SAMB

SYARIKAT AIR MELAKA BERHAD

DOKUMEN TAWARAN

RUJUKAN TAWARAN: SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

KETUA PEGAWAI EKSEKUTIF,
SYARIKAT AIR MELAKA BERHAD,
LOT 897, WISMA AIR,
JALAN HANG TUAH,
75300 MELAKA.

SYARIKAT AIR MELAKA BERHAD

DOKUMEN TAWARAN

RUJUKAN TAWARAN: SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

KANDUNGAN

SENARAI SEMAK PENGHANTARAN DOKUMEN TENDER

Penender diwajibkan menghantar dokumen di bawah untuk tujuan penilaian oleh pihak Syarikat Air Melaka Berhad (SAMB). Kegagalan pihak tuan/puan menghantar dokumen berikut boleh menyebabkan sebutharga tuan/puan tidak akan dipertimbangkan.

Bil	Dokumen	Semakan (Sila Tandakan √ Jika Berkaitan)	Semakan Oleh SAMB
	PENILAIAN TEKNIKAL		
1	Profil Syarikat	( )	( )
2	Pengalaman Kerja (sila sertakan surat tawaran)	( )	( )
3	Senarai Kenderaan dan Peralatan Kerja (Jika Berkaitan)	( )	( )
4	Senarai Nama Pekerja	( )	( )
5	Katalog Produk (Jika Berkaitan)	( )	( )
6	Sijil Suruhanjaya Perkhidmatan Air Negara (SPAN) yang masih sah (Jika Berkaitan)	( )	( )
7	Sijil IKRAM/SIRIM yang masih sah (Jika Berkaitan)	( )	( )
8	Salinan Sijil Kementerian Kewangan Malaysia yang masih sah (Jika Berkaitan)	( )	( )
9	Salinan Sijil Perolehan Kerja Kerajaan (SPKK) yang masih sah (Jika Berkaitan)	( )	( )
10	Salinan Pendaftaran Lembaga Pembangunan Industri Pembinaan Malaysia (LPIPM/CIDB) yang masih sah (Jika Berkaitan)	( )	( )
11	Salinan Pendaftaran Kementerian Kewangan & Sijil Taraf Bumiputera yang masih sah (Jika Berkaitan)	( )	( )
12	Salinan Pendaftaran Kementerian Dalam Negeri (KDN) yang masih sah (Jika Berkaitan)	( )	( )
13	Salinan Permit Suruhanjaya Perkhidmatan Air Negara (SPAN) (Jika Berkaitan)	( )	( )
14	Surat perlantikan wakil sah pengedar daripada pengilang. (Jika Berkaitan)	( )	( )
15	Jadual Perancangan Kerja Dan Tempoh Siap Kerja Yang Munasabah (Jika Berkaitan)	( )	( )

	PENILAIAN KEWANGAN		
16	Salinan bukti pembayaran pembelian dokumen Tender	( )	( )
17	Keseluruhan Dokumen Asal Tender Dikembalikan	( )	( )
18	Harga dan Tempoh Kerja Dicatatkan Dalam Borang Tender	( )	( )
19	Borang Tender Ditandatangan Oleh Pemilik Syarikat	( )	( )
20	Surat Akuan Pembida Diisi dan Ditandatangani oleh Pemilik Syarikat	( )	( )
21	Penyata Bank 3 Bulan Yang Terkini / Penyata Kewangan Satu (1) Tahun	( )	( )
22	Salinan Pendaftaran Suruhanjaya Syarikat Malaysia (SSM) Lengkap Beserta Maklumat Korporat	( )	( )
23	Salinan Borang 9, Borang 24 dan Borang 49 Bagi Syarikat Sdn Bhd	( )	( )
24	Penyata Akaun (2) Tahun yang telah diaudit.	( )	( )
	Lain-lain sijil yang berkaitan:- …… …… ……		

……
(Tandatangan Petender)
Nama :
No. I/C :
Tarikh :

Materi atau Cop Syarikat :

DISEMAK OLEH:

……
(Tandatangan Pegawai SAMB)
Nama :
Jawatan :
Tarikh :

BAHAGIAN A

ARAHAN KEPADA PETENDER

ARAHAN KEPADA PETENDER

SYARIKAT AIR MELAKA BERHAD
(SAMB)

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

1. PERIHAL TENDER

Tender ini bertujuan untuk mendapatkan perkhidmatan kontraktor-kontraktor yang berdaftar bagi **Kerja-Kerja Membaikpulih Loji Rawatan Air Bukit Sebukor Di Daerah Melaka Tengah, Melaka.**

2. KELAYAKAN PETENDER

Tender ini adalah dipelawa kepada kontraktor-kontraktor yang berdaftar dengan ***LEMBAGA PEMBANGUNAN INDUSTRI PEMBINAAN MALAYSIA, LPIPM (CIDB) G7*** *Pengkhususan* ***CE20, CE21, M19 dan E11*** serta ***SPAN Permit IPA Jenis D (Bekalan Air)*** yang masih sah dan dibenarkan untuk membuat tawaran buat masa ini.

3. DOKUMEN TENDER

Satu Set Dokumen Tender boleh dimuat turun di laman sesawang Syarikat Air Melaka Berhad (www.samb.com.my). Petender hendaklah mengemukakan bayaran melalui Pindahan Wang ke akaun **Bank Islam 04015010075113** (**Syarikat Air Melaka Berhad**) sebanyak **RM 1000.00.** Wang ini tidak akan dikembalikan.

4. PENYEDIAAN TENDER

4.1 Petender adalah dikehendaki mengisi segala maklumat-maklumat dengan sepenuhnya pada :-

a) Borang Tender
b) Ringkasan Tawaran
c) Jadual Kadar Harga
d) Latar Belakang Petender

4.2 Tulisan hendaklah terang dan dibuat dengan dakwat. Segala kesilapan hendaklah dipotong dengan cermat dan ditandatangan ringkas.

4.3 Jumlah harga pada Ringkasan Tawaran hendaklah dipindahkan ke dalam Borang Tender dan sekiranya berlaku perbezaan diantara harga didalam Ringkasan Tawaran dan harga didalam Borang Tender, harga dalam Borang Tender akan diambilkira.

5. PENYERAHAN TENDER

5.1 Tender hendaklah dimasukkan kedalam satu sampul surat berlakri dan ditulis di bahagian luarnya dengan tajuk tender tersebut tanpa terdapat apa-apa tanda-tanda yang membolehkan identiti petender dikenali. Sampul surat yang telah berlakri itu hendaklah dihantar kepada:-

Ketua Pegawai Esekutif
Syarikat Air Melaka Berhad
Lot 897, Tingkat 7, Wisma Air,
Jalan Hang Tuah,
75300 Melaka.

sebelum **pukul 12.00 tengah hari** pada **24 September 2025**

5.2 Mana-mana tender yang diterima selepas tarikh tutup yang ditetapkan akan ditolak atau dikembalikan semula kepada petender.

5.3 Petender-petender hendaklah mengambil maklum bahawa Penilaian Tender ini akan mengambil kira dan mementingkan keupayaan petender untuk melaksanakan projek yang ditender, disamping kemunasabahan harga tender. Justeru itu, keupayaan petender-petender akan dinilai semasa penilaian tender. Penilaian tender akan dibuat berasaskan kedudukan kewangan, pengalaman kerja, kakitangan teknikal dan prestasi kerja semasa petender.

Petender-petender dikehendaki mengemukakan maklumat-maklumat dan dokumen seperti yang dikehendaki sepertimana di dalam Latar Belakang Petender.

5.4 Dokumen-dokumen ini sangatlah penting untuk membolehkan penilaian keupayaan yang sewajarnya dibuat keatas petender. Sekiranya petender tidak atau gagal untuk mengemukan dokumen-dokumen tersebut, tender petender berkenaan akan ditolak dan tidak akan dipertimbangkan.

PETENDER DIKEHENDAKI MENYERTAKAN SATU SALINAN SIJIL PENDAFTARAN ASAL YANG BERKAITAN YANG TELAH DISAHKAN BERSAMA-SAMA DENGAN DOKUMEN TENDER SEMASA MENGEMUKAKAN TAWARAN.

6. TINDAKAN TATATERTIB

Earnest Money atau Deposit Tender tidak diperlukan semasa mengemukakan tender. Walau bagaimanapun jika petender menarik balik tawarannya sebelum sesuatu keputusan dibuat atau enggan menandatangan kontrak apabila tendernya diterima dalam tempoh sahlaku tender, iaitu sembilan puluh (90) hari dari tarikh akhir yang ditetapkan bagi penyerahan tender, maka pendaftarannya akan digantung selama dua (2) tahun bagi kesalahan pertama, lima (5) tahun untuk kesalahan kedua dan pendaftarannya akan dibatalkan untuk kesalahan ketiga.

7. MAKLUMAT-MAKLUMAT LANJUT

7.1 Jika terdapat apa-apa keraguan keatas makna sebenar mana-mana bahagian dalam dokumen tender, petender hendaklah menghubungi Pegawai Penguasa untuk mendapatkan penjelasan sebelum menghantar tendernya. Penjelasan tersebut hanya sah jika ia di keluarkan secara rasmi dan bertulis oleh Pegawai Penguasa.

7.2 Dari masa ke semasa sebelum tarikh tutup tender, Pegawai Penguasa mungkin akan mengeluarkan pindaan atau tambahan untuk memberi penjelasan atau memperbaiki Dokumen Tender.

7.3 Satu salinan pindaan tender akan dikeluarkan secara rasmi kepada petender dan ianya akan menjadi sebahagian daripada Dokumen Tender. Penerimaan tambahan tersebut mestilah disahkan kedalam borang yang dikepilkan bersama-sama dengan pindaan tersebut.

8. HAK SAMB UNTUK MENERIMA/MENOLAK TENDER

SAMB tidak terikat untuk menerima tender terendah atau mana-mana tender atau memberi sebarang sebab diatas penolakan sesuatu tender. Keputusan Lembaga Tender SAMB adalah muktamad.

9. BON PERLAKSANAAN

Kontraktor yang dilantik dikehendaki mengemukakan Bon Perlaksanaan sebanyak 5% daripada jumlah harga kontrak dalam bentuk Jaminan Bank atau Jaminan Insuran.

10. KOS MENENDER

Segala perbelanjaan yang dikeluarkan untuk menyedia dan mengemukakan tawaran hendaklah dibuat atas perbelanjaan sendiri dan petender tidak dibenarkan membuat apa-apa tuntutan kepada Syarikat Air Melaka Berhad (SAMB) berkaitan dengan hal tersebut.

11. SAMB tidak akan bertanggungjawab atau membayar perbelanjaan atau kehilangan yang boleh berlaku disebabkan penyediaan dokumen tender dan siasatan di tapak.

12. Segala kerja yang dinyatakan dalam kadar harga atau spefikasi akan dinyatakan di dalam kontrak.

Tarikh: Tandatangan Petender:

LAMPIRAN B

ARAHAN-ARAHAN YANG PERLU DIMASUKKAN KE DALAM ARAHAN KEPADA PETENDER.

A. **Maklumat Latar Belakang, Kewangan Dan Prestasi Petender**.

1. Petender-petender hendaklah mengambil makluman bahawa penilaian Tender ini akan mengambil kira dan mementingkan petender untuk melaksanakan projek yang ditender disamping kemunasabahan harga tender. Justeru itu keupayaan petender-petender akan dinilai semasa penilaian Tender. Penilaian ini akan dibuat berasaskan kedudukan kewangan, pengalaman kerja, kakitangan teknikal dan prestasi kerja semasa petender.

2. Untuk membolehkan Penilaian ini dibuat, petender-petender dikehendaki mengemukakan dokumen-dokumen berikut bersama-sama tendernya:-

   (i) Salinan Akaun Syarikat yang telah disahkan dan diaudit oleh Juru Audit yang bertauliah, bagi dua (2) tahun kewangan terakhir. (Bagi Syarikat Sdn. Bhd. sahaja)

   (ii) Salinan Penyata Bulanan Akaun Bank mengenai wang dalam tangan petender bagi tiga (3) bulan terakhir sebelum tutup tender

   (iii) Laporan Bank/Institusi kewangan mengenai kedudukan petender, atas format seperti BORANG CA (A/8), dalam satu sampul berlakri.

   (iv) Salinan Perakuan / Pengesahan siap kerja bagi setiap kerja yang telah Disiap dan disenaraikan di BORANG A4.

   (v) Salinan Borang KWSP `A' bagi bulan caruman terakhir bagi setiap kakitangan teknikal atau salinan perjanjian perkhidmatan professional yang diambil khidmat secara kontrak yang disenaraikan di BORANG A5.

   (vi) Salinan sijil kelulusan / kelayakan setiap kakitangan teknikal kategori A dan B yang disenaraikan di BORANG A5.

(vii) Laporan Penyelia Projek mengenai prestasi semasa petender, bagi setiap kerja semasa yang bukan projek SAMB yang disenaraikan di BORANG A9, dalam satu sampul berlakri. Dokumen-dokumen ini sangatlah penting untuk membolehkan penilaian keupayaan yang sewajarnya dibuat ke atas petender.

(viii) Petender juga haruslah mengemukakan Jadual Perancangan Kerja seperti format di BORANG A10 jika berkaitan dengan projek yang ditawarkan di dalam dokumen ini.

Sekiranya petender tidak atau gagal untuk mengemukakan dokumen-dokumen ini, terutamanya dokumen-dokumen (i), (ii), dan (vii) diatas, tender petender akan ditolak dan tidak akan dipertimbangkan.

3. Sekiranya petender gagal untuk mengemukakan salah satu bahagian daripada dokumen-dokumen (iii), (iv), (v), dan (vi), maklumat dan data-data yang tidak dapat disemak kerana ketiadaan atau ketidakcukupan dokumen-dokumen tersebut adalah tidak sah dan tidak boleh diambil kira dalam penilaian keupayaan petender yang berkenaan melainkan maklumat atau data-data tersebut membawa kesan negatif terhadap nilai keupayaannya. Ini bermakna kriteria-kriteria yang mana penilaiannya memerlukan maklumat atau data-data ini, akan diambil sebagai kosong.

4. Disamping mengemukakan dokumen-dokumen yang tersebut diatas petender-petender dikehendaki melengkapkan borang-borang berikut yang disertakan bersama Dokumen Tender ini, dengan sempurna dan mengembalikan bersama-sama dengan tender masing-masing.

(a) BORANG A - SURAT PENGAKUAN KEBENARAN MAKLUMAT DAN KEESAHAN DOKUMEN-DOKUMEN YANG DIKEMUKAKAN OLEH PETENDER.

(b) BORANG B - MAKLUMAT AM DAN LATAR BELAKANG PETENDER.

(c) BORANG C - DATA-DATA KEWANGAN.

(d) BORANG D - REKOD PENGALAMAN KERJA.

(e) BORANG E - KAKITANGAN TEKNIKAL.

(f) BORANG F - KEPUNYAAN LOJI DAN PERALATAN PEMBINAAN UTAMA.

(g) BORANG G - SENARAI KERJA KONTRAK SEMASA

(h) BORANG CA- LAPORAN BANK/INSTITUSI KEWANGAN MENGENAI KEDUDUKAN KEWANGAN PETENDER.

(i) BORANG GA- LAPORAN PENYELIA PROJEK ATAS PRESTASI KERJA (BUKAN / PROJEK SAMB) SEMASA PETENDER.

(j) BORANG H - JADUAL PERANCANGAN KERJA.

Borang-borang ini hendaklah diisi dengan maklumat-maklumat yang benar dan data-data yang tepat. Semua butiran perlu diisi dan jawapan yang jelas hendaklah diberikan terhadap semua pertanyaan di dalam borang-borang di atas. Jika perlu helaian tambahan boleh dilampirkan dan setiap helaian tambahan yang dilampirkan kepada borang-borang lain hendaklah ditandatangani oleh petender.

5. Bagi petender usahasama atau gabungan (seperti yang dibenarkan oleh CIDB) antara dua atau lebih kontraktor setiap ahli gabungan hendaklah masing-masing melengkapkan borang-borang yang tersebut di atas yang berasingan.

6. Semua maklumat dan dokumen-dokumen yang tersebut di atas hendaklah dikemukakan oleh petender bersama-sama tendernya sebelum tarikh tutup Tender dan petender tidak akan berpeluang lagi untuk mengemukakannya selepas itu.

7. Sekiranya petender didapati memberikan maklumat palsu atau sengaja menyorok (withold) atau tidak memberikan mana-mana maklumat yang memberikan kesan negatif terhadap keupayaannya, tendernya akan ditolak dan tindakan tatatertib akan diperakukan terhadapnya.

BAHAGIAN B

SYARAT-SYARAT KONTRAK (SAMB 100)

SYARIKAT AIR MELAKA BERHAD

STANDARD FORM OF CONTRACT TO BE USED WHERE BILLS OF QUANTITIES FORM PART OF THE CONTRACT

FORM SAMB 100 (Rev. 1/2010)

CONDITIONS OF CONTRACT
TO BE USED WHERE BILLS OF QUANTITIES FORM PART OF THE CONTRACT

FORM SAMB 100 (Rev. 1/2010)

This form has been approved by Attorney General's Chamber

TABLE OF CONTENTS

CONTRACT NO : _____of 20 _____

EXPENDITURE to be met from: Head .....

Sub-head .....

Year of .....

A CONTRACT made on ..... day of ..... 20..... between the SAMB of Malaysia (hereinafter referred to as the "SAMB") of the one part and .....

(Company No. : .....) (hereinafter called the "Contractor") and having its registered address at .....

..... of the other part.

(The SAMB and the Contractor shall hereinafter individually be referred to "Party" or collectively as the "Parties")

WHEREAS:

A. The SAMB is desirous of .....

.....

at ..... (hereinafter referred to as the 'Works') and has caused Drawings, Summary of Tender, Provisional Bills of Quantities (if any), Specification describing the work to be done to be prepared.

B. The said Drawings numbered ..... (hereinafter referred to as the "Contract Drawings"), and the Summary of Tender, Provisional Bills of Quantities (if any), Specification, Form of Tender and Letter of Acceptance of Tender have been signed by or on behalf of the Parties hereto.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1.0 DEFINITIONS AND INTERPRETATION

1.1 Definition

Unless the context otherwise requires, this Contract or an item or entry in the Appendices specifically otherwise provides, the following words and phrases in this Contract and the

Appendices shall have the meaning given below or ascribed in the clauses or Appendix item to which reference is made:

(a)	**"Contract"**	means this contract and the appendices attached hereto;
(b)	**"Contract Documents"**	means the documents forming the tender and acceptance thereof including: - Form of Tender; - Letter of Acceptance of Tender; - Contract Drawings; - Summary of Tender; - Specifications; - Treasury's Instructions; - Provisional Bills of Quantities (if any) ..... ; - ..... ; - ..... ; and all these documents shall be complementary to one another;
(c)	**"Contractor"**	means the person or persons, sole proprietor, partnership, firm or company whose tender for the Works has been accepted and who has or have signed this Contract and includes the Contractor's personal representatives, heirs, successors, executors, administrators, servant and agent;
(d)	**"Contract Period"**	means the time frame stipulated in clause 2;
(e)	**"Contract Sum"**	means the sum stipulated in clause 7;
(f)	**"Date for Completion"**	means the date fixed and stated in Appendix or any other date as provided for in clause 39;
(g)	**"Defects Liability Period"**	means the period stated in Appendix or if none stated, the period is twelve (12) months from the date of practical completion certified by the S.O. as provided for under clause 39.3;
.(h)	"**Nominated Sub-Contractor" or "Nominated Supplier"**	means all specialist, merchants, tradesmen and others executing any work or services, or supplying any materials or goods for which Prime Cost Sum (or P.C. Sums) are included in the Bills of Quantities or which the S.O. has given written instructions in regard to the expenditure of Provisional Sum and who may be nominated by the S.O. and employed by the Contractor as Sub-contractors or Suppliers;
(i)	**"On-Cost Charges"**	means any cost and expenses reasonably incurred by the SAMB;
(j)	**"Officer** Named"	means officer empowered to take action on behalf of the SAMB pertaining to clauses .....;

(k)	**"Prime Cost" or abbreviation "P.C. Sum"**	means a sum for works or services to be executed by a Nominated Sub-Contractor or sums for materials or goods to be obtained from a Nominated Supplier;
(l)	**"Provisional Sum"**	means a sum for work or for the supply of goods or materials which cannot be defined or detailed at the time the tender documents are issued;
(m)	**"Site"**	means the land and other places on, above, under, in or through which the Works are to be executed and any other lands or places provided or approved by the SAMB for working space or any other purposes as may be specifically designated in this Contract and whether the same may be on the Site or not;
(n)	**"S.O."**	means the Superintending Officer who shal be ....and/or his successors in office;
(o)	**"S.O.'s Representatives"**	means any person or persons delegated or authorised in writing by the S.O. to perform any of the duties of the S.O. as may be from time to time notified in writing to the Contractor by the S.O. pursuant to clause 3.3(a) of this Contract;
(p)	**"Works"**	means the works specified in the Contract Documents and shall include temporary works.

