of notches and other cuttings shall be true and smooth and in appropriate relation to the other surfaces of the piece.

5.2. Notches other than at the ends of beams shall be U-shaped formed by parallel cuts to previously drilled holes. The diameter of the hole shall be equal to the width of the required notch.

5.3. Where splitting is likely to have a deleterious effect, end sealing is recommended. For timbers known to split and check especially after installation, the ends of the boards and scantlings shall be protected with a coating designed to minimise end checking and checking and splitting. In severe cases where the ends and sides of heavy joists of timbers are liable to excessive split and check due to exposure to windward slanting sunlight, appropriate skirting or cover with a thin timber board shall be necessary.

6. Timber Joints

6.1. When solid timber members are to be jointed together using mechanical fasteners, the workmanship and method of assembly shall be in accordance with MS 544: Part 5. The mechanical fasteners are as listed below:

6.1.1. Nailed Joint

Where necessary to avoid splitting, nails shall be driven into pre-drilled holes or diameter not greater than four-fifths of the diameter of the nails. Care shall be taken to avoid placing nails in any end split.

6.1.2. Screwed Joint

Lead holes shall be used to ensure good workmanship in making screwed joints. The diameter of the hole for the shank shall be equal to the diameter of the shank, and for the threaded portion, the diameter of the hole shall not be greater than seven-eighth of the diameter of the root diameter of the screw thread adjacent to the shank. Care shall be taken to avoid placing screws in any end split.

6.1.3. Bolted Joint

6.1.3.1. Bolt holes shall be drilled to diameters as close as possible to the nominal diameter of the bolt and in no case more than 2mm larger than the bolt diameter. Care shall be taken to avoid placing a bolt in any end split. A minimum of one complete thread shall protrude from the nut.

6.1.3.2. A washer shall be fitted under the head of each bolt and under each nut. The minimum sizes of washers are shown in **Table H7** as given in accordance with MS 544: Part 6. Where joints using split-rings are to be used, as shown in the Drawings, the members of the joints shall be fitted together in their appropriate positions and clamped or spiked together before drilling. Alternatively, drilling jigs or multiple head boring machines may be used, or individual members may be marked out from the setting-out or by use of prepared templates.

6.1.3.3. If either of the latter methods is employed, sample members (usually the first ones produced) shall be carefully checked against the setting-out.

6.1.3.4. In all instances holes for bolt positions shall be accurately determined by reference to the point intersection of the centre lines of the member. Great care is necessary if the first set members marked out is to be used subsequently as drilling templates. Greater accuracy can usually be obtained by the use of special marking or drilling templates located by a pin at the intersection of the center lines.

6.1.3.5. Bolts holes shall be drilled at right angles to the surface of the joint. The contact surfaces of the members should be grooved to the appropriate dimensions as given in Part 6 of MS 544.

6.1.3.6. Drilling and grooving may be done in a single operation; alternatively, if the hole is predrilled the pilot of the grooving tool shall fit in the bolt hole, thus centering the groove about the hole.

6.1.3.7. Care shall be taken to ensure that all chips and shavings are removed, and rings shall be expanded before being placed in the grooves.

6.1.3.8. The joint shall be finally assembled and bolts inserted. Washers of the correct dimension shall be placed under the head of the bolt and the nut, and the nut tightened to hold the members together.

6.1.3.9. Recess for shear-plate connectors shall be accurately cut by means of a suitable tool to be appropriate dimensions as given in MS 544: Part 6.

6.1.3.10. Assembly of units shall be done on a level bed and in such a way as to avoid damage to any of the members and so that the finished structural units conform to detailed Drawings and specification supplied.

6.1.3.11. When assembly is to be performed on the site, one set of component parts shall be fitted together and dismantled prior to dispatch to the site, in order to ensure that the assembled structural units conform to the detailed Drawings and Specifications. Twisted or damaged members shall be replaced before erection on the site.

6.1.3.12. Before proceeding with bulk production, a complete assembly of one of each framed truss or other structural unit shall be checked to prove the accuracy of the templates, etc. A similar check shall be carried out from time to time to control the wear and tear on templates and gauges.

6.1.3.13. Timber members and built-up units shall be marked in accordance with a marking diagram.

7. Prefabricated Timber Roof Truss System

7.1. All prefabricated components shall be manufactured only by reputable licensed truss suppliers listed in J-TRUSS system online (Application and Approval of Truss System Provider) and approved by the S.O.. This supplier duly termed as 'System Provider' is responsible for the analysis, design, detailing, drawing, manufacture, material, handling and erection of the roof members, and their ancillary fixing components. The full requirement is outlined in the *Specification for Prefabricated Timber Roof Trusses (JKR 20601-0190-12)* or the latest edition published by JKR.

7.2. All projects shall be registered through J-Truss Online System in accordance to the latest requirement imposed by JKR Malaysia.

7.3. System Provider

The System Provider (S.P.) is a supplier of a proprietary roof truss system appointed by the Contractor and approved by the S.O., which employs Quality Assurance procedures in the design, detailing, connection, bracing, erection criteria and manufacture of truss components for the structural roof truss system.

7.4. Duties of Professional Engineer

7.4.1. The S.P. shall appoint a Professional Engineer (P.E.) whose duties shall include the following:

7.4.1.1. Preparation of roof truss analysis and design;

7.4.1.2. Preparation of drawings;

7.4.1.3. Design changes in every stage of work;

7.4.1.4. Certification for completion of roof truss installation;

7.4.1.5. Final certification for roof truss installation prior to issuance of Certificate of Practical Completion for the whole Works to the Contractor.

7.5. Fabricator

All trusses shall only be assembled by licensed fabricators approved by the S.P. and registered with CIDB. A copy of the CIDB registration certificate shall be submitted to the S.O. for verification.

7.6. Installer

All installation works shall be executed and supervised by qualified personnel with valid certificates issued by CIDB. The S.O. shall verify the identification and qualification of the installer prior to the installation.

7.7. General Truss Limitation

7.7.1. Prior to any pre-fabricated timber roof trusses works, the following general limitation shall be applied:

7.7.1.1. Maximum unsupported truss span 12m with permitted deviation of ±0.05m.

7.7.1.2. Maximum truss spacing of 1.2m with permitted deviation of ±0.025m.

7.7.1.3. The minimum basic wind speed shall be 35 m/s. However, the minimum basic wind speed shall be increased to 41 m/s for lightweight roof covering.

7.7.1.4. Maximum roof pitch shall be of 45°.

7.8. Analysis, Design Report and Drawings Submission

7.8.1. The S.P. through the Contractor shall propose to the S.O. or his approval a roof truss system which is safe, functional and conforming to design standard. Submission of proposal shall include truss analysis, design report, and construction drawings. The truss analysis shall indicate all loads, load combinations, connections criteria, bracings and tie-down of the truss. Design output of the truss members, battens, connections, tie-down and wall plates, anchors, bracings, truss accessories, splicing and stiffeners where related to the analysis shall be included in the design report. (In accordance to *Specification Pre-Fabricated Timber Roof Truss - JKR 20601-0190-12).*

7.8.2. All details in the construction drawings shall be sufficient to enable checking against the analysis and design report, by specifying and providing not limited to: the truss layout and configuration, timber grades, section properties of members, length of members in each truss configuration, properties of truss accessories, specification of fastener and anchor, tie-down and anchoring details and all types of connection details including the connection of all attachments to the trusses.

7.8.3. Technical specifications for fastener and anchor of which the design refers to shall also be submitted. Verification test certificate from an approved accredited laboratory on the technical parameter specified in the technical specifications shall be submitted upon request by the S.O..

7.9. Warranty

7.9.1. When a refabricated timber roof truss system is used, the Contractor shall submit to the S.O. a warranty from the S.P. certified by a P.E. with the following provisions:

7.9.1.1. All roof truss components shall be manufactured only by approved S.P. producing quality assured products and services.

7.9.1.2. System Provider's Warranty against any defects or damages which may arise during a period of ten (10) years from the Date of Practical Completion of Works due to any defect, fault or insufficiency in design, materials or workmanship or against any other failure which an experienced Contractor may reasonably contemplate but shall not include normal replacement and maintenance. (In accordance to *Specification Pre-Fabricated Timber Roof - JKR 20601-0190-12).*

8. Engineered Timber Product (ETP) for Structures

8.1. General

8.1.1. This sub-section shall apply to the construction of all structures or parts of structures to be composed of engineered timber products which is glulaminated timber (Glulam), laminated veneer lumber (LVL) and cross laminated timber (CLT) (refer Figure H1). The work shall be carried out all in accordance with this specification and the lines, levels, grades, dimensions and cross-sections shown in the Drawings and as required by the S.O..

8.1.2. Glue-laminated timber (Glulam) is a structural timber product manufactured by gluing together individual pieces of dimensioned timber, having their grained essentially parallel and manufactured in accordance with the relevant Standards. The laminations thickness is allowed within 2mm up to 50mm.

8.1.3. LVL is a structural timber product manufactured by bonding together rotary peeled or sliced thin wood veneers under heat and pressure. The minimum numbers of veneer shall be five (5) and maximum thickness of each veneer shall be 6mm.

8.1.4. CLT is a solid wood board which is manufactured by gluing boards/battens crosswise in several layers.

8.2. Design Requirement

8.2.1. Design Data

8.2.1.1. Load Item

All loads shall be clearly itemised as below: -

(i) Dead Load

Dead load shall be specified as per requirement in MS EN 1991-1-1, whichever standard adopted. However, the actual weight of ceiling, mechanical and electrical (M&E) services shall not be less than 0.25kN/m2.

(ii) Imposed Load

The value and requirement of imposed load shall be as per MS EN 1991-1-1, whichever standard adopted. Notwithstanding to the value in the standard, the minimum value of imposed load shall be 0.25kN/m2 distributed uniformly over the whole area supported and 0.9kN concentrated over a length of 125mm (or in the case of coverings, over a square of 125mm side so placed as to produce maximum stresses in the affected members).

(iii) Wind Load

(a). The requirement of wind load shall be as per MS 1553 or MS EN 1991-1-4 , whichever standard adopted, with the minimum basic wind speed as

per sub-section 2.2 of this specification or the value in MS 1553 whichever higher.

(b). Load combinations shall be clearly identified (as per MS EN 1991-1-1, MS 544 : Part 3 or other equivalent standards recognised internationally) and itemised to enable design checking to be carried out upon the most adverse conditions or the effect (of uplift) under consideration.

8.2.2. Design Standards

The design of ETP members, bracings, connections shall be in accordance with the following alternative of principal standards:

8.2.2.1. MS 544 Code of Practice for Structural Use of Timber

8.2.2.2. Any other equivalent standards recognised internationally

8.2.3. Eccentricity

The centroidal axes of the connected members should meet at a point, otherwise the effect of eccentricity of the connection should be taken into account in the design of the members and their connections.

8.2.4. Frame Stability

The analysis of ETP structure frame shall take the following requirements for frame stability:

8.2.4.1. Lateral forces i.e wind load, notional load, seismic load, whichever governs.

8.2.4.2. Identification of loadpath for lateral stability.

8.2.4.3. Bracing system i.e shear wall, steel brace etc.

8.2.4.4. Provision of ties for stability against progressive collapse

8.2.5. Designing to Avoid Tension Perpendicular to Grain

8.2.5.1. Whenever possible, joints should be designed to avoid causing tension perpendicular to grain stresses in ETP members.

8.2.5.2. Long lines of fasteners spaced together along the grain should be avoided, particularly if the bolts are in tightly drilled holes. These types of connections may induce tension perpendicular to grain stresses due prying actions from secondary moments.

8.2.6. Load Suspended from ETP Member

Loads suspended from ETP beams or girders should preferably be suspended from the top of the member or above the neutral axis.

8.2.7. Jointing, Connection and Bracing

8.2.7.1. Appearance

All connections/joints of ETP members shall be designed as concealed to provide neat joint appearances on all glulam ETP timber frames. Column to foundation and main rafter to column shall be constructed with flanges bolted connections with concealed internal connection to flange plates.

8.2.7.2. Uplift and Anchorage Loads

In cases where the ETP framing members must carry uplift and/or horizontal loads resulting from wind, seismic or construction conditions, such members are required to be anchored against any horizontal or vertical movements or incidental forces. As such, connection design shall include anchorage resistance to uplift and lateral movement apart from providing adequate bearing alone. The steel plate base shall be designed to be sufficient enough to take moment forces due to the frame being free standing structure during installation stage. The installation of J-Bolt (if required) shall be part of works of the main contractor.

8.3. Detailing and drawings

8.3.1. Detailing Consideration

8.3.1.1. Consideration of Decay

(i) Where ETP member is exposed to the external weather conditions, all details shall ensure that water and moisture is dispersed and not allowed to pond or accumulate. Prevention of moisture and water entrapment can be achieved by measures such as the usage of moisture barriers, protective overhangs, flashings and other protective features.

(ii) Arch and column bases shall be elevated a minimum of 300mm above the concrete floor level to cater potential for wetting of the floor.

8.3.1.2. Consideration of Shrinkage and Swelling

Whenever possible, all connections/joints detailing shall take into consideration the effect of timber swelling and shrinking due to moisture content changes in service to avoid splitting of member.

8.3.2. Detail Drawings

Construction drawing shall consist of:

8.3.2.1. Layout Drawings

Layout drawings shall indicate the plan view of all ETP members together with ties, bracing etc.

8.3.2.2. Design Detail Drawings

The design detail drawings shall clearly indicate the following:

(i) Shape of member

(ii) Span, height, spacing, pitch, overhang and camber

(iii) Designed wind load

(iv) Structural capacity of member i.e bending, shear, axial capacity etc

(v) Magnitude and direction of forces transferred to the supporting structure

(vi) Bracing

(vii) Cambering

Each member shall be clearly drawn on a separate drawing that clearly itemises all member sizes, grade, lengths, angles, connector sizes, orientations and positions.

8.3.2.3. Bracing

Bracing layout and details shall be provided for the total ETP structure, by specifying the type of bracing and the connection details.

8.3.2.4. Connection

The connection method and fixing type of each member to member connection shall be clearly detailed to enable checking, installation and inspection. Type of connections shall be in accordance with sub-section 6.

8.4. Material and testing

8.4.1. Timber for ETP

8.4.1.1. Grade and Strength Group

Timber used for manufacturing of ETP intended for structural use shall be graded to Hardwood Structural Grade as stated in Table 1 MS 1714 by timber graders registered with the MTIB. The strength group shall be a minimum of SG5 or equivalent, in accordance with MS 544: Part 2. The cost involved in the visual strength grading shall be borned by the Contractor. Notwithstanding the certificate, the S.O. reserves the right to carry out independent tests at Makmal Anatomi Kayu, FRIM or Fibre and Biocomposite Centre (FIDEC), MTIB to determine the species and Strength Group (SG).

8.4.1.2. Mixture of species

Timber of single species shall be used in a ETP structure, and it is proven to be suitable for the manufacturing of ETP by the qualification test given in MS 758. Lamination of ETP member shall not be of a mixture of different timber species.

8.4.1.3. Moisture Content

The moisture content of the timber at the time of gluing, shall be within the range of 8% to 15% for non-treated timber and 11% to 18% for treated timber as stipulated in MS 758. The range of moisture content of the laminations in a ETP member shall be not greater than 4%. Method for the determination of the moisture content of is as stipulated in MS 837 or equivalent method. The summary of standard procedure to determine the moisture content is as stated in sub-section 4.4 of this section.

8.4.2. Preservative Treatment

8.4.2.1. The timber species should attain sufficient natural durability and resistance to decay and insect attack as stipulated in MS 544: Part 10.

8.4.2.2. Where it is not possible to use timbers which have sufficient natural durability, the timber shall be preservative treated. The treatment of timbers shall be in accordance with specification stipulated in in MS 544: Part 10. If the preservative chemical is Copper Chrome Arsenic (CCA), it shall conform to MS 733 and sub-section 3.0 of this section.. If any other preservative chemical is used, the main contractor shall provide necessary documents as may be required by the S.O representative to prove the efficiency of the chemical treatment. Timber treatment with other type such as heat treatment are allowed in accordance to relevant standard.

8.4.3. Adhesive

8.4.3.1. Selection of Adhesive

The adhesive shall be capable of producing strong and durable joints, ensuring that the integrity of the bond is maintained throughout the intended lifetime of the structure. The adhesive shall meet the requirement for adhesive Type 1 and Service Classes as stipulated in Table 1 MS 758:2001.

8.4.4. Verification of Design Properties of ETP

The finished ETP shall comply to the required design properties as stipulated in MS 758. Verification shall be provided through:

8.4.4.1. Qualification Tests

(i) The Contractor shall be fully responsible to carry out qualification tests which shall be witnessed by the S.O.. The Contractor shall carry out a qualification test whenever a new process or process change involving

new adhesive, species combination, finger joint profile and lamination thickness.

(ii) Unless otherwise stated and approved by the S.O. in writing, a minimum of five (5) qualification tests shall be carried out before any actual manufacturing is allowed.

(iii) The Contractor shall provide in test report the information on the design properties which include; characteristics values for bending strength, modulus of elasticity, compression strength, shear strength and tension strength. These properties values to be declared are characteristic values as shown in drawing.

(iv) The test shall be carried out in accordance with BS EN 408 at any accredited approved laboratory at the expense by of the Contractor.

8.4.4.2. Quality Control Tests

The Contractor shall provide information on the glue line integrity, results of delamination tests and results of glue line shear test as stipulated in MS 758. Unless otherwise stated and approved by the S.O. in writing, a minimum of ten (10) quality control tests shall be carried out before any actual manufacturing is allowed.

8.4.5. Coating Specification

8.4.5.1. All ETP members shall be coated with a minimum of two coats of a clear construction sealer to provide a moisture resistant coating and shall be applied in accordance with the manufacturers' specification to the S.O.'s approval.

8.4.5.2. This should not be considered as a final finish as rectification of damage after erection shall be part of the Contract.

8.4.5.3. Details of the sealer used shall be documented and provided for on-going maintenance of the building.

8.4.5.4. All ETP members shall routinely receive a coat of protective sealer before shipping/transport and is wrapped for protection during shipping/transport and erection. The wrapping should be left in place as long as possible and ideally until permanent protection from the weather is in place.

8.5. Manufacturing

8.5.1. Manufacturing Requirement

8.5.1.1. All glued laminated timber building components shall be manufactured and assembled by licensed glued laminated timber manufacturers approved by the S.O.. The Contractor shall provide the necessary documents relating to the proposed manufacturer such as valid licenses or other certificates to the S.O. for approval prior to the commencement of any manufacturing work.

8.5.1.2. All glued laminated timber members shall be manufactured in a factory which has quality control and quality assurance procedures in place as approved by the S.O.. The S.O. reserves the right to visit the factory before giving any approval.

8.5.1.3. The manufacturing of ETP shall conform to MS 758 and relevant standards which specifies all the requirements for the manufacture of ETP which include among others;

(i) Production conditions – premises, and equipment and workmanship, quality assurance programme.

(ii) Adhesives - The adhesive shall meet the requirement for adhesive Type I and minimum Service Class 2 as stipulated in MS 758.

(iii) (Manufacture – laminations, bonding, clamping, curing and conditioning.

8.5.1.4. When laminations are joined by finger joints these shall be produced in conformity with BS EN 385 or equivalent Malaysian standard. The finger joint of each lamella layer shall be laid in a staggered positions.

8.5.1.5. The maximum permitted deviation from the average thickness within a lamination length of 1m is 0.2mm. Where non-gap-filling adhesives are used the limit deviation shall no exceed 0.1 mm. The difference in thickness over the cross-sectional width of the lamination shall be less than 0.15% of the width and in no case exceed 0.3mm.

8.6. Fabrication

8.6.1. Prior to fabrication, the Contractor shall notify the S.O. the dates of tests that shall be carried out. The S.O. may appoint a representative in the event the S.O. cannot be present during the tests. The Contractor shall forward a copy of the test results jointly certified by the manufacturer for the S.O.'s acceptance and approval.

8.6.2. Prior to the manufacture and fabrication of the glued laminated timber, the Contractor shall provide two (2) copies of the following documents for the S.O.'s approval:

8.6.2.1. Particulars of the manufacturer

8.6.2.2. Quality assurance programme of the manufacturing process

8.6.2.3. Method statement for assembly, installation, handling and transportation

8.6.2.4. Manufacturer's fabrication drawings

8.6.2.5. Manufacturer's assembly drawings

8.6.2.6. Grading summary of timber to be used in the manufacturing of glued laminated timber, issued by timber grader certified by MTIB

8.6.2.7. Results of qualification tests

8.7. Handling and Installation

The Contractor shall submit method statement of installation for the approval of S.O.. The method statement shall explain the sequence of erection of ETP structures and required safety measures.

8.7.1. Handling

8.7.1.1. At all stages of construction, all ETP structures components shall be properly protected to prevent damage.

8.7.1.2. During on-site storage, ETP members shall be stored off the ground with spacer blocks spaced between members. If construction delays occur, the wrapping shall be cut on the underside to prevent the accumulation of water condensation. Proper transit, storage and construction methods are required to avoid rapid changes in the moisture content of members.

8.7.1.3. During handling, correct lifting equipment shall be used. All ETP members must be protected from damages due to strap, chains and wire ropes.

8.7.1.4. When ETP are stored on-site, they should be placed above the firm ground on supporting block to protect them from water. If the ETP members are stored horizontally, the supporting block shall be spaced as such to prevent bending of the member. If the ETP members are stored vertically, they should be supported at the designed support location in a manner to prevent tipping or toppling.

8.7.2. Installation

8.7.2.1. The installation of ETP members shall be as the approved detail drawings.

8.7.2.2. During erection, ETP must be transversely braced to provide stability in accordance to method statement prepared by the Contractor and approved by S.O.. All other bracings shall be provided for this purpose. ETP gable ends shall be braced before installation of others internal frame.

8.7.2.3. The engagement of licensed surveyor to determine the accuracy of base plate and position of ETP structure shall be under the scope of work of the Contractor.

8.7.2.4. The Contractor shall inspect the prepared foundations and holding down bolts for position and level not less than seven days before erection of ETP work starts. He shall then inform the S.O.. If he finds any discrepancies which are outside the deviations specified in the drawing requesting that remedial work be carried out before erection commences.

8.8. Defects and alteration

8.8.1. Glued laminated timber structures shall not have any debonding. Glued laminated timber structures affected by debonding shall be marked as 'Rejected' and removed from site.

8.8.2. No element of the ETP roof truss, roof frames or roof ancillary members shall be cut or notched or removed or otherwise altered from its original state without the prior written approval of the S.O..

8.8.3. Where defects exceeding the limits or permitted tolerances are detected, rectification works shall be carried out based on the recommendations made by the P.E. and to the approval of the S.O..

8.9. Warranty

8.9.1. The Contractor shall submit to the S.O. a performance warranty by the Contractor on the performance of the ETP member against debonding which may occur during a period of ten (10) years from the date of practical completion. The terms of the performance warranty shall be as stipulated in **APPENDIX H/1** and as approved by the S.O..

9. Carpentry Works

9.1. All carpentry shall be accurately set out in strict accordance with the Drawings and shall be framed together and securely fixed to the approval of the S.O.. Timber framing shall be properly braced and checked, halve, screwed or bolted together as required. Longitudinal joints in plates, ridge, fascias, et cetera shall be formed over supports. Those timber members with lapped joints shall lap at least 150mm or twice the depth of the timber whichever is the greater. The brads, nails, screws, spikes, plugs, bolts, framing anchors and timber connectors shall be provided wherever necessary and as detailed. Other than those detailed, no joints are permitted in structural work unless prior permission is obtained from the S.O.. No structural member shall be notched unless instructed by the S.O..

9.2. For the carpentry works, timbers shall, as far as possible be in piece between continuing lengths. At corners, timbers shall be halved for materials of the same thickness, and sufficiently lapped for materials of different thicknesses.

10. Joinery Works

10.1. All doors, windows, louvers, screens and the like shall be constructed as shown in the Drawings. Frames shall be assembled at the commencement of the work and all members shall be carefully morticed and tenoned together but no wedging, pinning or gluing shall be done until the framing is prepared in readiness for immediate fixing. All doors, windows, louvers, screens and the like shall be properly stored on site.

10.2. Immediately before fixing in its final position, joinery shall be wedge and pinned by drawn hole pinning with 10mm diameter Strength Group 1 and 2 timber dowels pins. The pins shall be left projecting until permission is given for flushing off. The methods of framing and putting together of all Works shall be approved by the S.O. before being executed. Any portions that warp, twist or develop any other defects shall be replaced before wedging up. All framed work shall be pinned before being framed together.

10.3. The choice of species for joinery should be based on working properties of timbers that is maximum percentage of shrinkage.

10.4. Jointing or connection for joinery that is nailed joint, screwed joint, coach screwed joint or bolted joint shall comply with MS 544 : Part 5.

11. Timber Floor Finish

11.1. Unless otherwise shown in the Drawings, timber floors shall be constructed using 100mm x 38mm wrot, tongued and grooved boarding's, well cramped up and secret nailed to each joist or batten with 62mm wire nails. Floor boarding shall be in long lengths with splayed heading joints and no two adjacent joints shall occur over the same joist. On completion, the flooring shall be planed, sanded and all gaps sealed with an approved sealer. The floor shall then be cleaned off and unless otherwise specified, it shall be finished with three coats of approved polyurethane paint applied strictly in accordance with the manufacturer's instructions.

11.2. Wrot timber skirting shall be provided where shown and as detailed in the Drawings. Skirting shall be in long lengths with splayed heading joints and with mitres, returns and ends neatly cut and fitted and fixed to grounds.