1.2 Interpretation

(a) The terms "approved or approval" and "directed or direction" wherever used in this Contract shall be in writing.

(b) Words importing the singular include the plural and vice versa where the context requires.

(c) The headings are for convenience of reference only and shall not be deemed to be part of this Contract or be taken into consideration in the interpretation or construction of this Contract.

(d) Unless otherwise specifically stated, a reference in this Contract and the Appendices to any clause means that clause in this Contract.

(e) This Contract and the Appendices are to be read as a whole and the effect or operation of any clause in this Contract or item in or entry in the Appendices shall, unless otherwise specifically stated, be read subject to any relevant qualification or modification in any other clauses in this Contract or item in or entry in the Appendices.

2.0 CONTRACT PERIOD

The Contract Period shall be for a period of ..... commencing from ..... ending on .....

3.0 THE S.O. AND S.O.'S REPRESENTATIVE

3.1 Duties of S.O. and S.O.'s Representative

The S.O. shall be responsible for the overall supervision and direction of the Works. All matters regarding the Works shall be dealt with by the Contractor with the S.O.

3.2 S.O.'s Representative

(a) The S.O. may from time to time appoint such number of S.O.'s Representative as he deems fit.

(b) The S.O.'s Representative shall be responsible to the S.O. and his duties are to watch and supervise the Works and to test and examine any materials or goods to be used or workmanship employed in connection with the Works.

3.3 S.O.'s Authority to Delegate

(a) The S.O. may from time to time in writing delegate to the S.O.'s Representative any of the powers and authorities vested in the S.O. as listed in the letter of delegation and shall furnish to the Contractor a copy of all such written delegation of powers and authorities.

(b) Any instruction or approval given by the S.O.'s Representative to the Contractor within the terms of such delegation shall bind the Contractor and the SAMB as though it had been given by the S.O. PROVIDED THAT failure of the S.O.'s Representative to disapprove any work or material shall not prejudice the power of the S.O. thereafter to disapprove such work or materials and to order the pulling down, removal or breaking up thereof.

(c) If the Contractor is not satisfied with any decision of the S.O.'s Representative, the Contractor shall refer the matter to the S.O. who shall confirm, reverse or vary the decision of the S.O.'s Representative.

(d) The delegation under this clause shall not preclude the S.O. from himself exercising or performing at any time any of the delegated powers and duties.

4.0 S.O.'S RIGHT TO TAKE ACTION

4.1 Notwithstanding any provision in this Contract it is hereby agreed that:

(a) the power of the S.O. to issue instruction requiring a variation under clause 24 shall be subject to the financial limits as set out in Appendix 1 hereto. If the instruction for a variation under clause 24 is more than the financial limits as set out in the Appendix 1, the S.O. shall obtain the prior written approval of the relevant authorities of the SAMB; and

(b) the right to act on behalf of the SAMB in respect of any matter which arises out of the provisions of clauses 51, 52, 53, 58 and 66 shall be exercised by the Officer Named in Appendix 1;

4.2 The Contractor shall not be entitled to extension of time or any additional cost or expense or whatsoever arising from compliance with this clause 4.

5.0 **S.O.'S INSTRUCTIONS**

5.1 The S.O. may from time to time issue further drawings, details and/or written instructions (all of which are hereafter collectively referred to as "S.O.'s instructions") in regard to-

(a) the Variation as referred to in clause 24 hereof;

(b) any discrepancy in or between the Contract Documents as referred to in clause 8.2(b) hereof;

(c) the removal from the Site of any materials or goods brought thereon by the Contractor and the substitutions of any other materials or goods therefore;

(d) the removal and/or re-execution of any works executed by the Contractor;

(e) the dismissal from the Works of any person mentioned in clause 23.6 hereof employed thereupon;

(f) the opening up for inspection of any work covered up;

(g) the amending and making good of any defects whatsoever under clause 48;

(h) any matter which is necessary and incidental to the carrying out and completion of the Works under this Contract; and

(i) any matter in respect of which the S.O. is expressly empowered by this Contract to issue instructions.

5.2 All instructions issued by the S.O. shall be in writing. The Contractor shall forthwith comply with all instructions issued to him by the S.O. If such instruction is given orally, the S.O. shall then issue a written instruction within seven (7) days from the date of such oral instruction is given.

5.3 If within seven (7) days after receipt of a written notice from the S.O. requiring compliance of an instruction and the Contractor does not comply therewith, then the S.O. without prejudice to any other rights or remedies available to the SAMB under this Contract, undertake the work departmentally or employ and pay another Contractor or any other persons to execute any work whatsoever which may be necessary to give effect to such instruction. All costs and expenses incurred in connection with such employment (including On-Cost Charges), shall be deducted from any money due or to become due to the Contractor under this Contract, and failing which such deductions shall be recovered from the Performance Bond or as a debt due from the Contractor.

5.4 The Contractor shall be responsible for all costs and expenses incurred by the SAMB in carrying out the Works under clause 5.3 and On-Cost Charges (calculated by applying the Percentage of On-Cost Charges stated in Appendix hereto to the amount incurred). The SAMB shall be entitled to deduct such costs, expenses and On-cost Charges or any part thereof from any monies due or to become due to the Contractor under this Contract or to recover the same from the Performance Bond or as a debt due from the Contractor.

6.0 **SCOPE OF CONTRACT**

6.1 The Contractor shall upon and subject to this Contract, construct and complete the Works using materials, goods and workmanship of the quality and standards therein specified in accordance with best industry practice.

6.2 The Contractor shall also undertake any consequential work in relation to the construction and completion of Works on the Site i.e. removal/diversion of public sewer, water mains, electrical

mains, gas mains and telephone mains and the installation of permanent connections thereto shall be borne by the SAMB. The SAMB shall reimburse the Contractor for such costs by adding it to the Contract Sum PROVIDED THAT such cost have not already been included in the Contract Sum by way of a Provisional Sum or otherwise.

PROVIDED FURTHER any temporary connection shall be obtained by the Contractor with no additional cost to the SAMB for purpose of carrying out their work.

6.3 The Contractor shall also make good any defect, imperfection, shrinkage or any other fault whatsoever which may appear during the Defects Liability Period in accordance with clause 48 hereof.

7.0 CONTRACT SUM

The SAMB hereby covenants to pay the Contractor in consideration of the construction and completion of the Works and making good of any defects whatsoever to the Works the sum of Ringgit:

.....

..... (RM.....) or such other sum as shall become payable under and at the times and in the manner specified in this Contract.

8.0 CONTRACT DOCUMENTS

8.1 Custody of the Contract Documents

(a) The Contract shall be prepared in two (2) original copies. The original copies of the Contract shall remain in the custody of the S.O. and the Contractor.

(b) Immediately after the execution of this Contract, the S.O. shall furnish to the Contractor without any charge (unless he shall have been previously furnished) with:

(i) two (2) copies of the Contract Drawings; and

(ii) two (2) copies of the Specification, unpriced Summary of Tender and Provisional Bills of Quantities (if any) and (if requested by the Contractor) one copy of the priced Summary of Tender and Provisional Bills of Quantities (if any) and one copy of the Schedule of Rates.

(c) The S.O. shall, as and when necessary and without charge to the Contractor, furnish him with two (2) copies of such further working drawings or details as are reasonably necessary either to explain and amplify the Contract Drawings or the Specification (if any) or to enable the Contractor to construct and complete the Works in accordance with this Contract. PROVIDED THAT nothing contained in the said working drawings or details shall impose any obligation beyond those imposed by the Contract Documents.

(d) The Contractor shall keep one copy of the Contract Drawings, the Specification, unpriced Summary of Tender and Provisional Bills of Quantities (if any), priced Summary of Tender and Provisional Bills of Quantities (if any) and other like documents referred to in sub-clause (c) hereof on the Site and the S.O. shall at alt reasonable times have access to the same.

(e) Upon final payment being made pursuant to the issuance of Final Account and Payment Certificate under clause 31, the Contractor shall return to the S.O. all drawings, details, specifications, unpriced copy of Summary of Tender, Provisional Bill of Quantities (if any) and priced Summary of Tender and Provisional Bill of Quantities (if any).

(f) None of the documents hereinbefore mentioned shall be used by the Contractor for any purpose other than this Contract.

8.2 **Sufficiency of Contract Documents**

(a) The Contract documents are to be taken as mutually explanatory of one another. The Contractor shall provide everything necessary for the proper execution of the Works until its completion according to the true intent and meaning of the Contract Documents taken together whether the true intent and meaning may or may not be particularly shown or described PROVIDED THAT it can be reasonably inferred therefrom.

(b) If the Contractor shall find any discrepancy in or divergence between any two or more of the Contract Documents including a discrepancy or divergence between parts of any one of them, he shall immediately give to the S.O. a written notice specifying the discrepancy or divergence and the S.O. shall issue instructions in regard thereto PROVIDED ALWAYS that such discrepancy or divergence shall not vitiate this Contract.

9.0 REPRESENTATIONS, WARRANTIES AND UNDERTAKINGS OF THE CONTRACTOR

9.1 **Representations and Warranties**

The Contractor hereby represents and warrants to the SAMB that—

(a) it is a corporation validly existing under the laws of Malaysia*;

(b) the Contractor has obtained a valid registration with the Construction Industry Development Board;

(c) it has the corporate power to enter into and perform its obligations under this Contract and to carry out the transactions and to carry on its business as contemplated by this Contract*;

(d) it has taken all necessary corporate actions to authorize the entry into and performance of this Contract and to carry out the transactions contemplated by this Contract*;

(e) as at the execution date, neither the execution nor performance by it of this Contract nor any transactions contemplated by this Contract will violate in any respect any provision of—

(i) its Memorandum and Articles of Association; or

(ii) any other document or agreement which is binding upon it or its asset*;

(f) no litigation, arbitration, tax claim, dispute or administrative proceeding is presently current or pending or, to its knowledge, threatened, which is likely to have a material adverse effect upon it or its ability to perform its financial or other obligations under this Contract;

(g) this Contract constitutes a legal, valid and binding obligation of the Contractor and is enforceable in accordance with its terms and conditions;

(h) it has necessary financial and technical capability to undertake the Works,

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**applicable only if the Contractor is a company registered under the Companies Act 1965.*

and the Contractor acknowledges that the SAMB has entered into this Contract in reliance on its representations and warranties as aforesaid.

9.2 **Undertakings of the Contractor***

The Contractor undertakes that-

(a) it shall comply with all requirements, statutory or otherwise, regulating or relating to the conduct, trade, business or profession of a contractor, and the Contractor shall be fully and solely liable for all costs incurred thereby;

(b) it shall pay all taxes that may be imposed on the profits made in respect of this Contract in accordance with the applicable laws; and

(c) it shall ensure that all his employees, including non-Malaysian personnel, comply with all relevant laws to which they are subject to including payment of income tax, which in respect thereto the Contractor shall make such deductions from the salaries of his employees as may be lawfully imposed by the relevant authority.

10.0 OBLIGATIONS OF THE CONTRACTOR

The Contractor shall—

(a) construct, complete, test and commission the Works in accordance with the Specifications, Contract Drawings and any other documents specified in the Contract Documents;

(b) perform the Works in a proper manner and in accordance with good management practice and to the best advantage of the SAMB;

(c) take all appropriate measures expected of a contractor providing similar works to ensure that the Works comply with the requirements of this Contract;

(d) perform the Works and discharge its obligations as contained in this Contract by exercising professional judgment and practice, requisite skill, care and diligence. In performing the Works, the Contractor shall provide well-outlined procedures in the form agreed by the SAMB for reporting and co-ordination purposes;

(e) at all times perform the Works in such manner as will always safeguard and protect the SAMB's interest in relation to the Works and take all necessary and proper steps to prevent abuse or uneconomical use of facilities, if any, made available by the SAMB to the Contractor;

(f) inform the SAMB immediately in writing of the occurrence of any factor or event, which is likely to affect the Works. Such notification shall not be construed as a discharge of any of the Contractor's obligations under this Contract;

(g) provide and maintain throughout the Contract Period such number, categories of qualified and competent personnel necessary to perform the Works;

(h) provide and maintain at its own cost and expense all equipment and materials necessary for the proper and effective performance of the Works;

(i) instruct and supervise its staffs and sub-contractor in carrying out the Works' repairs and other works in relation to the Works;

** applicable only if the Contractor is a company registered under the Companies Act 1965.*

(j) make good any defect, imperfection, shrinkage or any other fault whatsoever which may appear during the Defects Liability Period; and

(k) carry out any other obligations and responsibilities under this Contract.

11.0 INSPECTION OF SITE

11.1 The Contractor shall be deemed to have inspected and examined the Site and its surroundings and to have satisfied himself before submitting his tender as to the following:

(a) the nature of the ground and subsoil;

(b) the form and nature of the Site;

(c) the extent and nature of the work, materials and goods necessary for the completion of the Works;

(d) the means of communication with and access to the Site;

(e) the accommodation he may require; and

(f) in general to have obtained for himself all necessary information as to risks, contingencies and all circumstances influencing and affecting his tender.

11.2 Any information or document forwarded by the SAMB to the Contractor shall not relieve the Contractor of his obligations under the provisions of this clause.

12.0 PROGRAMME OF WORK

12.1 Within fourteen (14) days from the receipt of the Letter of Acceptance by the SAMB, the Contractor shall submit to the S.O for his approval -

{a) a work programme for the carrying out of the Works (hereinafter referred to as "Work Programme") in such form and details as determined by the S.O. showing the detail activities of the Works so as to enable the SAMB to monitor the progress thereof; and

(b) a general description in writing, of the arrangements and methods of construction which the Contractor proposes to adopt for the carrying out of the Works.

12.2 The S.O shall within ..... (.....) days after receipt of the Contractor's programme:

(i) approve the Work Programme in writing; or

(ii) reject the Work Programme in writing with reasons and/or request modifications; and/or

(iii) request the Contractor to supply further information to clarify or substantiate the Work Programme or to satisfy the S.O as to its reasonableness having regard to the Contractor's obligations under the Contract,

PROVIDED THAT if none of the above actions is taken within the said period of .... (.....) days the S.O shall be deemed to have approved the Work Programme as submitted.

12.3 The Contractor shall upon receipt from the S.O any request under clause 12.2(ii) or (iii) resubmit a modified Work Programme or provide further information as requested.

12.4 If at any time it should appear to the S.O that the actual progress of Works does not conform to the approved Work Programme referred to herein before the Contractor shall produce, at the request of the S.O., a revised Work Programme showing the modifications to the approved Work Programme necessary to ensure completion of the whole Works within the time for completion provided for in clause 39 hereof or extended time granted pursuant to clause 43 hereof.

12.5 The submission to and approval by the S.O or the S.O's Representative of such Work Programme or the furnishing of such particulars shall not relieve the Contractor of any of his duties or responsibilities under this Contract.

13.0 PERFORMANCE BOND/PERFORMANCE GUARANTEE SUM

13.1(a) The Contractor shall, on the date of the possession of Site, provide a Performance Bond or Performance Guarantee Sum as the case may be substantially in the form as in Appendix issued by an approved licensed bank or financial institution incorporated in Malaysia in favour of the SAMB for a sum equivalent to five percent (5%) of the total Contract Sum as specified in Appendix to secure the due performance of the obligations under this Contract by the Contractor. The Performance Bond shall remain valid and effective until twelve (12) months after the expiry of the Defect Liability Period or the issuance of the Certificate of Completion of Making Good Defects, whichever is the later.

(b) If the Contractor fails to submit the said Performance Bond as specified in sub-clause (a) above on the date of possession of site, then the Contractor shall be deemed to have opted for Performance Bond in the form of Performance Guarantee Sum as provided for under clause 13.2 hereof.

13.2 The Contractor may opt for a Performance Bond in the form of Performance Guarantee Sum in lieu of the Bank, Insurance or Finance Company Guarantee as specified in clause 13.1 hereof whereby deductions of ten percent (10%) shall be made from the first interim payments and subsequent interim payment until the total amount deducted aggregate to a sum equivalent to five (5) percent of the Contract Sum. The amount deducted shall be retained by the SAMB up to twelve (12) months after the expiry of the Defect Liability Period or the issuance of the Certificate of Completion of Making Good Defects, whichever is the later.

13.3 Notwithstanding anything contained in this Contract, the SAMB shall be entitled at any time to call upon the Performance Bond, wholly or partially, in the event that the Contractor fails to perform or fulfil its obligations under this Contract and such failure is not remedied in accordance with this Contract.

13.4 If a payment is made to the SAMB pursuant to any claim under the Performance Bond, the Contractor shall issue to the SAMB further security in the form of additional performance bond or bonds for an amount not less than the amount so paid to the SAMB on or prior to the date of such payment so that the total sum of the Performance Bond shall be maintained at all times at the value specified in clause 13.1(a).

13.5 The Performance Bond (or any balance thereof remaining for the credit of the Contractor) may be released or refunded to the Contractor on the completion of making good of all defects, shrinkages or other faults which may appear during the Defects Liability Period and upon the giving of the Certificate of Completion of Making Good Defects for the whole of the Works under clause 48.

13.6 Notwithstanding the above, in the event that this Contract is terminated under clause 51 hereof the said Performance Bond or any balance thereof shall be forfeited.

14.0 INDEMNITY IN RESPECT OF PERSONAL INJURIES AND DAMAGE TO PROPERTY

14.1 The Contractor agrees with the SAMB that—

(a) it shall perform all of its obligations under this Contract at its own risk and releases, to the fullest extent permitted by law, the SAMB and their agents and servants from all claims and demands of every kind resulting from any accident, damage, injury or death arising from the carrying out of the Works except where such accident, damage, injury or death is caused or contributed to by any act or omission or negligence of the SAMB or its agents and servants. The Contractor expressly agrees that in the absence of any such act, omission or negligence as aforesaid the SAMB shall have no responsibility or liability whatsoever in relation to such accident, damage, injury or death;

(b) it shall indemnify and keep indemnified the SAMB from and against all actions, suits, claims or demands, proceedings, losses, damages, compensation, costs (including legal cost), charges and expenses whatsoever to which the SAMB shall or may be or become liable in respect of or arising from—

(i) the negligent use, misuse or abuse by the Contractor or its personnel, servants, agents or employees appointed by the Contractor;

(ii) any loss or damage to property or injury of whatsoever nature or kind and howsoever or wherever sustained or caused or contributed to by carrying out of the Works by the Contractor to any person and not caused by the negligence or wilful act, default or omission of the SAMB, its agents or servants; or

(iii) any loss, damage or injury from any cause whatsoever to property or persons affected by the Works to the extent to which the same is occasioned or contributed to by the act, omission, neglect, breach or default of the Contractor or personnel, servants, agents or employees; and

(c) the obligations under this clause shall continue after the expiry or earlier termination of this Contract in respect of any act, deed, matter or thing happening before such expiration or termination of this Contract.

14.2 The Contractor shall indemnify, protect and defend at its own cost and expense, the SAMB and its agents and servants from and against all actions, claims and liabilities arising out of acts done by the Contractor in the performance of this Contract.

15.0 INSURANCE AGAINST PERSONAL INJURIES AND DAMAGE TO PROPERTY

15.1 **Taking of Insurance**

(a) Without prejudice to his liability to indemnify the SAMB under clause 14 hereof, the Contractor shall, as a condition precedent to the commencement of any work under this Contract, effect and maintain such insurances whether with or without an excess amount as specified in Appendix hereto as are necessary to cover the liability of the Contractor and all sub- contractors, whether nominated or otherwise.

(b) Such insurance shall be for the purpose of personal injuries or death, damage or loss to property, movable or immovable, arising out of, or in the course of, or by reason of the execution of the Works and caused by any negligence, omission, breach of contract or default of the Contractor or any sub-contractor, whether nominated or otherwise, or of any servants or agents of the Contractor or of any such sub-contractor, whether nominated or otherwise. Where an excess amount is specified in Appendix, the Contractor shall bear the amount of such excess. The policy or policies of insurance shall contain a cross liability clause indemnifying each of the jointly insured against claims made by on him by the other jointly insured.

(c) Such insurance as referred to under sub-clause (a) hereof shall be effected with an insurance company as approved by the SAMB and maintained in the joint names of the SAMB and Contractor and all sub-contractors, whether nominated or otherwise. Such insurance shall cover from the period of the date of possession of site until the date of issuance of Certificate of Making Good Defects for any claim occasioned by the Contractor or any sub-contractor in the course of any operations carried out by the Contractor or any sub-contractor for the purpose of complying with his obligations under Clause 48 hereof.

15.2 **Production of Policies**

It shall be the duty of the Contractor to produce and shall deposit the relevant policy or policies of the insurance together with receipts in respect of premiums paid to the S.O., whether demanded or not.

15.3 **Default in Insuring**

If the Contractor fails to effect or renew such insurances as are required to be effected and maintained under this Contract, the SAMB or the S.O. on its behalf may effect or renew such insurance and shall be entitled to deduct a sum equivalent to the amount in respect of the premiums paid and On-Cost Charges (calculated by applying the 'Percentage for On-cost Charges' stated in Appendix hereto to the premiums paid), from any money due or to become due to the Contractor under this Contract or to recover the same from the Performance Bond or as a debt due from the Contractor.

15.4 **Cancellation of Insurance**

(a) The Contractor shall ensure that any insurance policy effected hereto shall only be cancelled by the insurer after the expiry of thirty (30) days from the date of receipt by the SAMB of a written notice from the insurer advising of such impending cancellation PROVIDED THAT the Contractor has been issued with the Certificate of Making Good Defects in accordance with clause 48.

(b) The Contractor shall not at any time permit or cause to be done any act, matter or thing which may result in any insurance effected by virtue of this Contract being vitiated or rendered void or voidable or whereby the rate of the premium on any insurance effected shall be liable to be increased.

15.5 **Loss or Damage Occasioned by Insured Risk**

(a) In the event of any damage or loss occurring during the performance of this Contract, the Contractor shall repair, replace or make good such damage or loss from the amount of insurance claimed, if sufficient, or if insufficient, using his own resources.

16.0 **INDEMNITIES TO SAMB IN RESPECT OF CLAIMS BY WORKMEN**

16.1 **Workmen Compensation**

(a) The Contractor shall be liable for and shall indemnify and keep indemnified the SAMB and its officers or servants from all liabilities arising out of claims by any workman employed by the Contractor in and for the performance of this Contract for payment of compensation under or by virtue of the Workmen's Compensation Act 1952 and the Employee's Social Security Act 1969 or any other law amending or replacing such law and from all costs and expenses incidental and consequential thereto.

(b) The Contractor shall effect and maintain throughout the Contract Period a "Workmen Compensation Insurance" or any other applicable insurance for its personnel, servants, agents or employees required under the laws of Malaysia.

17.0 EMPLOYEES' SOCIAL SECURITY ACT, 1969

17.1 Registration with SOCSO

Without prejudice to his liability to indemnify the SAMB under clause 16, the Contractor shall register or cause to register all local workmen employed in the execution of the Works and who are subject to registration under the Employee's Social Security Scheme ("the SOCSO Scheme") in accordance with the Employee's Social Security Act 1969 or any subsequent modification or re-enactment of the said Act. For the purpose of this sub-clause, the term "local workmen" shall include workmen who are Malaysian citizens and those who have permanent resident status.

17.2 Contribution to SOCSO

The Contractor shall submit the Code Number and Social Security Numbers of all the workmen registered under the SOCSO scheme to the S.O. for verification. The Contractor shall make payment of all contribution from time to time on the first contribution day on which the same ought to be paid and until the completion of this Contract and it shall be the duty of the Contractor to produce to the S.O. contribution statement or payment vouchers as evidence of payment of such contribution, whether demanded or not.

17.3 Default in Complying with SOCSO

If the Contractor fails to comply with the terms of this Clause, the SAMB or the S.O. on its behalf may without prejudice to any other remedy available to the SAMB for breach of any terms of this Contract:

(a) withhold an amount from any money which would otherwise be due to the Contractor under this Contract and which in the opinion of the S.O. will satisfy any claims for compensation by workmen that would have been borne by SOCSO Scheme had the Contractor not made default in maintaining the contribution; and/or

(b) pay such contributions as have become due and remain unpaid and deduct the amount of such contributions including On-Cost Charges (calculated by applying the Percentage of On-Cost Charges stated in Appendix to the contributions paid), from any money due or to become due to the Contractor under this Contract, and failing which such contributions shall be recovered from the Performance Bond or as a debt due from the Contractor.

18.0 INSURANCE OF WORKS

18.1 Taking of Insurance

(a) The Contractor shall in the joint names of the SAMB and the Contractor insure against loss and damage by fire, lightning, explosion, storm, tempest, flood, ground subsidence, bursting or overflowing of water tanks, apparatus or pipes, aircraft and other aerial devices or articles dropped therefrom, riot and civil commotion, all work executed and all unfixed materials and goods, delivered to, placed on or adjacent to the Works and intended therefore (but excluding temporary buildings, plant, tools and equipment owned or hired by the Contractor or any sub-contractor, nominated or otherwise) to the full value thereof (plus any amount which may be specifically stated in Appendix or elsewhere in the Contract Documents) and shall keep such work, materials and goods so insured until the completion of the whole of the Works, notwithstanding any arrangement for Sectional Completion or Partial Occupation by the SAMB under this Contract. Such insurance policy or policies shall provide expressly for payment in the first place to the SAMB of any insurance monies due under the policy or policies.

(b) The said insurance with or without an excess clause as specified in Appendix hereto shall be effected with an insurance company approved by the S.O. and it shall be the duty of the Contractor to produce to the S.O. the said policy or policies and the receipts in respect of the premium paid. Where an excess clause is specified in Appendix, the Contractor shall bear the amount of such excess.

18.2 **Default in Insuring**

If the Contractor fails to effect or renew such insurance as are necessary under this clause, the SAMB or the S.O. on its behalf may renew such insurance and pay the premium in respect thereof and deduct the amount so expended including On-Cost Charges (calculated by applying the 'Percentage of On-cost Charges' stated in Appendix to the premiums paid), from any money due or to become due to the Contractor under this Contract, and failing which such premium shall be recovered from the Performance Bond or as a debt due from the Contractor.

18.3 **Payment of Insurance in the Event of any Loss/Damage**

Upon the occurrence of any loss or damage to the Works or unfixed materials or goods prior to the date the Works has been certified as practically completed by the S.O. in the Certificate of Practical Completion, the Contractor shall notwithstanding that settlement of any insurance claim has not been completed, with due diligence restore, replace or repair the same, remove and dispose of any debris and proceed with the carrying out and completion of the Works. All money if and when received from the insurance under this clause shall be paid in the first place to the SAMB and then (less any such amounts as are specifically required in Appendix or elsewhere in the Contract Documents) be released to the Contractor by instalments on the certificate for payment issued by the S.O., calculated as from the date of receipt of the money in proportion to the extent of the work of restoration, replacement or repair and the removal and disposal of debris previously carried out by the Contractor. The Contractor shall not be entitled to any payment in respect of the work of restoration, replacement or repair and the removal and disposal of debris other than the money received under the said insurance.

18.4 **Cancellation of Insurance Policy**

The Contractor shall ensure that any insurance policy effected hereto shall only be cancelled by the insurer after the expiry of thirty (30) days from the date of receipt by the SAMB of a written notice from the insurer advising of such impending cancellation PROVIDED THAT the Contractor has been issued with the Certificate of Making Good Defects in accordance with clause 48.

19.0 SETTING OUT

19.1 The Contractor shall be responsible for the true and proper setting out of the Works and for the correctness of the positions, levels, dimensions and alignments of all parts of the Works and for the provisions of all necessary instruments, appliances and labour in connection therewith.

19.2 If at any time during the progress of the Works any error in the positions, levels, dimensions or alignments of any part of the Works is discovered, the Contractor shall at his own expense rectify such error unless such error is based on incorrect data supplied in writing by the S.O.'s Representative in which case the expense of rectifying shall be borne by the SAMB.

19.3 If at any time during the progress of the Works, any error shall appear or arise in the setting-out required to construct the Works or in the position, levels, dimensions or alignment of any part of the Works, the Contractor, on being required to do so by the S.O., shall at his own expense rectify such error to the satisfaction of the S.O. The checking of any setting out of or of any line or level by the S.O. shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all things used in the setting-out required for the construction of the Works until the S.O. agrees that the said things may be abandoned.

19.4 The Contractor shall give to the S.O. without charge such information as may be required by the S.O. to enable him to check the setting-out required for the construction of the Works including interpreting any marks made by the Contractor for the purpose of setting out.

20.0 UNFIXED MATERIALS AND GOODS

Unfixed materials and goods delivered to, placed on or adjacent to the Site and intended for incorporation therein, shall not be removed except for use upon the Works, unless the S.O. has consented in writing to such removal. Where the S.O. has included the value of such materials or goods in any certificate in accordance with clause 28, under which the Contractor has received payment, such materials and goods shall become the property of the SAMB, but the Contractor shall remain responsible for loss or damage to the same.

21.0 COMPLIANCE WITH THE LAW

21.1 The Contractor shall comply in all respects (including the giving of all notices and the paying of all fees required) with any law, regulation or by-law, or any order or directive issued by any public authority or public service company (hereinafter referred to as "Statutory Requirements"), relating to the Works or, in the case of public authority or public service company, with those systems the same are or will be connected. The Contractor shall submit to the S.O. all approvals received by the Contractor in connection therein. The Contractor shall keep the SAMB indemnified against all penalties and liability of every kind for breach of any such Statutory Requirements.

21.2 If after the Date of Tender (as specified in Appendix) there is any change or amendment in any written law, regulations and by-laws which necessitates any variation to the Works, the Contractor shall, before making such variation, give to the S.O. a written notice specifying and giving the reason for such variation and apply for the S.O.'s instruction in respect of the matter.

22.0 DESIGN

22.1 Design Liability

(a) Notwithstanding any design and specifications supplied by the SAMB, if the Contractor is required under this Contract to undertake the design of any part of the Works which is a stand alone design as determined by the SAMB, the Contractor shall ensure that such design is suitable, functional, safe, compatible and integrates with the design and specifications of the Works and it shall be undertaken, approved and endorsed by a competent and registered professional.

(b) The Contractor shall submit to the S.O. all drawings, specifications, calculations and any other relevant information pertaining to the stand alone design for approval. No work shall commence without prior written consent of the S.O.

(c) The Contractor shall be fully responsible and guarantee the SAMB that the stand alone design, integration, execution of the Works, materials and workmanship for the Works or part of the Works are independent of fault, suitable, functional, safe and compatible with the requirements of the SAMB.

(d) The approval of the stand alone design by the S.O pursuant to sub-clause (b) shall not absolve the Contractor from its responsibility under sub-clause (c) and the Contractor shall be liable and shall fully indemnify and keep the SAMB indemnified for any design defects, damage, inadequacies or insufficiency of such design.

22.2 **Design Guarantee Bond**

(a) The Contractor shall provide a Design Guarantee Bond for the stand alone design issued by an approved licensed bank or financial institution of the sum of Ringgit ... (RM...) amounting to 5% of the value of the said part of the Works substantially in the form as in Appendix [.....] upon or before the issuance of the Certificate of Practical Completion of the Works as a security for the Contractor's obligations and warranties under Clause 22.1. Such Design Guarantee Bond shall remain valid for a period of 5 years from the date of practical completion of the Works.

(b) If any defect or damage shall occur to that particular part of the Works as a result of any defect, fault, insufficiency, imperfection, shrinkages or inadequacy in the stand alone design including workmanship, materials or equipment which has become defective arising from design fault then the approved licensed bank or financial institution issuing the Design Guarantee Bond pursuant to sub-clause (a) above shall pay to the SAMB, on demand by the SAMB in writing notwithstanding any objection by the Contractor or any third party, the sum of ..... being equal to 5% of the value of the said part of the Works or such part thereof as may be demanded.

(c) If the Design Guarantee Bond is not deposited with the SAMB in accordance with sub-clause (a) above, the SAMB shall have the right to claim from the Performance Bond the sum of Ringgit (RM...) being equal to 5% of the value of the said part of the Works or such part thereof as may be demanded.

(d) If a payment is made to SAMB pursuant to clause (b), the Contractor shall ensure that further security in the form of an additional Design Guarantee Bond for an amount no less than the amount so paid to SAMB shall be issued to SAMB prior to or upon the date of such payment. If any of the issued Design Guarantee Bond were to expire prior to the validity period, a replacement Design Guarantee Bond shall be issued to SAMB on or prior to the date of expiry of the first mentioned Design Guarantee Bond in an amount not less than the amount of that Design Guarantee Bond.

23.0 EMPLOYMENT OF WORKMEN

23.1 **Workmen**

(a) The Contractor shall employ, in the execution of this Contract, only Malaysian citizens as workmen.

(b) If in any particular trade or skill required to complete the Works, the Contractor can show to the satisfaction of the S.O. that Malaysian citizens are not available, then the Contractor may employ non-Malaysian citizens subject to the approval of the SAMB.

(c) The Contractor shall on the commencement of the Works furnish to the Jabatan Tenaga Kerja of the State in which this Contract is performed all particulars connected with this Contract and such returns as may be called for from time to time in respect of labour employed by him on for the execution of this Contract, in accordance with the requirements of the Employment Act 1955, Employment (Restriction) Act 1968, and Internal Security (Registration of Labour) Regulation 1960 or any subsequent modification or re-enactment thereof.

(d) The Contractor shall maintain on the Site at all times during the progress of the Works an up to date register containing particulars of all workers employed by him.

(e) The Contractor shall cause his sub-contractors (including 'labour only' sub-contractors) and Nominated Sub-Contractors to comply with the provisions of this clause.

23.2 Compliance with Employment Act 1955, *etc.*

In the employment of workmen for the execution of this Contract, the Contractor shall comply, and shall cause his sub-contractors (including "labour only" sub-contractors) and Nominated Sub-Contractors to comply with all the requirements of the Employment Act 1955, Employment (Restriction) Act 1968, Employee's Provident Fund Act 1951, the Industrial Relations Act 1967 and any other law relating to the employment of workmen, or any subsequent modification or re-enactment thereof. PROVIDED THAT the Contractor shall not be entitled to any claim for additional costs and payments whatsoever in respect of his compliance with this clause.

23.3 **Days and Hours of Working**

No work shall be done on:

(a) the weekly day of rest;

(b) any public holiday which is recognised in the state where this Contract is being carried out; or

(c) between the hours of six in the evening and six in the following morning;

without the written permission of the S.O. PROVIDED THAT when such written application of the Contractor is approved by the S.O., the Contractor shall comply fully with all the requirements of the Employment Ordinance 1955 in regard thereto or any subsequent modification or re-enactment thereof and shall bear any costs for compliance therewith, and any extra costs incurred by the SAMB in connection with the supervision of the Works.

23.4 Wages Books and Time Sheets

(a) The Contractor shall keep and shall cause his sub-contractors (including "labour only" sub-contractors) and Nominated Sub-Contractors to keep proper wages books and time sheets showing wages paid to and the time worked by all workmen employed by him and his sub-contractors as aforesaid in and for the performance of this Contract.

(b) The Contractor shall produce such wages books and time sheets on demand for inspection by any persons duly authorised by the S.O.

(c) The Contractor shall furnish to the S.O. or S.O.'s Representative such information relating to the wages and conditions of employment of such workmen as the S.O. may from time to time require.

23.5 Default in Payment of Wages

In the event of default in the payment of —

(a) any money in respect of wages; and/or

(b) payment in respect of Employees Provident Fund Contributions,

of any workmen employed by the Contractor or his sub-contractors (including "labour only" sub-contractors) and Nominated Sub-contractors in and for the performance of this Contract, which a

claim has been filed with the Department of Labour, then the S.O. shall make payment to the Director General of Labour and/or Employees Provident Fund, as the case may be, out of any monies at any time due to the Contractor under this Contract and such payment shall be deemed to be a payment made to the Contractor by the SAMB under and by virtue of this Contract.

23.6 **Discharge of Workmen**

(a) The Contractor shall employ in and about the execution of the Works only such persons as are of good character, careful, skilled and experienced in their respective vocations and trades.

(b) The S.O. shall be at liberty to object to and require the Contractor to remove immediately from the Site any person employed by the Contractor in or about the execution of the Works who in the opinion of the S.O. misconducts himself or is incompetent or negligent in the proper performance of his duties. Such person shall not again be employed upon the Works without the prior written permission of the S.O.

(c) Any person so removed from the Works shall be replaced without delay by a substitute approved by the S.O. PROVIDED THAT the Contractor shall not be entitled to any claim for any expense whatsoever incurred by him in respect of any direction given by the S.O. under this clause.

24.0 VARIATIONS

24.1 The S.O. may issue instructions requiring a Variation in a form of a Variation Order. No variation required by the S.O. shall vitiate this Contract. Upon the issuance of such Variation Order, the Contractor shall forthwith comply with the Variation Order issued by the S.O.

24.2 The term 'Variation' means a change in the Contract Document which necessitates the alteration or modification of the design, quality or quantity of the Works as described by or referred to therein and affects the Contract Sum, including:

(a) the addition, omission or substitution of any work;

(b) the alteration of the kind or standard of any of the materials, goods to be used in the Works; or

(c) the removal from the Site of any work executed or materials or goods brought thereon by the Contractor for the purposes of the Works other than work, materials or goods which are not in accordance with this Contract.