11.3. Where engineered timber flooring are specified or shown in the Drawings, it shall be finished with high abrasive protective overlay and a moisture barrier balancing film to be applied on timber flooring backing in accordance with the manufacturer's recommendations and S.O.'s approval.

11.4. Timber strip and parquet flooring shall be as specified in SECTION K: PLASTERING, PAVING, TILING AND CARPET.

12. Ceiling Timber Battens

Where ceiling battens are used for ceilings, it shall be fixed to the frames with butt 'V' joint using nails or screws. Asbestos-free cement flat sheets for ceiling shall be 5mm thick fixed to frames using mitred profiled timber cover battens and brass screws with rounded edge beading. Ceiling panels shall be set out symmetrically from the centre line of the ceiling. Suspended ceiling systems shall be as specified in SECTION I: CEILING.

13. Timber Partitions

Non-structural timber partitions shall be as specified in SECTION E: WALL SYSTEM.

14. Fascia And Barge Boards

Unless otherwise shown on the Drawings, fascia and barge boards shall be 25mm thick wrot timber and supplied in long lengths. The boards shall be fixed in whole lengths and where joints are necessary, they shall be scarfed jointed and the joints shall occur only over the ends of roof framing members and mitred corners. Board, 250mm wide and less shall be in one width and those deeper shall be formed by multiple of boards jointed together by tongue and groove and 'V' joint.

15. External Boarding

15.1. Unless otherwise shown on the Drawings, all external boarding shall be formed with 150mm x 19mm horizontal, vertical or diagonal boarding in wrot pressure-treated timber in long lengths and to the sectional profile as detailed in the Drawings.

15.2. Unless otherwise shown, lapping for plain weather boarding shall be 38mm. Boarding shall be secured to the frames using 75mm galvanized steel nails and in the case of plain weather boarding, nails shall not be driven through the lapped

portions. The exposed bottom ends of all external vertical boarding shall be splayed inward at an angle of 30° and treated with preservatives.

15.3. The timber boarding shall be cleaned off and unless otherwise specified, it shall be finished with approved polyurethane base paint with UV protection applied strictly in accordance with the manufacturer's recommendations. The strength grouping for external timber flooring shall be in accordance with the Properties of Malaysian Timber as shown hereinafter in **TABLE H8**.

15.4. For coastal environments and exposed weather applications subjected to airborne salts deposition, metal connectors and fasteners used shall comply with AS 3566 Class 4 and be certified as such by the supplier of fasteners and to the approval of the S.O..

15.5. All fixings and associated components shall be manufactured from compatible metals and coated conforming to ISO 9223 Category 4 (C4) and Category 5 (C5) environment. Flashings shall be made from the same material as the roofing sheets.

16. Staircase And Balustrades

16.1. Unless otherwise shown in the Drawings, the Contractor shall prepare Shop Drawings as required for the Works. Prior to the fabrication and installation works, the Contractor shall submit the Shop Drawings to the S.O.'s for approval.

16.2. The preferred sizes for modular staircase and stair openings shall comply with MS 1064: Part 3.

17. Timber Solid Panel Doors

17.1. All fire doors shall be of the appropriate Fire Resistance Period (FRP) in accordance with the Ninth Schedule of the Uniform Building By-Laws.

17.2. All fire doors including frames shall be constructed to a specification of the relevant FRP in accordance with MS 1073 and shall be tested by a laboratory, approved and certified by DGFR and have obtained a Product Certification Scheme from an accredited certification body.

17.3. All double leaf doors with rebated meeting stiles shall be provided with coordinating device so as to fit fully within the door openings with a gap of not more than 3mm between the frame and the edge of the door when closed

17.4. Where shown on the Drawings, approved vision panel of suitable size shall be incorporated in the Fire Rated Door.

17.5. Flush doors shall generally comply with MS 1506: Specification for Wooden Door with plywood facing and strength group 1 and strength group 2 timber lipping, mitred around all edges. The plywood and strength group 1-4 shall in all respects with the Specifications mentioned hereinbefore.

17.6. The preferred sizes for modular door sets shall comply with MS 1064: Part 4 and for modular windows shall comply with MS 1064: Part 5.

18. PVC Doors

18.1. Unless otherwise specified in the Drawings, PVC doors shall be of strong impact resistance and waterproof/moisture resistant laminated timber finish on both sides. Unless otherwise shown in the Drawings, the door shall be 38mm thick.

18.2. PVC toilet doors shall be of full single panel of flush type. It shall be 100% waterproof, strong impact resistance and not be discoloured easily. Unless otherwise shown on the Drawings, the door shall be 38mm thick. PVC door shall be delivered to the site complete with ironmongery as listed in the '**TABLE 9**: SCHEDULE OF IRONMONGERY'.

19. Products And Materials

19.1. Plywoods

19.1.1. Unless otherwise specified, plywood used for interior and exterior purposes other than for formworks and temporary works shall be manufactured with Moisture Resistant (MR) bond and Weather and Boil Proof (WBP) bond respectively in compliance with MS 228. Boards which are to be painted or varnished shall be properly sanded down and holes and crevices filled with approved wood putty or filler.

19.1.2. Plywood intended for use as shuttering board shall be of the Weather and Boil Proof (WBP) type.

19.1.3. Plywood intended for structural use, shall be of Malaysian Basic Structural Grade (MBSG) rated or equivalent and shall comply with MS 544: Part 4.

19.1.4. Plywood to be used in marine environment or severe wet conditions shall be in accordance with MS 544: Part 4.

19.2. Blockboard

19.2.1. Blockboard shall comply with MS 1123. Fixing of blockboards shall generally be in accordance with the manufacturer's instructions.

19.2.2. Boards which are to be painted or varnished shall be properly sanded down and holes and crevices filled with approved wood putty or filler to the approval of the S.O..

19.3. Chipboards

19.3.1. Chipboards shall be of the type manufactured from wood chips or shavings combined with a thermosetting synthetic resin glue binder bonded and hot-pressed together and complying with MS 1036 for medium density chipboard. The type and quality of boards shall be approved by the S.O.. The boards shall be fixed as detailed in the Drawings with a minimum edge distance of 12mm for nailing.

19.3.2. Boards which are to be painted or varnished shall be properly sanded down and holes and crevices filled with approved wood putty or filler to the approval of the S.O..

19.4. Fibre Building Boards

19.4.1. All fibre building boards namely, Hard Board, Medium Board and Medium Density Fibre Board (MDF) shall comply with MS 1429 and MS 1912. The type and quality of Fibre building boards shall be as approved by the S.O. Perforated hardboards shall be not less than 3.2mm thick with maximum of 4.8mm perforation at 19mm centers unless otherwise stated in the Drawings.

19.4.2. All fibre building boards shall be fixed strictly in accordance with the manufacturer's instruction. Unless otherwise detailed in the drawings, the ceiling boards shall be butt and `V' jointed.

19.5. Composite Boards

19.5.1. The type and quality of composite boards shall be as approved by the S.O. and shall be fixed strictly in accordance with the manufacturer's instruction.

19.5.2. Fixing of timber base composite boards shall comply with the manufacturer's instructions. Panels which are to be painted or varnished shall be properly sanded down and holes and crevices filled with approved wood putty or filler to the satisfaction of the S.O.. Panels which are for wet prone area, shall comply with MS 1787.

19.6. Woodwool Slabs

Woodwool slab shall comply with MS 1036 and shall be of the type and quality as approved by the S.O.. Unless otherwise specified in the Drawings, the slab shall be laid with its length at right angles to support, fixed strictly in accordance with the manufacturer's instruction.

19.7. Wood Cement Boards

19.7.1. Wood cement boards shall comply with the requirements of MS 934 or MS 544: Part 4. In fixing, the board must be supported on all four edges and at immediate positions at centres not exceeding 610mm. Joints between boards shall occur on centers of supports. Minimum edge distance shall be 20mm.

19.7.2. Boards which are to be painted shall be lightly sanded and any dust shall be removed from the surface with a piece of clean coarse cloth. Any filling compounds used shall be alkali-resistant. Fixing of the board shall be in accordance with the manufacturer's instructions.

19.8. High Pressure Laminate (HPL)

High Pressure Laminate is a thermoset paper/plastic composite, where decorative papers impregnated with melamine are consolidated over phenolic-impregnated craft papers at high temperature and pressure to form a homogenous laminate. Unless otherwise specified, HPL shall comply with MS 1787: Part 1-15 for durability.

19.9. Wood Plastic Composite (WPC)

WPC shall be made from minimum 70% rice husk and balance recycled HDPE. WPC solid decking system shall be of 145mm (w) x 25mm (t) fixed onto 300mm c/c on Suspended Leveling System with hot dipped zinc-aluminium alloy coated steel with a minimum coating mass of AZ150 to AS/NZS 1397-2002 steel sheet

grade G300 on to flat concrete slab with ENSS03 stainless steel clip, all in accordance with manufacturer's recommendation and S.O.'s approval.

20. Ironmongery

20.1. Unless otherwise shown on the Drawings, the Contractor shall supply and fix all ironmongery as listed in the **TABLE H9**: Schedule of Ironmongery attached hereinafter, complete with fixing screws of the same material and finish.

20.2. Proper sockets shall be provided for all bolts to fix flush in floors, cills and door and window frames. Each lock shall be provided with three keys and no locks shall have identical keys, unless specifically required by the S.O..

20.3. All doors, windows, gates, joinery, et cetera, shall be provided with anti-rust heavy duty ironmongery appropriate for its function, complete with fixing screws of the same material and finish

20.4. All doors shall be provided with door-stops, door-closers and other appropriate ironmongery where applicable or as shown on the Drawings.

20.5. The submission of ironmongery set shall have been tested and certified by Certification bodies accredited by Jabatan Standard Malaysia.

21. Built-in Furniture

21.1. General

21.1.1. Built-in furniture shall be constructed and properly framed in wrot timber as shown on the Drawings. Where fittings are not to be painted, unless otherwise specified, they shall be stained and varnished as described in SECTION O:PAINTING.

21.1.2. All interior furniture works shall be coordinated with mechanical and electrical works and as approved by the S.O..

21.1.3. All built-in furniture materials shall be protected wrapped in strong waterproof paper or polythene/polyethylene (PE) sheeting to protect against damp and scratching during transportation from the factory. The wrapping shall not be removed until installation starts.

21.1.4. Built-in furniture materials shall be unloaded and handled in a manner which will not result in damage, deformation or contamination to the built-in furniture materials.

21.1.5. Built-in furniture materials and loose furniture delivered to the site shall be properly stored by arranging them in stacks, keeping them properly wrapped and stored under cover if they are not used or assembled immediately.

21.2. Materials

21.2.1. All composite wood products, such as Medium Density Fibreboard (MDF) shall comply with MS 1429 and the use of Particleboards shall comply with MS 1912.

21.2.2. The formaldehyde emission for all composite wood products and wood based panels shall comply with MS 1787.

21.2.3. Laminates used in composite wood products shall comply with MS ISO 4586.

21.2.4. Unless otherwise specified in the Drawings or Specification the resin used in composite wood products shall be phenol-formaldehyde (PF), melamine-urea-formaldehyde (MUF), melamine-urea-phenol formaldehyde (MUPF), polymeric diphenyl methane diisocyanate (PMDI) or polyurethane (PU).

21.2.5. Adhesive for wood and composite wood products shall be phenol-formaldehyde resin adhesive classified as weather-proof and boil-proof, in accordance with MS 908.

21.2.6. Thermoplastic fittings, such as handles and accessories, where applicable, shall be polyamide (PA) or polypropylene (PP). Thermoplastics shall comply with MS 2324.

21.2.7. Solid surface shall be non-porous, homogenous, stain and chemical resistant, fire resistant and with a composition of acrylic polymer, aluminium trihydrate filler and pigment.

21.2.8. Where timber species are used it shall be constructed and properly framed in wrot timber as detailed in the Drawings.

21.3. Component Assemblies

21.3.1. Unless otherwise stated in the Drawings, steel frames, where applicable, shall be square and flat with mitred, welded corners.

21.3.2. Screws shall have countersunk heads which shall comply with MS ISO 1482.

21.3.3. Hinges shall have a spring mechanism to lock the door in a close or open position, remain completely hidden behind the door and enable the door to open to 120°.

21.3.4. Drawer slides shall be epoxy powder coated metal, mounted from the bottom and provided with friction bearing-mounted nylon rollers.

21.3.5. Unless otherwise specified, drawers shall have the 'soft-close' and/or 'positive-close' functions, which are mechanisms enabling drawers to quietly shut, or which fully shut after being only partially pushed. Drawers can be lifted up and removed easily for cleaning purposes.

21.3.6. All drawers, unless otherwise specified, shall have ¾ extension and be able to sustain up to 25kg. Kitchen cabinet drawers shall have full extension and be able to sustain up to 45kg, which is suitable for large pots, pans and/or woks.

21.3.7. Drawers for storing small kitchen cutlery shall have thermoplastic inserts with subdivided compartments.

21.3.8. Drawer handles and cabinet pulls shall be ergonomic. Thermoplastic handles and pulls shall recess into the door panels. Metal handles and pulls that extrude shall either be epoxy powder coated and/or anodized aluminium.

21.3.9. Solid surface worktops and countertops shall be 12mm thick, 600mm deep with backsplash 100mm high, with integral bowl, where applicable. Actual dimension of solid surface worktops shall be measured at site. Upon installation of the solid surface worktops, it shall be polished and set level to S.O.'s approval.

21.3.10. Unless otherwise specified, worktops and countertops shall have a flat edge finishing at the perimeter. Worktops and countertops shall be provided with holes and cut-outs for plumbing components, where applicable. All joints shall be inconspicuous and use the manufacturer's recommended adhesive and silicone sealant.

21.3.11. Built-in furniture sliding doors shall be fitted with guides or similar fittings, rollers or ball bearings, pull handles, stops and locking mechanisms.

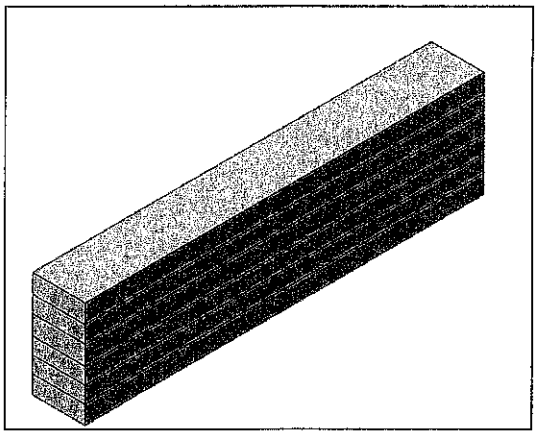
21.3.12. Cabinet doors with glass inserts and/or panels shall be constructed with proper support to ensure that the glass remains securely fixed. Support shall be bedded in mastic with all interstices completely filled.

21.3.13. Glass inserts and/or panels and glass shelves, where applicable, which needs to be structurally strong shall be tempered glass. Tempered glass shall comply with MS 1498.

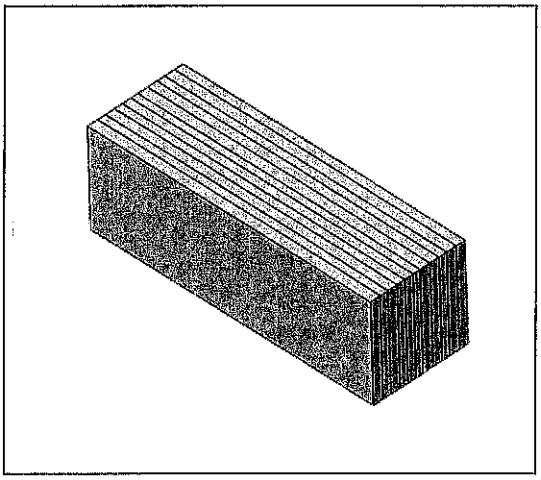
21.3.14. Cupboards, wardrobes, cabinets and shelves shall have peg-holes on either side internally, allowing for adjustable shelf height. Adjustable legs, if applicable, shall be of a proprietary system type as approved by the S.O..

FIGURE H1: ENGINEERED TIMBER PRODUCTS:

(a) Glued Laminated (Glulam) Timber



(b) Laminated Veneer Lumber (LVL)



(c) Cross Laminated Timber (CLT)

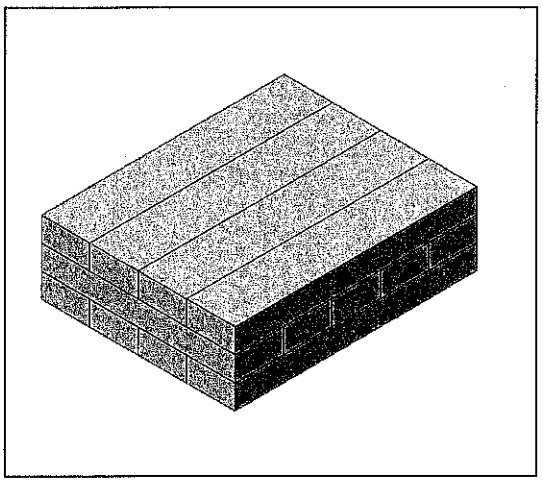


Table H1. Schedule of Timber Grouping and Usage

No	Typical Usage	Species
1	**Structural frames**	
	1.1 All columns, stilts and beams	SG4
2	**Bearer to water tank**	SG5
3	**Staircase and component elements**	
	3.1 Stinger & treads/Riser	SG5
	3.2 Trimmer beams	SG5
	3.3 Balustrades, nosing and handrails	SG5
4	**Flooring**	
	4.1 Floor bearers, joists and strutting for joists	SG5
	4.2 Floor boardings	SG5
	4.3 Gymnasium floor boarding	SG4
	4.4 Parquet flooring	SG5
	4.5 Skirtings	SG5
5	**Walling**	
	5.1 Wall and partition framings	SG5
	5.2 External wall boardings	SG5
	5.3 Internal wall boardings	SG7
6	**Roof structures**	
	6.1 Roof trusses, rafters, purlins, wall plates and other roof members	SG1 - SG4
	6.2 Fascia boards	SG5
7	**Ceiling frames**	
	7.1 Ceiling joists and spacers	SG5
	7.2 Cover battens to joints of ceiling sheets	SG7
	7.3 Ceiling strips and soffit battens	SG7
8	**Door and window frames**	
	8.1 All doors, windows, vent frames, grounds, stops and architraves	
	8.1.1 External usage	SG5
	8.1.2 Internal usage	SG7
9	**Furniture fitting**	
	9.1 Built-in fittings and furniture in general	
	9.1.1 Carcassing	SG5
	9.1.2 Lining/Panelling	SG7
	9.1.3 Top	SG5
	9.2 Workshop furniture top	SG5
10	**Beading fillets and edgings in general**	SG5

Table H2. Schedule of Timber Species in accordance with Strength Grouping (S.G)

S.G 1	S.G 2	S.G 3	S.G 4	S.G 5	S.G 6	S.G 7
A) Naturally Durable						
Balau	Belian	Bekak	Giam	Jati		
Bitis	Mata Ulat	Delek	Malabera	Tembusu		
Cengal	Kekatong	Keranji	Merbau			
Penaga			Resak			
B) Requiring Treatment						
	Dedaru	Agoho	Berangan	Alan Bunga	Bayur	Ara
	Kempas	Balau Merah	Dedali	Babai	Damar Minyak	Batai
	Merbatu	Kelat	Derum	Balik Angin Bopeng	Durian	Geronggang
	Mertas	Kembang Semangkuk	Kapur	Bintangor	Jelutung	Laran
		Kulim	Kasai	Brazil Nut	Jenitri	Pelajau
		Pauh Kijang	Keruntum	Gerutu	Jongkong	Pulai
		Penyau	Mempening	Kundur	Kasah	Sesenduk
		Perah	Meransi	Kedondong	Macang	Terentang
		Petaling	Meranti Bakau	Keledang	Medang	
		Ranggu	Merawan	Keruing	Melantai/ Kawang	
		Ru	Merpauh	Ketapang	Meranti Merah Muda	
		Surian Batu	Nyalin	Kungkur	Meranti kuning	
		Tualang	Perupuk	Melunak	Mersawa	
			Punah	Mempisang	Sengkurat	
			Rengas	Mengkulang	Terap	
			Simpoh	Meranti Merah Tua		
				Meranti Putih		
				Nyatuh		
				Penarahan		
				Petai		
				Ramin		
				Kayu Getah		
				Sengkuang		
				Sepetir		
				Tetebu		

Notes :

1. For naturally durable timbers, sapwood should be excluded. If sapwood is included, preservative treatment is necessary.(Source: MS 360:1986)
2. For timber requiring treatment, they should be amenable to preservative treatment.

Table H3. Schedule of Moisture Contents (M.C) of Timber for Various Positions in Building

Application	Maximum M.C. At Time Of Installation For Non Air-Conditioned Application	Maximum M.C. At Time Of Installation For Airconditioned Application (Kiln-Dried Timber)
Structural Components		
• Columns, beams, bearer, studs, joists, ties and struts	30% (Thickness >100mm) 25% (Thickness <100mm)	Not applicable Not applicable
Roofing		
• Rafters, ties, struts, purlins and bracing	25%	Not applicable
• battens	25%	Not applicable
Staircase		
• stringers, treads, trimmer beam and handrail	19%	12%
• balustrades	19%	12%
Flooring		
• floor boarding and parquetry	19%	12%
• skirtings	19%	12%
Walling		
• wall, partition framing	19%	12%
• external wall boardings	19%	Not applicable
• internal wall boardings	19%	12%
• fascia boards	19%	Not applicable
Ceiling Frames		
• cover battens to joints of ceiling sheets	25%	Not applicable
• ceiling strips and soffit battens	19%	12%
Door & Window Frames		
• door, window and vent frames including their stops and grounds	19%	12%
• door leaves, window and vent sashes	19%	12%
Furniture		
• built in fittings, furniture generally	19%	12%
• workshop furniture	19%	12%
• science laboratory tops	19%	12%
Beading fillets and edgings generally	19%	12%

Table H4. Natural Durability[1] Classification of Peninsular Malaysia Timbers for Ground Contact

Class 1	Class 2	Class 3		Class 4	
Very durable (More than 10 years)	**Durable (5 to 10 years)**	**Moderately durable (2 to 5 years)**		**Not durable (Less than 2 years)**	
Chengal	Balau	Agoho[2]	Rengas	Api-api	Nyatoh[6c]
Giam	Bekak	Balau, red	Sepetir	Ara	Perapat
Penyau	Bitis	Bakau	Tumu	Berangan	Perah
Resak	Kasai	Bungor	Tualang	Balek angin	Perupok
Tempinis	Kapur [4a]	Derum	Telor buaya	Bintangor	Petai
	Nyatoh[6a]	Dedali	Pelong	Batai	Podo
	Merbau	Dedaru	Kerukup	Bayur	Pulai
	Mersawa	Delek	Brazil nut[2]	Damar minyak	Putat
	Merbau lalat	Dungun	Keruntum	Dungun paya	Ramin
	Delinsem[2]	Acacia[3]	Keruing[8a,b,c]	Durian	Samak
	Malabera	Pauh kijang	Keledang[9a,b]	Engkabang	Sena
	Medang[5a,b]	Kapur[4b]	Mata ulat	Jelutong	Sawa luka
	Penaga	Kelat	Medang[5c]	Gaham badak	Sepul
	Pelajau	Kembang semangkok	Meranti,[7a,b,c,d,e] dark red	Geronggang	Sesenduk
	Pelawan	Kempas	Mempening	Gerutu	Sentang[3]
	Ranggu	Keranji	Mengkulang	Gading	Simpoh
	Surian batu	Gegatal	Meransi	Gapis	Sempilor
	Teak	Kulim	Merbatu	Meranti bakau	Terentang
	Tembusu	Kungkur	Merawan	Meranti, light red	Tapus
		Leban	Merbau kera	Jenitri	Terap
		Nyalas	Meranti, white	Jongkong	Tuai
		Pauh kijang	Mertas	Kasah	Tulang daing
		Petaling	Nyatoh[6b]	Kekabu	Ketapang
		Punah	Nyireh	Kawang	Rubberwood
			Nipis kulit	Keledang[9c,d,e]	Pine[3]
				Kapur[4c]	Yemane[3]
				Kayu malam	Coconut
				Kedondong	Tengkurung
				Kungkur	Penarahan
				Meranti, yellow	Keruing[8d,e]
				Laran	Meranti tembaga
				Lelayang	Machang
				Lilin	Medang[5d, e]
				Limpaga[2]	Mempisang
				Ludai	Merbatu
				Merpauh	Melantai
					Minyak berok

NOTE:

For reference to source of data see Bibliography.

The results were obtained from the graveyard test from the Forest Research Institute Malaysia test site.

[1] All samples taken from heartwood area except for the timber which their sapwood and heartwood cannot be differentiated. Timber of the same species but from different regions in Malaysia may have different durability classifications.
[2] The timber is not Peninsular Malaysia origin.
[3] Plantation timber, originally from other countries.
[4a] *Dryobalanops aromatica*
[4b] *Dryobalanops rappa*
[4c] *Dryobalanops oblongifolia*
[5a] *Alseodaphne insignis*
[5b] *Dehaasia nigrescens*
[5c] *Cinnamomum porrectum*
[5d] *Litsea firma*
[5e] *Litsea megacarpa*
[6a] *Palaquium impressinervium*
[6b] *Palaquium maingayi*
[6c] *Palaquium gutta*
[7a] *Shorea uliginosa*
[7b] *Shorea platyclados*
[7c] *Shorea pauciflora*
[7d] *Shorea singkawang*
[7e] *Shorea curtisii*
[8a] *Dipterocarpus sublamellatus*
[8b] *Dipterocarpus crinitus*
[8c] *Dipterocarpus verrucosus*
[8d] *Dipterocarpus kerrii*
[8e] *Dipterocarpus lowii*
[9a] *Artocarpus interger*
[9b] *Artocarpus lanceifolius*
[9c] *Artocarpus dadah*
[9d] *Artocarpus rigidus*
[9e] *Artocarpus heterophyllus*

Table H5. Natural Durability[1] Classification of Sarawak Timbers for Ground Contact

Class 1	Class 2	Class 3		Class 4	
Very durable (More than 10 years)	**Durable (5 to 10 years)**	**Moderately durable (2 to 5 years)**		**Not durable (Less than 2 years)**	
Belian	Kapur bukit	Baru	Kapur paji	Acacia	Bindang
Penyau	Kapur kelansau	Bedaru	Kapur paya	Alan	Geronggang
Selangan batu[2]	Kawi	Kandis	Luis/Chengal pasir	Asam	Jadap
	Luis	Kasai	Medang luis kasar	Bajan	Jelawai
	Lun runcing	Leban	Mengkulang	Bayur	Jelutong
	Mertama	Nyireh	Mersawa kunyit	Bengang	Kayu cina
	Nyatoh[3]	Pelajau	Petai belalang	Benuah	Kayu malam
	Rhu	Resak membangun	Sempilor	Binuang	Kelampayan
	Selangan batu[4a]	Seladah[4b, c]		Bintangor	Kembang semangkok
		Selumar		Bintawak	Kepayang babi
		Selunsur		Dungun	Keranji
		Tapang		Durian	Keruing
		Urat mata		Empenit	Ketiau
				Entuyut	Kumpang
				Litoh	Legai
				Medang	Meranti, light red
				Menggris	Yellow flame
				Mersawa paya	Meranti, yellow
				Minggi	Mergasing
				Ngilas	Peran/bilat
				Nyatoh[5a, b]	Segera
				Pelai	Seladah[6a, b]
				Perah	Sentang
				Perupok	Simpoh Tampoi
				Petai	Tekalong
				Pitoh	Teruntum Ubah
				Ramin	Upi
				Resak paya	
				Sawih	

[1] The results were obtained from the graveyard test from Oya Road, Sibu test site. All samples taken from heartwood area except for the timber which their sapwood and heartwood cannot be differentiated. Timber of the same species but from different regions in Malaysia may have different durability classifications.

[2] *Shorea pulricostata*

[3] *Palaquium rivulare*

[4a,b,c] *Shorea flava, S. laecis, S. spp*

[5a,b] *Dacryodes incurvata, Santira laevigata*

[6a,b] *Palaquium pseudorostratum, Ganua motleyana*

Table H6. COMMON COMMERCIAL TIMBER SIZES

Sizes and geometrical properties of Malaysian structural timbers

Shape	Nominal Size (mm x mm)	Minimum timber sizes (mm)		
		Fullsawn	Baresawn	Dressed Timber
Square	25 x 25 (1" x 1")	28 x 28	25 x 25	20 x 20
	50 x 50 (2" x 2")	55 x 56	50 x 50	45 x 45
	75 x 75 (3" x 3")	80 x 81	75 x 75	70 x 70
	100 x 100 (4" x 4")	106 x 106	100 x 100	90 x 90
	125 x 125 (5" x 5")	131 x 131	125 x 125	115 x 115
	150 x 150 (6" x 6")	159 x 159	150 x 150	140 x 140
Rectangle	25 x 50 (1" x 2")	28 x 56	25 x 50	20 x 45
	25 x 75 (1" x 3")	28 x 81	25 x 75	20 x 70
	25 x 100 (1" x 4")	28 x 106	25 x 100	20 x 90
	25 x 125 (1" x 5")	28 x 131	25 x 125	20 x 115
	25 x 150 (1" x 6")	28 x 159	25 x 150	20 x 140
	25 x 175 (1" x 7")	28 x 184	25 x 175	20 x 165
	25 x 200 (1" x 8")	28 x 212	25 x 200	20 x 190
	38 x 50 (1½" x 2")	41 x 56	38 x 50	33 x 45
	38 x 75 (1½" x 3")	41 x 81	38 x 75	33 x 70
	38 x 100 (1½" x 4")	41 x 106	38 x 100	33 x 90
	38 x 125 (1½" x 5")	41 x 131	38 x 125	33 x 115
	38 x 150 (1½" x 6")	41 x 159	38 x 150	33 x 140
	38 x 175 (1½" x 7")	41 x 184	38 x 175	33 x 165
	38 x 200 (1½" x 8")	41 x 212	38 x 200	33 x 190
	50 x 75 (2" x 3")	55 x 81	50 x 75	45 x 70
	50 x 100 (2" x 4")	55 x 106	50 x 100	45 x 90
	50 x 125 (2" x 5")	55 x 131	50 x 125	45 x 115
	50 x 150 (2" x 6")	55 x 159	50 x 150	45 x 140
	50 x 175 (2" x 7")	55 x 184	50 x 175	45 x 165
	50 x 200 (2" x 8")	55 x 212	50 x 200	45 x 190
	63 x 100 (2½" x 4")	68 x 106	63 x 100	58 x 90
	63 x 125 (2½" x 5")	68 x 131	63 x 125	58 x 115
	63 x 150 (2½" x 6")	68 x 159	63 x 163	58 x 140
	63 x 175 (2½" x 7")	68 x 184	63 x 175	58 x 165
	63 x 200 (2½" x 8")	68 x 212	63 x 200	58 x 190
	75 x 100 (3" x 4")	80 x 106	75 x 100	70 x 90
	75 x 125 (3" x 5")	80 x 131	75 x 125	70 x 115
	75 x 150 (3" x 6")	80 x 159	75 x 175	70 x 140

(Source : MS 544 : Part 2)

Table H7. Minimum required size of Washers for Structural Bolted Joints

Bolt diameter (mm)	Washer size (mm)		
	Thickness	Min. diameter for round washers	Min. side length for square washers
M6	1.6	30	25
M8	2.0	36	32
M10	2.5	45	40
M12	3.0	55	50
M16	4.0	65	57
M20	5.0	75	65
>M20	6.0	85	75

(Source: MS 544 : Part 6)

Table H8. Properties of Malaysian Timber

Heavy Hardwoods				
No	Species	Strength	Tangential Movement	Air-dry density (kg/m^3)
1	Balau	Very strong	2.1 – 2.5%	850-1155
2	Merbau	Strong	2.1 – 2.5%	515-1040
3	Red Balau	Strong	2.1 – 2.5%	800-880
Medium Hardwoods				
1	Kelat	Strong	2.1 – 2.5%	495-1010
2	Kempas	Very strong	> 3.1%	770-1120
3	Keruing	Strong	2.6 – 3.0% 3.1%	690-945
4	Mengkulang	Strong	2.1 – 2.5%	625-895
5	Merpauh	Strong	1.5 – 2.0%	640-880
Light Hardwoods				
1	Bintagor	Moderately strong	1.5 – 2.0%	495-865
2	Dark Red Meranti	Moderately strong	< 1.5% 1.5 – 2.0%	560-865
3	Gerutu	Moderately strong	2.6 – 3.0%	575-880
4	Mersawa	Moderately strong	2.1 – 2.5%	515-735
5	Yellow Meranti	Moderately strong	1.5 – 2.0%	575-735

(Source: Choo KT, Gan KS & Lim SC, Movement of Seasoned Timber in Service, FRIM Technical Information Handbook No. 18)

Table H9. Schedule Of Ironmongery

Type of Doors, Windows etc.	Ironmongery for each type of doors, windows etc.
1. Single Leaf Door	
1.1. Plywood Flush Door	a) 3 Nos. of 102mm x 76mm x 2mm galvanised steel hinges with nylon rings. b) 1 No. upright 3 lever mortice lockset with satin chrome lever handle furniture of approved manufacture with 2 Nos. chrome plated keys of different serial number for each building. c) 1 No. stainless steel door stopper.
1.2. Timber Panelled Door	a) 3 Nos. of 102mm x76 mm x 2mm stainless steel hinges with nylon ring. b) 1 No. medium duty cylindrical lockset, 5 pin tumbler with knob and rose of stainless steel with hairline finish complete with 3 Nos. nickle-plated brass keys of different serial number for each building. c) 1 No. stainless steel door stopper.
2. Double Leaf Door 2.1. Plywood Flush Door	a) 6 Nos. 102mm x 76mm x 2mm stainless steel hinges with nylon rings. b) 1 Set Hollow Lever Handle Stainless Steel Mortice Lock Body with single key thumb turn cylinder. c) 1 No. solid brass mortice lock rebated part. d) 1 Set of 150mm and 300mm Flush Bolt Lever Type Stainless Steel. e) 1 No. dust socket medium. f) 2 Nos. stainless steel door stopper.
2.2. Timber Panelled Door	a) 6 Nos. 102mm x 76mm x 2mm stainless steel hinges with nylon rings. b) 1 No. cylindrical lock stainless steel, 5 pin tumbler with knob and rose of stainless steel with 3 nos nickle-plated brass keys c) 1 No. solid brass mortice lock rebated part. d) 1 Set of 150mm and 300mm Flush Bolt Lever Type Stainless Steel. e) 1 No. dust socket medium. f) 2 Nos. stainless steel door stopper.
3. PVC Door To Toilet /Bathroom Cubicles	a) 3 Nos. 102mm x 76mm x 2mm stainless steel hinges with nylon rings. b) i) Residential Quarters - 1 No. stainless steel cylindrical lock with privacy locking device operated by turn from inside and knob handle. ii) Non-residential buildings - 1 No. stainless steel indicator bolt toilet. c) 1 No. hat & coat hook stainless steel.
4. Single Leaf Fire Rated Door	
4.1. Standard size of 800 mm x 2100 mm ½ hr & 1 hr fire rated door (Metal Frame & Timber Door)	a) 3 Nos. 127mm x 89mm x 2.5mm heavy duty stainless steel hinges. b) 1 Set Hollow Lever Handle Stainless Steel Mortice Lock Body with single key thumb turn cylinder approved by DGFR. c) 1 No. stainless steel door stopper. d) 1 No. door closer. e) 1 No. floor spring for double swing door.
4.2. Standard size of 900 mm x 2100 mm ½ hr & 1 hr fire rated door (Metal Frame & Timber Door)	a) 3 Nos. 12mm x 89mm x 2.5mm heavy duty stainless steel hinges. b) 1 Set Hollow Lever Handle Stainless Steel Mortice Lock Body with single key thumb turn cylinder approved by DGFR. c) 1 No. stainless steel door stopper. d) 1 No. door closer. e) 1 No. floor spring for double swing door.
4.3. Standard size of 900mm x 2100mm 2 hr fire rated door (Metal Frame & Timber Door)	a) 4 Nos. 127mm x 89mm x 2.5mm heavy duty stainless steel hinges. b) 1 Set Hollow Lever Handle Stainless Steel Mortice Lock Body with single key thumb turn cylinder approved by DGFR. c) 1 No. stainless steel door stopper. d) 1 No. door closer. e) 1 No. floor spring for double swing door. f) 2 Nos. of ball bearings. g) 1 No. of heavy duty stainless steel latch with 75 mm long backset.
5. Double Leaf Fire Rated Door	
5.1. Standard size of 1200mm x 2100mm	a) 4 Nos. 127mm x 89mm x 2.5mm heavy duty stainless steel hinges. b) 1 Set Hollow Lever Handle Stainless Steel Mortice Lock Body with single key thumb turn cylinder approved by DGFR. c) 1 No. solid brass mortice lock rebated part. d) 1 Set of 150 mm and 300 mm Flush Bolt Lever Type Stainless Steel. e) 1 No. dust socket medium.

Type of Doors, Windows etc.	Ironmongery for each type of doors, windows etc.
	f) 2 Nos. stainless steel door stopper. g) 2 Nos. automatic door closer of hydraulically spring operated type (for swing doors) or of wire rope and weight type (for sliding doors). h) 2 Nos. floor spring for double swing door.
5.2. Standard size of 1800mm x 2100mm	a) 6 Nos. 127 mm x 89 mm x 2.5 mm heavy duty stainless steel hinges. b) 1 Set Hollow Lever Handle Stainless Steel Mortice Lock Body with single key thumb turn cylinder approved by DGFR. c) 1 No. solid brass mortice lock rebated part. d) 1 Set of 150 mm and 300 mm Flush Bolt Lever Type Stainless Steel. e) 1 No. dust socket medium. f) 2 Nos. stainless steel door stopper. g) 2 Nos. automatic door closer of hydraulically spring operated type (for swing doors) or of wire rope and weight type (for sliding doors). h) 2 Nos. floor spring for double swing door.
5.3. Standard size of 2400mm x 2100mm	a) 8 Nos. 127 mm x 89 mm x 2.5 mm heavy duty stainless steel hinges. b 1 Set Hollow Lever Handle Stainless Steel Mortice Lock Body with single key thumb turn cylinder approved by DGFR. c) 1 No. solid brass mortice lock rebated part. d) 1 Set of 150 mm and 300 mm Flush Bolt Lever Type Stainless Steel. e) 1 No. dust socket medium. f) 2 Nos. stainless steel door stopper. g) 2 Nos. automatic door closer of hydraulically spring operated type (for swing doors) or of wire rope and weight type (for sliding doors). h) 2 Nos. floor spring for double swing door.
6. Single Leaf Fire Escape Door	a) 3 Nos. of 127mm x 89mm x 2.5mm thick heavy duty stainless steel hinges. b) 1 complete set of approved make fire rated panic bolts.
7. Double Leaf Fire Escape Door	a) 6 Nos. of 127mm x 89mm x 2.5mm thick heavy duty stainless steel butt hinges. b) 1 complete set of approved make fire rated panic bolts.
8. Glass Door	a) 1 Set Floor Spring. b) 1 Set Patch Fitting, door bottom, door top, lock clamp, over panel. c) 1 pair Pull handle 600 mm.
9. Aluminium Door	a) 3 Nos. 102mm x 76mm x 2mm stainless steel hinges with nylon rings. b) 1 Set Hollow Lever Handle Stainless Steel Mortice Lock Body deadlock with single key thumb turn cylinder.
10. Kitchen Cabinet Door/ Workbench	a) Galvanised steel continuous 'piano' butt hinges. b) 1 No. 100mm aluminium 'D' handle. c) 1 No. bales catch. d) 1 No. galvanised steel cupboard lock in satin chrome finish.
11. Wardrobe	a) 3 Nos. of 75mm brass butt hinges (per door leaf). b) 2 Nos.100mm anodised aluminium barrel bolt (for double leaf doors) c) 1 No. 100mm aluminium 'D' handle. d) Chromium plated steel clothes hanger rail. e) Steel cylinder cupboard lock in satin chrome finish.
12. Drawer	a) 1 No. steel cylinder drawer lock in satin chrome finish. b) 1 No.100mm aluminium 'D' handle.
13. Sliding and Folding Door/ Partition	a) Top or bottom running set sliding and folding door gear, complete with tracks, channel, brackets, roller guides, hangers and all necessary butt hinges, flush bolts and flush door pulls, etc. as recommended by the manufacturer. b) 1 No. upright 3 lever rebated mortice lockset for sliding and folding door with satin chrome lever handle furniture with 2 Nos. keys of different serial number for each building.
14. Straight Sliding Door	a) Top or bottom running set straight sliding door gear complete with tracks, brackets, hangers, roller guides, channels, door stops, flush brass bolts, brass flush pull etc. as recommended by the manufacturer. b) 1 No. upright 3 lever mortice lockset with satin chrome finish for straight sliding door with 2 Nos. keys of different serial number for each building.
15. Timber Casement Window	a) 2 Nos. 400mm long approved electro-galvanised steel friction hinges. b) 1 No. approved brass with satin chrome finish combination handle and fastener.
16. Top Hung Casement Timber Window.	a) 2 Nos. 750mm long approved electro-galvanised steel friction hinges. b) 1 No. approved brass with satin chrome finish automatic locking fastener.

Type of Doors, Windows etc.	Ironmongery for each type of doors, windows etc.
17. Top Hung Vent/Sashes	a) 2 Nos. 400mm long approved electro-galvanised steel friction hinges. b) 1 No. approved brass with satin chrome finish automatic locking fastener

APPENDIX H/1

GLUED LAMINATED TIMBER PERFORMANCE WARRANTY (SPECIMEN)

1.0 Coverage of Performance Warranty

We ..... the glued laminated timber Manufacturer hereby warrant that for a period of **ten (10) years** from the date of Practical Completion, the glued laminated timber system shall not be affected by the following defect:

a) Debonding

This condition occurs when the individual laminations of a glued laminated timber member become separated.

2.0 Procedure for Claims

i) Any defect claims shall be made in writing and delivered by post or by hand to the Manufacturer.

ii) A technical team from the Manufacturer will be dispatched to evaluate the nature of the claim. Should our findings conclude the defects as within the scope of warranty, then the Manufacturer shall make good such defects.

iii) Should the Manufacturer's technical team conclude that the defects falls outside the scope of the warranty, the Manufacturer shall not be held responsible for the claim.

iv) Should the Government disagree with the conclusion of the technical team pertaining to the defects in particular, then an independent third party competent in such technical evaluation shall be appointed to investigate the disputed defects.

v) The appointment of independent third party competent in such technical evaluation shall only be appointed upon the mutual agreement between the Government and the Manufacturer.

vi) The findings of the third party shall be conclusive and mutually accepted by the Government and the Manufacturer.

vii) If the findings of the independent third party are within the coverage of this performance warranty, all cost shall be borne by the Manufacturer or otherwise such cost shall be borne by the Contractor.

viii) All claims for the defects must be received by the Manufacturer not later than fourteen (14) days from the expiry of the warranty period.

MANUFACTURER

.....

.....

.....
Company Stamp

.....
Signature
Name:
Date:

WITNESS

.....

.....

.....
Company Stamp

.....
Signature
Name:
Date:

APPENDIX H/2

SAMPLE CERTIFICATE OF COMPLIANCE

CERTIFICATE OF COMPLIANCE

Certificate of Compliance

Certificate No. .....

This is to certify that the sawn timber below which is consigned to (name and address of consignee).....
.....

under purchase order number ..... has been graded by a qualified Timber Grader in accordance with the Malaysian Standard (MS XXX) that the timber is of the kind/strength group of timber and grade(s) shown in the summary below; and that the appropriate grade and other marks have been placed on the timber.

Descriptions

Cross section (Size)	Timber name/strength group of timber, grade, number of pieces and length	Pieces	Volume

Total number of pieces ..... KD/AD/SD

Total volume of timber .....m^3

THIS HARDWOOD WAS GRADED IN ACCORDANCE WITH REQUIREMENTS

OF MS .....

.....

Name & Signature of Timber Grader and
C.O.C. number

Date: .....

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DRAINAGE

TABLE OF CONTENTS

1. General

1.1. All drainage works shall be in accordance with the *JKR Standard Specification for Drainage Works in Building Projects No. 20601-0195-13* and conform to the requirements of the *Urban Stormwater Management Manual for Malaysia (MSMA)* and *MS 2526.*

1.2. The works shall include the construction of surface drains, sumps, culverts, subsoil drains, and other drainage structures in accordance with the above requirements or as directed by the S.O..

1.3. Drainage works shall be constructed to the lines, levels, grades and cross-sections shown on the Drawings or to suit the site as approved by the S.O..

1.4. Final discharge point shall be identified and approved by the relevant Local Authorities. Where necessary, the existing drainage system shall be upgraded in order to ensure they are fully functional.

2. Excavation and Backfilling

2.1. All general excavation works shall be as specified in SECTION B: EXCAVATION AND EARTHWORKS.

2.2. The Contractor shall notify the S.O. sufficiently in advance of the beginning of any excavation so that cross-section elevations and measurements shall be taken of undisturbed ground. The natural ground adjacent to the structure shall not be disturbed without permission of the S.O.. The excavation works shall be carried out so as not to cause any danger or obstruction to the traffic or public.

2.3. All excavation shall be inspected and approved by the S.O. prior to further work being carried out.

2.3.1. Excavation of Hard Materials/Rock

2.3.1.1. Hard materials/rock encountered in the trench excavation shall be removed to the approval of the S.O.. Layer of rock encountered along the bottom of the excavation shall be cut and trimmed to the required level.

2.3.1.2. Voids formed at bottom of the trench due to the removal of rocks shall be backfilled to the required level with 20mm Grade 20P concrete or other suitable materials, well rammed and compacted all to the approval of the S.O..

2.3.1.3. Jagged surfaces of rocks at the bottom of the excavation due to the trimming shall be levelled and smoothened with sand blinding to the approval of the S.O..

2.3.2. Excavation of Soft Materials

When, in the opinion of the S.O. the foundation material is soft or otherwise unsuitable, the Contractor shall remove and insert foundation fill material or concrete as specified or shown on the Drawings or directed by the S.O.. It shall be placed and compacted in layers not more than 150mm thick or as directed by the S.O..

2.4. Excavation for Drain Trenches

2.4.1. The trench shall be excavated to a depth intended or shown on the Drawings. The blinding material shall be laid immediately after the excavation.

2.4.2. Should the bottom of the trench be inadvertently excavated below the specified level, it should be brought back at the Contractor's expense to the correct level with good selected earth or sand, carefully rammed into place.

2.5. Excavation for Culvert

2.5.1. The earthworks at the required location shall be constructed to a level at least 600mm above the top of culverts design levels or to the top of subgrade levels, whichever is lower. The culverts specified to be constructed in trench conditions shall be excavated in accordance with sub-section 2.6..

2.5.2. Where drainage conditions or other circumstances so require, the S.O. shall direct the Contractor to construct the culvert without first constructing the earthworks to the level specified above, in which case excavation, and foundation preparation shall be in accordance with sub-section 2.7..

2.6. Trench Method

2.6.1. The trench to receive culvert shall have sufficient width and depth to enable the placing of bedding material. The bottom of the trench shall be trimmed to suitably smooth plane surface which shall be kept free from water, all to the satisfaction of the S.O..

2.6.2. Rock or other hard material encountered shall be excavated to a depth as directed by S.O.. The excavated hard material shall be replaced with suitable material uniformly compacted in layers of not more than 150mm compacted thickness to provide satisfactory support for the culvert, all to the satisfaction of the S.O..

2.7. Open Ground Method

2.7.1. Where existing ground levels are above top bedding material design levels and firm foundation materials are encountered, excavation and foundation preparation shall be similar to the described in trench method above. Otherwise a firm foundation plane shall be prepared, which shall be essentially free draining along the line of the culvert by trimming the existing ground, or such fill as it is necessary to place and compact, over a width sufficient to permit satisfactory construction of the pipe bedding, all to the satisfaction of the S.O..

2.7.2. Where soft or unstable soil is encountered in the foundation, it shall be excavated over a width of at least 1.5 times the outside of each side of the culvert centre-line to the depth directed by the S.O., and replaced with suitable material uniformly compacted in layers of not more than 150mm compacted thickness to provide satisfactory support for the pipe, all to the satisfaction of the S.O..

2.8. Backfilling

2.8.1. Drainage trenches shall be backfilled immediately after completion of drain laying or installation of culverts and as soon as the S.O. has inspected and given his approval.

2.8.2. Backfilling with approved fill materials shall be placed evenly in layers not exceeding 150mm. To provide uniform support, loose thickness of fill materials on both sides of the drain shall be thoroughly compacted with mechanical rammers. This procedure shall be followed for the whole depth of drain section.

2.8.3. All spaces excavated under this Specification and not occupied by a permanent structure shall be backfilled with material free from large lumps, wood and extraneous material.

3. Materials

3.1. Basic construction materials shall comprise the following;

3.1.1. Granular Bedding Material

The foundations shall be of granular bedding material suitably graded broken rubble, crushed stone, crushed gravel, sand or other material as shown on the Drawings or as directed by the S.O..

3.1.2. Concrete

Concrete for blinding, bedding and cast-in-situ drains shall be as shown in the Drawings and as specified in SECTION D: CONCRETING.

3.1.3. Ordinary Backfill Material

3.1.3.1. Ordinary backfill material shall be of suitable material as defined in SECTION B: EXCAVATION & EARTHWORK.

3.1.3.2. Materials from swamps, peats or top soils and other highly organic clay or silt, materials containing logs, stumps or boulders, which are susceptible to combustion, and any other materials which, by virtue of their physical or chemical composition or at their moisture content will not compact properly, shall not be used for filling.

3.1.4. Granular Backfill Material

3.1.4.1. Granular backfill material shall be sand, crushed stone, crushed gravel or a mixture of crushed and natural aggregates, shall be essentially free from vegetative and other organic matter and clay, and shall not contain lateritic or concretionary materials. The material shall conform to the following physical and mechanical quality requirements:

(i) The fines shall be non-plastic;

(ii) Sand shall have a gradation conforming to the envelope shown in **Table S1**;

(iii) Material other than sand shall have a gradation conforming to one of the envelopes shown in **Table S2**.