24.3 Any variation made under this clause shall not relieve the Contractor from his obligations under clause 22.1(c).

25.0 VALUATION OF VARIATION

25.1 All variations instructed in writing by the S.O. in accordance with clause 24 hereof shall be measured and valued by the S.O. The valuation of Variations, unless previously or otherwise agreed, shall be made in accordance with the following rules:

a) The rates in the Schedule of Rates, after adjustment if necessary as provided in Clause 26.2 hereof, shall determine the valuation of work (other than work involving a whole addition of any item of work priced in the Summary of Tender, which shall be valued in accordance with rule (b) hereof) of similar character and executed under similar conditions as work priced therein;

b) The said rates, where work is not of similar character or executed under similar conditions as aforesaid, shall be the basis of rates for the same, so far as may be reasonable, failing which a fair valuation thereof shall be made by the S.O.;

c) Where work involves the addition of the whole of any similar item of work and executed under similar conditions a

d) s work priced in the Summary of Tender, the price of such item
of work in the Summary of Tender shall be the basis of the valuation of the said item of work. The rates in the Schedule of Rates shall determine the valuation of work omitted; provided that if the omission involves the omission of the whole of any item of work in the Summary of Tender, the price of such item of work in the Summary of Tender shall be the basis of valuation of the item omitted. Omission of the whole of an item of work in the Summary of Tender shall mean omission of the whole of the work where it is not required and shall not apply to the substitution of any work in the Summary of Tender.

25.2 Where work cannot properly be measured or valued, the S.O. may allow daywork price as specified in Appendix. Unless otherwise provided in the Bills of Quantities, the daywork prices for the purpose of this Contract shall be taken to mean the actual net cost to the Contractor of his materials, plant and labour for the work concerned. The Contractor shall be paid daywork prices, plus fifteen percent (15%), which shall include for the cost of all ordinary plant, tools, scaffolding, supervision and profit. PROVIDED ALWAYS that as a condition precedent to any right to any payment the Contractor shall produce vouchers, receipts and wage books specifying the time for labour and plant employed and materials used to the S.O. not exceeding seven (7) days after the work shall have been done.

25.3 The amount of variations shall be certified by the S.O. and added to or deducted from the Contract Sum as the case may be and the amount shall be adjusted accordingly.

26.0 SUMMARY OF TENDER

267 The Summary of Tender, Provisional Bills of Quantities (if any), shall be the basis of the Contract Sum. Any error in description or quantity or omission of Works from the Summary of Tender and Provisional Bills of Quantities (if any) shall not vitiate this Contract but shall be rectified and the amount in respect of such rectification shall be added to or deducted from the Contract Sum as the case may be.

26.2 The SAMB reserves the right to adjust the rates in the Schedule of Rates and the prices in the Summary of Tender submitted by the Contractor to ensure their reasonableness before acceptance of tender and the decision of the SAMB shall be final.

26.3 Any adjustment of the prices in the Summary of Tender by the preceding clause 26.2 above and any arithmetical error in the Summary of Tender shall before the signing of this Contract be so adjusted and rectified so that the total amount in the Summary of Tender shall correspond to the lump sum amount tendered by the Contractor in the Form of Tender. Provided always the lump sum amount shown in the Form of Tender shall remain unaltered. Provided further that Provisional and Prime Cost Sums shall not be subjected to such adjustment of prices.

26.4 Subject to the Clauses 8.2(a) and 11 hereof, the quality and quantity of the Works included in the Contract Sum shall be to be that which is shown upon the Contract Drawings or described in the Specification and/or the Summary of Tender. Where quantities of work are given in the Contract Drawings and/or the Specification and/or the Summary of Tender for the purpose of tendering, unless otherwise stated, these shall be deemed to form part of this Contract and the method of measurement of and payment for the same shall be made in accordance with the rules as set down in the Contract Drawings and/or the Specification and/or Summary of Tender.

Provisional Quantities

26.5 Where the quantities of Works are stated as "provisional" in the Bills of Quantities, such quantities are the estimated quantities which shall not be taken as the actual and correct quantities of Works to be executed by the Contractor in the fulfilment of his obligations under the Contract. The amount to be paid to the Contractor in respect of such Works upon completion of this Contract shall be ascertained by remeasurement of the work as it is actually executed. The rates in the "provisional" Bills of Quantities shall determine the valuation of the Works of similar character and executed under similar conditions as work priced therein. The said rates, where work is not of similar character or executed under similar conditions as aforesaid, shall be the basis of rates for the same so far as maybe reasonable, failing which a fair valuation thereof shall be made by the S.O..

26.5 For the purpose of clause 26.5, the amount to be paid to the Contractor shall be set off against the amount for such work in the Bills of Quantities, and the balance shall be added to or deducted from the Contract Sum as the case may be.

27.0 MEASUREMENT OF WORKS

27.1 The S.O. shall, when he requires any part or parts of the Works to be measured or remeasured for the purposes of clauses of Variation under clause 24 and provisional quantities under clause 26.5, give reasonable notice to the Contractor who shall attend or send a qualified agent to assist the S.O. or S.O.'s Representative in making such measurement and shall furnish all particulars required by the S.O.. Should the Contractor fail to attend or neglect or omit to send such agent, then the measurement made by the S.O. or approved by him shall be taken to be the correct measurement of the work.

27.2 Upon the completion of the measurement pursuant to clause 27.1, the S.O. shall supply the Contractor with such measurement in respect of the said parts.

28.0 PAYMENT TO CONTRACTOR AND INTERIM CERTIFICATES

28.1 When the Contractor has executed work including delivery to or adjacent to the Works of any unfixed materials or goods intended for incorporation into the Works in accordance with the terms of this Contract and their total value of work thereof has reached the sum referred to in Appendix, the S.O. shall at that time make the first valuation of the same.

28.2 Thereafter, once (or more often at the discretion of the S.O.) during the course of each succeeding month the S.O. shall make a valuation of the works properly executed and of unfixed materials and goods delivered to or adjacent to the Site, provided the total value of work properly executed and the value of unfixed materials and goods as specified in clause 28.4 hereof, delivered to the Site intended for incorporation into the Works in each subsequent valuation shall not be less than the sum referred to in Appendix.

28.3 Within fourteen (14) days from the date of any such valuation being made and subject to the provision mentioned in clause 28.1, the S.O. shall issue an Interim Certificate stating the amount due to the Contractor from the SAMB. PROVIDED THAT the signing of this Contract shall not be a condition precedent for the issue of the first Interim Certificate (and no other) so long as the Contractor has returned the Letter of Acceptance of Tender duly signed and has deposited with the S.O. or the SAMB the relevant insurance policies under clauses 15 and 18 hereof.

28.4 The amount stated as due in an Interim Certificate shall, subject to any agreement between the Parties as to payment by stages, be the estimated total value of the work properly executed and up to ninety percent (90%) of the value of the unfixed materials and goods delivered to or adjacent to the Site intended for incorporation into the permanent Works up to and including the date the valuation was made, less any payment (including advance payment) previously made

paid under this Contract. PROVIDED THAT such a certificate shall only include the value of the said unfixed materials and goods as and from such time as they are reasonably and properly and not prematurely delivered to or adjacent to the Site and adequately protected against weather, damage or deterioration.

28.5 This clause shall not apply to any unfixed materials and goods which are supplied and delivered by Nominated Suppliers for which payment shall be made for the full value of the unfixed materials and goods.

28.6 Within a number of days as stated in Appendix (or if none stated then within thirty (30) days of the issue of any such Interim Certificate), the SAMB shall make a payment to the Contractor as follows:

(a) where the Performance Bond is in the form of a Banker's, Insurance or Finance Company Guarantee, payment shall be made on the amount certified as due to the Contractor in the said Interim Certificate; or

(b) where the Performance Bond is in the form of a Performance Guarantee Sum, payment of ninety percent (90%) on the amount certified as due to the Contractor shall be made with the remaining ten percent (10%) being retained by the SAMB as a Performance Guarantee Sum. PROVIDED THAT when the sum retained is equivalent to five percent (5%) of the Contract Sum then in any subsequent Certificate, payment shall be made on the full amount certified as due to the Contractor.

29.0 ADJUSTMENT OF CONTRACT SUM

The amount to be added to or deducted from the Contract Sum in respect of expense or loss due to fees and charges in relation to the supply of water and electricity and permanent connections to water, electricity, telephone and sewerage mains under clause 6.2, variations under clause 24, rectification of errors in Bill of Quantities under clause 26.3, fluctuation of price under clause 30, payment of P.C. Sums and Provisional Sums under clause 34, opening up work for inspection and testing of materials or goods and executed work under clause 35.2, loss and expense under clause 44 and costs of disposal of fossils, *etc.* under clause 65 hereof, shall be certified by the S.O.

30.0 FLUCTUATION OF PRICE (NOT APPLICABLE)

In accordance with the Special Provisions to the Conditions of Contract for Fluctuation of Price as contained in Appendix (if applicable), the amount payable by the SAMB to the Contractor upon the issue by the S.O. of an Interim Certificate under clause 28 hereof shall be increased or decreased accordingly. The net total of any such increases or decreases shall be given effect to in determining the Contract Sum.

31.0 FINAL ACCOUNT AND PAYMENT CERTIFICATE

31.1 As soon as is practicable but not later than three (3) months after the issuance of the Certificate of Practical Completion, the Contractor shall submit full particulars complete with receipts, vouchers records that would substantiate the Contractor's claim under clause 44 together with any documents, supporting vouchers and any explanation and calculations including documents relating to the accounts of Nominated Sub-Contractors or Nominated Suppliers, which may be necessary to enable the Final Account to be prepared by the S.O. PROVIDED ALWAYS the Contractor had given the notice of claim in writing within the stipulated time or times in the said provisions.

31.2 If the Contractor fails to submit full particulars of all claims within the stipulated period, the S.O. shall forthwith make the assessment based on the available documents submitted by the Contractor for the purpose of the Final Account. The SAMB shall be discharged from all liabilities in connection with the claims.

31.3 Within three (3) months after the expiry of the Defects Liability Period for the whole of the Works or three (3) months after the issue of the Certificate of Completion of Making Good Defects under clause 48 hereof, whichever is the later, the S.O. shall issue the Final Certificate.

31.4 The Final Certificate shall be supported by documents, and full particulars complete with receipts, vouchers records showing the S.O.'s final valuation of Works and any amount determined in clause 31.1 in accordance with the terms of this Contract. After setting out or allowing for all payments or other expenditure of the SAMB or any permitted deductions made by the SAMB or the S.O. on its behalf, the Final Certificate shall state any final balance due from the SAMB to the Contractor or from the Contractor to the SAMB, as the case may be, which shall thereupon become the debt payable. Such certificate shall also take account of any outstanding permitted deductions not yet made by the SAMB under the terms of this Contract whether by way of liquidated damages or otherwise.

31.5 No final payment due to the Contractor under the Final Certificate, shall be made unless and until the Contractor shall have satisfied the S.O. by means of a Statutory Declaration made by or on behalf of the Contractor to the effect that the workmen who have been employed by the Contractor on the Works including workmen employed by sub-contractors, whether nominated or otherwise (including "labour only" sub-contractors) have received all wages due to them in connection with such employment, and that all dues or contributions under the Employment Act 1955, the Employee's Social Security Act 1969, the Employee's Provident Fund Act 1965 and any other laws relevant to the employment of workmen, have been paid.

32.0 EFFECT OF S.O.'S CERTIFICATES

No certificate of the S.O. under any provision of this Contract shall be considered as conclusive evidence as to the sufficiency of any work, materials or goods to which it relates, nor shall it relieve the Contractor from his liability to amend and make good all defects, imperfections, shrinkages, or any other faults whatsoever as provided by this Contract. In any case, no certificate of the S.O. shall be final and binding in any dispute between the SAMB and the Contractor if the dispute is brought whether before an arbitrator or in the Courts.

33.0 DEDUCTION FROM MONEY DUE TO CONTRACTOR

The SAMB or the S.O. on its behalf shall be entitled to deduct any money owing from the Contractor to the SAMB under this Contract from any sum which may become due or is payable by the SAMB to the Contractor under this Contract or any other contracts to which the SAMB and Contractor are Parties thereto. The S.O. in issuing any certificate under clauses 28 and 31, shall have regard to any such sum so chargeable against the Contractor, provided always that this provision shall not affect any other remedy to which the SAMB may be entitled for the recovery of such sums.

34.0 PRIME COST / PROVISIONAL SUMS

34.1 In respect of any and every Prime Cost or P.C. Sum provided in the Contract, the amount due to any Contractor shall be determined by deducting the said Prime Cost or P.C. Sum and the relevant profit and/or attendance charges from the Contract Sum and substituting for the same with the actual amount due to relevant Nominated Sub- Contractor or Nominated Supplier as valued in accordance with the relevant sub-contract and the sums due to any Contractor by way

of profit and/or attendance charges at the rates or prices stipulated in the Contract Documents (if any).

34.2 The Provisional Sum may be expended at such times and in such amounts as the S.O. may direct. Such sum if not used either wholly or in part shall be deducted from the Contract Sum. The value of works which are executed by the Contractor in respect of Provisional Sums shall be ascertained in accordance with clause 25 hereof. The said value of such work executed by the Contractor shall be set off against all such Provisional Sums and the balance shall be added to or deducted from the Contract Sum as the case may be.

34.3 Any work to be executed, or materials or goods to be supplied for which Provisional Sums are provided in the Bills of Quantities may, if the S.O. so decides, be treated as P.C. Sum items and shall be dealt with in accordance with clause 34.1.

34.4 Where the Contractor in the ordinary course of his business directly carries out works for which P.C. Sums are provided in the Bills of Quantities and where such works are set out in Appendix hereto and the S.O. is prepared to accept tenders from the Contractor for such works the Contractor shall be permitted to tender for the same or any of them without prejudice to SAMB's right to reject the lowest or any tender. If the tender of the Contractor for any work included in the P.C. Sum is accepted, such tender shall be held to include the profit and attendance charges, and the Contractor shall not be entitled to the profit and attendance charges as contained in the Bills of Quantities notwithstanding any provision to the contrary under clause 34.1.

35.0 MATERIALS, GOODS AND WORKMANSHIP

35.1 All materials, goods and workmanship shall be of the respective kinds and standards described in the Specification and of good quality and in accordance with the standard of the workmanship in the industry. The Contractor shall upon the request of the S.O. furnish him with the relevant certificates and/or vouchers to prove that the materials and goods comply with the Specification.

35.2 The Contractor shall, entirely at his own cost, provide samples of materials and goods for testing purposes. The Contractor shall, when instructed by the S.O. to open up for inspection any work covered up, or arrange for or carry out any test of any materials or goods (whether or not already incorporated in the Works) or of any executed work which the S.O. may in writing require and the cost of such opening up or testing (together with the cost of making good in consequence thereof) shall be added to the Contract Sum unless provided for in the Bills of Quantities by way of Provisional Sums or otherwise or unless the inspection or test shows that the work, materials or goods are not in accordance with this Contract.

35.3 The Contractor shall pay all duties and taxes which may be imposed by law, such as customs duties and sales tax, on all materials, goods and equipment, whether purchased or imported in the Contractor's name or his agent, which are incorporated in the Works or used directly in the construction, completion or maintenance of the Works.

35.4 Except where otherwise specified, the Contractor shall pay all tonnage and other royalties, rent fees and other payments or compensation (if any) for getting stone, sand, gravel, clay or other materials required for the Works.

36.0 INSPECTION AND TESTING OF MATERIALS, GOODS AND EQUIPMENT

36.1 Further to the Contractor's obligations under clause 10, the Contractor shall submit to the S.O. for his approval, proposals for inspecting the design and setting out of the Works and testing the materials and workmanship to ensure that the Contractor's obligations under the Contract are fulfilled.

36.2 The Contractor shall carry out the inspection and tests approved under clause 36.5 or elsewhere in the Contract and such further tests as the S.O. may reasonably require, including to open up for inspection any work covered up or to carry out any test of any materials or goods (whether or not already incorporated in the Works or any executed Works).

36.3 The S.0 may issue instructions to the Contractor to remove from the Site or rectify any work, goods which are not in accordance with this Contract at his own cost.

36.4 The Contractor shall, as may be required by the S.O. from time to time, provide such assistance, instruments, machines, labour and materials as are normally required for the purpose of examining, measuring and testing of any work, as well as and the quality, weight or quantity of the materials used, and shall supply samples of materials before incorporation in the Works for testing.

36.5 Unless the Contract otherwise provides, the cost of making any test shall be borne by the Contractor if such test is:

(a) proposed by the Contractor; or

(b) clearly intended by or provided for in the Contract.

36.6 Notwithstanding anything in clause 36.5, if the Contractor carries out any further test as required by the S.O. pursuant to clause 36.2 and the result of such test shows the workmanship or materials is not in accordance with the provisions of the Contract, then the cost of such test shall be borne by the Contractor. But if the result of such test shows the workmanship or materials comply with the provisions of the Contract, then the cost of such test shall be borne by the SAMB.

37.0 CONSTRUCTIONAL PLANT, EQUIPMENT, VEHICLES AND MACHINERIES

37.1 The Contractor shall pay all port dues including (but not by way of limitation) wharfage dues, pilotage fees, anchorage, berthage and mooring fees, quarantine dues, loading porterage and overtime fees for constructional plant, equipment, vehicles and machineries for use directly in connection with the construction, completion of the works brought into and despatched from Malaysia by the Contractor (or in his name by agents).

37.2 The Contractor shall furnish to the S.O. all such shipping documents, invoices and other documentation as may be required by the Customs Authorities in connection with the importation of goods, materials, constructional plant, equipment, vehicles and machineries.

37.3 In the case of constructional plant, equipment, vehicles, and machineries imported on the Contractor's behalf by importing agents and the like both the shipping documents and the invoices of the original suppliers or manufacturers must indicate clearly that the consignment is for the Contractor's account.

37.4 The procedure in respect of the requirements of the foregoing shall be determined by the Customs Authorities. The Contractor shall make written application to the S.O. and shall provide the relevant documentation of all constructional plant, equipment, vehicles and machineries to be imported into Malaysia not less than forty-five (45) days before the arrival of the said constructional plant, equipment, vehicles and machineries.

37.5 The Contractor shall pay all charges and other expenses in connection with the landing and shipment of all constructional plant materials and other things of whatsoever nature brought into or despatched from Malaysia for the purpose of the Contract.

37,6 The Contractor shall make his own arrangement in obtaining clearance through the Customs of constructional plant, equipment, vehicles and machineries. However, if required, the S.O.'s assistance may be sought.

37.7 Under this Contract, the Contractor shall be required to furnish all lists of constructional plant, equipment, vehicles and machineries to the S.O. whether the constructional plant, equipment, vehicles and machineries are hired or acquired.

38.0 POSSESSION OF SITE

38.1 No work under this Contract shall commence unless and until the Performance Bond stipulated under clause 13 and such insurance policy as specified under clauses 15 and 18 shall have been deposited with the SAMB, PROVIDED THAT for the purposes of this clause only (but for no other), if the Contractor shall produce to the SAMB the cover note of the said insurance policy and the receipt of premium paid, it shall be a sufficient discharge of his obligations under this clause.

38.2 Unless the Contract Documents shall otherwise provide, possession of the Site as complete as may reasonably be possible but not so as to constitute a tenancy, shall be given on or before the "Date for Possession" stated in the Letter of Acceptance to the Contractor who shall thereupon and forthwith commence the Works (but subject to clause 38.1) and regularly and diligently proceed with and complete the Works on or before the Date for Completion as stated in Appendix.

38.3 The "Date for Completion" of the Works as referred to under clause 39 hereof shall be calculated from the said "Date for Possession". PROVIDED ALWAYS that the possession of Site may be given in section or in parts and any other restrictions upon possession of the Site shall be stated in the Appendix to these Conditions or in the Contract Documents.

38.4 In the event of any delay in giving possession of the Site from the "Date for Possession" as stated in Letter of Acceptance or delay in giving any section or part of the Site as provided in clause 38.3, the S.O. may issue instructions in regard to the revision of the "Date for Possession" and the "Date for Completion" shall be appropriately revised under clause 43.1(h) hereof, but the Contractor shall not be entitled to claim for any loss or damage caused by such delay in giving possession of the Site, nor shall he be entitled to terminate this Contract.

38.5 In the event that the giving of the possession of the whole Site is delayed beyond ninety (90) days of the "Date for Possession" stated in the Letter of Acceptance, the S.O. shall give written notice to the Contractor of the causes of such delay. Upon the receipt of the said written notice issued by the S.O., the Contractor may, inform the S.O. in writing of its decision within fourteen (14) days of receipt of the said notice either to:

(a) agree to proceed with the Works when the Site is subsequently made available, in which case clause 38.4 shall apply in particular, the Contractor shall not be entitled to claim for any loss or damage caused by such delay in giving possession of the Site, or

(b) terminate this Contract, without prejudice to any other rights or remedies that the SAMB and the Contractor may have as a result of the termination.

38.6 In the event that the giving of possession of any section or part of the Site (whether provided for in clause 38.3 or otherwise) is delayed beyond ninety (90) days from the Date of Possession stated in the Appendix or the date the Contractor is scheduled to commence work on that section or part of the Works in accordance with the approved programme of Works as referred to in clause 12 hereof as the case may be, then the S.O. shall give written notice to the Contractor of the causes of such delay. Upon receipt of the said written notice, the Contractor may inform the S.O. in writing, within fourteen (14) days of receipt of the said notice of its decision either to:

(a) agree to proceed with the Works when the section or part of the Site is subsequently made available, in which case sub-clause 38.5(a) above shall apply and in particular, the Contractor shall not be entitled to claim for any loss or damage caused by such delay as aforesaid; or

(b) request for S.O.'s instruction to omit the relevant section or part of the Works from the Contract. If the S.O. agrees to such request then the relevant section or part of the Works shall be duly omitted and deemed to be a variation to the Contract. Such variation shall not vitiate this Contract. If the S.O. does not agree to such request as aforesaid, then the Contractor shall be entitled to claim for any loss and/or expenses caused by and in respect of such delay beyond ninety (90) days as aforesaid.

39.0 COMPLETION OF WORKS

39.1 Subject to clauses 38.3 and 41, the Contractor shall complete the whole of the Works on or before the "Date for Completion" as stated in the Appendix or such extended time as may be allowed under clause 43 hereof.

39.2 If the Contractor considers that the works have achieved practical completion, the Contractor shall notify the S.O. in writing to that effect.

39.3 Within 14 days of receipt of such notice, the S.O. shall carry out testing/ inspection of the Works. Pursuant to such inspection/testing, the S.O. shall —

(a) issue the Certificate of Practical Completion to the Contractor if in his opinion the whole Works have reached Practical Completion and have satisfactorily passed any inspection/test carried out by the S.O. The date of such completion shall be certified by the S.O. and such date shall be the date of the commencement of the Defects Liability Period as provided in clause 48 hereof; or

(b) give instruction to the Contractor specifying all defective works which are required to be completed by the Contractor before the issuance of the Certificate of Practical Completion.

39.4 If the S.O. has given instruction pursuant to clause 39.3(b), no Certificate of Practical Completion shall be issued to the Contractor until the Contractor has effectively carried out the remedial work within reasonable period to the satisfaction of the S.O.

39.5 The Works shall not be regarded as practically complete unless it has fulfilled the following:

(a) the Works have been completed in accordance with the terms and conditions of this Contract;

(b) the SAMB can have full, proper and beneficial use of the Works for their intended purpose, notwithstanding that there may be works of a very minor defects PROVIDED THAT such works do not prevent or diminish the full, proper and beneficial use as aforesaid;

(c) the Works have passed any commissioning tests required in the Contract Document;

(d) the Works shall be made available to the SAMB in a condition fit for occupation; and

(e) all the essential services, including access roads, landscape, car parks, drains, sanitary, water and electricity installation, fire hydrant, sewerage and refuse disposal equipment and fire lifts specified in this Contract.

39.6 When the whole of the Works have reached practical completion to the satisfaction of the S.O., the date of such completion shall be certified by him and such date shall be the date of the commencement of the Defects Liability Period as provided in clause 48 hereof.

40.0 DAMAGES FOR NON-COMPLETION

40.1 If the Contractor fails to complete the Works by the Date for Completion or within any extended time granted pursuant to clause 43, the S.O. shall forthwith issue a Certificate of Non-Completion to the Contractor.

40.2 Without prejudice to the SAMB's right to terminate this Contract, when the S.O. issues the Certificate of Non-Completion, the SAMB shall be entitled to recover from the Contractor, Liquidated and Ascertained Damages calculated at the rate stated in Appendix 1 from the period of the issuance of the Certificate of Non-Completion to the date of issuance of Certificate of Practical Completion or the date of termination of this Contract. The S.O. may deduct such Liquidated and Ascertained Damages from any money due or to become due to the Contractor, failing which such damages "shall be recovered from the Performance Bond or as a debt due from the Contractor. The S.O. shall inform the Contractor in writing of such deduction.

40.3 The Liquidated and Ascertained Damages stated in Appendix 1 shall be deemed to be a reasonable amount of loss which the SAMB will suffer in the event that the Contractor is in breach of this clause. The Contractor by entering into this Contract agrees to pay to the SAMB the said amount(s) if the same become due without the need of the SAMB to prove his actual damage or loss.

40.4 The payment or deduction of such Liquidated and Ascertained Damages shall not relieve the Contractor from his obligation to complete the Works or from any of its obligations and liabilities under the Contract.

41.0 SECTIONAL COMPLETION

41.1 Where different completion dates for different sections or parts of the Works are stated and identified in Appendix or elsewhere in the Contract Documents and different and separate Liquidated and Ascertained Damages are provided for each section or part of the Works, the provisions of this Contract in regard to:

(a) Certificate of Practical Completion;

(b) Delay and Extension of Time;

(c) Liquidated Ascertained Damages; and

(d) Defects Liability Period,

but not Insurance of the Works under clause 18, Performance Bond under clause 13 and final payment on the Final Certificate under clause 31 hereof shall, in the absence of any express provision to the contrary elsewhere in the Contract Documents apply as if each such section or part was the subject of a separate and distinct contract between the SAMB and the Contractor.

41.2 For the avoidance of doubt, nothing contained in clause 41.1 shall entitle the Contractor to the release of the whole or any part of the Performance Bond or Performance Guarantee Sum deposited by him. The Performance Bond or Performance Guarantee Sum shall be released or be refunded only upon the issue of the Certificate of Making Good Defects of the whole of the Works or in respect of the last section of the Works, as the case may be.

42.0 PARTIAL OCCUPATION/TAKING OVER BY SAMB

42.1 If at any time before the whole of the Works have reached practical completion pursuant to clause 39, the SAMB with the consent of the Contractor (which consent shall not be unreasonably withheld) shall take possession of and occupy any part or parts of the same (any such part being hereinafter in this Clause referred to as 'the relevant part'), then notwithstanding anything expressed or implied elsewhere in this Contract.

Certificate of *Partial* Occupation

(a) within seven (7) days from the date on which the SAMB shall have taken possession of the relevant part, the S.O. shall issue a Certificate of Partial Occupation in respect of the relevant part stating the estimated value of the said relevant part, and for all the purposes of this Clause (but for no other) the value so stated shall be deemed to be the total value of the said relevant part;

Defects Liability Period

(b) for the purposes of clauses 39 and 48 hereof, the relevant part shall be deemed to have reached practical completion and the Defects Liability Period in respect of the relevant part shall be deemed to have commenced on the date on which the SAMB shall have taken possession and occupied. thereof;

Certificate of Making Good Defects

(c) at the end of the Defects Liability Period of the relevant part and if in the opinion of the S.O. any defect, imperfection, shrinkage or any other fault whatsoever in respect of the relevant part which he may have required to be made good under clause 48.1, shall have been made good by the Contractor, the S.O. shall issue a certificate to that effect;

***Reduction of Liquidated Ascertained* Damages**

(d) if, before the time of completion of the whole of the Works or, if applicable any section, a Certificate of Practical Completion has been issued for any part of the Works or of a section, the rate of the liquidated and ascertained damages for delay in completion of the remainder of the Works or of that section shall, for any period of delay after the date stated in such Certificate of Practical Completion, be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works or section, as applicable;

Insurance of the Works

(e) notwithstanding the partial occupation by the SAMB of the relevant part the Contractor shall insure and keep insured the Works in the manner as stipulated under clause 18 and the Contractor shall give notice to the insurer of such partial occupation; and

***Performance Bond Not* Affected/**

(f) it is expressly agreed that nothing contained in the preceding paragraphs shall entitle the Contractor to the release of the Performance Bond or any part thereof deposited by him under clause 13 hereof, the intention being that the said Performance Bond or any part thereof shall be released or refunded only upon the completion of making good all defects, imperfections, shrinkages or other faults which may appear during the Defects Liability Period and upon the giving of the Certificate of Completion of Making Good Defects for the whole of the Works under clause 48 hereof.

43.0 DELAY AND EXTENSION OF TIME

43.1 Upon it becoming reasonably apparent that the progress of the Works is delayed, the Contractor shall forthwith give written notice to the S.O as to the causes of delay and relevant information with supporting documents enabling the said officer to form an opinion as to the cause and calculation of the length of delay. If in the opinion of the S.O the completion of the Works is likely to be delayed or has been delayed beyond the Date for Completion stated in Appendix 1 or beyond any extended Date for Completion previously fixed under this Clause due to any or more of the following events:

(a) force majeure as provided under clause 58;

(b) exceptionally inclement weather;

(c) suspension of Works under clause 50;

(d) directions given by the S.O., consequential upon disputes with neighboring owners provided the same is not due to any act, negligence or default of the Contractor or any sub-contractor, nominated or otherwise;

(e) S.O.'s instructions issued under clause 5 hereof, PROVIDED THAT such instructions are not issued due to any act, negligence, default or breach of this Contract by the Contractor or any sub-contractor, nominated or otherwise;

(f) the Contractor not having received in due time instructions in regard to the nomination of sub-contractors and/or suppliers provided in this Contract, necessary instructions, drawings or levels for the execution of the Works from the S.O. due to any negligence or default of the S.O. PROVIDED THAT the Contractor shall have specifically applied in writing on a date which having regard to the Date for Completion stated in Appendix or to any extension of time then fixed under this clause, was neither unreasonably distant from nor unreasonably close to the date on which it was necessary for him to receive the same;

(g) delay in giving possession of the Site as provided under clause 38.4 hereof other than claim in effecting insurance and Performance Bond;

(h) delay on the part of artists, tradesmen or others engaged by the SAMB in executing work not forming part of this Contract;

(i) the Contractor's inability for reason beyond his control and which he could not reasonably have foreseen at the date of closing of tender of this Contract to secure such goods, materials and/or services as are essential to the proper carrying out of the Works; or

(j) delay on the part of the Nominated Sub-contractors and/or Nominated Suppliers to perform their works, due to reasons as stated above in sub-clauses (a) to (i),

then the S.O. may if he is of the opinion that the extension of time should be granted, so soon as he is able to estimate the length of the delay beyond the date or time aforesaid issue a Certificate of Delay and Extension of Time giving a fair reasonable extension of time for completion of the Works.

PROVIDED THAT all such delays are not due to any act, negligence, default or breach of contract by the Nominated Sub-contractor and/or Nominated Supplier and/or the Contractor, or

any of the servants or agents of such Nominated Sub-contractor or Nominated Supplier or the Contractor.

PROVIDED ALWAYS that the Contractor has taken all reasonable steps to avoid or reduce such delay and shall do all that may reasonably b'! required to the satisfaction of the S.O. to proceed with the Works.

PROVIDED FURTHER that the Contractor shall not be entitled to any extension of time where the instrúctions or acts of the S.O. are necessitated by or intended to remedy any default of or breach of contract by the Contractor.

44.0 CLAIMS FOR LOSS AND EXPENSE

44.1 If at any time during the regular progress of the Works or any part thereof has been materially affected by reason of delays as stated under clause 43.1 (c), (d), (e), (f} and (h), and the Contractor has incurred direct loss and/or expense beyond that reasonably contemplated and for which the Contractor would not be reimbursed by a payment made under any other provision in this Contract, then the Contractor shall within thirty (30) days of the occurrence of such event or circumstances or instructions give notice in writing to the S.O. of his intention to claim for such direct loss or expense together with an estimate of the amount of such loss and/or expense, subject always to clause 44.2 hereof.

44.2 As soon as is practicable but not later than ninety (90) days after practical completion of the Works, the Contractor shall submit full particulars of all claims for direct loss or expense under clause 44.1 together with all supporting documents, vouchers, explanations and calculations which may be necessary to enable the direct loss or expense to be ascertained by the S.O.. The amount of such direct loss or expense ascertained by the S.O. shall be added to the Contract Sum.

44.3 If the Contractor fails to comply with clauses 44.1 and 44.2, he shall not be entitled to such claim and the SAMB shall be discharged from all liability in connection with the claim.

45.0 INVESTIGATION BY THE SAMB AND OTHER PERSONS IN CASE OF ACCIDENT, FAILURE OR OTHER EVENT

Where the SAMB, its employee or any person or body appointed or authorised by it carries out any investigation in relation to any accident, failure or other event which has occurred to, in or in connection with the Works. or any part thereof for the purpose of determining the cause or reason for the said accident, failure or event, the Contractor shall render all such necessary assistance and facilities as may be required by the SAMB, its employee or such person or body, including the giving of access to all specifications, designs, records and other available information relating to the Works.

46.0 ACCESS FOR WORKS, *ETC.*

46.1 Access for S.O.

(a) The S.O. and any person authorised by the S.O. shall at all times have access to the Works and to the factories, workshops or other places of the Contractor or of any sub-contractor or supplier where any equipment, materials, goods or work are manufactured, fabricated, assembled, prepared or stored for the Contract.

(b) Where any such equipment, materials, goods or work are being manufactured, fabricated, assembled, prepared or stored in the factories, workshops or other places of

a sub-contractor or supplier, the Contractor shall by a term in the sub-contract secure a similar right of access to those factories, workshops or other places for the S.O. and any person authorised by the S.O., and shall take reasonable steps required of him by the S.O. to enforce or assist in enforcing such right.

(c) Any person so removed from the Works shall be replaced without delay by a substitute approved by the S.O.; PROVIDED THAT the Contractor shall not be entitled to any claim for any expense whatsoever incurred by him in respect of any direction given by the S.O. under this Clause.

46.2 Access for Other Contractors and Workmen

The Contractor shall in accordance with the requirements of the S.O. afford all reasonable access and facilities to any other person engaged by the SAMB and their workmen and of any other constituted authorities for the purposes of executing any work on or near the Site.

47.0 SUB-CONTRACT OR ASSIGNMENT

47.1 The Contractor shall not without the prior written consent of the S.O. (which consent shall not be unreasonably delayed or withheld) sub- contract the design for any portion of the Works under clause 22 of this Contract. Where the S.O. consents to any sub-contract under this clause, such consent shall not in any way absolve the obligations of the Contractor under clause 10.

47.2 The Contractor shall not sub- contract the whole or any substantial part of the Works without the prior written consent of the S.O. (which consent shall not be unreasonably delayed or withheld). Any such consent, if given, shall not relieve the Contractor from any liability or obligation under this Contract and he shall be responsible for the due observance by such sub-contractors, of all the terms, stipulations and conditions under this Contract.

47.3 Notwithstanding any sub-contract made pursuant to clauses 47.1 and 47.2, the Contractor shall be fully responsible for the acts, defaults or neglects of any sub-contractor, including 'labour only' sub-contractors, his agents, servants or workmen as if they were the acts, defaults or neglects of the Contractor, his agents, servants or workmen; PROVIDED THAT the provision of labour on a piecework basis shall not be deemed to be a sub-contract under this clause.

47.4 It shall be a condition in any sub-contract which has been consented to by the SAMB that upon termination of the Contractor's employment under the Contract, the employment of the sub-contractor under the sub-contract shall terminate immediately. No claim whatsoever shall be made by the Contractor and/or sub-contractor against the SAMB for any work done or materials or goods supplied.

47.5 If the Contractor sub-contracts the Works, in whole or in part, to any person without getting prior written consent of the S.O. as provided under this clause, the S.O. shall have the right to instruct the Contractor to forthwith terminate such sub-contract and the Contractor shall be liable for all costs and expense relating to such termination.

47.6 The Contractor shall not assign the Contract or any part thereof, or any benefit or interest therein or thereunder otherwise than by way of assignment in favour of the Contractor's banker or any financial institution or Corporation of any monies due or to become due under this Contract without prior written consent of the S.O.

48.0 DEFECTS AFTER COMPLETION

48.1 Completion of Outstanding Work and Remedying Defects

(a) At any time during the Defects Liability Period as stated in Appendix hereto (or if none stated the period is twelve (12) months from the date of practical completion of the Works), any defect, imperfection, shrinkage or any other fault whatsoever which may appear and which are due to materials or goods or workmanship not in accordance with this Contract, the S.O. shall issue written instruction to the Contractor to make good such defects, imperfections, shrinkages or any other fault whatsoever at the Contractor's own cost. The Contractor shall complete all such works with due expedition or within such time as may be specified by the S.O.

(b) Without prejudice to sub-clause (a), any defect, imperfection, shrinkage or any other fault whatsoever which may appear during the Defects Liability Period to be made good by the Contractor, shall be specified by the S.O. in the Schedule of Defects which he shall deliver to the Contractor not later than fourteen (14) days after the expiration of the Defects Liability Period. The defects, imperfections, shrinkages or any other fault whatsoever specified in the Schedule of Defects shall be made good by the Contractor at his own costs and to be completed within a reasonable time but in any case not later than three (3) months after the receipt of the said Schedule. PROVIDED THAT the S.O. shall not be allowed to issue any further instruction requiring the Contractor to make good of any defect, imperfection, shrinkage or any other fault whatsoever after the issuance of the said Schedule of Defects or after fourteen (14) days from the expiration of the said Defects Liability Period, whichever is the later.

48.2 Default in Remedying Defects

If the Contractor shall fail to comply with either clause 48.1(a) and/or 48.1(b) within the time so specified, the materials or works so affected may be made good in such manner as the S.O. may think fit, in which case the costs incurred including On-Cost Charges (calculated by applying the Percentage of On-Cost Charges stated in Appendix to the costs incurred), shall be deducted from any money due or to become due, to the Contractor under this Contract and failing which such costs shall be recovered from the Performance Bond or as a debt due from the Contractor.

48.3 Diminution in Value of Works

If any defect, imperfection, shrinkage or any other fault whatsoever is such that, in the opinion of the S.O., It shall be impracticable or inconvenient to the SAMB to have the Contractor to remedy the same, the S.O. shall ascertain the diminution in the value of the Works due to the existence of such defects, imperfections, shrinkages or any other fault whatsoever. The amount of such diminution shall be recoverable by the SAMB from the Contractor as a debt due under the Contract and failing which such diminution shall be recovered from the Performance Bond.

48.4 Certificate of Completion of Making Good Defects

When in the opinion of the S.O. the Contractor has made good the defects, imperfections, shrinkages or any other fault whatsoever which he is required to make good under clauses 48.1(a) or (b), or both, the S.O. shall issue a certificate to that effect, and the date specified in such certificate shall be the date on which the Contractor has completed making good such defects, imperfections, shrinkages or any other fault whatsoever. The said Certificate shall be referred to as the "Certificate of Completion of Making Good Defects".

49.0 UNFULFILLED OBLIGATIONS

Notwithstanding the issue of the Certificate of Completion of Making Good Defects under clause 48.4 hereof the Contractor and the SAMB shall remain liable for the fulfilment of any obligation incurred under the provisions of the Contract, prior to the issue of the said certificate, which remains unfulfilled at the time such certificate is issued, and for the purpose of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the Parties hereto.