Table S1. Grading Limits for Sand Backfill

B.S. Sieve Size	% Passing by Weight
10.0mm	100
5.0mm	90 - 100
1.18mm	45 - 80
300 µm	10 - 30
150 µm	2 - 10

Table S2. Grading Limit for Granular Backfill other than Sand

B.S Sieve Size	% Passing by Weight		
	A	B	C
37.5mm	100	-	-
28.0mm	70 -100	100	-
20.0mm	60 - 90	70 - 100	100
10.0mm	45 - 75	45 - 75	-
5.0mm	30 - 60	35 - 65	45 - 75
2.0mm	20 - 50	25 - 50	30 - 60
425 µm	10 - 30	10 - 30	15 - 35
75 µm	0 - 2	0 - 2	0 - 2

3.1.4.2. The granular backfill shall be placed in layers not to exceed 150mm in depth and each layer shall be thoroughly compacted by means of packers or mechanical tampers to a relative compaction of not less than 95% Standard Proctor Density for the backfill material at optimum moisture content.

4. Surface Drainage

4.1. Surface drains shall be constructed with regard to both operation and ease of maintenance and adequate gradient shall be provided to enable self-cleansing flow.

4.2. Where gradient designed is not practical or above the finished level, the Contractor shall submit their proposal for the approval of the S.O..

4.3. Reinforced concrete struts shall be provided for all drain side walls exceeding 0.9m height. Handrails shall be provided for open drains more than 1.2m width and / or maximum depth as specified in **Table S3**.

Table S3. Maximum Depths of Open Drain

Cover/Handrail Fence Condition	Maximum Depth (m)
Without protective covering	0.6
With solid or grated cover	1.2

4.4. Types of Surface Drains

4.4.1. Surface drains of all types shown on the Drawings shall be constructed either unlined or lined using cast in situ concrete, precast or porous concrete drain sections or stone pitching.

4.4.2. Unlined (Earth) Drains

4.4.2.1. The Contractor shall refer to approved plans for location, extent and construction details as shown on the Drawing, or otherwise directed by the S.O..

4.4.2.2. Excavation for unlined/earth drains shall be trimmed to form a smooth, firm surface to the required lines, levels, grades and cross-sections as shown on the Drawings or as directed by the S.O..

4.4.2.3. Any areas of over excavation shall be made good to the satisfaction of the S.O., all at the contractor's own cost.

4.4.2.4. The sides of cut drain shall not be steeper than 1:1.5 (V:H), while fill slopes shall not be steeper than 1:2 (V:H). The surface water shall be discharges to a stable outlet such that soil erosion is prevented from occurring.

4.4.3. Lined Drain

4.4.3.1. Lined drains shall be constructed from material proven to be structurally sound and durable and have satisfactory jointing systems. Unless otherwise stated in the Drawings, the maximum steepness of the side slopes for lined open drains shall be as indicated in **Table S4**.

Table S4. Maximum Steepness of the Side Slopes

Drain lining	Maximum steepness of the maximum side slopes (V:H)
Concrete, brickwork and blockwork	Vertical
Stone Pitching	1:1.5
Grassed/Vegetated, rock riprap	1:2

4.4.3.2. All concrete works shall conform to the requirement in SECTION D: CONCRETING of this Specification or unless otherwise specified.

4.4.3.3. Lined drains shall be constructed by the following means;

(i) Cast In Situ Concrete Drains

a) Cast in-situ concrete drains shall be Grade 25P concrete unless otherwise stated. Weep holes shall be cast in-situ as shown on the Drawings or as directed by the S.O..

b) Where the concrete grade is found to be of the lower grade, the S.O. shall request the Contractor to do the rectification work according to the requested proper method.

(ii) Precast Concrete Drain

a) Precast concrete block inverts shall be of the shapes and dimensions as shown on the Drawing and shall be of Grade C20/25 concrete or unless otherwise specified.

b) The joint shall be grouted with cement mortar (1:3) and weep holes shall be provided as shown on the Drawing or as directed by the S.O..

c) The S.O. shall have access to the casting yards where the proprietary precast concrete product are being utilized. A copy of the manufacturer's test certificate shall be provided to the S.O..

d) All inspections shall be conducted in the present of the S.O. and any rectification works shall be carried out any accordance to the method as approved by the S.O..

(iii) Cascade Drains

Cascade drains shall be constructed from precast concrete drain units and laid stepping on a 150mm thick bed of mass concrete of Grade 20P or as shown on the Drawings or as approved by the S.O..

5. Subsoil Drain

5.1. This work shall include supply and installation of subsoil drains, constructed in accordance with these Specifications at locations and in accordance with the lines, levels and grades as shown on the Drawing and/or to suit the site as approved by the S.O..

5.2. Minimum gradient of 1:200 shall be provided for the drain to discharge into existing stormwater system, open drain, creek or pond in the area unless otherwise stated on the drawings. The discharge shall not create an unwanted bog.

6. Sumps

6.1. Sumps shall be constructed as accordance to the Drawing or as directed by the S.O. to facilitate changes in level and flow within a drainage system. All sumps shall be covered either by concrete slab or galvanized steel grating hinged to the seating frame on the sumps for safety purposes.

6.2. Unless otherwise as shown on the Drawings, sumps of depth less than 1.5m (internal depth) shall be made up of brickwalls of minimum 225mm thickness. Sump of depth (internal depth) more than 1.5m shall use reinforced concrete Grade 20P or otherwise specified in the Drawings.

7. Culverts

7.1. The work shall comprise of supply and installation of either reinforced concrete pipe culverts or precast box culverts, including the end treatment components such as headwall, wingwalls, aprons and sumps and channel protection works, all in accordance with these Specifications and details as shown on the Drawings.

7.2. Culvert Bedding

7.2.1. Type A bedding shall consist of Grade 20P concrete otherwise stated on the drawings and complying with SECTION D: CONCRETING.

7.2.2. Type B bedding shall consist of clean, natural sand or gravelly sand of suitable gradation and quality with maximum particle size of not more than 20mm.

7.3. Culvert Components

Culvert shall be constructed with barrel and end treatments including headwalls, endwalls, wingwalls, outlet protection, inlet improvement and debris control structures.

7.4. Pipe Culverts

7.4.1. Reinforced concrete pipes shall conform to the requirement of *MS EN 1916* and shall be approved by the S.O..

7.4.2. The S.O. reserves the right to request for test certificates and further tests to be carried out on samples, all at the Contractor's own cost.

7.5. Precast Box Culverts

7.5.1. Precast box culverts shall conform to the requirement of *MS 1293-1* and shall be approved by the S.O..

7.5.2. Unless otherwise shown on the Drawings, the precast box culvert shall be capable of withstanding a proof load test of 112.5kN applied over an area of 320mm x 320mm at any position on the cover slab.

7.5.3. The S.O. reserves the right to request for test certificates and further tests to be carried out on samples, all at the Contractor's own cost.

7.5.4. Individual sections of the precast box culvert shall be rejected because of such defects specified herein before for pipe culverts.

7.5.5. Precast box culverts shall be laid on Type B bedding with layer of crushed aggregate of maximum particle size not exceeding 50mm as shown on the Drawings or directed by the S.O..

7.5.6. The maximum gap between each culvert shall not be more than 13mm and the difference in level shall less than 3mm. The gap shall be filled with cement mortar (1:3) with smooth finished.

7.5.7. To ensure uniform bearing, a layer of cement grout shall be spread along the top of the walls of the invert where the lid shall sit.

8. On-Site Detention

8.1. On-site detention (OSD) facilities shall be constructed in accordance to the Drawings and conform to the requirements of *MSMA* and *MS 2526*.

8.2. The construction of OSD facilities shall include the system components at the inlet, storage and outlet zone to cater outflow discharges without causing adverse effects on downstream properties. Fencing and warning signs shall be provided as shown on the Drawings.

8.3. Maintenance shall be done periodically or as and when the silt has accumulated to 0.3m thick. The desilted material shall be transported to disposal site approved by S.O..

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WALL SYSTEM

TABLE OF CONTENT

1. General

1.1. Non-structural wall (NSW) system hereby refers to vertical building element designed as non-loadbearing internal wall which serve with functions as cited in Uniform Building By-Laws (UBBL), and not being a party wall inside a building.

1.2. Non-structural wall system shall refer to solid wall, lightweight drywall partition, pre-cast/pre-fabricated panels, etc.

1.3. Structural wall (SW) system hereby refers to vertical building element designed as loadbearing internal wall which serve with functions as cited in Uniform Building By-Laws (UBBL) and being a party wall inside a building.

1.4. Structural wall system shall refer to blockwork system stated in sub-section 4..

1.5. Unless otherwise specified, all non-structural walls or infill walls shall be constructed using proprietary blocks. Building materials considered for non-structural wall construction may refer to sub-section 2. below. Each material type shall comply with the respective standard or manufacturer's specification. Build-up or configuration of NSW shall be strictly based on recommendations or/and design by solution provider.

1.6. Unless otherwise specified, design considerations of NSW shall take into consideration the following functional features, any one or in combination, and comply with relevant parts of the current Building Code:

1.6.1. Structural stability. This includes consideration of external loadings, if any such as lateral wind or traffic pressure, heavy fixtures etc.;

1.6.2. Thermal & fire resistance;

1.6.3. Water resistance;

1.6.4. Acoustic performance; and

1.6.5. Impact resistance.

1.7. Design for Wall Performances

1.7.1. Loading

1.7.1.1. All NSW shall be constructed only for their intended purposes and any additional loadings shall be referred to the S.O. for approval.

1.7.1.2. Proprietary internal lightweight partition, including secondary framing shall be designed to meet specification requirement to ensure structural sufficiency and safety. The governing factor shall be based upon allowable deflection limit shall be of L/240 or L/360 @ 250Pa or equivalent design code. L refers to height of wall in metre (m). 250Pa refers to lateral uniform pressure applying perpendicular to wall surface.

1.7.2. Thermal and Fire Rating

1.7.2.1. Material used for wall construction shall be classified as Class O building material in accordance with BS 476 Part 4 (non-combustible) or Part 6 & 7 (limited combustible), or at least has an A2 rating in accordance with EN 13501 Part 1.

1.7.2.2. Unless otherwise specified or shown on the Drawings, fire rated walls and partitions system shall be constructed and calculated according to requirements and approval of the DGFR and compliance to the Uniform Building By-Law (UBBL).

1.7.2.3. The glass wool, stone wool and cellulose insulation materials used shall comply with BS 476 - Fire tests on building materials and structures:

Part 4 : Non-combustibility test for materials;

Part 6 : Method of test for fire propagation for products; and

Part 7 : Method of test to determine the classification of the surface spread of flame of products.

1.7.3. Water proofing

Where necessary, NSW shall be properly treated with proprietary water proofing system as per respective manufacturer's recommendation, along with warranty coverage if applicable.

1.7.4. Acoustic rating

1.7.4.1. Where necessary, NSW shall be designed to have specific sound insulation rating in accordance with ISO or equivalent as below:

ISO 140-3 – Laboratory measurements of airborne sound insulation of building elements; and

ISO 717-1 – Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation.

1.7.4.2. Unless otherwise specified, designing architect shall determine the required acoustic performance for the wall structure based on intended usage.

1.7.5. Security and impact rating

1.7.5.1. Where applicable, wall shall be designed with some degree of security and impact resistance feature. While solid wall structure is naturally to have high impact resistance capability, for drywall partition this shall be evaluated in accordance with BS 5234: Partitions (including matching linings) – Part 2: Specification for performance requirements for strength and robustness including methods of test, or equivalent.

1.7.5.2. Where necessary, designing architect shall decide grade of duty rating for wall structure making reference to recommendation in Table 1 – Partition grades by categories of duty in BS 5324: Part 2.

2. Products, components and proprietary systems

2.1. Cement

The cement, unless otherwise described, shall be CEM 1 complying with MS EN 197-1 and as specified under SECTION D: CONCRETING.

2.2. Sand

Sand for mortar shall comply with MS EN 12620 and as specified in SECTION D: CONCRETING.

2.3. Mortar

2.3.1. Mortar shall consist of one (1) part of cement to six (6) parts of sand, with the addition of an approved mortar plasticizer used strictly in accordance with manufacturer's recommendation. The ingredients for mortar shall be measured in proper gauge boxes and shall be mixed on a clean boarded platform or in an approved mechanical batch mixer.

2.3.2. All mortar shall be used within forty-five (45) minutes of mixing and no remaking up of mortar shall be permitted thereafter.

2.3.3. Mortar for brickwork below damp proof course or ground floor level shall be in the proportion of one part of cement and three parts of sand.

2.4. Damp Proof Course

2.4.1. Unless otherwise shown on the Drawings, bituminous damp proof courses shall comply with BS 8215: Code of practice for design and installation of damp-proof courses in masonry construction. The bitumen damp proof membrane shall be two (2) ply with a nominal mass of 1840g/m².

2.4.2. Bitumen damp proof course shall be in rolls to suit the thickness of walls or brickwork. The damp proof course shall be bedded on a level bed of cement mortar (1:1) and lapped at least 150mm or the width of the damp proof course at running joints and intersections.

2.4.3. In all cases of doubt as to the exact location of the damp proof course, the Contractor shall refer to the S.O. before laying the damp proof course. The damp proof course above ground shall be continuous for the whole length and thickness of the wall and be at least 150mm above finished ground level to prevent moisture from the ground rising through the foundation to the wall above ground, which otherwise would make wall surfaces damp and damage wall finishes.

2.5. Bricks and Blocks

2.5.1. General

All brick walls shall have G.I expanded/exmet mesh reinforcement with 750mm x 5mm diameter brickwork dowel bar complete with 75mm right angle bent to hook onto brickwork at every 4th course.

2.5.2. Samples

Separate samples of each type of bricks and blocks taken at random from the load, shall be submitted to the S.O. for approval before the bricks and blocks

are used. All subsequent deliveries shall generally be up to the standard of the samples approved. No soft, broken, twisted or otherwise defective bricks and blocks will be permitted to be used.

2.5.3. Clay Bricks

All ordinary clay bricks shall be machine-made, wire cut and shall be hard, well burnt, sound, square and clean all in accordance with MS 76.

2.5.4. Cement Sand Bricks and Hollow Blocks

2.5.4.1. All cement sand bricks and hollow blocks shall comply with MS 27.

2.5.4.2. The dimensions of blocks shall comply with MS 1064.

2.5.4.3. Wherever blocks are used, a modular sized block shall be used and constructed in accordance with the manufacturer's standards, requirements and method statements.

2.5.4.4. The composition of cement sand bricks and hollow blocks shall consist of a uniform mixture of sand and cement. The sand cement shall be mixed in the ratio of six (6) parts of sand to one (1) part of cement by volume in a mechanical mixer capable of taking one (1) bag of cement (50 kg of cement shall be taken as 0.035 cube). The sand used shall be as described hereinbefore and the maximum size shall pass through a 4.8 mm mesh BS sieve. The cement used shall be CEM 1 as described under SECTION D: CONCRETING.

2.5.4.5. The Contractor shall only use cement sand bricks and hollow blocks supplied by approved manufacturer.

2.5.4.6. The minimum permissible average compressive strength shall be 5.2N/mm² for bricks and 2.8N/mm² for hollow blocks per 10 samples taken at random from the Contractor's stock pile of 1000 or part thereof. All rejected or condemned bricks shall be removed from site at the Contractor's expense.

2.5.5. Light Weight Concrete Block

2.5.5.1. Light weight concrete blocks shall comply with BS EN 6073-1 and shall be used and laid strictly in accordance with the manufacturer's instructions.

2.5.5.2. Light weight concrete blocks shall be free from asbestos or toxic substances.

2.5.5.3. Where light weight concrete blocks are used in lieu of clay bricks, a modular sized block shall be used according to manufacturer's standards, requirements and method statements.

2.5.5.4. The light weight concrete blocks shall have the following performance criteria:

Dry density of between 500kg/m³ and 1500kg/m³;

Dimensional accuracy of ± 1.5mm on all faces;

The permissible compressive strength shall be not less than 7N/mm² per 10 samples taken at random from the contractor's stock pile of 1000 or part thereof and tested at certified lab;

Ultimate tensile strength shall be 0.44 - 0.55 Mpa;

Thermal resistance (R-value) of not less than $1 m^2K/W$; and

Minimum working density for the blocks is 910kg/m³.

2.5.5.5. The infill wall thickness of light weight blocks shall be as follows:

100mm thickness for internal walls;

125mm thickness for external walls;

200mm thickness (fire rated) for party wall; and

Internal spaces with 24 hour air-condition should comply with the thermal resistance R-value of not less than $1 m^2K/W$.

2.6. Patented and Proprietary Brick and Block

2.6.1. Patented bricks and blocks shall comply with MS 2282 and shall be used and laid strictly in accordance with the manufacturer's instructions.

2.6.2. Cement Brick (Patented or Proprietary)

2.6.2.1. The cement brick wall partition system shall satisfy the performance requirements specified in Clause 5 of BS 476: Part 22, for non-load bearing wall partition for the following periods:

Integrity : 130 minutes
Insulation : 130 minutes

2.6.2.2. Minimum compressive strength shall be not less than 7 N/mm².

2.6.3. All patented or proprietary brick and block wall installation works shall strictly adhere to the manufacturer's method statement for installation works and to S.O.'s approval.

2.7. Large Prefabricated Panels.

Large prefabricated panels when used shall conform to MS 1313 and shall be installed strictly in accordance with the manufacturer's recommendations.

2.8. Gypsum Plasterboard

2.8.1. Gypsum plasterboard sheeting shall be a complete proprietary system, in accordance with the Product Data, approved sample and the relevant Standards.

2.8.1.1. BS EN 15283 (Series): Gypsum boards with fibrous reinforcement - Definitions, requirements and test methods; dan

2.8.1.2. BS EN 520: Gypsum plasterboards - Definitions, requirements and test methods.

2.8.2. Provide moisture-resistant, impact-resistant, fire-resistant and acoustic-rated plasterboard systems where indicated or required.

2.8.2.1. Moisture-resistant grade (MR) plasterboard shall be suitable proprietary products for use in moisture-resistant construction in wet areas where normal plasterboard would be unsuitable.

2.8.2.2. Fire-resistant grade (FR) plasterboard shall be suitable proprietary products for fire-resistant construction.

2.8.2.3. Impact-resistant grade (IR) plasterboard shall be suitable proprietary products for construction of system requiring robustness feature.

2.9. Fibre Cement Sheet

2.9.1. Fibre-cement (FC) sheeting shall be a complete proprietary system, asbestos-free, in accordance with the Product Data, approved samples, and the relevant Standards.

2.9.1.1. MS 1224: Specification for fibre cement symmetrically corrugated sheet and fittings - product specification and test method; and

2.9.1.2. MS 1296: Fibre-cement flat sheets- product specification and test methods.

2.10. Insulation (Acoustical and Thermal)

2.10.1. Unless otherwise specified or shown on the Drawings, acoustic wall panel and/or systems shall be constructed and calculated according to requirements of acoustic specialist and approved by S.O.'s approval.

2.10.2. Thermal insulation system shall comply with MS1020. Samples of the insulation material shall be submitted to the S.O. for approval before they are used and subsequent delivery shall be up to the standard of samples approved.

2.10.3. Unless otherwise shown in the Drawings, glass wool insulation shall be made in Malaysia 50mm thick. It shall have a conductive value of maximum 0.035 W/m^2K (tested at a mean temperature of 20°C based MS1020 tested according to ASTM C518). Unless otherwise specified the size of the glass wool insulation shall be 600mm x 1200mm. Glass wool insulation shall be fixed in accordance with the manufacturer's recommendation and to the approval of the S.O..

2.10.4. Where stone wool insulation is to be used, it shall be made in Malaysia 50mm thick. It shall have a conductive value of maximum 0.035 W/m^2K (tested at a mean temperature of 20°C based MS1020 tested according to ASTM C518). Unless otherwise specified the size of the stone wool insulation shall be 600mm x 1200mm. Stone wool insulation shall be fixed in accordance with the manufacturer's recommendation and to the approval of the S.O..

2.10.5. The contractor shall submit the COO (certificate of origin) confirming made in Malaysia from the supplier/manufacturer to the S.O for approval prior to the commencement of the works. No installation works shall commence until approval is given in writing by the S.O..

2.10.6. Recommended type of spray applied cellulose insulation shall be:

2.10.6.1. Thickness - 30mm;

2.10.6.2. Thermal conductivity (k-value) = 0.0029 W/m·K tested to ASTM C-177;

2.10.6.3. Fire retardant Class "O" complying with BS476 Part 6 & 7 and endorsed by FRDM;

2.10.6.4. Average moisture absorption of not more than 15% as per ASTM C739;

2.10.6.5. Tested Noise Reduction Coefficient of NRC 0.75 at 30mm thickness; and

2.10.6.6. Tested to be non-toxic and asbestos free, contain no carcinogenic materials and shall not cause any skin irritation to humans.

3. Type of Finishes to Walls and Partitions

3.1. Unless otherwise shown in the Drawings, all plastering works for brick walls shall include the wall surface area above ceiling finish level.

3.2. Unless otherwise specified or shown on the drawings, the appropriate type of finishes for walls and partitions shall be as specified in the Schedule of Finishes. Unless otherwise shown on the Drawings or described in the B.Q., The finishes and their dimensions shall be as specified in SECTION K: PLASTERING, PAVING, TILING AND CARPET and SECTION O: PAINTING.

4. Structural Wall (Blockwork System)

This clause shall apply to the construction of all load bearing blockworks with or without steel reinforcement. All lines, levels, grades, dimensions and cross-sections shall be as shown on the Drawings and/or directed by the S.O.. The full requirement is outlined in the *Specification for Load Bearing Blockwork System (JKR 20601-0252-18)* or the latest edition published by JKR.

4.1. Material

The block shall comply with the requirements of MS 2282 Part 3.

4.2. Compressive Strength

For all block units intended to be used in elements subject to structural requirements, the mean compressive strength shall not be less than 7N/mm^2. The manufacturer shall also declare the normalised compressive strength when relevant.

4.3. Density

The net dry density of the units shall be declared in kilogram per cubic meters (kg/m^3) by the manufacturer in accordance with MS 1933 Part 13. The minimum dry density of unit shall not be less than 1500kg/m^3.

4.4. Structural Mortar

4.4.1. Recommended minimum compressive strength for prescribed mortar shall be class M6. The proportion of materials by volume shall be referred to **TABLE E1.**

4.4.2. The compressive strength of masonry mortar shall be determined in accordance with BS EN 1015 Part 11. The adhesion between the mortar and the masonry units shall be adequate for the intended use. The ingredients for mortar shall be measured in proper gauge boxes and shall be mixed on a clean boarded platform or in an approved mechanical batch mixer.

4.4.3. The characteristic compressive strength of masonry bonded with thin layer mortar shall be taken as the values given for mortar strength class M12 (mortar designation (i) in **TABLE E1.** The contractor shall submit the manufacturer's specification and method statement to the S.O. for approval prior to the commencement of works.

4.5. Mortar Testing

The use of mortars shall be in accordance with the recommendation given in BS EN 1996. When samples are taken from a designed mortar in accordance with BS EN 1015 Part 2 and tested in accordance with BS EN 1015 Part 11, the compressive strength of the mortar shall not be less than the specified compressive strength. **TABLE E1** shows the relationship of compressive strength classes and the compressive strength of mortar at 28 days.

4.6. Concrete Infill

Concrete infill for reinforced masonry shall be of minimum grade C25/30 (designed mix) or 30P (prescribed) with 10mm nominal size aggregates and specified in accordance with MS 523 Part 2. The minimum cement content, maximum free water/cement ratio and the concrete cover shall conform to the requirement in **Table E2.**

4.7. Blocklaying

4.7.1. Unless otherwise specified, all blockworks shall be laid on a full bed of mortar, and vertical joints shall be filled up fully. The average thickness of the vertical and horizontal joints shall be 10mm, exclusive of any key in the jointing surfaces of the units.

4.7.2. Unless specified, as work proceeds do not rack back corners and other advanced work higher than 1.2m above the general level. For facing work complete the whole lift within one period of operation. Except where permitted by a proprietary system or by the designer, do not carry up any one leaf more than 1.5m height in one day.

4.8. Block Masonry Bonds

The running or stretcher bond of blocks are shown in **FIGURE E1** and **FIGURE E2.**

4.9. Services Holes and Chases

4.9.1. In order to eliminate unnecessary cutting away and making good, sleeves and chases should be provided during the erection of the masonry. In external walls, all sleeves and pipes should preferably be laid with a fall toward the

outside. The installation of services should be completed before plastering or other finishing work is begun.

4.9.2. Where chases have to be cut, suitable power tools which do not operate by heavy impact should be used so that the recommended depth is not exceeded. Fixing units (blocks) where required, should be built into the wall or partition in the correct positions for skirting, rails and other items of joinery, fittings, etc.

4.9.3. In walls or leaves constructed of solid units, the depth of horizontal chases should not exceed one-sixth of the thickness of the single leaf at any point whilst the depth of the vertical chases should not normally exceed one-third of the thickness of the single leaf at any point.

4.9.4. The cutting of holes up to approximately 300mm square in the wall to accommodate items of equipment may be permitted.

4.9.5. Where heavy fittings are to be fixed to a wall, the effect on the stability of the masonry should be considered.

5. Samples and Mock-up

5.1. Samples and mock-up of wall construction shall be provided and approved by the S.O. prior to the commencement of the actual construction works. The size of the samples shall be determined by the S.O..

5.2. The samples and mock-up for walls and partitions shall include connections between the following components where applicable:

5.2.1. Floor to floor to a minimum of 5m length;

5.2.2. Wall corners;

5.2.3. Lintels;

5.2.4. Stiffeners;

5.2.5. Door and window frames; and

5.2.6. All other walls between different materials.

5.3. Sample and Mock-Up Panels for Structural Wall (Blockwork System)

5.3.1. The contractor shall construct a mock-up panel for the project with total build-up area more than 100m^2 using load bearing blockworks system.