50.0 SUSPENSION OF WORKS

50.1 Suspension and Resumption of Works

(a) The S.O. may at any time instruct the Contractor to suspend part or all of the Works.

(b) Upon receipt of such written instruction, the Contractor shall suspend part or all of the Works for such time and in such manner as specified in the instruction and shall duly protect, store and secure the Works or such part of the Works against any deterioration, loss or damage.

(c) During the suspension period, the Contractor shall continue to perform its obligations under this Contract, which are not affected by the instruction to suspend, including the obligation to effect and maintain insurances and Performance Bond.

(d) The S.O. may instruct the Contractor to resume the Works at any time thereafter. Upon receipt of such instruction the Contractor shall resume the Works, and the Parties shall jointly examine the Works affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works which has occurred during the suspension. The Contractor shall also take all necessary actions to mitigate the expenses incurred

50.2 Extension of Time

If the Contractor suffers delay and/or incurs expenses in complying with the instruction under clause 50.1(a), and in resumption of the Works, and if such delay and/or expenses was not foreseeable by the Contractor, the Contractor shall give notice for extension of time under clause 43 and the provisions thereof shall apply accordingly. PROVIDED THAT the Contractor shall not be entitled to such extension if the suspension is due to a cause attributable to the Contractor and he shall not be entitled to payment of loss and expense if he —

(a) fails to take measures specified in clause 50.1(b); and

(b) fails to take all necessary action to mitigate the expenses incurred.

In the event such suspension shall continue for a period exceeding twelve (12) months, the Parties shall then discuss whether to mutually terminate the Contract or suspend the Works for a further period.

50.3 Consequences of Mutual Termination

(a) If the Contract is mutually terminated under this clause-

(i) clause 51.1(c)(i) shall be applicable; and

(ii) payment obligations including all costs and expenditure incurred by the SAMB and the Contractor shall be ascertained in accordance with clause 54.

51.0 EVENTS AND CONSEQUENCES OF DEFAULT BY THE CONTRACTOR

51.1 Default of Obligations

(a) **Events of Default**

In the event the Contractor -

(i) faits to commence works at the Site within two (2) weeks after the Date for Possession;

(ii) suspends or abandons the carrying out of the Works or any part thereof for a continuous period of ..... ( ) days;

(iii) fails to proceed regularly and diligently with the performance of his obligations under the Contract;

(iv) fails to execute the Works in accordance with the Contract;

(v) persistently neglects to carry out his obligations under the Contract;

(vi) refuses or persistently neglects to comply with a written notice from the S.O. in relation to any defective work or equipment, materials or goods which are defective or do not meet the requirements of the Contract;

(vii) fails to comply with the provisions of clause 47; or

(viii) fails to comply with any terms and conditions of this Contract,

then the SAMB shall give written notice to the Contractor specifying the default, and requiring the Contractor to remedy such default within fourteen (14) days of the receipt of the default notice or any period determined by the SAMB.

(b) **Termination**

If the Contractor fails to remedy the breach within such period, the SAMB shall have the right to forthwith terminate this Contract by giving a written notice to that effect

(c) **Consequences of Termination**

If this Agreement is terminated under clause 51.1(b) -

(i) the Contractor shall -

(A) forthwith cease all operations of the Works;

(B) carry out any protection works so as to secure the Site, equipment, goods, materials therein against any deterioration, loss or damage and to do all necessary things so as to leave the Site in a clean and tidy condition;

(C) remove its personnel and workmen from the Site;

(D) vacate the Site within the time stipulated by the S.O., remove all temporary buildings, plant, tools, equipment, goods and unfixed materials which have not been paid by the SAMB, as specified by the S.O. Failing which, the SAMB may (but without being responsible for any

loss or damage) remove and sell any such property belonging to the Contractor, holding the proceeds, less all cost incurred, to the credit of the Contractor;

(E) either -

(aa) terminate all third party contracts entered into by the Contractor for the purposes of this Contract;

(bb) assign to the SAMB, if so required by the S.O., at no cost or expense to the SAMB, the benefit of any agreement for the supply of materials or goods and/or for the execution of any work or services for the purposes of this Contract; or

(cc) allow such third party to enter into a contract with the SAMB or any person deemed necessary by the SAMB for the purpose of completing the Works;

PROVIDED THAT the SAMB shall not be obliged to pay any third party for any materials or goods delivered or any work executed or services for the purposes of this Contract (whether before or after the date of termination) for which the SAMB has paid but the Contractor has failed to make payment to the third party;

(F) at no cost to the SAMB, hand over to the SAMB all plans, designs, specification and other relevant documents relating to the Works;

(G) pay to the SAMB for any losses and damages as a result of termination of this Contract in the manner provided under clause 56; and

(H) not be released from any of its obligations under the Contract.

(ii) the SAMB shall —

(A) call upon the Performance Bond or forfeit the Performance Guarantee Sum;

(B) enter and repossess the Site;

(C) be entitled to carry out and complete the Works on its own or employ any other person to carry out and complete the Works; and

(D) be entitled to claim against the Contractor for any losses, costs, expenses and damages suffered as a result of termination of this Contract in the manner provided under clause 56.

(iii) for the avoidance of doubt, the Parties hereby agree that the Contractor shall not be entitled to any form of losses including loss of profit, damages, claims or whatsoever upon termination of this Contract under this clause.

51.2 **General Default**

(a) **Events of Default**

If at any time during the Contract Period-

(i) the Contractor becomes bankrupt;

(ii) the Contractor becomes insolvent or compounds with or enters into an arrangements or compositions with its creditors;

(iii) an order is made or resolution ih effectively passed for the winding-up of the Contractor (except for the purpose of restructuring or amalgamation with the written consent of the SAMB, which consent shall not be unreasonably withheld);

(iv) a provisional liquidator, receiver or manager of its business or undertaking duly appointed, or possession taken by or on behalf of creditors or debenture holders secured by a floating charge of any property comprised in or subject of the floating charge; or

(v) execution is levied against a substantial portion of the Contractor's assets,

then the SAMB shall have the right to terminate this Contract forthwith by giving notice to that effect.

(b) **Consequences of Termination**

(i) In the event the termination of this Contract under clause 51.2 takes place, clauses 51.1(c)(i) and 51.1(c)(ii) shall apply.

(ii) For the avoidance of doubt, the Parties hereby agree that the Contractor shall not be entitled to any form of losses including loss of profit, damages, claims or whatsoever upon termination of this Contract under this clause.

52.0 TERMINATION ON NATIONAL INTEREST

52.1 Termination

(a) Notwithstanding any provision of this Contract, the SAMB may terminate this Contract by giving not less than thirty (30) days written notice to that effect to the Contractor (without any obligation to give any reason thereof) if the SAMB considers that such termination is necessary for national interest, national policy or national security.

(b) For the purpose of this clause, what constitutes "national interest", "national policy" and "national security", shall be solely made and determined by the SAMB and such determination shall for all intent and purposes be final and conclusive and shall not be open to any challenge whatsoever.

52.2 Consequences of Termination

Upon such termination of this Contract under clause 52.1-

(a) payment obligations including all costs and expenditure incurred by the SAMB and the Contractor shall be ascertained in accordance with clause 54; and

(b) clause 51.1(c)(i) and clause 51.1(c)(ii)(B) and (C) shall apply.

53.0 TERMINATION ON CORRUPTION, UNLAWFUL OR ILLEGAL ACTIVITIES

53.1 Termination

Without prejudice to any other rights of the SAMB, if the Company, its personnel, servants or employees is convicted by a court of law for corruption or unlawful or illegal activities in relation to this Contract or any other agreement that the Contractor may have with the SAMB, the SAMB shall be entitled to terminate this Contract at any time, by giving immediate written notice to that effect to the Contractor.

53.2 Consequences of Termination

Upon such termination under clause 53.1 —

(a) the SAMB shall be entitled to all losses, costs, damages and expenses including any incidental costs and expenses incurred by the SAMB arising from such termination;

(b) clause 51.1(c)(i) and (ii) shall apply; and

(c) for the avoidance of doubt, the Parties hereby agree that the Contractor shall not be entitled to any other form of losses including loss of profit, damages, claims or whatsoever upon termination of this Contract.

54.0 PAYMENTS UPON SUSPENSION AND TERMINATION ON NATIONAL INTEREST

54.1 If this Contract is terminated under clause 50 or clause 52, the amount to be paid (in so far as such amounts or items have not already been covered by payments on account made to the Contractor) shall be the following:

(a) the value of all work carried out up to the date of termination;

(b) the amounts payable in respect of any preliminary items so far as the Work or service comprised therein has been carried out or performed and a proper proportion of any such items which have been partially carried out or performed;

(c) the cost of materials or goods reasonably ordered for the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery (such materials or goods becoming the property of the SAMB upon such payment being made to the Contractor);

(d) a sum being the amount of any expenditure reasonably incurred by the Contractor in so far as such expenditure has not been recovered by any other payments referred to in this sub-clause; and

(e) the reasonable cost of any protection works and removal of equipment and site facilities pursuant to termination as provided under this Contract,

PROVIDED THAT such amount to be paid by the SAMB shall be confined only to those items as are clearly and expressly stated in sub-clauses (a)-(e) above.

54.2 For the avoidance of doubt, the Parties hereby agree that the Contractor shall not be entitled to any other form of losses including loss of profit, damages, claims or whatsoever other than stipulated under clause 54.1(a)-(e). The Parties further agree that the amount agreed above by the SAMB shall constitute as a full and final settlement between the Parties.

54.3 Upon termination of this Contract under clause 50 and clause 52, a final account of this Contract shall be prepared and issued by the S.O.

55.0 EVENTS AND CONSEQUENCES OF DEFAULT BY THE SAMB

Default of Obligations

(a) Events of Default

If the SAMB without any reasonable cause fails to perform of fulfil any of its obligations which adversely affects the Works,

then the Contractor may issue a notice specifying the default by the SAMB and requiring the SAMB to remedy the same within the period specified therein taking into account the nature of the remedy to be carried out by the SAMB or such other period as may be agreed by both Parties from the date of receipt of such notice.

(b) Termination

If the SAMB fails to remedy the default period specified in such notice issued under Clause 55 (a) within the stipulated period time therein, the Contractor shall have the right to forthwith terminate this Contract by giving a written notice to that effect.

(c) Consequences of Termination

If this Contract is terminated under Clause 55 (b)

i. the SAMB shall pay to the Contractor —

(a) the value of the Works carried out up to the date of termination;

(b) the amounts payable in respect of any preliminary items so far as the Work or service comprised therein has been carried out or performed and a proper proportion of any such items which have been partially carried out or performed;

(c) the cost of materials or goods reasonably ordered for the Works which have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery (such materials or goods becoming the property of the SAMB upon such payment being made to the Contractor); and

(d) a sum being the amount of any expenditure reasonably incurred by the Contractor in so far as such expenditure has not been recovered by any other payments referred to in this sub-clause.

ii. For the avoidance of doubt, the Parties hereby agree that the Contractor shall not be entitled to any other form of losses including loss of profit, damages, claims or whatsoever upon termination of this Contract.

56.0 CERTIFICATE OF TERMINATION COSTS

56.1 As soon as the arrangements for the completion of the Works made by the SAMB enable the S.O. to make a reasonably accurate assessment of the ultimate cost to the SAMB of completing the Works following the termination of the Contractor's employment and the engagement of other contractors or persons, and the. amount of direct loss and/or damage caused to the SAMB due to the termination has been ascertained by the S.O., then the
S.O. may issue a certificate (hereinafter referred to as the "Certificate of Termination Costs")

stating the Completion Cost (hereinafter defined) and the Final Contract Sum (hereinafter defined).

56.2 The Completion Cost comprises the following sums, costs or expenditure:

(a) the sums previously paid to the Contractor by the SAMB;

(b) the sums paid or payable to other contractors or persons engaged by the SAMB to complete the Works;

(c) any sums paid to sub-contractors or suppliers under clause 61;

(d) any costs or expenditure incurred or to be incurred including On-Cost Charges incurred by the SAMB in completing the Works; and

(e) the amount of direct loss and/or damage caused to the SAMB due to the termination.

56.3 The Final Contract Sum comprises of the following amounts or sums:

(a) the amount which would have been payable under the Contract on completion in accordance with the Contract, allowing any variations or other matters which would have resulted in an adjustment of the original Contract Sum; and

(b) any other sums which the SAMB might be entitled under the terms of the Contract to deduct from the original Contract Sum,

had the Contractor's employment not been terminated.

56.4 The Certificate of Termination Costs shall state the difference between the Final Contract Sum and the Completion Cost. If the Final Contract Sum is less than the Completion Cost, the difference shall be a debt payable by the Contractor to the SAMB and if greater the difference shall be a debt payable by the SAMB to the Contractor.

56.5 The Certificate of Termination Costs shall be binding and conclusive on the Contractor as to the amount of such loss or damage specified therein.

56.6 In the event the completion of the Works being undertaken departmentally, allowance shall be made, when ascertaining the amount to be certified as costs and expense incurred by the SAMB, for cost of supervision, interest and depreciation on plant and all other usual overhead charges and profit as would be incurred if the Works were completed by other contractors or persons.

57.0 SURVIVING RIGHTS

Any termination under this Contract shall not affect the liability of either Party hereto for any of its acts or omissions during the period of the Contract and both Parties shall thereafter continue to be so liable and shall keep the other Party hereto indemnified and hold harmless in respect of any claims arising therefrom.

58.0 EFFECT OF FORCE MAJEURE

58.1 Neither the SAMB nor the Contractor shall be in breach of its obligations under this Contract if it is unable to perform its obligation under this Contract (or any part of thereof), other than the payment obligations as a result of the occurrence of an Event of Force Majeure.

58.2 An "Event of Force Majeure" is an event beyond the control of both Parties which are:

(a) war (whether declared or not), hostilities, invasion, act of foreign enemies;

(b) insurrection, revolution, rebellion, military or usurped power, civil war, terrorism;

(c) natural catastrophe including but not limited to earthquakes, floods, subterranean spontaneous combustion or any operation of the forces of nature against which an experienced contractor could not reasonably have been expected to take precautions;

(d) nuclear explosion, radioactive or chemical contamination or radiation (unless caused by the negligence act, omission or default of the Contractor, its agents or personnel);

(e) pressure waves caused by aircraft or other aerial devices traveling at sonic or supersonic speeds; and

(f) riot, commotion or disorder, unless solely restricted to employees of the Contractor or its personnel, servants or agents.

58.3 If an Event of Force Majeure occurs by reason of which either Party is unable to perform any of its obligation under this Contract (or any part thereof}, the Party shall inform the other Party immediately of the occurrence of that Event of Force Majeure with full particulars thereof and the consequences thereof.

58.4 If either Party considers the Event of Force Majeure to be of such severity or to be continuing for such period of time that it effectively frustrates the original intention of this Contract, then the Parties may agree that this Contract may be terminated upon mutual agreement of the Parties.

58.5 If this Contract is terminated by an Event of Force Majeure pursuant to the above clause, all rights and obligations of the Parties under this Contract shall forthwith terminate and neither Party shall have any claim against the other Party and neither Party shall be liable to each other save for any rights and liabilities accruing prior to the occurrence of the Event of Force Majeure.

58.6 Neither Party shall be entitled to rely upon the provisions above if both Parties reasonably determine that an Event of Force Majeure has not occurred.

58.7 For avoidance of doubt, the Parties shall continue to perform those parts of those obligations not affected, delayed or interrupted by an Event of Force Majeure and such obligations shall, pending the outcome of this clause continue in full force and effect.

59.0 SITE AGENT AND ASSISTANTS

Unless otherwise provided elsewhere in this Contract, the Contractor shall keep constantly on the Site a competent, efficient, suitability qualified, experienced and good character site agent and his assistants in each trade as may be necessary who must be capable of receiving instructions in Bahasa Malaysia, and in default it shall be the responsibility of the Contractor to provide replacement for them and all wages and other expenses in connection with the employment of such replacement site agent and assistants. Any directions, explanations or instructions given to such site agent by the S.O. shall be deemed to have been given to the Contractor under this Contract.

60.0 NOMINATED SUB-CONTRACTORS AND/OR NOMINATED SUPPLIERS

60.1 The S.O. shall obtain tenders for Nominated Sub-Contractor's or Nominated Supplier's work or services, or for the supply of materials or goods in respect of which Prime Cost Sums or

Provisional Sums are included in the Bills of Quantities, and the Contractor shall, on the written instruction of the S.O., enter into such sub-contracts with the Nominated Sub-Contractor or Nominated Supplier as the case may be and such sub-contracts shall be in the form as referred to in clause 60.2(b).

60.2 The S.O. shall not nominate as a sub-contractor or a supplier in connection with the Works:

(a) a person against whom the Contractor shall make in writing within twenty one (21) days from the date of the S.O.'s instruction under clause 60.1 hereof what the S.O. considers to be reasonable objection;

(b) a person who will not enter into a sub-contract with terms and conditions as provided in the SAMB standard form of sub-contract for Nominated Sub-contractor (Form PWD 203N) or for Nominated Supplier (Form PWD 203P), as the case may be; or

(c) a person who will not give to the SAMB such indemnity with terms and conditions as provided in the SAMB standard form of Letter of Indemnity for Nominated Sub-contractors (Form PWD 203N7) or for Nominated Suppliers (Form PWD 203P7), as the case may be.

60.3 If pursuant to clause 60.2, the Contractor is not required to enter into a sub-contract with a Nominated Sub-contractor or Nominated Supplier, as the case may be, the S.O. shall do one or more of the following:

(a) nominate an alternative sub-contractor or supplier, as the case may be, in which case clause 60.2 hereof shall apply;

(b) by order under clause 24 vary the Works or the work or services, materials or goods, the subject of the Prime Cost Sums or Provisional Sum as aforesaid, including if necessary the omission of any such work or services, materials or goods so that they may be provided by workmen, contractors or suppliers, as the case may be, employed by the SAMB either concurrently with the Works or at some other date in which case the Contractor shall not be entitled to claim for any losses therefrom; or

(c) in accordance with clause 34.4 arrange for the Contractor to execute such work or services, or to supply such materials or goods.

61.0 PAYMENT TO NOMINATED SUB-CONTRACTOR OR SUPPLIER

61.1 The S.O. in issuing Interim Certificates under clause 28 or the Final Certificate under clause 31 hereof shall state separately the amount of interim or final payment due to each Nominated Sub-Contractors or Suppliers which amount subject to clause 61.2 hereof, shall be paid by the SAMB direct to the Nominated Sub-contractors or Suppliers. The amount paid by the SAMB direct to the Nominated Sub-contractors or Suppliers shall be deemed to be a payment to the Contractor by the SAMB under and by virtue of this Contract.

61.2 Subject to the relevant provisions in the sub-contract (Form PWD 203N or Form PWD 203P as the case may be), the Contractor shall be entitled to be paid and the SAMB may pay to the Contractor out of any money otherwise due to a Nominated Sub-contractors or Suppliers:

(a) any amount which the SAMB or the S.O. on its behalf in exercise of any rights under this Contract has deducted from any money due to the Contractor and such deduction is in respect of some act or default solely of the Nominated Sub-contractors or Suppliers, his servants or agents;

(b) any amount agreed by the Nominated Sub-Contractor or Suppliers as due to the Contractor, or any amount awarded in arbitration or litigation in favour of the Contractor which arises out of or under the sub-contract; and

(c) the amount of any claim for loss and/or expense actually incurred by the Contractor by reason of any breach or failure to observe the provisions of the sub-contract by the Nominated Sub-contractors or Suppliers under the sub-contract.

61.3 Any amount paid to the Contractor in accordance with this clause shall be deemed to be a payment to the Nominated and/or Sub-Contractors or Suppliers under the sub-contract.

62.0 NO LIABILITY OF SAMB TO NOMINATED AND/OR SUB-CONTRACTOR OR SUPPLIER

Nothing in clauses 60 or 61 or anything else contained in this Contract shall render the SAMB in any way liable to any Nominated and/or Sub-Contractor or Supplier.

63.0 RESPONSIBILITIES OF CONTRACTOR TO NOMINATED AND/OR SUB-CONTRACTORS OR SUPPLIERS

63.1 The Contractor shall be fully responsible to ensure that the Nominated Sub-Contractor or Suppliers shall conform with the terms and conditions of this Contract and shall be fully responsible for the acts, defaults or breach of any terms and/or conditions of this Contract by the Nominated Sub-Contractors or Suppliers on their part in the same way as for his own or those of other sub-contractors or suppliers engaged by himself. The SAMB shall in no circumstances be liable to the Contractor for the default of any Nominated Sub-Contractors or Suppliers.

63.2 In the event of repudiation or abandonment of his sub-contract by any Nominated Sub-contractor or Supplier, or the determination by the Contractor of the employment of the Nominated Sub-contractor or Supplier for any reason whatsoever under the sub-contract, the Contractor shall do one of the following :

(a) with the consent of the S.O. (such consent not to be unreasonably withheld) employ another competent sub-contractor or supplier to complete the sub-contract; or

(b) undertake to complete the sub-contract himself.

PROVIDED THAT in any of such events the Contractor is entitled to be paid the same sum for the work or services to be executed, or materials or goods to be supplied, as would have been payable had the original Nominated Sub-contractor or Supplier completed the sub-contract without any default on its part.

64.0 INTELLECTUAL PROPERTY RIGHTS

64.1 The Copyright and all other proprietary rights whatsoever in the Works and other material developed and supplied by the Contractor pursuant to or under this Contract shall vest in and shall be the sole property of the SAMB and the Contractor shall not during or at any time after completion of the Works or after the expiry or termination of this Contract, in any way, question or dispute the ownership of the SAMB. The proprietary rights in the Works shall vest in the SAMB free and clear of all liens, claims and encumbrances on the Works.

64.2 The Contractor shall be responsible for any claim that the equipment supplied infringes a patent, copyright or registered design.

64.3 If the SAMB's use or possession of the equipment is likely to constitute an infringement, then the Contractor shall promptly and at its own expenses procure for the SAMB the right to continue using and possessing the equipment; or modify or replace the equipment so as to

avoid the infringement (in which event the Contractor shall compensate the SAMB for the amount of any direct loss or damage sustained or incurred by the SAMB during such modification or replacement).

64.4 The Contractor shall indemnify the SAMB against any claim for the infringement of any letters patent, copyright or registered designs by the use of any equipment or of information supplied under this Contract and against all costs and damages which the SAMB may incur in any action for which such infringements or for which the SAMB may become liable in any such action.

65.0 ANTIQUITIES

65.1 All fossils, coins, antiquities and other objects of interest or value which may be found on the Site or in excavating the same during the progress of the Works shall become absolute property of the SAMB and upon discovery of such an object the Contractor shall forthwith-

(a) not to disturb the object and shall cease work if and in so far as the continuance of the work would endanger the object or prevent or impede its excavation or its removal;

(b) take all steps which may be necessary to preserve the object in the exact position and condition in which it was found; and

(c) inform the S.O. of the discovery and precise location of the object.

65.2 The S.O. shall issue instructions in regard to what is to be done concerning the object reported by the Contractor under clause 65.1 and (without prejudice to the generality of his power) such instructions may require the Contractor to permit the examination, excavation or removal of the object by a third party. Any such third party shall for the purpose of clause 15 be deemed to be a person for whom the SAMB is responsible and not to be a sub-contractor.

65.3 If compliance with the provisions of clause 65.1 or with an instruction issued under clause 65.2 has involved the Contractor in direct loss and/or expense for which he would not be reimbursed by a payment made under any other provisions of this Contract then the amount of such loss and/or expense shall be added to the Contract Sum.

66.0 ARBITRATION

66.1 If any dispute or difference shall arise between the SAMB and the Contractor out of or in connection with the contract, then parties shall refer such matter, dispute or difference to the officer named in Appendix for a decision.

66.2 The officer named in Appendix's decision shall be in writing and shall subject to clause 66.4 hereof, be binding on the Parties until the completion of the Works and shall forthwith be given effect to by the Contractor who shall proceed with the Works with all due diligence whether or not notice of dissatisfaction is given by him.

66.3 If the Parties —

(a) fails to receive a decision from the officer named in the Appendix within forty-five (45) days after being requested to do so; or

(b) is dissatisfied with any decision of the officer named in the Appendix,

then such dispute or difference shall be referred to arbitration within forty-five (45) days to an arbitrator to be agreed between the Parties and failing such agreement, to be appointed by the Director of the Regional Centre for arbitration in Kuala Lumpur on the application of either Party hereto. Such arbitration shall be heard at the Kuala Lumpur Regional Centre for Arbitration and shall be conducted in accordance with the rules for arbitration of the Kuala Lumpur Regional Centre for Arbitration using the facilities and the system available at the Centre.

66.4 Such reference, except on any difference or dispute under clause 51 hereof shall not be commenced until after the completion or alleged completion of the Works or determination or alleged determination of the Contractor's employment under this Contract, or abandonment of the Works, unless with the written consent of the SAMB and the Contractor.

66.5 In the event that such consent has been obtained in accordance with clause 66.4, the reference of any matter, dispute or difference to arbitration pursuant to this clause and/or the continuance of any arbitration proceedings consequent thereto shall in no way operate as a waiver of the obligations of the parties to perform their respective obligations under this Contract.

66.6 In any arbitration proceedings conducted pursuant to clause 66.3, the Parties may make any counter claim in relation to any dispute or difference arising from the Contract.

66.7 Upon every or any such reference the costs of such incidental to the reference and award shall be in the discretion of the Arbitrator who may determine the amount thereof, or direct the amount to be taxed as between solicitor and client or as between party and party, and shall direct by whom and to whom and in what manner the same be borne, award and paid.

66.8 The award of the Arbitrator shall be final and binding on the Parties.

66.9 In the event of the death of the arbitrator or his unwillingness or inability to act, then the SAMB and the Contractor upon agreement shall appoint another person to act as the arbitrator, and in the event the SAMB and the Contractor fail to agree on the appointment of an arbitrator, an arbitrator shall be appointed by the Director of the Regional Centre for Arbitration in Kuala Lumpur.

66.10 In this clause, "reference" shall be deemed to be reference to arbitration within the meaning of the Arbitration Act 2005.

66.11 The arbitration shall be nment by the Arbitration Act 2005 and the laws of Malaysia.

67.0 NOTICE, *ETC.*

67.1 Any notice, approval, consent, request or other communication required or permitted to be given or made under this Contract shall be in writing in Bahasa Malaysia or English language.

67.2 Such notice shall be effected by:

(i) hand delivery or courier and an acknowledgement of receipt obtained;

(ii) leaving the notice at the registered office or site office of the Contractor in which case it shall be deemed to have been duly delivered; or

(iii) registered post in which case it shall be deemed to have been received seven (7) days after the date of posti

67.3 The address of the SAMB and the Contractor is as shown below or such other address as either party may have notified the sender:

to the SAMB:

Address:

to the Contractor:

Address:

67.4 It shall be the duty of the parties to notify the other if there is a change of address or entity by giving a written notice within fourteen (14) days. In the event of the Contractor failing to notify the S.O. of such an address or any change in his address, such written notices and instructions shall be deemed to have been served upon the Contractor if they are sent in the manner stated above to the address stated in this Contract or to the Contractor's site office.

68.0 SAFETY AT THE SITE

68.1 Compliance with Safety Requirements

The Contractor shall comply with all relevant laws, regulations, rules, by-laws, directive or order by the relevant authorities on the requirements of safety-at-work ("Safety Requirements") and shall ensure his personnel, workmen and sub-contractors at all times during the execution of Works comply with such Safety Requirements.

68.2 Submission of Safety Programme

(a) Within 14 days from the receipt of the Letter of Acceptance by the SAMB, the Contractor shall submit to the S.O a safety programme to ensure that all construction activities required for the execution of the Works are carried out in a safe manner and in compliance with Safety Requirements.

(b) The safety programme shall be subject to the approval of the S.O. The submission to and approval by the S.O of the safety programme shall not relieve the Contractor of any of his obligations and liabilities pertaining to the safety requirement under the Contract.

68.3 Safety Officer and Personnel

a) The Contractor shall appoint a suitably qualified and experienced person as safety officer who shall be responsible for compliance with Safety Requirements and all safety matters relating to the Works. The Contractor shall, from time to time, provide such other personnel and resources as may be required to ensure the effective implementation of the safety programme on Site.

b) The Contractor shall conduct training programmes for all workmen including workmen of his sub-contractors for compliance with the Safety Requirements.

68.4 Safety Measures

(a) The Contractor shall ensure that the constructional plant together with all other tools and equipment and other items used in the execution of the Works are in a safe, sound and good condition and capable of performing the functions for which they are intended.

(b) The Contractor is responsible for instituting a safe method of construction on Site for all the workers and shall ensure that his sub-contractors whether nominated or otherwise institute the same method of construction for their workers.

(c) Without limiting his liability under the Contract, the Contractor shall provide all workmen on Site with the necessary safety equipment including but not limited to safety boots, safety helmets and protective clothing.

69.0 ADVANCE PAYMENT

69.1 The Contractor shall be entitled to an advance payment on the Contract amounting to 25% of the value of the Contract Sum less Provisional Sums (hereinafter referred to as the "Builder's Work") but subject to a maximum of RM10 million on compliance with the following conditions:

(a) on return of the Letter of Acceptance duly signed by the Contractor together with the Performance Bond (if any), insurance policies, confirmation from SOCSO Authorities and the receipts for all premium paid;

(b) production of a Banker's/Insurance/Finance Company Guarantee in the approved format equal in value to the advance proposed to be paid;

(c) Submission of the Banker's Guarantee / Insurance Guarantee / Financial Company Guarantee not later than 3 months from the date of possession of Site.

69.2 The advance payment shall be recouped when the cumulative total value of the Builder's Work executed and certified (including the amount certified for materials on site) reaches (25%) twenty five percent of the total contract value of Builder's Work, by way of a fixed percentage deduction from the total certified value of the Builder's Work executed (including the amount certified for materials on site) during the period covered by an Interim Payment Certificate, in all the subsequent Interim Payment Certificates on the basis that the advance payment made shall be fully recovered in the Interim Payment Certificate in which the cumulative total certified value of the Builder's Work executed (including the amount certified for materials on site) reaches seventy-five (75) percent of the total contract value of the Builder's work*. The deduction shall be calculated as follows:

$$\$ D = 200 \text{ A percent of } \$P \quad / \quad B$$

Where $ D = cumulative deduction to be made in Interim Payment Certificate,

$ A = total amount of advance paid,

$ B = total contract value of Builder's Work

$ P = gross certified value of Builder's Work executed (including the amount certified for materials on site) or agreed cumulative scheduled payments in excess of 25% of $ B

69.3 The liability under the advance guarantee shall be terminated upon realization by the SAMB of the full sum of advance paid. However, if the full sum of the advance paid cannot be realized before the completion date of the contract or. any authorised extension thereof or the case of the contract been determined before the date of the determination, then the balance of the advance repayable to the SAMB shall be recovered from the advance guarantee

70.0 **AMENDMENT**

No modification, amendment or waiver of any of the provisions of this Contract shall be effective unless made by mutual consent and made in writing by way of supplementary agreement specifically referring to this Contract and duly signed by the Parties. The provisions in respect of such amendment, variation or modification thereof shall be supplemental to and be read as integral part of this Contract which shall remain in full force and effect as between both Parties.

71.0 CONFIDENTIALITY

71.1 This Contract and all such drawings, records, data, books, reports and all matters pertaining hereto shall be considered as confidential matter and shall not be disclosed to any third party without prior written mutual agreement, save and except where-

(a) disclosure of such information is necessary for the purposes of raising finance to undertake the obligations of the Contractor under this Contract;

(b) disclosure of such information is made to the Contractor's consultants, auditors or advisers;

(c) disclosure of such information is required by law or by any SAMB agency or for the performance of any obligations under this Contract; or

(d) the information has entered public domain.

71.2 Where information has been disclosed to third parties pursuant to clause 69.1, the Contractor undertakes to ensure that such third parties shall not disclose the information to any other third party.

71.3 The restrictions contained in this clause shall survive the termination of this Contract and shall continue to bind both Parties without limit in point of time.

72.0 STAMP DUTY

The Contractor shall solely bear the stamp duties, legal costs and fees in the preparation and execution of this Contract and anything incidental thereto.

73.0 SEVERABILITY

If any provision of this Contract is held to be illegal or is invalid under any laws or regulations effective and applicable during the term of this Contract such provision shall be fully severable and this Contract shall be construed as if such illegal or invalid provision had never comprised as part of this Contract and the remaining provisions of this Contract shall remain in full force and effect and shall not be affected by the illegal or invalid provision or by its severance from this Contract.

74.0 WAIVER

Failure by any Party to enforce at any time, any provision of this Contract shall not be construed as a waiver of its right to enforce the breach of such provision or any other provision in this Contract or as a waiver of any continuing, succeeding or subsequent breach of any provision or other provision of this Contract.

75.0 LAWS APPLICABLE

This Contract shall be governed by and construed in accordance with the laws of Malaysia and the Parties irrevocably submit to the exclusive jurisdiction of the courts of Malaysia.

76.0 SUCCESSORS BOUND

This Contract shall be binding upon the respective successors-in-title of the Parties.

77.0 EPIDEMICS AND MEDICAL ATTENDANCE

77.1 The Contractor shall maintain the Site in clean and sanitary condition and shall comply with all requirements of the SAMB Health and Sanitary Authorities. In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the SAMB or the local medical or health authorities for the purpose of dealing with and overcoming the same.

77.2 The Contractor shall ensure that sufficient first aid kits are made available at suitable locations on the Site.

78.0 TECHNOLOGY TRANSFER

If the Contractor appoints foreign professionals, the Contractor shall endeavour to ensure that the employees of the SAMB are trained or exposed to the expertise of such foreign professionals pursuant to a programme for technology transfer.

79.0 GENERAL DUTIES AND PERFORMANCE STANDARD

78.1 Industry Practice

The Contractor shall provide and perform the Works in a proper manner in accordance with good management and best industry practice and to the best advantage of the SAMB and shall comply with all law, statutes and any guidelines or direction issued by the SAMB to the contractor from time to time.

79.2 Competency

The Contractor shall provide and perform its obligations under this Contract and take all appropriate measures expected of a competent company using due care and skills of a professional person providing similar service or works to ensure that the Works comply with the terms and conditions of this Contract.

79.3 **SAMB's Interest**

The Contractor shall at all times perform the Works in such manner as will always safeguard and protect the SAMB's interest and take all necessary and protect the SAMB' interest take all necessary and proper steps to prevent abuse and in accordance with the provisions of this Contract.

80.0 RESTRICTION AND PROCEDURE ON USE OF IMPORTED MATERIALS AND GOODS

80.1 The Contractor shall use local goods/materials as listed in the 'Senarai Bahan/Barangan Buatan Tempatan' issued by IKRAM QA Services Sdn. Bhd. and/or issued by SIRIM QA Services Sdn. Bhd., whichever is relevant. If the Contractor fails to comply with this requirement, the SAMB may reject the goods/materials which are found to be not in compliance with this requirement.

80.2 For local goods/materials not listed as aforesaid, such goods/materials may be allowed if prior testing and certification from IKRAM QA Services Sdn. Bhd. or SIRIM QA Services Sdn. Bhd., whichever is relevant, has been obtained. Where such testing cannot be carried out by IKRAM QA Services Sdn. Bhd. or SIRIM QA Services Sdn. Bhd. the Contractor may, with the S.O.'s prior approval, have the testing to be done by another agency.

80.3 Under no circumstances shall the Contractor be permitted to incorporate or supply imported materials, plant, equipment, vehicles or other goods into the Works or forming part of the scope of the Works except those approved by the SAMB, prior to the execution of the Contract. The Contractor shall at his own cost entirely substitute any materials, plant, equipment, vehicles or other goods proposed to be imported but not approved by the SAMB, with suitable local materials, plant, equipment, vehicles or other goods, including making any necessary subsequential changes or adjustment to the design of the Works to accommodate such substitution, all to the concurrence of the S.O..

80.4 The Contractor shall ensure that the procurement of approved imported materials, plant, equipment, vehicles or other goods are obtained directly from the country of origin based on F.O.B. or other similar basis. The transportation and insurance of such imported materials, plant, equipment, vehicles or other goods from the country of origin to the Site shall be arranged by the Contractor through the SAMB's Multi Modal Transport Operators (hereinafter referred to as MTO) as listed in Appendix. The Contractor shall allow in his tender all costs and time required in complying with the requirements of this Clause including the cost required for the services provided by the MTO.

80.5 The Contractor shall submit documentary evidence of compliance with this clause to the S.O. within one (1) month from the date of each delivery to the Site of such materials, plant, equipment, vehicles or other goods.

81.0 TIME

Time whenever mentioned shall be of the essence of this Agreement.

IN WITNESS WHEREOF the Parties hereto have executed this Agreement on the day and year first above written.

SIGNED for and on behalf of	)	
	)	.....
THE SAMB OF MALAYSIA	)	
	)	
in the presence of:	)	.....
	)	
*[1] The Common Seal of	)	
	)	
(Co. No. :)	)	
was hereunto affixed	)	
in the presence of:	)	

.....	.....
Director	Director/Secretary
Name : NRIC	Name :
No.:	NRIC No.:

[1] *applicable only if the Contractor is a company registered under the Companies Act 1965*

APPENDIX TO THE CONDITIONS OF CONTRACT

Clause
4.1(a) Officer(s) empowered to approve variations according to the limits as set out in Treasury's Instructions No. 202 as amended.

Financial Limits	Officer

4.1(b) Officer(s) empowered to take action on behalf of the SAMB in respect of:

Clauses 51, 52, 53, 58 and 66 .....

13 Performance Bond

Amount of Guarantee ... . RM.....

Guarantor Bank/Insurance Company/
Finance Company ... ...

Guarantee No. ... .

15 Minimum insurance cover for any one accident or series of accidents arising out of one event ... ... RM.....

Policy No..... .....

Period of insurance.....

15.1 (b) Amount of excess ..... RM.....

Clause		
17.	SOCSO Scheme registration number	
18.	Amount to be added to full value of Contract Sum as the insured sum	RM.....
	Total Amount Insured	RM.....
		Policy of insurance.....
18 (b)	Amount of excess.....	RM.....
21.2	Date of Tender.....	
28.1	Value of work to be executed including materials and goods to be delivered before First Interim Certificate will be issued.....	RM.....
28.2	Value of work to be executed including Materials and goods to be delivered before each Subsequent Interim Certificate will be issued.....	RM.....
28.6	Period for honouring payment certificate (if none stated, then within thirty (30) days of the issue of the Certificate.....	RM.....
34.4	Work covered by P.C. Sums for which the Contractor Will be permitted to tender.....	RM.....
38.2	'Date for Possession' of the Site.....	RM.....
39.1	'Date for Completion' for whole of the Works.....	
40.2	Liquidated and Ascertained Damages at the rate of.....	RM.....

Clause

41.1 Sectional Completion:

Identification of Sections or parts	Date for Possession [Clause 38.3]	Date for Completion	Liquidated & Ascertained Damages

48.1 (a) Defects Liability Period (if none stated, Then the period is twelve (12) months.....