5.3.2. Sample panels shall be built on site in a protected position to provide an agreed standard for the work and treatment of joints before the commencement of the works subjected to the S.O. approval. Such panels shall be maintained throughout the contract and removed on completion.

5.3.3. The mock-up panel needs to be constructed to expose not less than 2m length x 1m height, selected as follows:

6. Walling / Construction

6.1. Brick Walling

6.1.1. Unless otherwise specified or shown on the Drawings, the whole of the brickwork shall be constructed with standard size clay bricks in mortar as described and the surface left ready for plastering.

6.1.2. All clay bricks shall be soaked in a suitable tank or pit to be provided by the Contractor for at least half an hour before being laid and shall be kept wet whilst being laid. The top of walls left off shall be thoroughly wet before work is resumed. All constructed walling must be left wet and properly protected from the direct sunlight during the following day. The Contractor shall provide sufficient means to ensure that this is done.

6.1.3. Cement sand bricks shall not be soaked but dipped in water before being laid and all constructed brickwork shall be protected from direct sunlight during the day on which it is laid and also during the following day and the contractor shall provide sufficient means to ensure that this is done.

6.1.4. All bricks shall be properly bedded in mortar and all joints shall be thoroughly flushed up and raked out to a depth of 13mm as the works proceeds. No joint shall exceed 10mm in thickness.

6.1.5. Brickwork shall be carried up perfectly true and plumb in a uniform manner. No one portion being raised more than 1m above another at one time. No overhand work shall be permitted, and scaffolding shall be carried up as the work proceeds. The vertical points of every alternate course shall be kept perpendicular over one another, and all perpends, quoins, et cetera shall be kept strictly true and square.

6.1.6. All intersections and angles of walls shall be properly bonded together, and all walls and piers of lengths not multiples of brick sizes shall be cut and bonded in the best approved manner. No broken bricks shall be used except where required to form bonds.

6.1.7. All half brick (113mm) walls shall be reinforced at every fourth course with approved reinforcement (for example exmet) commencing two courses above floor level. For block walling, reinforcement shall be at every second course commencing one course above floor level.

6.1.8. All brick walls shall be constructed on reinforced concrete beams in accordance with the Drawings. No brick walls except lightweight partitions are allowed to be constructed on reinforced concrete slabs.

6.1.9. Unless otherwise specified, all toilet perimeter walls shall be constructed using clay bricks. Cement sand bricks shall not be used for toilet walls.

6.1.10. All half brick walls shall be built in Stretcher Bond.

6.1.11. All other brickwork shall be built in English Bond or as shown on the Drawings.

6.2. Facing Brickwork

6.2.1. All facing brickwork shall be executed in first quality approved facing bricks in Stretcher or Flemish Bond as shown on the Drawings, properly bonded into any backing walls, piers, et cetera. Joints shall be racked out to a depth of 13

mm and point up in coloured cement mortar to approved tints, finished with a neat struck weathered joint.

6.2.2. Facing brickwork shall be kept perfectly clean and no rubbing down of brickwork will be allowed.

6.3. Stonework

6.3.1. Unless otherwise shown on the Drawings or described in the B.Q., all stone blocks used shall be of limestone or granite whichever is more readily available within the locality of the Site and shall be free from cracks, fissures or other defects to the approval of the S.O.. The stone blocks shall in general, have their largest faces parallel. Unless otherwise required, the maximum thickness of the stone blocks shall in no case exceed the thickness of the wall or portion of the structure into which it is being built.

6.3.2. Stone walling shall be laid random un-coursed or random coursed as shown on the Drawings. Through or bonded stones shall be used at one stone per meter square for random coursed. Where backing brick wall is shown, the through stone shall be properly bonded in such brick wall.

6.3.3. Unless otherwise shown on the Drawings, all stonework shall be bedded in cement and sand mortar (1:3) mix and finished with a flushed joint rubbed down with sacking. All interstices between individual stones shall be filled with mortar. Finish to exposed surfaces or random walling shall be hammer-dressed.

6.4. Hollow Block Walling

The cement sand block wall shall be laid in the manner specified for brick wall. The hollow block shall not be soaked but dipped in water before laying. The hollow block wall shall be reinforced at every second course with reinforcement commencing one course above floor level.

6.5. Autoclaved Aerated Concrete (AAC) Block Walling

6.5.1. Where shown on the Drawings and/or described in the B.Q. or as an alternative to clay bricks, the Contractor may use AAC blocks for non-load bearing walls and partitions. The AAC block work shall be constructed strictly in accordance with the manufacturer's recommendations. Any extra cost in connection therewith shall be borne by the Contractor.

6.5.2. Only proprietary thin bed adhesive shall be used assembling AAC block wall. The AAC block work shall be installed using an approved thin layer of proprietary thin bed adhesive mortar with minimum flexural strength of 0.44 MPa to all horizontals and perpends. The first course must be made true and level using a normal layer of mortar with thin layer of adhesive to fully seal the perpends. The thin layer of proprietary adhesive shall be applied using notched trowel to obtain an even distribution of adhesive to achieve joint thickness of 2mm to 3mm.

6.5.3. A damp-proof course slip-joint membrane shall be laid on top of the floor slab or beams before receiving the mortar bedding to allow for differential movement between the blocks and the supporting structure.

6.5.4. The AAC block work shall be laid in a manner that the vertical joint of the lower course shall be staggered at least 100mm relative to the vertical joint of the overlaying course.

6.5.5. Unless otherwise directed and/or shown, where concrete block walls abut concrete faces, the face shall be flushed.

6.5.6. Control joints should be built into walls at spacing not greater than 8m centres, and at locations in accordance with manufacturer's recommendation.

6.5.7. Care must be taken to keep the walls clean, strictly in accordance with the manufacturer's recommendation. Excess adhesive must be removed progressively.

6.5.8. The wall surfaces may be finished with suitable surface coating that has the dual properties of being waterproof and water vapour permeable and shall be applied in accordance with the manufacturer's recommendation.

6.5.9. Only proprietary cement plaster of the same AAC block shall be used for external rendering of an external wall. The minimum thickness for the rendering of the external wall shall be 12mm thick.

6.5.10. Only proprietary skim coat base and skim coat finish of the same AAC block shall be used for internal wall application. The recommended thickness of the skim coat base shall be between 2 - 4mm thickness and the skim coat finish of an internal wall shall be of 1 - 2mm thickness. Both are coatings shall be applied as a two-coat system and applied according to manufacturer's instruction and to the S.O's approval.

6.5.11. All AAC block wall installation works shall strictly adhere to the manufacturer's method statement for installation works and to S.O.'s approval.

6.6. Parapet and Freestanding Wall

6.6.1. Any parapet and freestanding wall consisting of 155mm thick brick wall including plastering on both sides shall only be constructed to a maximum height of 900mm.

6.6.2. Where shown on the Drawings, freestanding walls above 900mm in height shall be constructed as per the engineer's detail Drawings or to the S.O.'s approval.

6.6.3. Precast reinforced concrete copings shall be constructed on all external parapet and free-standing walls. The reinforced concrete coping shall be laid to fall, complete with 12mm half round throating.

6.6.4. Freestanding walls more than 3m length vertically and horizontally shall be constructed with reinforced concrete stiffeners to engineer's detail and with the S.O.'s approval.

6.7. Lintel and Stiffener

6.7.1. Unless otherwise specified or shown on the Drawings, lintels shall be provided to all openings and to be sized accordingly by the Contractor to the S.O.'s approval.

6.7.2. Reinforced concrete stiffeners shall be constructed at every minimum of 3m vertically and horizontally to strengthen brick and block wall system construction according to engineer's detail.

6.8. Fasteners

Unless otherwise shown on the Drawings, fasteners or cramps for frames, metal windows and precast units shall be built in at 1m centres on the vertical side of the frame. Mild steel cramps shall be 25mm x 3mm x 225mm long for fixing wooden frames, etc. One end of the cramp shall be turned up and screwed to back of the frame and the other end shall be split and fish-tailed for building in. Cramps which are to be fixed to concrete shall be embedded in concrete and built into brickwork as the work proceeds.

6.9. Cutting

All cuttings such as arches, sinks, setbacks, and projections shall be properly formed. Chases and holes through walls and slabs for the passage of pipes, wiring and the like shall be neatly cut or formed. Upon the installation of the services pipes, the chases and holes through walls shall be properly sealed (Fire Stop) to prevent fire spread as required by the DGFR and UBBL. Where plastering works are done on the cuttings, the surface shall be smooth and seamless.

6.10. Partitioning

6.10.1. Timber Framed Partition

6.10.1.1. All timber used for the timber stud framings for partition walls shall be as specified in SECTION H: TIMBER, JOINERY AND IRONMONGERY.

6.10.1.2. Wall partition consisting of timber frames shall consist of vertical and horizontal studs. The studs shall consist of approved timber hardwood with a minimum size of 50mm x 50mm unless otherwise specified. All horizontal and vertical studs shall be constructed at a maximum nominal spacing of 610mm centres.

6.10.1.3. The top most horizontal frame, referred to as the top plate shall be bolted or nailed to the ceiling and continuously erected using timber or metal stiffener securely fixed to the slab to the S.O.'s approval. The timber and metal stiffeners shall be spaced at 1220mm centres maximum.

6.10.1.4. The lowest horizontal frame, referred to as the bottom plate, shall be securely fixed using bolts or nails. Unless otherwise advised, all fixing to slabs, M12 expansion bolts shall be used at 1220mm centres maximum with galvanized mild steel strap, or equivalent, to the floor to the S.O.'s approval. All fixings to timber slabs shall be fixed at 600mm centres maximum.

6.10.1.5. Unless otherwise specified, dimension for timber panels shall comply with MS 1064.

6.10.1.6. Where proprietary timber partitions are used, they shall be constructed in accordance with the manufacturer's recommendations and to the S.O.'s approval.

6.10.1.7. Partitions, screens and vent panels, shall be constructed as detailed in the Drawings. Where shown, galvanized welded wire mesh or expanded metal of the required sizes and patterns shall be fixed to vent panels and window openings. The mesh shall be secured in position using rebated and mitred timber battens and screws.

6.10.2. Metal Framed Partition

6.10.2.1. Steel sections such as, but not limited to metal framing and studs shall comply with ASTM C645, BS EN 14195, BS 7364 or other approved equivalent standards as appropriate, and to the approval of the S.O..

6.10.2.2. Unless otherwise specified, all metal framing for partitions shall be either galvanized or zinc alum coated steel 62mm C-Studs (vertical) and 64mm U-tracks (horizontal) of 0.5mm base metal thickness. The steel stud shall be manufactured from mild steel strip, with material specification complying to either one of the following:

Steel grade Z2 with minimum yield strength of 210N/mm^2 and zinc coating type Z275 minimum, complying with BS EN 10143;

Steel grade G300, with minimum yield strength of 300N/mm^2 and zinc-alum coating type AZ150 minimum, complying with AS 1397.

6.10.2.3. The stud which is to support a joint shall have a minimum fixing face width of 32mm for screw fixing and all other framing members shall not be less than 30mm. Drywall screws shall be at least 10mm longer than total thickness of plasterboards on each side of the partition wall. The plasterboards are laid staggered and fixed to the metal frames using drywall screws not exceeding 300mm centres.

6.10.2.4. The top most U-track (horizontal) shall be screwed to the ceiling and continuously erected using metal stiffener securely fixed to the slab. The metal studs directly supporting plasterboard sheets shall be spaced at 610mm centres maximum. The bottom U-track (horizontal) shall be securely fixed to the floor slab using bolts or screws. Unless otherwise advised, all fixing to slabs, M12 expansion bolts shall be used at 1200mm centres maximum with galvanized mild steel strap to the floor and to the S.O.'s approval.

6.10.2.5. Unless otherwise shown on the Drawings, the partitions shall not be erected more than 3000mm height. Partitions which are more than 3000mm height shall be supported by additional structural members, to structural engineer's detail and S.O.'s approval.

6.10.2.6. Partition above ceiling shall allow for cut out opening for service ducts or trunks and cable trays. The contractor shall coordinate with all subcontractors on the exact location and size of the openings. For fire rated partition, any gaps around any pipe ducts through the partition shall be properly sealed with approved fire/smoke stop system by the fire stopping specialist.

6.10.2.7. If full height partition has to be terminated below ventilation duct route parallel to the partitions, the stud of the partition shall be secured to the support frame of the duct or extended secondary frame support. In such cases, space between the duct and reinforced concrete soffit need not be sealed up, unless it is of fire rated type of partition.

6.10.2.8. The deflection of the metal frame partition system under service condition shall be controlled by the limit for the calculated deflection of the element chosen for the system and its intended use. The

deflection shall not exceed L/240 or L/360 subject to the finishing material attached to the partition. Any system wall partition selected shall be installed strictly according to the manufacturer's specifications and details to the S.O.'s approval.

6.10.3. Plasterboard lining

6.10.3.1. The type of plasterboard used shall comply with BS EN 520. The specified plasterboard shall carry class 'O' approval from DGFR. Unless otherwise specified the plasterboards used for the works shall be minimum 12.5mm thick with standard length of 2440mm and shall be free of defects.

6.10.3.2. The deviations and tolerances shall be in accordance with BS 8212. When required, the deflection under load shall be determined in accordance with BS EN 520.

6.10.3.3. The appropriate type of sealant shall be used for the required type of plasterboard. Elastomeric sealants shall be used at the perimeter of the dry lining or partitioning to provide an airtight construction and to the approval of the S.O..

6.10.3.4. Jointing compound shall be of air drying or setting type, in accordance with BS EN 13963, and to the approval of the S.O.. Jointing compound shall be applied as per manufacturer's recommendation and S.O.'s approval. The use of any additives to modify any of the properties of compounds shall not be permitted.

6.10.3.5. Jointing tape for plasterboards shall not be less than 48mm wide and not exceeding 60mm in accordance with ASTM C475 or equivalent, and the approval of the S.O..

6.10.3.6. Control joints shall be provided for a long continuous run of plasterboard wall spaced at not more than 10m apart.

6.10.3.7. Corner beads shall be provided as reinforcement to permit construction of true, concealed angles with gypsum base and panels.

6.10.3.8. Provision shall be allowed for the plasterboard partition system to support surface mounted fixtures by incorporating independent support framing hidden behind or exposed on the partition surface to provide adequate and appropriate support and to the approval of the S.O..

6.10.3.9. Wherever possible, full length plasterboard sheets shall be used to eliminate the need for sheet end butt joints. Where possible, joints on opposite sides of framing should be arranged to occur between different framing members.

6.10.3.10. Plasterboard sheets shall be laid out to minimize butt joints and waste. Butt joints on adjoining sheets shall be staggered. Butt joints on opposite sides of the wall shall be staggered. The sheet shall be laid so that the vertical joints fall a minimum of 200mm from the edge of the opening.

6.10.3.11. Fire resisting systems comprising of more than one layer of plasterboards, the joints in successive layers should be staggered.

In the case of walls sheeted on both sides' joints should be staggered on opposite sides of the wall.

6.10.3.12. Penetrations in the system shall only be allowed if installed in accordance to manufacturer's recommendation and tested at the Contractor's expenses. Penetration shall be strictly carried out in accordance with the requirements of the DGFR and to the approval of the S.O..

6.10.3.13. Fasteners shall have a corrosion-resistant finish and be appropriate for intended use, also in accordance with BS EN 14566 and BS 8212, or any relevant standards. The heads of fasteners shall be shaped so that they can be driven slightly below the surface of the plasterboard without punching through the paper liner.

6.10.3.14. Impact resistance of a partition system including gypsum plasterboard shall be determined in accordance with ISO 7892 and BS 5234-2.

6.10.3.15. The Contractor shall submit to the S.O., a manufacturer's warranty against any defect or damage to the proprietary plasterboard partition system which may arise during the period of five (5) years from the date of Certificate of Practical Completion. Terms of the warranty shall be such as shall be approved by the S.O..

6.11. Insulation Installation

6.11.1. Where necessary, insulation shall be installed so that:

6.11.1.1. It abuts or overlaps adjoining insulation other than at supporting members such as studs, noggings, joists, furring channels and the like where the insulation must butt against the member;

6.11.1.2. It forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and

6.11.1.3. It does not affect the safe or effective operation of a service or fitting.

6.11.2. Reflective insulation shall be installed so that:

6.11.2.1. The necessary airspace to achieve the required R-value between a reflective side of the reflective insulation and a building lining or cladding;

6.11.2.2. The reflective insulation closely fitted against any penetration, door or window opening;

6.11.2.3. The reflective insulation adequately supported by framing members; and

6.11.2.4. Each adjoining sheet of roll membrane being overlapped not less than 50mm; or taped together.

6.11.3. Bulk insulation shall be installed so that:

6.11.3.1. It maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and

6.11.3.2. In a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50mm.

6.11.4. Fixing methods of insulation material shall be as below, or as recommendation of manufacturer:

6.11.4.1. Use proprietary fixing methods which prevent long term sag, collapse or dislodgement; and

6.11.4.2. Fasteners shall be suitable non-corrosive types.

6.12. Glass Partitions

6.12.1. Unless otherwise specified or shown on the Drawing, all fixed glass wall systems shall be 8mm thick minimum, erected with stainless steel framing system for sizes up to 1200mm x 4800mm maximum installed to manufacturer's recommendation and to S.O.'s approval. For sizes more than 4800mm, the panels shall be constructed according to manufacturer's recommendation and the installation shall be certified by a P.E.

6.12.2. Glass doors shall be installed complete with accessories as recommended by the manufacturer and to the S.O.'s approval.

TABLE E1 – MASONRY MORTARS

	Mortar designation	Compressive strength class	Prescribed mortars (proportion of materials by volume) (see notes 1 and 2)		Compressive strength at 28 days N/mm²
			Cement **(a)**: sand with or without air entrainment	masonry cement **(b)**: sand	
Increasing ability to accommodate movement, e.g. due to settlement, temperature and moisture changes ↓	(i)	M12	-	-	12
	(ii)	M6	1 : 3 to 4	1 : 2½ to 3½	6

a. Cement, or combination of cements except masonry cements.

i) Combinations produced in the mortar mixer from Portland cement CEM I conforming to MS EN 197 Part 1 and ground granulated blastfurnace slag conforming to MS EN 15167 Part 1 where the proportions and properties conform to CEM II/A-S or CEM II/B-S of MS EN 197 Part 1, except Clause 9 of that standard.

ii) Combinations produced in the mortar mixer from Portland cement CEM I conforming to MS EN 197 Part 1 where the proportions and properties conform to CEM II/A-L or CEM II/A-LL of MS EN 197 Part 1, except Clause 9 of that standard.

iii) Combinations produced in the mortar mixer from Portland cement CEM I conforming to MS EN 197 Part 1 and pulverized fuel ash conforming to MS EN 450 Part 1, where the proportions and properties conform to CEM II/A-V or CEM II/B-V of MS EN 197 Part 1, except Clause 9 of that standard.

b. Masonry cement (inorganic filler other than lime)

NOTE 1 Proportioning by mass will give more accurate batching than proportioning by volume, provided that the bulk densities of the materials are checked on site.

NOTE 2 When the sand portion is given as, for example, 5 to 6, the lower figure should be used with sands containing a higher proportion of fines whilst the higher figure should be used with sands containing a lower proportion of fines.

TABLE E2 - MINIMUM CONCRETE COVER FOR CARBON STEEL REINFORCEMENT

Exposure situations	*Concrete grade in MS EN 206 and MS 523 Part 2 & MS 523 Part 3*				
	C25/30	C28/35	C32/40	C35/45	C40/50
	Minimum cement content (kg/m^3)				
	300	320	340	360	380
	Maximum free water/cement ratio				
	0.65	0.6	0.55	0.50	0.45
	Thickness of concrete cover				
	mm	mm	mm	mm	mm
E1[a]	20	20	20[b]	20[b]	20[b]
E2	—	35	30	25	20
E3	—	—	40	30	25
E4	—	—	—	60	50

Exposure situation E1. Internal work and the inner skin of ungrouted external cavity walls and behind surfaces protected by an impervious coating that can readily be inspected, or external parts built.

Exposure situation E2. Buried masonry and masonry continually submerged in fresh water or external parts built.

Exposure situation E3. Masonry exposed to freezing whilst wet, subjected to heavy condensation oe exposed to cycles of wetting by fresh water and drying out or external parts built.

Exposure situation E4. Masonry exposed to salt or moorland water, corrosive fumes, abrasion or the salt used for de-icing.

a Alternatively, 1: 0 to ¼ : 3: 2 cement: lime : sand: 10 mm nominal aggregate mix may be used to meet exposure situation E1 when the cover to reinforcement is 15 mm minimum.

b These covers may be reduced to 15 mm minimum provided that the nominal maximum size of aggregate does not exceed 10mm.

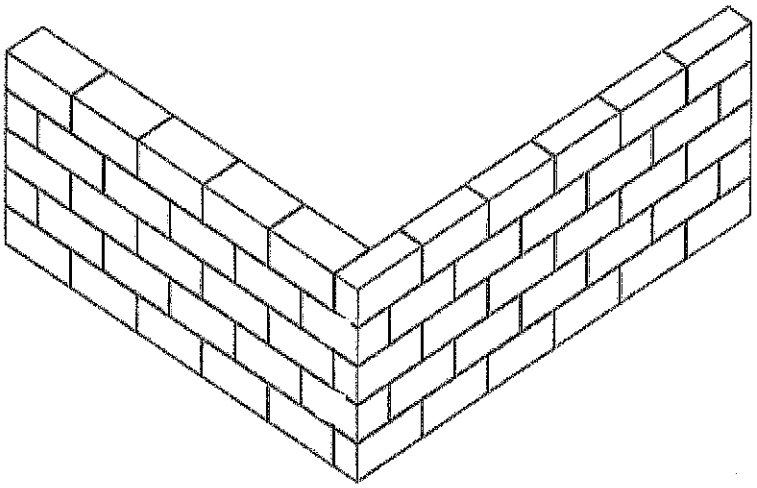


FIGURE E1: RUNNING OR STRETCHER BOND

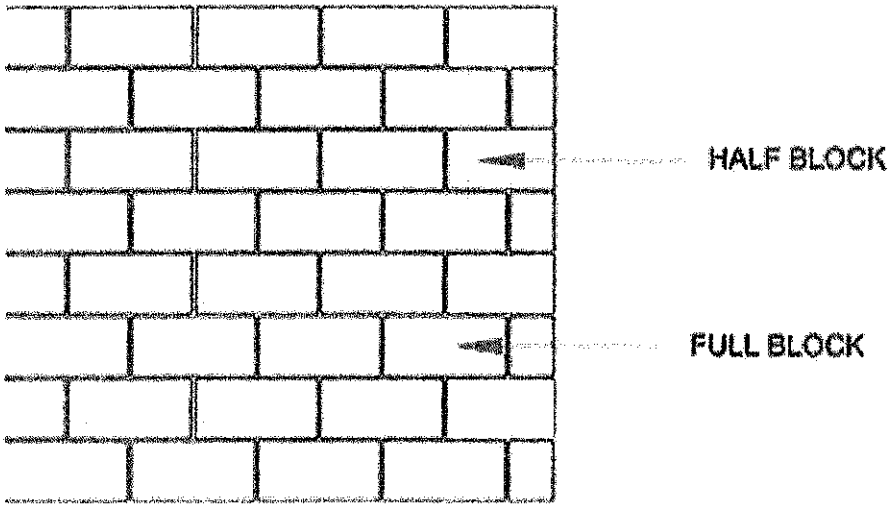


FIGURE E2: RUNNING OR STRETCHER BOND

SPESIFIKASI

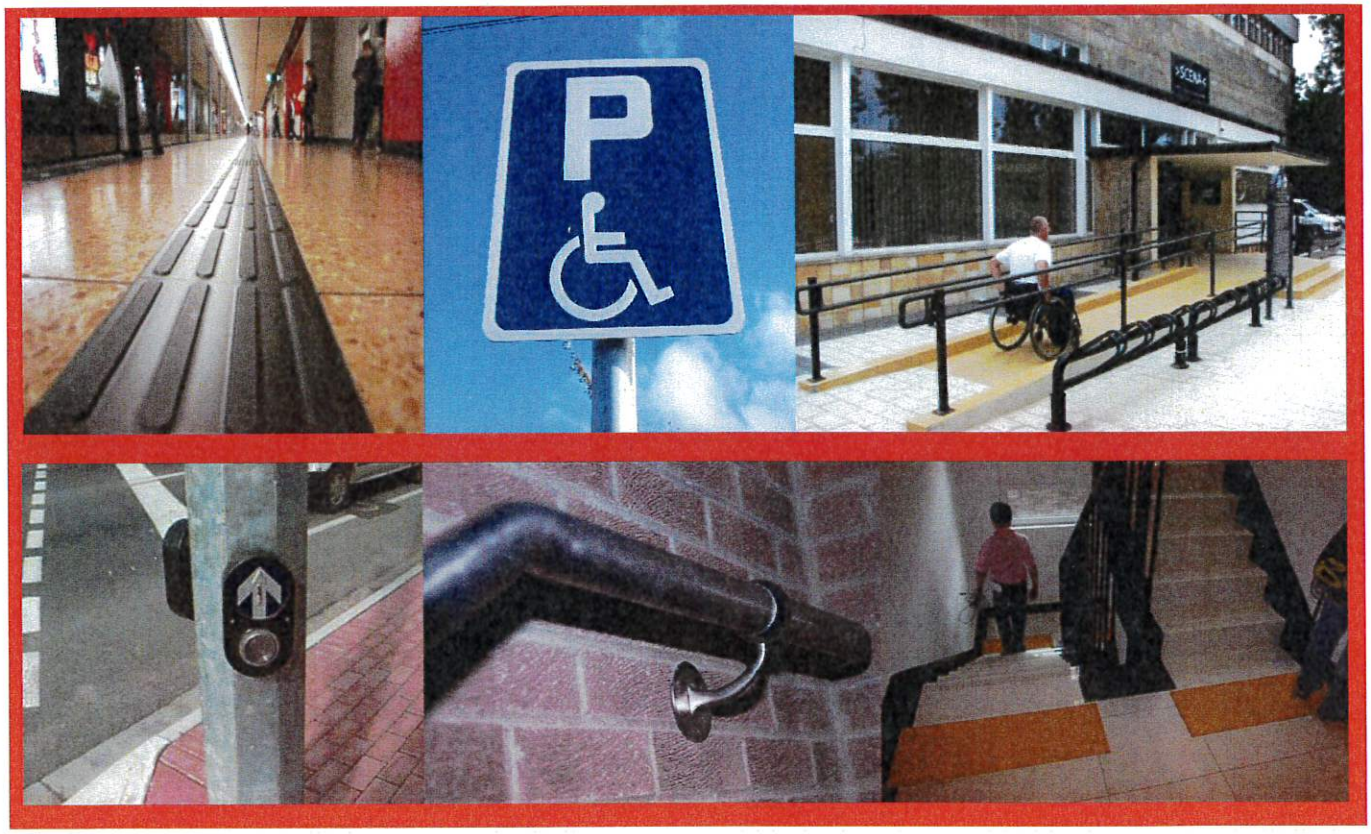
REKA BENTUK SEJAGAT (UNIVERSAL DESIGN)

GP015-A

GP

GARIS PANDUAN PERANCANGAN

Reka Bentuk Sejagat (Universal Design)



GARIS PANDUAN PERANCANGAN

Reka Bentuk Sejagat (Universal Design)

JABATAN PERANCANGAN BANDAR DAN DESA SEMENANJUNG MALAYSIA
KEMENTERIAN PERUMAHAN DAN KERAJAAN TEMPATAN
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Pemberitahuan

Garis Panduan ini menggantikan
Garis Panduan dan Piawaian Perancangan Kemudahan
Golongan Kurang Upaya JPBD 1/2000 yang disediakan oleh
Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia, 2000.

Garis panduan ini hendaklah dibaca bersama
Rancangan Pemajuan sama ada, Rancangan Tempatan atau Rancangan
Kawasan Khas.

Garis panduan ini tidak mengatasi mana-mana garis panduan lain, sama ada dari segi subjek atau pun pertapakan, yang disediakan di bawah peruntukan perundangan oleh mana-mana pihak. Ia perlu dibaca bersama dengan garis panduan/piawaian lain yang berkaitan yang disediakan oleh Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia, agensi teknikal, Kementerian lain, Lembaga Industri Pembinaan Malaysia (CIDB), Jabatan Standard Malaysia (STANDARDS MALAYSIA) dan SIRIM Berhad.

15 Jun 2011

ISI KANDUNGAN

1. TUJUAN

Garis Panduan Perancangan Reka Bentuk Sejagat (Universal Design) ini disediakan untuk membantu Pihak Berkuasa Negeri (PBN), Pihak Berkuasa Perancang Tempatan (PBPT) dan agensi pelaksana di dalam merancang dan mereka bentuk kemudahan-kemudahan dan persekitaran bandar yang dapat memenuhi keperluan akses oleh semua golongan individu termasuk kanak-kanak, orang-orang tua dan golongan orang kurang/kelainan upaya (OKU).

2. MENGAPA GARIS PANDUAN INI DIPERLUKAN

Garis Panduan ini adalah semakan semula bagi menggantikan 'Garis Panduan dan Piawaian Perancangan Kemudahan Golongan Kurang Upaya' yang telah dihasilkan pada tahun 2000 oleh Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia, Kementerian Perumahan dan Kerajaan Tempatan. Semakan semula garis panduan ini adalah diperlukan bagi merancang kemudahan-kemudahan dan persekitaran bandar yang bercirikan reka bentuk sejagat (universal design) yang boleh diakses oleh semua golongan individu tanpa mengira peringkat umur, saiz dan keupayaan fizikal masing-masing.

Garis Panduan ini mengambil perhatian bahawa setiap individu melalui peringkat umur kanak-kanak, dewasa, tua dan seterusnya mengalami kekurangan upaya dan terdapat juga individu yang mempunyai atau mendapat kecacatan di dalam tempoh hayatnya. Oleh itu, Garis Panduan ini menggariskan keperluan penyediaan kemudahan akses untuk semua golongan individu termasuklah golongan yang ditakrifkan sebagai orang kurang/kelainan upaya (OKU).

Akta Orang Kurang Upaya 2008 (Akta 685), mendefinisikan orang kurang upaya (OKU) sebagai mereka yang mempunyai kekurangan jangka panjang dari segi fizikal, mental, intelektual atau deria yang apabila berinteraksi dengan pelbagai halangan, boleh menyekat penyertaan penuh dan berkesan mereka dalam masyarakat. Kategori OKU tersebut termasuklah:

(i) Kurang upaya penglihatan;
(ii) Kurang upaya pendengaran;
(iii) Kurang upaya fizikal;
(iv) Masalah pembelajaran;
(v) Kurang upaya pertuturan;
(vi) Kurang upaya mental; dan
(vii) Kurang upaya pelbagai.

Di samping itu, golongan OKU sementara juga dikenalpasti. Ini adalah berdasarkan kepada fakta bahawa setiap individu pasti melalui pengalaman kekurangan upaya sementara akibat ditimpa kecederaan atau jatuh sakit. Ini termasuklah individu yang terpaksa menggunakan kerusi roda atau

tongkat untuk bergerak dari satu tempat ke tempat yang lain dan juga wanita hamil yang memerlukan kemudahan sokongan seperti *handrail* untuk menaiki tangga.

3. SKOP

Garis Panduan ini memberi penekanan terhadap aplikasi konsep reka bentuk sejagat di dalam merancang kemudahan-kemudahan dan persekitaran bandar yang boleh diakses oleh semua golongan individu berdasarkan kepada Malaysian Standard (MS) yang dihasilkan oleh Jabatan Standard Malaysia. Garis Panduan ini adalah terbahagi kepada dua (2) bahagian iaitu Garis Panduan Umum dan Garis Panduan Khusus. Garis Panduan Khusus memperincikan kawalan am perancangan yang digariskan di dalam Garis Panduan Umum dan meliputi perancangan kemudahan di luar bangunan dan di dalam bangunan termasuklah bangunan awam dan komersial, terminal pengangkutan awam, tempat letak kereta, kawasan rekreasi dan sebagainya.

3.1. Definisi

Reka Bentuk Sejagat (Universal Design) didefinisikan sebagai reka bentuk persekitaran dan produk yang boleh digunakan secara meluas oleh semua golongan individu tanpa memerlukan sebarang adaptasi atau rekaan khas (*Center for Universal Design, North Carolina State University, 1997*). Ia merupakan satu konsep di mana setiap individu mempunyai akses kepada semua tempat dan kemudahan pada setiap masa. Konsep ini mempengaruhi reka bentuk kediaman, tempat kerja, pengangkutan, perhubungan, peralatan komputer, perabot serta apa-apa produk dan perkhidmatan untuk memenuhi keperluan harian dan kehidupan semua golongan individu. Sebagai contoh, penyediaan *ramp* bukan sahaja dapat memudahkan aksesibiliti oleh golongan OKU yang menggunakan kerusi roda tetapi juga dapat memudahkan seseorang ibu yang menolak kereta sorong bayi dan seseorang pekerja yang menolak troli barangan mendaki atau menuruni cerun.

Reka bentuk sejagat adalah satu pendekatan baru yang muncul daripada konsep bebas halangan (*barrier free*) atau reka bentuk mudah akses (*accessible design*). Konsep-konsep sedemikian bertujuan untuk memberi akses dan menghapuskan halangan fizikal kepada golongan OKU. Namun demikian, penyelesaian kepada masalah tersebut seringkali melibatkan pendekatan yang bersifat pengasingan penyediaan kemudahan-kemudahan di antara golongan OKU dengan individu lain. Sebagai contoh, penyediaan *ramp* ke pintu masuk sesuatu bangunan yang disediakan secara eksklusif untuk golongan OKU seringkali mengakibatkan mereka terpisah daripada pintu masuk utama yang digunakan oleh individu lain.

Berbeza dengan konsep-konsep tersebut di atas, pendekatan reka bentuk sejagat ialah mengintegrasikan sebaik mungkin kemudahan-kemudahan untuk digunakan oleh semua golongan individu secara inklusif tanpa pengasingan. Di samping itu, konsep reka bentuk sejagat juga mengambilkira perubahan kehidupan seseorang individu dari peringkat umur kanak-kanak ke peringkat umur dewasa, tua dan juga kurang upaya. Oleh itu, konsep reka bentuk sejagat menekankan penyediaan kemudahan-kemudahan berdasarkan kepada semua peringkat umur dan keupayaan fizikal individu termasuklah golongan OKU.

Berdasarkan kepada *Center for Universal Design, North Carolina State University*, Reka Bentuk Sejagat (Universal Design) mempunyai 7 prinsip (NCSU, 1997) seperti berikut:

Prinsip 1: Mampu Guna (*Equitable Use*)

Suatu reka bentuk yang memberi manfaat dan mampu digunapakai oleh semua individu pelbagai keupayaan.

Prinsip 2: Penggunaan Fleksibel (*Flexibility in Use*)

Reka bentuk pelbagai yang memenuhi dan mampu menampung pelbagai pilihan dan keupayaan individu, contohnya sama ada pengguna biasa atau kidal.

Prinsip 3: Penggunaan Mudah dan Intuitif (*Simple and Intuitive Use*)

Reka bentuk yang mudah difahami tanpa berfikir, pengetahuan, pengalaman dan kemahiran membaca (buta huruf).

Prinsip 4: Daya Penyampaian Maklumat Mudah (*Perceptible Information*)

Reka bentuk yang dapat menyampaikan maklumat dengan berkesan kepada pengguna tanpa mengira keadaan persekitaran dan keupayaan deria pengguna.

Prinsip 5: Kesilapan Minimum (*Tolerance for Error*)

Reka bentuk yang meminimumkan risiko dan kemungkinan bahaya seperti kemalangan atau kecuaian.

Prinsip 6: Rendah Keupayaan Fizikal (*Low Physical Effort*)

Reka bentuk yang boleh digunakan secara efisien dan selesa tanpa menimbulkan keletihan.

Prinsip 7: Kesesuaian dan Kecukupan Saiz dan Ruang (*Size and Space for Approach and Use*)

Saiz dan ruang yang bersesuaian serta mencukupi perlu disediakan untuk kemudahsampaian dengan menggunakan saiz dan bentuk badan (posture) serta mobiliti dan ergonomik pengguna.

3.2. Peruntukan Perundangan

Akta Jalan, Parit dan Bangunan 1974 (Akta 133) terutamanya memperuntukkan undang-undang berhubung aksesibiliti di persekitaran bandar. Pindaan Undang-undang Kecilnya iaitu Pindaan Undang-Undang Kecil Bangunan Seragam (UKBS) 1984 pada tahun 1990 melalui Seksyen 34A memperuntukkan keperluan penyediaan akses dan kemudahan di bangunan untuk pengguna OKU. Seksyen 34A(1) mewajibkan semua bangunan awam menyediakan akses bagi membolehkan OKU memasuki, keluar dan berada dalam bangunan dan menyediakan kemudahan-kemudahan berkaitan untuk digunakan oleh OKU. Seksyen 34A(2) pula memperuntukkan keperluan UKBS 1984 ini hendaklah mematuhi Malaysian Standard (MS) seperti berikut:

(i) *MS 1184: 2002- Code of Practice on Access for Disabled Persons to Public Buildings*; dan

(ii) *MS 1183: Part 8: 1990 (P)- Specification for Fire Precautions in the Design and Construction of Buildings- Part 8: Code of Practice for Means of Escape for Disabled People*.

Oleh itu, setiap Pihak Berkuasa Tempatan yang mengguna pakai UKBS 1984 dikehendaki menguatkuasakan undang-undang ini dan memastikan bahawa kemudahan-kemudahan bagi golongan OKU disediakan berdasarkan kepada kedua-dua MS tersebut di atas.

Seksyen 34A(2) kini sedang di dalam peringkat cadangan untuk diperluaskan bagi memasukkan keperluan terhadap pematuhan Malaysian Standard (MS) seperti berikut:

I. MS 1331: 2003- *Code of Practice for Access of Disabled Persons Outside Buildings (First Revision)*; dan

ii. MS 2015: Part 1: 2006- *Public Toilets- Part 1: Minimum Design Criteria*.

Disamping itu, perundangan berkaitan yang perlu juga dirujuk termasuklah Akta Perancangan Bandar dan Desa, 1976 (Akta 172) di mana semua pembangunan hendaklah mendapat kebenaran merancang (KM) daripada Pihak Berkuasa Perancang Tempatan (PBPT) dan PBPT boleh mengeluarkan syarat-syarat yang berkaitan termasuklah penyediaan kemudahan-kemudahan dan persekitaran bandar yang dapat memenuhi keperluan akses oleh semua golongan individu.

4. PRINSIP PERANCANGAN

Penyediaan kemudahan-kemudahan dan persekitaran bandar berkonsepkan reka bentuk sejagat perlu memenuhi prinsip-prinsip perancangan seperti berikut:

4.1. Kemudahsampaian

Pengagihan kemudahan yang mencukupi dan saksama melalui perletakan aktiviti di tempat yang mudah dihubungi, terhampir dan bersesuaian dengan keperluan semua golongan individu.

4.2. Keselamatan

Kemudahan yang menitikberatkan ciri-ciri keselamatan dan tidak membahayakan pengguna.

4.3. Keselesaan

Kemudahan yang fleksibel, selesa dan mudah digunakan tanpa sebarang halangan.

4.4. Mesra Pengguna

Kemudahan dan peralatan yang mesra pengguna dan tidak membebankan keupayaan fizikal; mengambilkira kemampuan dan kebolehan semua golongan individu; dan mudah difahami oleh semua golongan individu.

5. GARIS PANDUAN UMUM

Perancangan kemudahan dan persekitaran bandar bercirikan reka bentuk sejagat hendaklah mematuhi kawalan am perancangan seperti berikut:

5.1. Kemudahan Yang Bersepadu

Penyediaan kemudahan untuk semua golongan individu hendaklah dirancang secara bersepadu dan diintegrasikan dengan kemudahan sedia ada lain di mana perkara ini hendaklah diambilkira di dalam penyediaan pelan susun atur untuk proses kelulusan kebenaran merancang (KM).

5.2. Kemudahsampaian

Perancangan hendaklah menitikberat-kan kemudahsampaian ke bangunan awam, kediaman bertingkat, bangunan perniagaan, terminal pengangkutan awam dan kawasan rekreasi dari tempat letak kereta atau perhentian pengangkutan awam;

Perancangan hendaklah mengambilkira semua golongan individu tanpa mengira peringkat umur dan keupayaan fizikal masing-masing untuk keluar dan masuk dari sesuatu tempat tanpa sebarang halangan; dan

Perancangan hendaklah mengambilkira perlakuan pelbagai aktiviti asas semua golongan individu sama ada kanak-kanak,

orang dewasa, orang tua dan OKU seperti bergerak, duduk dan pelbagai aktiviti lain.

5.3. Perletakan Kemudahan Yang Ideal

Perletakan kemudahan memerlukan perancangan yang teliti serta perlu menitikberatkan ciri-ciri keselamatan, keselesaan dan kesesuaian bagi memaksimumkan penggunaan yang cekap dan berkesan. Perletakan kemudahan hendaklah paling hampir dan tidak membebankan setiap golongan individu.

5.4. Mesra Pengguna

Semua kemudahan hendaklah berasaskan kepada pelbagai ciri mesra pengguna untuk keselesaan semua golongan individu khususnya golongan OKU.

6. GARIS PANDUAN KHUSUS

Garis Panduan Khusus meliputi perancangan kemudahan di luar bangunan (MS 1331: 2003) dan di dalam bangunan (MS 1184: 2002 dan MS 2015: Part 1: 2006) seperti di dalam **Jadual 1.0.**

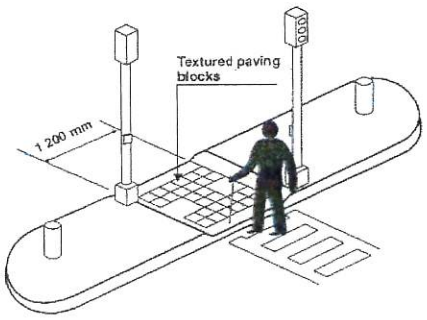
Nota: Oleh kerana garis panduan ini adalah merupakan garis panduan perancangan di bawah Akta 172, maka garis panduan perancangan kemudahan di dalam bangunan adalah bermaksud untuk memberi penekanan terhadap keperluan penyediaan kemudahan-kemudahan di bawah UKBS 1984 dan tidak bermaksud untuk mengatasinya.

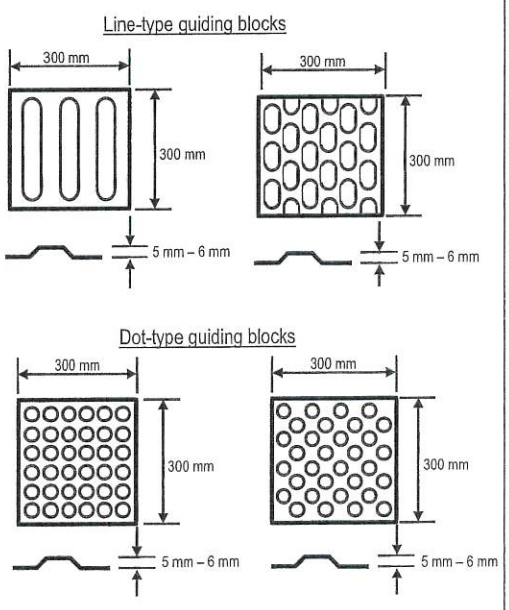
Jadual 1.0: Garis Panduan Khusus Reka Bentuk Sejagat (Universal Design)

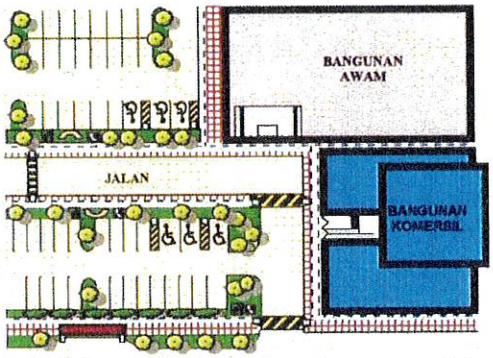
Kemudahan	Garis Panduan Khusus
1. Laluan Pejalan Kaki  Laluan pejalan kaki tanpa sebarang halangan fizikal  *Sumber: http://blog.safetytubs.com/182/universal-design-2/, Jun 2011* Laluan pejalan kaki sesuai untuk semua individu termasuk pengguna kerusi roda	**Luar Bangunan** a) Laluan pejalan kaki hendaklah disediakan tanpa sebarang halangan fizikal untuk memberi akses ke bangunan, kawasan rekreasi, terminal pengangkutan awam, tempat letak kereta dan sebagainya. b) Laluan pejalan kaki hendaklah sentiasa diterangi cahaya, kukuh, rata, serap air dan tidak licin di dalam keadaan cuaca panas dan lembap [Klausa 4.1 dan 25.1, MS 1331:2003]. c) Saiz laluan pejalan kaki hendaklah sesuai untuk semua individu termasuk pengguna kerusi roda. Saiz lebar minimum adalah 1500 mm dan maksimum 3000 mm bagi kawasan laluan di perhentian bas dan teksi atau tempat melintas jalan [Klausa 4.2, MS 1331:2003]. d) Sekiranya *kerb* tidak disediakan di laluan pejalan kaki, perbezaan ketinggian pejalan kaki dengan jalan bersebelahan hendaklah maksimum 10 mm [Klausa 4.6, MS 1331:2003]. e) *Guiding blocks/tactile blocks* hendaklah disediakan di laluan utama pejalan kaki sebagai pemandu arah.

Kemudahan	Garis Panduan Khusus
 *Sumber: http://hubpages.com/hub/Stainless-steel-bollards, Disember 2010* *Bollard* di laluan pejalan kaki  Saiz lubang dan kedudukan penutup longkang/parit tidak seharusnya mengganggu kelancaran pergerakan terutamanya pengguna kerusi roda	f) Sekiranya bollard disediakan di sepanjang laluan pejalan kaki, jarak antara setiap *bollard* adalah minimum 900 mm dan maksimum 1200 mm untuk memberi laluan kepada pengguna kerusi roda. g) Tanda amaran berbunyi/berlampu di kawasan-kawasan merbahaya atau kawasan pembinaan hendaklah disediakan untuk keselamatan individu yang mengunakan laluan pejalan kaki. [Klausa 28.1, MS 1331:2003]. h) Penutup longkang/parit hendaklah tidak licin dan sama rata dengan permukaan laluan pejalan kaki. Bukaan maksimum lubang di antara penutup longkang/parit adalah 13 mm [Klausa 4.5, MS 1331:2003]. i) Perabot jalan seperti pokok, pasu bunga, tiang lampu, papan tanda dan kerusi/bangku hendaklah diletakkan di tepi laluan pejalan kaki supaya tidak menganggu pergerakan individu [Klausa 18.1 dan 22.2, MS 1331:2003]. j) Laluan pejalan kaki hendaklah tidak dikongsi bersama laluan sikal bagi mengelakkan risiko kemalangan.

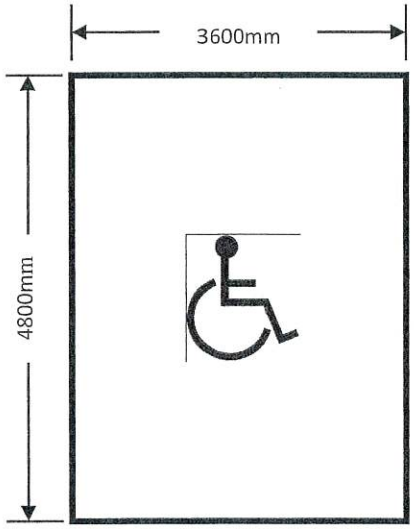
Kemudahan	Garis Panduan Khusus
 *Sumber: http://futureofud.wikispaces.com/UD+and+the+ICF, Jun 2011* Permukaan laluan pejalan kaki daripada bahan yang tidak licin serta mempunyai warna dan tekstur yang berbeza	**Dalam Bangunan** a) Laluan pejalan kaki hendaklah disediakan tanpa sebarang halangan fizikal dari pintu masuk bangunan hingga ke setiap tingkat di dalam bangunan untuk memberi akses kepada individu terhadap kemudahan-kemudahan di dalam bangunan [Klausa 3.3, MS 1184:2002]. b) Saiz laluan pejalan kaki dan *ramp* hendaklah mempunyai ruang lega minimum 1200 mm untuk pengguna kerusi roda. Kecerunan maksimum adalah 1:12 [Klausa 5.1, MS 1884:2002]. c) Permukaan laluan pejalan kaki hendaklah daripada bahan yang tidak licin serta mempunyai warna dan tekstur yang berbeza bagi memaklumkan sebarang potensi halangan fizikal [Klausa 26, MS 1184:2002]. d) *Guiding blocks/tactile blocks* hendaklah disediakan di laluan utama pejalan kaki sebagai pemandu arah.

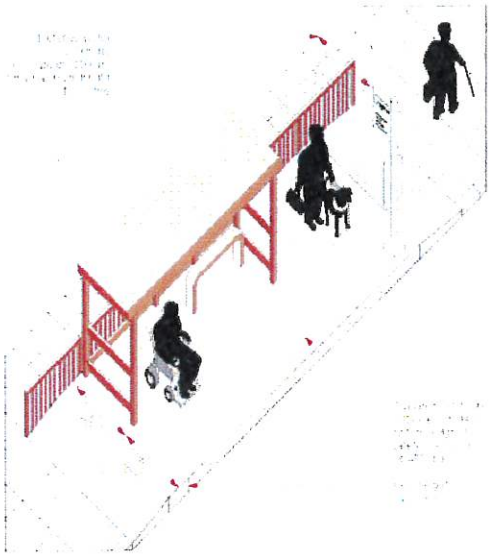
Kemudahan	Garis Panduan Khusus
2. Lintasan Pejalan Kaki   Lampu isyarat untuk kemudahan melintas jalan **MS 1331:2003**	a) *Step ramp/dropped kerb* hendaklah disediakan di lintasan pejalan kaki [Klausa 6.1, MS 1331:2003]. *Step ramp* hendaklah mempunyai warna dan tekstur yang berbeza dengan laluan pejalan kaki bersebelahan dan permukaannya hendaklah tidak licin [Klausa 6.4, MS 1331:2003]. b) *Guiding blocks/tactile blocks* hendaklah disediakan di kedua-dua arah ke lintasan pejalan kaki [Klausa 17.3, MS 1331:2003]. c) Lampu isyarat hendaklah mempunyai *visual and audio signals* untuk memberi panduan kepada individu untuk melintas jalan [Klausa 17.5, MS 1331:2003]. d) Di jalan-jalan utama dimana trafik adalah sibuk (dimana pembahagi jalan adalah cukup luas atau lebih daripada 2700 mm), lintasan pejalan kaki hendaklah disusun atur secara berperingkat bagi mengelakkan kesesakan lalu lintas akibat daripada masa yang diambil oleh pelintas jalan kaki [Klausa 17.7, MS 1331:2003].

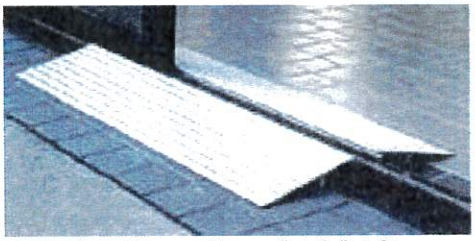
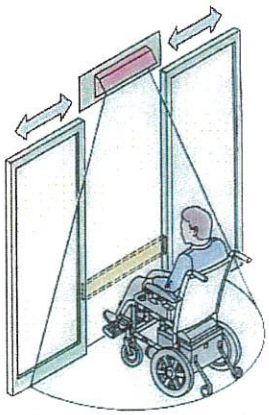
Kemudahan	Garis Panduan Khusus
3. *Guiding Blocks/ Tactile Blocks*	a) *Guiding blocks/tactile blocks* hendaklah disediakan untuk memandu arah orang kurang upaya penglihatan dan memberi amaran pada bahagian tertentu bagi mengelakkan halangan fizikal atau risiko kemalangan [Klausa 12, MS 1331:2003 dan Klausa 15, MS 1184:2002].
 *Guiding blocks/tactile blocks* di dalam dan luar bangunan	b) Tempat yang hendaklah disediakan *guiding blocks/tactile blocks* termasuklah: • Berhadapan pintu masuk bangunan, tangga, lif, eskalator dan *ramp;* • Laluan utama pejalan kaki di luar dan di dalam bangunan; • Lintasan pejalan kaki; dan • Platform terminal pengangkutan awam.
 **MS 1184:2002**	c) Dua jenis permukaan laluan iaitu *Line-type guiding blocks/tactile blocks* dan *Dot-type guiding blocks/tactile blocks* adalah asas kepada menunjuk arah laluan [Klausa 12.5, MS 1331:2003 dan Klausa 15.4, MS 1184:2002]. d) *Line-type guiding blocks/tactile blocks* menunjukkan arah laluan untuk diikuti [Klausa 12.5(a), MS 1331:2003 dan Klausa 15.4(a), MS 1184:2002]. e) *Dot-type guiding blocks/tactile blocks* memberi tanda amaran bertujuan menangkis halangan fizikal dan bahaya serta menunjuk arah dan amaran sekiranya menghampiri selekoh dan simpang [Klausa 12.5(b), MS 1331:2003 dan Klausa 15.4(b), MS 1184:2002].

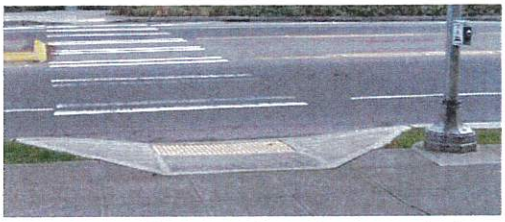
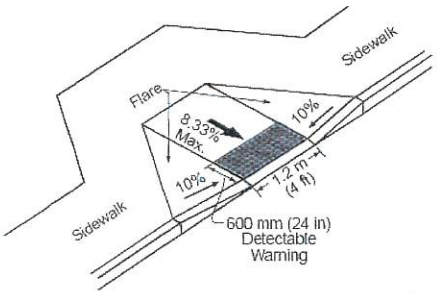
Kemudahan	Garis Panduan Khusus
4. Tempat Letak Kereta  *Sumber: Kajian Garis Panduan Perancangan Reka Bentuk Sejagat (Universal Desgin); JPBD SM, 2011.* Pelan tatatur yang menyediakan kemudahan tempat letak kereta untuk pengguna kerusi roda berdekatan dengan anjung masuk ke bangunan  *Sumber: http://www.nolimitslsinc.com/ Security.html, Jun 2011* Tempat letak kereta di atas permukaan yang rata	a) Tempat letak kereta untuk pengguna kerusi roda hendaklah disediakan di luar dan di dalam semua bangunan awam dan komersial, terminal pengangkutan awam dan kediaman bertingkat serta kawasan rekreasi. Tempat letak kereta di luar bangunan hendaklah berbumbung khas untuk kemudahan pengguna kerusi roda. b) Lokasi tempat letak kereta hendaklah berdekatan dengan pintu masuk utama bangunan [Klausa 21.1, MS 1331:2003]. c) Tempat letak kereta hendaklah disediakan di atas permukaan yang rata [Klausa 4.2, MS 1184:2002]. d) Untuk di luar bangunan, sekiranya terdapat laluan pejalan kaki bersebelahan dengan tempat letak kereta, *step ramp/dropped kerb* selebar minimum 1200 mm hendaklah disediakan sebagai akses ke laluan pejalan kaki [Klausa 21.5, MS 1331:2003]. e) Untuk di dalam bangunan, tempat letak kereta hendaklah sama rata dengan laluan pejalan kaki bersebelahan. Sekiranya tidak sama rata, *step ramp/dropped kerb* selebar minimum 1000 mm dan maksimum 1050 mm hendaklah disediakan [Klausa 4.3, MS 1184:2002].

Kemudahan	Garis Panduan Khusus
 Simbol tempat letak kereta untuk pengguna kerusi roda  *Sumber: http://www.thedisabledshop.com/ Blog/category/independent-living/; Disember 2010* Simbol tempat letak kereta untuk pengguna kerusi roda di atas permukaan jalan	f) Simbol tempat letak kereta untuk penggguna kerusi roda hendaklah disediakan dan dapat dilihat apabila memasuki kawasan tempat letak kereta. Tanda arah yang mencukupi hendaklah disediakan [Klausa 4.5, MS 1184:2002]. g) Simbol tempat letak kereta untuk pengguna kerusi roda juga hendaklah disediakan di atas permukaan ruang tempat letak kereta [Klausa 21.5, MS 1331:2003]. h) Jumlah ruang petak letak kereta untuk pengguna kerusi roda bagi sesebuah bangunan hendaklah minimum 1 ruang bagi setiap 25 petak letak kereta awam atau minimum 1 ruang bagi setiap 2 petak letak kereta awam sekiranya hanya terdapat 2 petak letak kereta.

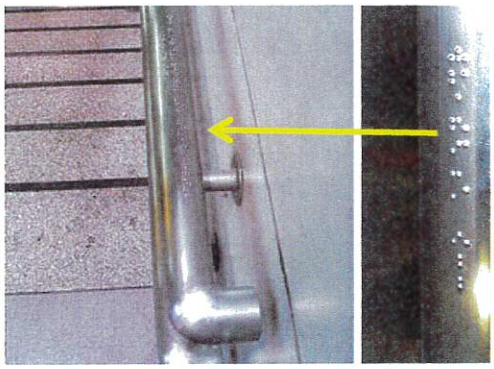
Kemudahan	Garis Panduan Khusus
 *Sumber: Kajian Garis Panduan Perancangan Reka Bentuk Sejagat (Universal Desgin); JPBD SM, 2011.* Saiz minimum tempat letak kereta sudut tepat	i) Saiz minimum tempat letak kereta sudut tepat adalah 3600 mm lebar x 4800 mm panjang. Sekiranya kemudahan tempat letak kereta tersebut adalah selari dengan jalan raya, saiz minimum adalah 3600 mm lebar x 6600 mm panjang bagi membolehkan pengguna kerusi roda keluar daripada bahagian pemandu dan bergerak di antara tempat letak kereta untuk menuju ke laluan pejalan kaki bersebelahan.

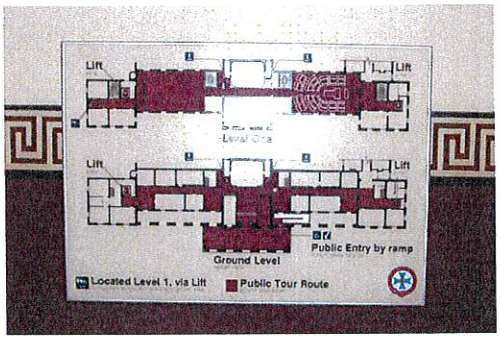
Kemudahan	Garis Panduan Khusus
5. Hentian Bas  *Sumber: http://www.dft.gov.uk/transportforyou/access/peti/inclusivemobility, Disember 2010.* Reka bentuk hentian bas yang mengambilkira pengguna kurang upaya  *Sumber: http://james-g-mcconnell.com/j_c_decaux_street_furniture, Disember 2010*	a) Kemudahan seperti *step ramp/dropped kerb, ramp, guiding blocks/tactile blocks* dan *railings* hendaklah disediakan di hentian bas. b) Aras lantai hentian bas hendaklah sama tinggi dengan aras lantai bas untuk memudahkan semua golongan individu menaiki atau menuruni bas. c) Permukaan lantai hentian bas hendaklah tidak licin. d) Pencahayaan yang mencukupi hendaklah disediakan di hentian bas. e) Kerusi/bangku yang selamat, selesa dan dari bahan yang sesuai hendaklah disediakan di hentian bas. f) Reka bentuk hendaklah memudahkan bas untuk berhenti bersebelahan dengan *kerb* untuk mengambil penumpang. g) Nombor laluan bas yang timbul (*embossed*) hendaklah disediakan di bahagian dinding kaca hentian bas untuk panduan orang kurang upaya penglihatan [Klausa 5,18,19 dan 24, MS 1331:2003].

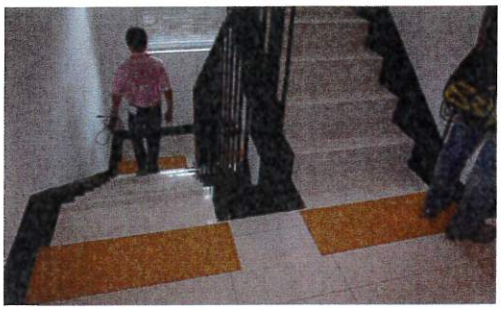
Kemudahan	Garis Panduan Khusus
6. Pintu Masuk Utama Bangunan  *Sumber:* http://www.cdihp.org/briefs/brief5-improve-access.html#sect1, Jun 2011 Akses kepada pengguna kerusi roda di pintu masuk utama  *Sumber:* http://www.northcountrypublicradio.org/news/tags/innovation-trail, *Jun 2011* Reka bentuk pintu masuk bagi pengguna kerusi roda  Pintu berkaca automatik	a) Semua pintu masuk utama bangunan hendaklah menyediakan akses kepada pengguna kerusi roda untuk memasuki bangunan [Klausa 6.1, MS 1184:2002]. b) Sekiranya pintu masuk utama tidak boleh diakses oleh pengguna kerusi roda, tanda arah simbol pengguna kerusi roda/OKU hendaklah disediakan di pintu masuk utama tersebut untuk memaklumkan arah ke pintu masuk alternatif [Klausa 6.3 dan 28, MS 1184:2002]. c) *Guiding blocks/tactile blocks* hendaklah disediakan di pintu masuk dan keluar bangunan. Permukaan lantai hendaklah menggunakan bahan dan *colour contrast* [Klausa 25.2, MS 1331:2003] di pintu masuk dan keluar bagi tujuan tanda amaran untuk orang kurang upaya penglihatan. d) Pintu masuk bangunan hendaklah mempunyai lebar minimum 900 mm. Walaubagaimanapun, lebar minimum bagi pintu masuk hospital dan kompleks sukan adalah 1000 mm [Klausa 8.1, MS 1184:2002]. Ruang untuk berpusing (*turning radius*) bagi pengguna kerusi roda hendaklah disediakan dengan ukurlilit minimum 1200 mm [Klausa 8.3/ Klausa 14, MS 1184:2002]. e) Pintu berkaca automatik sebaiknya hendaklah disediakan. Sekiranya tiada pintu sedemikian maka hendaklah disediakan pintu yang boleh dibuka dengan sebelah tangan dan menggunakan *lever handle* maksimum 1200 mm dari aras lantai [Klausa 27.1, MS 1184:2002].

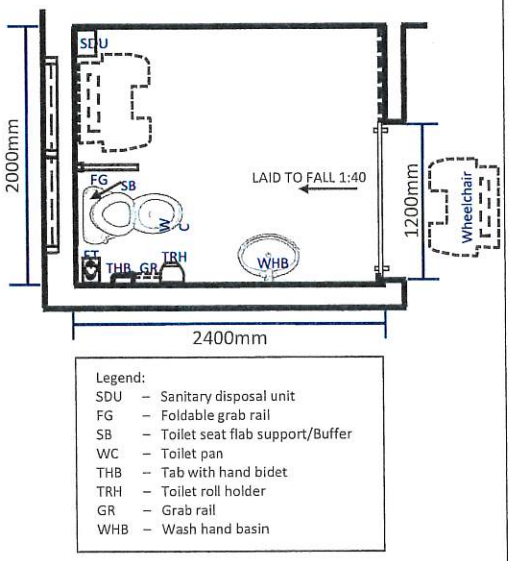
Kemudahan	Garis Panduan Khusus
7. *Step Ramp/Dropped Kerb*	**Luar Bangunan**
 *Sumber: http://www.fhwa.dot.gov/publications/research/safety/pedbike/05085/chapt8.cfm, Jun 2011*	a) *Step ramp/dropped kerb* hendaklah disediakan di lintasan pejalan kaki, persimpangan lampu isyarat, hentian bas dan sebagainya [Klausa 6.1, MS 1331:2003].
Step ramp/dropped kerb berhampiran persimpangan lampu isyarat	b) *Step ramp/dropped kerb* hendaklah mempunyai warna dan tekstur yang berbeza dengan laluan pejalan kaki bersebelahan dan permukaannya hendaklah tidak licin [Klausa 6.4, MS 1331:2003].
 *Sumber: http://www.seattle.gov/transportation/pedestrian_masterplan/pedestrian_toolbox/tools_deua_ramps.htm; 9.6.2011*	**Dalam Bangunan**
 *Sumber: http://www.fhwa.dot.gov/publications/research/safety/pedbike/05085/chapt8.cfm*	a) Sekiranya paras lantai termasuk di pintu masuk bangunan tidak melebihi daripada 215 mm sama ada di atas atau bawah laluan pejalan kaki, *step ramp/dropped kerb* hendaklah disediakan [Klausa 7.1, MS 1184:2002].
Contoh reka bentuk *step ramp/dropped kerb* di lintasan lampu isyarat	b) *Step ramp/dropped kerb* hendaklah mempunyai permukaan yang tidak licin [Klausa 7.4, MS 1184:2002].

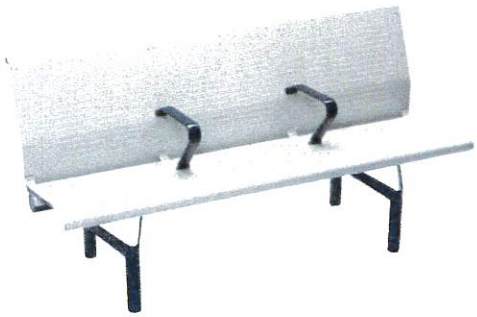
Kemudahan	Garis Panduan Khusus
8. *Ramp*  Kemudahan *ramp* di bangunan awam  *Sumber: http://blogs.walkerart.org/offcenter/ category/community/, Jun 2011* Kemudahan *ramp* di taman awam	a) *Ramp* hendaklah disediakan di luar dan di dalam semua bangunan awam dan komersial, terminal pengangkutan awam, tempat letak kereta, kediaman bertingkat serta kawasan rekreasi bagi menghubungkan laluan pejalan kaki. b) Kecerunan maksimum *ramp* adalah 1:12 [Klausa 7.2(a), MS 1331:2003 dan Klausa 5.1(b), MS 1184:2002)] dan kelebaran minimum 1200 mm [Klausa 7.2(d), MS 1331:2003 dan Klausa 5.1(a), MS 1184:2002]. c) *Ramp* tanpa penghadang di kiri kanan hendaklah disediakan *kerb* dengan ketinggian minimum 100 mm untuk keselamatan pengguna kerusi roda dan pengguna bertongkat [Klausa 7.5, MS 1331:2003 dan Klausa 5.2(c), MS 1884:2002]. d) *Guiding blocks/tactile blocks* hendaklah disediakan pada permulaan dan akhir kecerunan *ramp* bagi memberi amaran dan panduan kepada orang kurang upaya penglihatan. e) Permukaan *ramp* hendaklah dari bahan yang tidak licin dan bersesuaian [Klausa 25, MS 1331:2003 dan Klausa 26, MS 1184:2002]. f) Minimum 1 *ramp* hendaklah disediakan untuk setiap deretan rumah kedai/ pejabat.

Kemudahan	Garis Panduan Khusus
9. *Handrail*  *Handrail* yang disediakan bersama dengan *ramp*  Saiz *handrail* yang sesuai adalah penting untuk keselesaan dan keselamatan semua individu  *Sumber: http://pingmag.jp/2006/09/29/ accessibility-for-blind-people/, Jun 2011* Tulisan Braille pada *handrail* bagi membantu golongan cacat penglihatan	a) *Handrail* hendaklah disediakan di laluan pejalan kaki, koridor bangunan, *ramp* dan tangga bangunan [Klausa 11, MS 1331:2003 dan Klausa 12, MS 1184:2002] untuk kegunaan dan keselamatan semua individu. b) *Handrail* hendaklah dipasang minimum 840 mm dan maksimum 900 mm dari aras lantai [Klausa 11.2(a), MS 1331:2003 dan Klausa 12.1, MS 1184:2002]. c) *Handrail* hendaklah mempunyai jarak minimum 50 mm dan maksimum 100 mm dari dinding bangunan [Klausa 11.2(d), MS 1331:2003 dan Klausa 12.5, MS 1184:2002]. d) *Handrail* hendaklah mempunyai ukur lilit/lebar minimum 40 mm dan maksimum 60 mm serta hendaklah tidak licin dan selamat untuk digenggam [Klausa 11.3, MS 1331:2003 dan Klausa 12.2, MS 1184:2002].

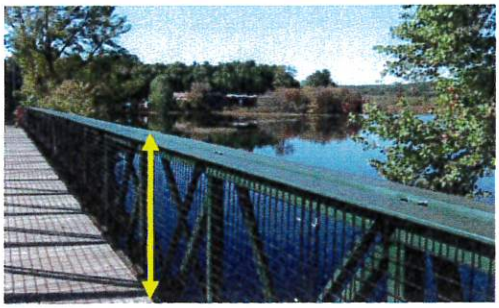
Kemudahan	Garis Panduan Khusus
10. Papan Tanda dan Simbol  *Sumber: http://design1528.blogspot.com/2010/03/designers-towards-accessibility-and.html; Disember 2010* Simbol akses untuk pengguna kerusi roda/OKU  Papan tanda kenyataan/pelan petunjuk yang menunjukkan lokasi kemudahan untuk OKU di dalam bangunan	a) Simbol antarabangsa akses untuk pengguna kerusi roda/OKU adalah berwarna putih dengan latarbelakang berwarna biru [Klausa 20.4, MS 1331:2003 dan Klausa 28.1, MS 1184:2002]. b) Lokasi minimum papan tanda akses untuk pengguna kerusi roda/OKU adalah di tempat letak kereta terbuka, laluan pejalan kaki, pintu masuk utama bangunan dan pintu masuk alternatif, kawasan resepsi, lobi lif, tandas dan pintu kecemasan [Klausa 28.3, MS 1184:2002]. c) Saiz, jenis dan tulisan huruf papan tanda hendaklah jelas dan boleh dibaca [Klausa 28.6, MS 1184:2002]. d) Papan tanda bertulisan *braille* hendaklah disediakan untuk kemudahan orang kurang upaya penglihatan [Klausa 28.7, MS 1184:2002]. e) Papan tanda kenyataan/pelan petunjuk di dalam dan di luar bangunan hendaklah disediakan untuk menunjukkan lokasi kemudahan untuk pengguna kerusi roda/OKU seperti tandas, lif, pintu kecemasan, tempat letak kereta, hentian bas, kawasan rekreasi dan lain-lain [Klausa 20.3, MS 1331:2003 dan Klausa 28.5, MS 1184:2002]. f) Papan tanda yang memaklumkan kepada pemandu kenderaan kawasan yang selalu digunakan oleh pengguna kerusi roda/OKU hendaklah disediakan untuk tujuan keselamatan [Klausa 20.1, MS 1331:2003].

Kemudahan	Garis Panduan Khusus
11. Tangga, Lif dan Eskalator   *Sumber: http://www.infolink.com.au/t/Grab-Rails* *Guiding blocks/tactile blocks* di tangga dapat membantu pengguna kurang upaya penglihatan  Lif untuk kemudahan semua individu termasuk pengguna kerusi roda/OKU	a) Tangga, lif dan eskalator hendaklah disediakan untuk memberi akses kepada individu di bangunan bertingkat [Klausa 9.1 dan 11.1, MS 1184:2002 dan Klausa 8.1 dan 10.1, MS 1331:2003]. b) Spesifikasi penyediaan tangga hendaklah mengikut Klausa 9, MS 1184:2002. c) *Guiding blocks/tactile blocks* hendaklah disediakan di tangga, lif dan eskalator [Klausa 12.1(a), MS 1331:2003 dan Klausa 15.1(a), MS 1884:2002] sebagai panduan halangan fizikal atau amaran potensi kemalangan kepada orang kurang upaya penglihatan. d) Minimum 1 lif berdekatan dengan pintu masuk utama bangunan hendaklah boleh diakses oleh pengguna kerusi roda dan mempunyai ruang untuk berpusing 180 darjah [Klausa 9.4, MS 1331:2003 dan Klausa 10.4, MS 1184:2002].

Kemudahan	Garis Panduan Khusus
12. Tandas  Kemudahan tandas untuk pengguna kerusi roda  *Sumber: Kajian Garis Panduan Perancangan Reka Bentuk Sejagat (Universal Desgin); JPBD SM, 2011.* Saiz minimum tandas untuk pengguna kerusi roda **MS 2015:Part 1:2006**	a) Tandas untuk pengguna kerusi roda/OKU hendaklah disediakan di semua bangunan awam dan komersial, kawasan rekreasi, tempat tumpuan awam dan terminal pengangkutan awam. b) Bilangan dan reka bentuk tandas hendaklah mengikut Klausa 16, 17, 18, 19, 20, 22 dan 26 MS 1184:2002 [Klausa 18.13, MS 1331:2003] dan MS 2015: Part 1: 2006. *c)* Bilangan minimum tandas yang perlu dilengkapi dengan kemudahan untuk pengguna kerusi roda adalah 1 bagi setiap 10 tandas biasa [Klausa 5.5, MS 2015: Part 1: 2006] dimana saiz minimum tandas adalah 2000 mm x 2400 mm. Saiz minimum tandas untuk selain daripada pengguna kerusi roda adalah 1200 mm x 2400 mm dilengkapi dengan *grab bar.* d) Simbol tandas lelaki/perempuan hendaklah timbul (embossed) atau bertulisan *braille* untuk panduan kepada orang kurang upaya penglihatan [Klausa 28.7, MS 1184:2002].

Kemudahan	Garis Panduan Khusus
13. Perabot Jalan  Paras telefon awam hendaklah mengambilkira keperluan semua individu  Contoh reka bentuk tempat duduk/bangku awam yang mesra pengguna	**a) Telefon Awam** 1) Minimum 1 telefon awam khas hendaklah disediakan di tempat awam. 2) Ciri-ciri telefon awam khas hendaklah mengambilkira: • Laluan/akses tanpa halangan ke telefon; • Papan tunjuk arah; • Reka bentuk telefon yang mudah di mana ketinggian slot duit, kad dan dail hendaklah maksimum 1000 mm daripada aras lantai; • Alat bantuan tambahan disediakan (sekiranya perlu); • Perletakan telefon tidak menghalang laluan; dan • Pencahayaan yang mencukupi. 3) Semua keperluan di atas hendaklah disediakan berdasarkan Klausa 27.4, MS 1184:2002. **b) Tempat Duduk/Bangku Awam** 1) Kemudahan tempat duduk/bangku hendaklah disediakan di tempat awam yang boleh digunakan oleh semua individu. 2) Tempat duduk/bangku untuk berehat juga hendaklah disediakan di tempat-tempat yang mudah sampai seperti di sepanjang laluan pejalan kaki.

Kemudahan	Garis Panduan Khusus
 *Sumber: http://www.unicorn-containers.com/ Street_Litter_Bins/Street_litter_Bins_Full_ Range.htm, Jun 2011* Ketinggian lubang tong sampah yang mudah digunakan oleh semua individu	3) Reka bentuk tempat duduk/bangku hendaklah menepati ciri-ciri keselesaan, kesesuaian ketinggian dan keselamatan. Penyandar, pemegang dan permukaan tempat duduk/bangku hendaklah sesuai untuk semua individu. Ketinggian tempat duduk/bangku adalah minimum 420mm dan maksimum 450mm daripada aras lantai. 4) Semua keperluan diatas hendaklah disediakan berdasarkan Klausa 19, MS 1331:2003. **c) Peti Surat/Tong Sampah** 1) Perletakan, kesesuaian, reka bentuk dan ketinggian peti surat dan tong sampah hendaklah mengambilkira semua individu. 2) Ketinggian slot surat dan lubang tong sampah hendaklah maksimum 1000 mm daripada aras lantai [Klausa 18.8, MS 1331:2003].

Kemudahan	Garis Panduan Khusus
 Ketinggian pagar keselamatan yang sesuai bagi menghindar bahaya  *Sumber: http://www.nst.com.my/nst/articles/ 2atb/Article/* Ketiadaan pagar keselamatan boleh mengundang bahaya kepada individu	**d) Pagar Keselamatan** 1) Pagar keselamatan hendaklah disediakan di sekeliling taman tasik dan kolam buatan manusia yang menjadi tempat tumpuan orang awam. 2) Reka bentuk dan bahan binaan hendaklah mempunyai ciri-ciri keselamatan dan ketahanan. 3) Ketinggian minimum adalah 1200 mm daripada aras lantai. 4) Pagar keselamatan hendaklah disokong oleh *guiding blocks* sebagai panduan kepada orang kurang upaya penglihatan.
14. Lain-lain  Reka bentuk dan ketinggian mesin ATM hendaklah mengambilkira keperluan semua individu	**Mesin *Automated Teller Machine* (ATM)** Perletakan, kesesuaian, reka bentuk dan ketinggian mesin ATM hendaklah mengambilkira keupayaan semua individu di mana ketinggian slot duit dan kad hendaklah maksimum 1000 mm daripada aras lantai [Klausa 27.4, MS 1184:2002].

7. PENUTUP

Mesyuarat Jemaah Menteri pada 4 Mei, 2011 telah meluluskan Garis Panduan Perancangan Reka Bentuk Sejagat (Universal Design) dan mesyuarat Majlis Negara Bagi Kerajaan Tempatan pada 23 Mei, 2011 telah bersetuju dengan pelaksanaan garis panduan ini yang menggariskan perkara-perkara asas berhubung dengan prinsip-prinsip perancangan serta garis panduan umum, garis panduan khusus dan piawaian perancangan yang perlu dipatuhi.

Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia, Kementerian Perumahan dan Kerajaan Tempatan berharap agar aspek-aspek yang dicadangkan dalam Garis Panduan ini dipatuhi dan menjadi panduan kepada PBN, PBT dan pemaju dalam merancang, mengawal dan memantau pelaksanaan penyediaan kemudahan-kemudahan dan mewujudkan persekitaran bandar yang dapat memenuhi keperluan akses oleh semua golongan individu termasuk kanak-kanak, orang-orang tua dan golongan OKU.

Untuk sebarang pertanyaan, sila hubungi:

Pengarah
Bahagian Penyelidikan dan Pembangunan
Jabatan Perancangan Bandar dan Desa Semenanjung Malaysia
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LAMPIRAN C

JADUAL HARGA

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

ANGGARAN JABATAN

RINGKASAN SEBUTHARGA *(FINAL SUMMARY)*

BILL NO.	KETERANGAN	MUKA SURAT	JUMLAH (RM)
1	ARAHAN AM	A1-A4	
2	KERJA-KERJA AWALAN	B1-B7	
3	KERJA-KERJA PEMBAIKAN DI DALAM BLOK UTAMA	C1-C12.4	
4	KERJA-KERJA PEMBAIKAN DI DATARAN JAM BUNGA	D1-D4.4	
5	KERJA-KERJA PEMBAIKAN JALAN DI SEKITAR TASKA	E1-E1.1.4	
6	PEMBAIKAN DI SEKITAR KOMPLEKS PARLIMEN	E2-E2.1.9	
7	WANG PERUNTUKAN SEMENTARA *(PROVISIONAL SUM)*	F	30,000.00
8	TEMPOH KERJA	G	
JUMLAH DIBAWA KE BORANG SEBUTHARGA			

(Ringgit Malaysia : .....

(RM : .....)

.....
(Tandatangan Penyebutharga)

.....
(Tandatangan Saksi)

Nama : .....

No. K/P: .....

Jawatan : .....

yang diberi kuasa dengan sempurnanya

untuk menandatangani sebutharga ini

.....
(Meteri atau Cop Penyebutharga)

Tarikh : .....

Nama : .....

No. K/P: .....

Jawatan : .....

Alamat :

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.....

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Tarikh : .....

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

ITEM	KETERANGAN	UNIT	KUANTITI	KADAR SEUNIT (RM)	JUMLAH (RM)
A	**ARAHAN AM**				
A1	**Taklimat Sebutharga / Lawatan Tapak**				
A1.1	Penyebuatharga adalah diminta mengambil perhatian terhadap Taklimat Sebutharga / Lawatan Tapak. Taklimat Sebutharga / Lawatan Tapak diadakan bagi memudahkan penyebutharga mendapat gambaran yang lebih jelas mengenai skop kerja yang akan dihargakan. Ini akan memastikan penyebutharga memahami dan menyedari risiko dan tanggungjawab serta dapat membantu penyebutharga di dalam menghargakan tawaran dengan lebih realistik.				
A1.2	Hanya Kontraktor /penama yang sah perlu menghadiri lawatan tapak yang DIWAJIBKAN pada tarikh dan masa yang ditetapkan melalui Borang Pendaftaraan Kehadiran Lawatan Tapak akan dibenarkan mengambil Dokumen Sebutharga.				
A2	**Surat Jaminan**				
A2.1	Penyebutharga mestilah menghantar surat jaminan bagi setiap item atau bahan yang berkaitan. Minimum tempoh surat jaminan mestilah mengikut tempoh yang telah ditetapkan dalam Spesifikasi atau mana-mana bahagian di dalam dokumen bermula dari tarikh tempoh siap kerja. Penyebutharga perlulah mengambil kira hal ini dalam menghargakan item atau bahan tersebut.				
A3	**Katalog/Sampel/Bahan**				
A3.1	Penyebutharga **DIWAJIBKAN** menyediakan dan memajukan setiap katalog serta contoh pengeluar/jenama cat dan warna yang dicadangkan mengikut harga yang ditawarkan bersama-sama Dokumen Sebutharga semasa menghantar Dokumen Sebutharga. Kegagalan Penyebutharga memajukan katalog/proposal/contoh bahan akan membolehkan sebutharga yang dimajukan tidak dinilai.				
A3.2	Semua katalog, proposal dan contoh bahan TIDAK AKAN DIPULANGKAN semula dan ianya akan MENJADI HAK RASMI PARLIMEN. Tidak ada tuntutan secara lisan atau bertulis akan dilayan.				
A3.3	Penyebutharga hendaklah melampirkan sekurang-kurangnya 1 (satu) proposal cadangan pengeluar/jenama cat dan warna bagi skop kerja yang dinyatakan.				
A4	**Hari dan Waktu Bekerja yang Dibenarkan**				
A4.1	Hari dan waktu bekerja yang dibenarkan kepada penyebutharga yang berjaya adalah pada hari bekerja biasa iaitu dari jam 8.30 pagi sehingga 5.30 petang. Jika penyebutharga yang berjaya memerlukan kerja-kerja dilaksanakan melebihi hari dan waktu yang dibenarkan, kelulusan perlu diperolehi terlebih dahulu daripada Pegawai Penguasa/Pegawai Projek.				
	JUMLAH				

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

ITEM	KETERANGAN	UNIT	KUANTITI	KADAR SEUNIT (RM)	JUMLAH (RM)
B	**KERJA-KERJA AWALAN** **Nota:** i) Semua bayaran adalah tertakluk kepada kuantiti yang ditetapkan ii) Sebarang butiran yang tidak dihargakan dianggap telah dimasukkan didalam butiran-butiran lain iii) Penyebutharga adalah dianggap telah melawat tapakbina dan membaca syarat-syarat sebutharga bersama-sama dengan pelan dan spesifikasi untuk memastikan sendiri liputan kerja-kerja yang terlibat sebelum menghargakan kerana sebarang tuntutan bayaran tambahan tidak akan dipertimbangkan iv) Sebarang kerosakan harta benda awam adalah menjadi tanggungjawab kontraktor				
B1	Penyediaan untuk insuran - insuran yang diperlukan untuk melaksanakan kerja seperti berikut : i. Pampasan pekerja *(Workmen compensation)* ii. Liabiliti awam *(Public liability)*	 Pukal Pukal	 Pukal Pukal		
B2	Menyediakan t*emporary scaffolding, temporary props, staging* dan *catwalks (temporary walking platfor, acess, egress* dan lain-lain) yang perlu untuk melaksanakan kerja-kerja tersebut yang diluluskan oleh Pegawai Peguasa/Pegawai Projek	Pukal	Pukal		
B3	Menyediakan plastik kanvas atau seumpamanya bagi melindungi permukaan lantai, jubin cermin perabut dan bahan-bahan yang tidak terlibat dengan proses kerja ini	Pukal	Pukal		
B4	Kerja-kerja pembersihan, pembaikan dan pengangkutan sampah pukal apabila kerja-kerja siap dilaksanakan di tapak dengan mengikut arahan dari Pegawai Penguasa/Pegawai Projek PARLIMEN	Pukal	Pukal		
B5	Membekal dan membukukan Gambar Foto Kemajuan Kerja (Sebelum, Semasa Dan Selepas) dalam bentuk *hardcopy* dan *softcopy pendrive*	Set	2		
B6	Menyediakan tong roro disepanjang kerja-kerja dijalankan di tapak.	Nos	2		
B7	Menyediakan sampel bahan dan juga mock-up untuk kelulusan Pegawai Inden sebelum kerja-kerja di laksanakan di tapak	Pukal	Pukal		
B8	Mengemukakan sijil jaminan daripada kontraktor dan pembekal bagi item berikut : i- Kerja-kerja mengecat di basement Blok Utama selama 5 tahun ii- Kerja-kerja pemasangan motor sliding door di Pintu 1 dan 2 selama 2 tahun iii- Kerja-kerja waterproofing di kolam dan Dataran Jam Bunga selama 2 tahun	Pukal	Pukal		
	JUMLAH				-

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

ITEM	KETERANGAN	UNIT	KUANTITI	KADAR SEUNIT (RM)	JUMLAH (RM)
C	**PEMBAIKAN DI DALAM BLOK UTAMA**				
C1	KERJA PENGGANTIAN JUBIN DINDING DAN KERJA-KERJA YANG BERKAITAN DI DALAM TANDAS DI RAJA BLOK UTAMA				
C1.1	Kerja-kerja memasang plywood dan canves di bahagian atas carpet di sepanjang laluan masuk ke tandas	M	60		
C2	KERJA PEMASANGAN DINDING SEKATAN				
C2.1	Kerja-kerja membina dinding sekatan dengan menggunakan plywood serta ditutup setiap lubang di sekeliling bagi mengelakkan habuk keluar termasuk memasang 1 unit pintu	M	9		
C2.2	Kerja-kerja membuka pintu tandas sediada serta di balut keseluruhan pintu untuk di simpan di tempat yang sesuai	No.	2		
C2.3	Kerja-kerja menutup keseluruhan peralatan tandas termasuk wc, singki dan lain-lain peralatan tandas dengan menggunakan plywood	Pukal	Pukal		
C2.4	Kerja-kerja membuka cermin dan lampu bahagian dalam tandas	Pukal	Pukal		
C2.5	Kerja-kerja menutup keseluruhan lantai dan skirting dengan menggunakan plywood bagi mengelakkan bahagian tersebut rosak semasa kerja-kerja memecah dijalankan	M	30		
C2.6	Kerja-kerja membekal dan memasang sticky matt bagi merangkap habuk	No.	1		
C3	KERJA MEMECAH JUBIN LAMA				
C3.1	Kerja-kerja memotong setiap sambungan jubin lama dengan menggunakan diamond cutter bagi mengelakkan jubin dan skirting sediada pecah	Pukal	Pukal		
C3.2	Kerja-kerja meroboh/memecah keseluruhan jubin bahagian atas sediada bagi membolehkan pemasangan jubin baru	M	35		
C4	KERJA PEMASANGAN JUBIN BARU				
C4.1	Kerja-kerja membekal dan memasang jubin baru dari jenis granite tile saiz 600mm x 600mm di keseluruhan dinding yang terlibat	M	35		
C5	KERJA MENGECAT SILING				
C5.1	Kerja-kerja mengecat keseluruhan siling bahagian dalam tandas dengan menggunakan cat emulsi	M	30		
C6	KERJA MEMASANG SEMULA PERALATAN TANDAS				
C6.1	Kerja-kerja memasang semula semua peralatan tandas termasuk cermin, lampu dan pintu	Pukal	Pukal		
C7	KERJA PEMBERSIHAN				
C7.1	Kerja-kerja membuka/meroboh dinding sekatan sementara serta melupus keluar dari kawasan kerja	Pukal	Pukal		
C7.2	Kerja-kerja membersihkan keseluruhan kawasan yang terlibat dengan kerja-kerja yang dijalankan	Pukal	Pukal		
C8	KERJA MEMASANG PINTU SLIDING TEMPERED GLASS AUTOMATIK SERTA KERJA YAHG BERKAITAN DI PINTU 1 DAN 2 BLOK UTAMA BANGUNAN PARLIMEN MALAYSIA				
C8.1	KERJA MEMBUKA/MENANGGAL PINTU DAN UKIRAN SEDIADA				
C8.1.1	Kerja-kerja membuka serta menanggal pintu sliding sediada serta melupus keluar dari kawasan kerja	Pukal	Pukal		
C8.1.2	Kerja-kerja membuka serta menanggal ukiran box up dan kornish sediada bagi membolehkan pemasangan bracket untuk pintu sliding baru. Kerja-kerja pemasangan semula ukiran box up dan kornish seperti asal.	Unit	1		
	JUMLAH				-

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

ITEM	KETERANGAN	UNIT	KUANTITI	KADAR SEUNIT (RM)	JUMLAH (RM)
C8.1.3	Kerja-kerja memotong lantai granite sediada serta memasang granite baru bagi menutup lubang lama.	MR	15		
C9	KERJA MEMBEKAL DAN MEMASANG PINTU SLIDING TEMPERED GLASS AUTOMATIK				
C9.1	Kerja-kerja membekal dan memasang pintu sliding tempered glass dengan ketebalan 12mm termasuk pemasangan kerangka besi untuk motor automatik Spesifikasi :- i Control panel 1 set ii Pully 1 set iii Hardware part 1 set iv Remot control 1 set v Power switch 1 set vi Floor guide 1 set vii Rail and cover 1 set viii Infrared sensor 1 set ix Backup battery 1 set x Wireless push buttery 1 set xi Frosted sticker xii Lock set	set	2		
C10	KERJA PENYEDIAAN LONGKANG DAN TEMBOK DI HADAPAN PINTU 6 BLOK UTAMA				
C10.1	Kerja-kerja menggali/mengorek tanah sediada bagi mendapatkan aras yang bersesuaian	M	25		
C10.2	Kerja-kerja membekal dan memasang longkang baru dari jenis clay gliss saiz 6" separuh bulat termasuk tapak asas konkrit serta kerja-kerja yang bersangkutan	M	25		
C10.3	Kerja-kerja membina tembok tambahan di bahagian tepi longkang dengan dinding batu bata berlepa di kedua belah permukaan termasuk kerja-kerja yang bersangkutan	M	8		
C11	KERJA MEMBAIKI PINTU YANG ROSAK DI DALAM BLOK UTAMA				
C11.1	Kerja-kerja membaiki serta memperelok mana bahagian pintu sediada (dua daun) termasuk menyapu kemasan syelex di permukaan pintu dan frame	No	4		
C11.2	Kerja-kerja memasang plate stainless steel di bahagian bawah pintu yang terlibat (dua daun) ukuran 300mm x 900mm	Set	4		
C12	KERJA MENGECAT DINDING, TIANG DAN SOFFIT SLAB DI BASEMENT BLOK UTAMA				
C12.1	Kerja-kerja membersih permukaan dinding, tiang dan siling serta mengikis cat kapur lama, distemper lama dan sebagainya dari permukaan yang dilepa, basuh dan membaiki semua retak dan permukaan lain yang cacat	M	4050		
C12.2	Kerja-kerja menyapu 1 lapisan cat undercoat pada permukaan yang berlepa	M	4050		
C12.3	Kerja-kerja menyapu 2 lapisan cat penyudah jenis *weathershield* di keseluruhan bahagian yang terlibat merangkumi soffit slab, dinding, rasuk, tiang dan tembok	M	4050		
C12.4	Kerja-kerja memasang railing besi di bahagian lantai bagi mengelak dari bergesel di bahagian dinding saiz 2 diameter serta di skrew dibahagian lantai	MR	8		
	JUMLAH				-

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

ITEM	KETERANGAN	UNIT	KUANTITI	KADAR SEUNIT (RM)	JUMLAH (RM)
D	**PEMBAIKAN DI DATARAN JAM BUNGA**				
D1	KERJA MEMECAH/MEROBOH				
D1.1	Kerja-kerja memotong, memecah dan membersihkan segala ubinan dan skrid dan ratakan semula serta jalur-jalur potongan untuk menerima lepaan baru.	M2	86		
D.1.2	Kerja-kerja menyediakan permukaan dengan lepaan 25mm simen dan pasir 1:3 atau skrid di lepa sebelum pemasangan pebble wash stone.	M2	86		
D2	KERJA PEMASANGAN BAHAN KALIS AIR (WATERPROOFING)				
D2.1	Kerja-kerja menyediakan dan menyapu 2 lapisan permukaan kalis air berasaskan simen (cementitious waterproofing) dari jenis PEP-seal 911 atau setanding di keseluruhan permukaan lantai dan tembok yang terlibat.	M2	86		
D3	KERJA-KERJA PEBBLE WASH STONE				
D3.1	Kerja-kerja menghampar, menuang dan melepa batu pebble wash stone jenis berkualiti tinggi atau setaraf dengannnya bersaiz 5mm - 10mm bersimen tebal 25mm di permukaan tembok konkrit.	M2	86		
D3.2	Kerja-kerja menyapu 2 lapisan sealer jenis stone guard di keseluruhan permukaan lepaan pebble wash.	M2	86		
D4	TEMBOK DAN PAPAN TANDA NAMA DAN LOGO				
D4.1	Kerja-kerja membekal dan memasang granite baru di bahagian tembok mengikut kaedah pemasangan (DRY FIX INSTALLATION). Kontraktor dikehendaki mengemukakan perincian lukisan shop drawing, method statement dan tiga rekabentuk konsep bagi keseluruhan sistem bracket, skrew dan granite.	M2	15		
D4.2	Kerja-kerja membekal dan memasang tanda nama abjad jenis Box up lettering stainless steel 25mm x 230mm tinggi. PARLIMEN MALAYSIA	No.	16		
D4.3	Kerja-kerja membekal dan memasang Logo Jata Negara jenis Box up lettering stainless steel 25mm tebal x 360mm.	No.	1		
D4.4	Kerja-kerja menyapu 1 lapisan cat alas (undercoat) dan 2 lapisan cat penyudah jenis weather sheild di sekeliling tembok jam.	M	40		
	JUMLAH				-

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

ITEM	KETERANGAN	UNIT	KUANTITI	KADAR SEUNIT (RM)	JUMLAH (RM)
E1	PEMBAIKAN JALAN DI SEKITAR TASKA PARLIMEN MALAYSIA				
E1.1	KERJA MENURAP JALAN				
E1.1.1	Kerja-kerja membersih permukaan jalan	M	1750		
E1.1.2	Kerja-kerja menyembur 1 (satu) lapisan bitumen tack coat dikeseluruhan permukaan jalan yang terlibat dengan menggunakan spray pump	M	1750		
E1.1.3	Kerja-kerja membekal dan menurap semula permukaan jalan dengan hot primex (ACW 14) 50mm tebal serta dipadatkan dengan mengguna jentera pemadat 6 tan	M	1750		
E1.1.4	Kerja-kerja mengecat garisan jalan dan petak parking menggunakan cat thermoplastic				
	i Garisan jalan	M	344		
	ii Petak parking kereta	Lot	14		
	iii Petak parking motosikal	Lot	6		
E2	PEMBAIKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA				
E2.1	KERJA PENYEDIAAN FASILITI OKU DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA				
E2.1.1	Memasang tanda tunjuk arah **accessible entrance** bagi kemudahan OKU berkerusi roda di sekitar Blok Utama (Sila rujuk cadangan Laporan Audit)	NO	30		
E2.1.2	Memasang papan tanda arah untuk **accessible ramp** di setiap ramp OKU di	NO	30		
E2.1.3	Memasang papan tanda arah untuk **accessible route** di setiap ramp OKU di	NO	30		
E2.1.4	Menyediakan signage, symbols dan wayfinding di sekitar Blok Utama.	NO	100		
E2.1.5	Pemasangan handrail di tepi ramp di dalam Dewan Negara	NO	1		
E2.1.6	Pemasangan handrail di tepi ramp di dalam Dewan Rakyat.	NO	2		
E2.1.7	Menyediakan signage, symbols dan wayfinding di tempat pemerhati pelawat Dewan Rakyat.	NO	6		
E2.1.8	Menyediakan tanda amaran strobe light di lobi lif dan surau Blok Utama.	NO	10		
E2.1.9	Membina ramp baharu dengan kemasan seperti sedia ada mengikut spesifikasi OKU di Dewan Banquet. Kadar harga termasuklah menyediakan lukisan Arkitek & Struktur serta perincian shop drawing bagi rekabentuk ramp OKU mengikut spesifikasi OKU oleh pihak kontraktor dan diluluskan oleh Pegawai Inden.	NO	1		
E3	KERJA PENYEDIAAN BRC KANDANG RUSA DI KOMPLEKS PARLIMEN MALAYSIA				
E3.1	PINTU DAN PAGAR DAWAI HIJAU				
E3.1.1	Kerja-kerja membekal dan memasang pagar dawai hijau (chain link) beserta tiang angle saiz 2" ½ x 2" ½ tebal 4mm,ditanam sedalam 2 kaki,dikonkrit beserta kerja-kerja berkaitan	M	10		
E.3.1.2	Kerja-kerja membekal dan memasang pintu dari jenis besi dengan lapisan pagar dawai hijau (chainlink) termasuk aksesori seperti selak dan engsel serta kerja-kerja berkaitan	M	5		
E4	PINTU PAGAR CYCLONE KANDANG RUSA SEDIADA				
E4.1	Kerja-kerja membuka pintu kecil kandang rusa sediaada yang telah rosak,	NO	2		
E.4.2	Kerja-kerja membaiki semula jaring cyclone yg rosak,membekal dan memasang aksesori pintu untuk dijadikan pintu dari jenis slidding kepada jenis swing termasuk kerja-kerja berkaitan.	NO	2		
E5	PAGAR KANDANG RUSA				
E5.1	Kerja-kerja membekal dan memasang tiang jenis hollow galvanized saiz 2" ½ x 2" ½ , tebal 1.9mm ketinggian 9' ditanam dan konkrit	Bil	15		
	JUMLAH				

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

ITEM	KETERANGAN	UNIT	KUANTITI	KADAR SEUNIT (RM)	JUMLAH (RM)
E5.2	Membekal dan memasang BRC R8 saiz lubang 4"x4" ukuran 20' panjang x 7' tinggi,dicat,welding termasuk aksesori serta kerja-kerja berkaitan.	M	125		
E5.3	Membekal dan memasang plywood ukuran 4' x 8'tebal ¾ di cat undercoat serta 2 lapisan cat minyak serta besi jenis U channel untuk dislot plywood pada besi U untuk dijadikan laluan rusa.	M	50		
E5.4	Membekal dan memasang pintu jenis swing yang baru dari jenis besi galvanised / jaring cyclone ukuran tinggi 7' x 4' lebar termasuk aksesori serta kerja berkaitan	Bil	3		
E6	KERJA PEMBAIKAN KEBOCORAN KOLAM TAMAN HERBA				
E6.1	Kerja-kerja memecah sebahagian dinding kolam yang retak bagi membolehkan kerja-kerja pembaikan di jalankan	M	75		
E6.2	Kerja-kerja membaiki keretakan dan kebocoran dinding dengan menggunakan kaedah pressure grouting atau bahan waterproofing bersesuaian mengikut saranan specialist /pembekal	Point	100		
E6.3	Kerja-kerja menyapu 2 lapisan bahan kalis air dari jenis cementatious waterproofing di bahagian lantai dan dinding kolam serta penambahan jubin di setiap bebibir kolam bagi melancar pengaliran air.	M	120		
E6.4	Kerja-kerja melepa semula batu pabble wash di bahagian yang terlibat	M	15		
	JUMLAH				-

KERJA-KERJA PENYELENGGARAAN DAN PEMBAIKAN KEROSAKAN DI DALAM BLOK UTAMA, DATARAN JAM BUNGA, TASKA PARLIMEN DAN LAIN-LAIN KEROSAKAN DI SEKITAR KOMPLEKS PARLIMEN MALAYSIA

ITEM	KETERANGAN	UNIT	KUANTITI	KADAR SEUNIT (RM)	JUMLAH (RM)
F	***Wang Peruntukan Sementara (Provisional Sums)*** Nota: Penyebutharga hendaklah menspesifikasikan keterangan dengan perincian yang jelas pada keseluruah item *Provisional Sums* ini dengan mendapat kelulusan Pengawal Penguasa PARLIMEN terdahulu				
F1	Sediakan Wang Peruntukan Sementara sebanyak RM50,000.00 (Ringgit Malaysia : Lima Puluh Ribu Sahaja) untuk kerja-kerja penyelenggaraan dan pembaikan kerosakan di sekitar Kompleks Parlimen (Skop akan diperincikan oleh Pegawai Inden sekiranya terdapat keperluan dan akan dipotong jika tiada keperluan.	L/S	L/S	30,000.00	30,000.00
	JUMLAH				**30,000.00**