5.3,5.4,15.3, 17.3(b), 18.2 Percentage of on-cost charges..... 5%

48.2, 56.2(d) Percentage of on-cost charges..... 10%

BAHAGIAN B1

ADDENDA NO.1 KEPADA SYARAT-SYARAT KONTRAK

Addenda No. 1 – kepada Syarat-syarat Kontrak SAMB 100 (Rev. 1/2010) mengandungi 1 helai muka yang menjadi sebahagian daripada kontrak tersebut dan hendaklah dibaca dan diertikan sedemikian (termasuk muka surat ini)

_____	_____
Tandatangan Kontraktor	Tandatangan Pegawai
Nama Penuh:_____ (Huruf Besar)	Nama Penuh:_____ (Huruf Besar)
Atas Sifat : _____	Atas Sifat : _____
No My Kad : _____	No My Kad : _____
Yang diberi kuasa dengan sempurnanya untuk menandatangani untuk dan bagi pihak	Untuk dan bagi pihak Syarikat Air Melaka Berhad
_____	_____
Meteri atau Cop Kontraktor	Cop Rasmi Syarikat
Saksi:_____	Saksi:_____
Nama Penuh :_____	Nama Penuh :_____
No. My Kad : _____	Jawatan : _____
Alamat : _____	
_____	
_____	

KLAUSA PENCEGAHAN RASUAH DALAM DOKUMEN

PEROLEHAN SAMB

"Penamatan mengenai rasuah, aktivitl menyalahi undang-undang atau tidak sah"

(a) Tanpa menjejaskan apa-apa hak lain Lembaga SAMB, jika [syarikat/firma], kakitangan, pengkhidmat atau pekerjanya disabitkan oleh mahkamah undang-undang bagi rasuah atau aktiviti menyalahi undang-undang atau menyalahi undang-undang berhubung dengan [perjanjian/kontrak] ini atau mana-mana perjanjian yang [syarikat/firma] itu mungkin ada dengan SAMB, yang SAMB berhak untuk menamatkan [perjanjian/kontrak] ini pada bila-bila, dengan memberi notis bertulis serta merta bagi maksud itu kepada [syarikat/firma].

(b) Jika penamatan berlaku, SAMB berhak untuk mendapat balik semua kerugian, kos, kerosakan dan perbelanjaan (termasuk apa-apa kos dan perbelanjaan sampingan) yang dilakukan oleh SAMB yang timbul daripada penamatan tersebut.

(c) Bagi mengelakkan sebarang keraguan, pihak-pihak dengan ini bersetuju bahawa [syarikat/firma] tidak layak menuntut apa-apa bentuk kerugian termasuk kehilangan keuntungan, kerosakan, tuntutan atau apa jua selepas penamatan [perjanjian/kontrak] ini.

BAHAGIAN C

BORANG TENDER (SAMB 100B)

BORANG INI HENDAKLAH DIGUNAKAN JIKA KUANTITI MENJADI SEBAHAGIAN DARIPADA KONTRAK
(*THIS FORM IS TO BE USED WHERE QUANTITIES FORM PART OF THE CONTRACT)*

Kontrak No :……..tahun 20…….bagi
***Contract No**: of for*

Kerja–Kerja tersebut dibawah ini yang dibuat pada …….haribulan
The under – mentioned Work entered into on the day of

…… 20 ……. oleh pihak - pihak yang bertandatangan di
by the undersigned parties,

bawah ini, adalah berhubung dengan Borang Tender ini yang menjadi sebahagian
refers to this Form of Tender which is and shall be read

daripada Kontrak tersebut dan yang hendaklah dibaca dan diertikan sedemikian.
And construed as part of the said Contract.

……	……
Tandatangan Kontraktor *Singnature of Contractor*	Tandatangan Pegawai *Singnature of Officer*
(Nama Penuh……..) *Name in Full*	(Nama Penuh……..) *Name in Full*
Atas Sifat…… *In the capacity of*	Jawatan……... *Designation*
yang diberi kuasa dengan sempurnanya untuk menandatangani untuk dan bagi pihak *duly authorized to sign for and on behalf of*	Untuk dan bagi pihak **Syarikat Air Melaka Berhad** *For and on behalf of* **Syarikat Air Melaka Berhad**

……
Meteri atau cap Kontraktor
Contractor's seal or chop

Saksi……. *Withness*	Saksi……. *Withness*
(Nama Penuh…… *Name in Full*	(Nama Penuh…… *Name in Full*
Pekerjaan…….. *Occupation*	Jawatan……... *Designation*
Alamat…….. *Address*	

SYARIKAT AIR MELAKA AIR BERHAD

BORANG TENDER
(FORM OF TENDER)

TENDER BAGI……..
TENDER FOR

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

mengikut Pelan-Pelan No .....-.....
in accordance with Drawing Nos.
……
……
dan lain-lain pelan terperinci yang diberi untuk menerangkannya.
and any other detail drawing suppliesd in amplification thereof.

Salinan - salinan Dokumen Meja Tender yang merangkumi Perjanjian Kontrak,
Copies of the Tender Table Documents comprising the Contract Agreement,

Pelan-pelan tersebut di atas, Spesifikasi dan Dokumen Tender yang lain boleh dilihat di tempat yang
the above - mentioned Drawings, Specification and other Tender Documents may be seen at the place

dinyatakan dalam Notis Tender dalam masa waktu pejabat pada mana - mana hari bekerja
specified in the Tender Notice during office hours on any working day

hingga tarikh akhir yang ditetapkan bagi penyerahan tender.
until the final date fixed for the submission of tenders.

Kepada :
To :

Ketua Pegawai Esekutif
Syarikat Air Melaka Berhad
Lot 897, Wisma Air
Jalan Hang Tuah,
75300 Melaka
(Pihak menerima tender)

TUAN,

Di bawah dan tertakluk kepada Syarat - Syarat Membuat Tender yang dilampirkan bersama ini,
Under and subject to the Conditions of Tendering annexed hereto,

yang bertandatangan di bawah ini adalah dengan ini membuat tender dan menawar untuk
the undersigned does hereby tender and offer to

melaksana dan menjalankan Kerja - kerja dan peruntukan - peruntukan dan membekalkan semua
execute and perform the Works and provisions and supply all

buruh, bahan dan loji dan segala benda dari tiap - tiap jenis yang masing - masing disebut,
labour, materials and plants and everything of every kind respectively named,

ditunjuk, diperihal dan dimasudkan dalam atau yang hendaklah ditakrifkan daripada Dokumen
shown, described and alluded to in, or to be inferred from the Tender

Tender, yang hendaklah dilaksanakan dan dibekalkan oleh pihak Kontraktor, bagi Kerja - kerja yang
Documents, to be executed and supplied on the part of Contractor, for the Works

diperihalkan di atas, dengan menepati Dokumen Tender tersebut bagi jumlah wang pukal yang
above described, in conformity with the Tender Documents for the lump sum

disebutkan di bawah ini.
named herein below.

2. Yang bertandatangan di bawah ini bersetuju menjadi terikat oleh dan tunduk kepada Syarat-
The undersigned agrees to be bound by and submit to the Conditions
Syarat Kontrak dan Spesifikasi tersebut dan bersetuju bahawa jika Tender yang disetujuiterima,
of Contract and Specification and agrees that if this Tender is accepted, the
harga dan kadar harga dalam Jadual Kadar Harga dan Ringkasan Tender hendaklah diteliti dan
p*rice and rates in the Schedule of Rate and Summary of Tender Shall be scrutinized and*
diselaraskan oleh Pegawai Penguasa tentang kemunasabahannya tetapi jumlah wang pukal yang
adjusted by the Superintending Officer as to their reasonableness but the lump sum tendered
ditenderkan di bawah ini hendaklah tetap tak berubah. Jadual Kadar harga, selepas diselaraskan
herein below shall remain unaltered. The Schedule of Rates, after adjustment
sebagaimana yang diperuntukkan dalalm Syarat-sayarat Kontrak, hendaklah menjadi asas bagi
as by the Condition of Contract provided, shall form the basic of valuation of
menilaikan apa-apa perubahan yang mungkin diarahkan oleh Pegawai Penguasa dari semasa ke
any variation which may from time to time be ordered by the superintending
ke semasa, tetapi jika sesuatu perubahan itu melibatkan peninggalan atau pertambahan menyeluruh
Officer, but where a variation involves the omission or addition of the whole of
sesuatu butiran kerja yang terhadapnya harga ada diberikan dalam Ringkasan Tender, maka
any item of work against which the price is given in the Summary of Tender, then
harga dalam Ringkasan Tender itu hendaklah menjadi asas bagi menilaikan perubahan itu.
such price in the Summary of Tender shall from the basic of valuation of such variation.
Yang bertandatangan di bawah ini selanjutnya bersetuju bahawa Ringkasan Tender itu hendaklah
The undersigned agrees that the Summary of Tender shall also form the
juga menjadi asas bagi menilaikan Perakuan Bayaran Sementara.
basic for the valuation of Interim Payment Certificate.

3. Dan selanjutnya, yang bertandatangan di bawah ini bersetuju menyiapkan Kerja-Kerja itu
And futher, the undersigned agrees to complete the Works
dalam masa.....hari/minggu/bulan* dari tarikh pemilikan tapakbina atau dalam apa-apa tempoh lanjutan
within..... days/weeks/months from the date of possession of site or within such extended time
yang diperuntukan dalam Syarat-Syarat Kontrak.
as by the Conditions of Contract provided.

4. Jumlah amaun Tender ini ialah jumlah wang pukal sebanyak Ringgit.....
The total amount of this Tender is the lump sum of Ringgit
.....
.....
iaitu, RM .....
i.e.

5. Yang bertandatangan di bawah ini berharap dibenarkan membuat tender, dalam sedikit masa
The undersigned desires to be permitted to tender, in due course,
lagi bagi kerja berikut yang mana dijalankan secara langsung oleh yang bertandatangan di bawah ini
for the following work which the undersigned in the ordinary course of
dalam perjalanan biasa perniagaannya dan yang baginya Wang Kos Prima atau Wang
business directly carries out and for which Prime Cost or Provisional Sums
Peruntukan sementara telah dimasukkan dalam amaun Tender ini:
have been included in the amount of this Tender:
.....
.....
.....
.....

6. Bahawasanya adalah diketahui bahawa Syarikat Air Melaka Berhad sentiasa berhak menyejuterima atau menolak
Whereas it is understood that the Syarikat Air Melaka Berhad reserves the right to accept or
Tender ini, sama ada ianya lebih rendah atau lebih tinggi daripada tender-tender yang lain, atau
to refuse this Tender, whether it be lower or higher than any other tender, or
sama amaunnya. Yang bertandatangan di bawah ini bersetuju yang Tender ini akan berterusan
of the same amount. The undersigned agrees that this Tender shall remain
sah dan tidak akan ditarik balik dalam tempoh sembilan puluh (90) hari dari tarikh akhir yang
valid and shall not be withdrawn within ninety (90) days from the final date

ditetapkan bagi penyerahan tender dan bersetuju bahawa tiada apa-apa had, syarat atau janji
fixed for the submission of tenders and agrees that no other term, condition or stipulation
lain akan dikenakan oleh kami selepas tarikh tersebut.
shall be imposed by us after the said date.

7. Yang bertandatangan di bawah ini bersetuju, jika Tender ini disetujuterima, mendeposit,
The undersigned agrees, in the event of acceptance of this Tender, to deposit,
dengan seberapa segera yang praktik selepas penerimaan Surat Setujuterima Tender tetapi sebelum
as soon as is practicable after the receipt of the Letter of Acceptance of Tender but before the
bermulanya Kerja-Kerja, perkara-perkara berikut:
commencement of the Works, the followings:

(a) Bon Perlaksanaan;
Performance Bond;

(b) Polisi Insurans Tanggungan Awam (iaitu insurans terhadap bencana kepada orang-orang
Insurance Policy for Public Liability (i.e. insurance agains injury to persons
dan kerosakan kepada harta) atau Nota Liputan beserta dengan resit bagi premium yang
and damage to property or the Cover Notes together with receipts of premium paid in

telah dibayar;
respect thereof;

(c) Nombor pendaftaran di bawah Skim Keselamatan Sosial Pekerja (PERKESO); dan / atau
Registration number under Employee's Social Security (SOCSO) Scheme; and / or

(d) Polisi Insurans Pampasan Pekerja atau Nota Liputan beserta dengan resit bagi premium
Insurance Policy for Workmen's Compensation or the Cover Notes together with receipts
yang telah dibayar.
of premium paid in respect thereof.

Yang bertandatangan di bawah ini selanjutnya bersetuju mendeposit Polisi Insurans bagi Kerja-
The undersigned further agrees to deposit the Insurance Policy for the Works
Kerja itu dan melaksanakan Perjanjian Kontrak yang formal dalam masa yang munasabah
And to execute the formal Contract Agreement within a reasonable time
selepasnya itu.
thereafter.

8. Yang bertandatangan di bawah ini dengan ini juga bersetuju bahawa Borang Tender ini
The undersigned hereby also agrees that this Form of Tender together
berserta Surat Setujuterima Tender ini (jika ada) hendaklah menjadi kontrak yang mengikat
with the Letter of Acceptance of Tender (if any) shall constitute a binding contract
antara kita walaupun Perjanjian Kontrak yang formal belum dilaksanakan.
between us notwithstanding that a formal Contract Agreement has not been executed.

9. Yang bertandatangan di bawah ini mengesahkan, selepas menyemak sendiri, bahawa dokumen-
The undersigned confirms, after a personal scrutiny, that the documents
dokumen dan pelan-pelan yang digunakan oleh yang bertandatangan di bawah ini untuk menyusun
and drawings used by the undersigned in compiling
Tender ini adalah salinan-salinan yang sebenarnya bagi dokumen-dokumen dan pelan-pelan yang
this Tender are true copies of the documents and drawings included
dimasukkan dalam Dokumen Meja Tender.
in the Tender Table Documents.

10. Yang bertandatangan di bawah ini bersetuju bahawa:
The undersigned agrees that:
(a) jika Tender ini ditarik balik sebelum tamatnya Tempoh Sah Tender atau apa-apa tempoh
if this Tender is withdrawn before the expiry of the Tender Validity Period or any
lanjutan, atau
extended period thereof, or

(b) jika yang bertandatangan di bawah ini mengenakan apa-apa had, syarat atau janjian
if the undersigned imposes any additional terms, condition or stipulation
tambahan kepada Tender ini selepas tarikh akhir yang ditetapkan bagi penyerahan tender,
to the Tender after the final date fixed for the submission of tenders,

atau
or

(c) jika sekiranya Tender telah disetujuterima, yang bertandatangan di bawah ini enggan dan *in the event that the Tender having been accepted, the undersigned refuses and* tidak melaksanakan Perjanjian Kontrak yang formal atau mendeposit Bon Perlaksanaan *fails to execute the formal Contract Agreement or to deposit the Performance Bond* sebagaimana dikehendaki oleh Syarat-Syarat Kontrak atau tidak meneruskan Kerja - Kerja *as required by the Conditions of Contract or fails to proceed with the Works;*

maka, dalam mana-mana hal itu, tanpa menyentuh apa-apa hak lain yang ada padanya,
then, in any of such event, without prejudice to any other rights it may posses, the

Syarikat Air Melaka Berhad sentiasa berhak mengambil tindakan tatatertib terhadap yang bertandatangan
Syarikat Air Melaka Berhad reserves the rights to take disciplinary action against the undersigned or to

di bawah ini atau membatalkan pendaftaran yang bertandatangan di bawah sebagai kontraktor
cancel the registration of the undersigned as a Syarikat Air Melaka Berhad contractor, as the

Syarikat Air Melaka Berhad sebagaimana difikirkan perlu oleh Syarikat Air Melaka Berhad.
Syarikat Air Melaka Berhad deems fit.

Bertarikh pada……..haribulan……., 20……
Dated this day of 20

……
Tandatangan Petender
Signature of Tenderer

Nama Penuh……..
Name in Full

Atas sifat……
In the capacity of

Yang diberi kuasa dengan sempurnanya
Untuk menandatangani Tender ini untuk
Dan bagi pihak:
duly authorised to sign this Tender for and
on behalf of:

…….
Menteri atau cap Petender
Tenderer's seal or chop

Saksi……
Witness

Nama Penuh……
Name in full

Pekerjaan…….
Occupation

Alamat…….
Address
……

BAHAGIAN D

SURAT AKUAN PEMBIDA

SURAT AKUAN PEMBIDA

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

(No. Rujukan Tender : SAMB / 24 / 2025)

Saya, ……..(Nama Wakil Syarikat) No. Kad Pengenalan.....yang mewakili ……..…. (Nama Syarikat) nombor Pendaftaran.....(MOF/PKK/CIDB/ROS/ROC/ROB) 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 .....(Nama Kementerian/Agensi} 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--

3.1 saya atau mana-mana orang yang berkaitan dengan syarikat boleh didakwa bagi kesalahan* di bawah Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Ata 694] dan Kanun Keseksaan [Akta 574] serta boleh dihukum di bawah undang-undang masing-masing atas kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara (i) dalam surat akuan ini; 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 bawan Seksyen 17A, Akta Suruhanjaya Pencegahan Rasuah Malaysia 2009 [Akta 6941, 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 :……
Cap 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 [Akta 574].

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

Pihak Syarikat :Penama pada sijil pendaftaran untuk menandatangani Surat ini.
Pihak Kerajaan :Pegawai yang diberi kuasa oleh Menteri di bawah seksyen 2 Akta Kontrak Kerajaan1949 untuk menandatangani kontrak

SURAT AKUAN PEMBIDA BERJAYA

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

(No. Rujukan Tender : SAMB / 24 / 2025)

Saya, …….....(Nama Wakil Syarikat) No. Kad Pengenalan……..... yang mewakil.....(Nama Syarikat) nombor Pendataran .....(MOF/PKK/CIDB/ROS/ROC/ROB) 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;
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 membuat pakatan harga dengan syarikat lain atau apa-apa pakatan sepanjang proses perolehan atau menawarkan, menjanjikan atau memberikan apa-apa suapan kepada mana-mana orang dalam .....(Nama Kementerian/Agensi) 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 Penarikan balik tawaran kontrak bagi perolehan di atas; atau
2.2 Penamatan kontrak bagi perolehan di atas; dan
2.3 Lain-lain tindakan undang-undang/tatatertib mengikut undang-undang/peraturan perolehan Kerajaan yang berkuatkuasa.

3. Saya sesungguhnya faham bahawa--

3.1 saya atau mana-mana orang yang berkaitan dengan syarikat boleh 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 masing-masing atas kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara (i) dalam surat akuan ini; atau

3.2 tindakan boleh dikenakan ke atas syarikat di bawah Akta Persaingan 2010 [Akta712) atas kegagalan saya atau mana-mana orang yang mewakili syarikat ini untuk mematuhi perkara ii). 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 :……
Cap 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 [Akta 574].

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.

BAHAGIAN E

SURAT SETUJUTERIMA TENDER (SAMB 100D)

SURAT SETUJUTERIMA TENDER
(KERJA)

NO KONTRAK : _____

Untuk kerja-kerja yang disebutkan di bawah ini dibuat pada haribulan _____2025 oleh pihak-pihak yang bertandatangan di bawah ini, merujuk kepada Surat Setujuterima Tender yang menjadi sebahagian daripada kontrak tersebut dan yang hendaklah dibaca dan diertikan sedemikian

_____	_____
Tandatangan Kontraktor	Tandatangan Pegawai
Nama Penuh: _____ (Huruf Besar)	Nama Penuh: _____ (Huruf Besar)
Atas Sifat:	Atas Sifat:
Yang diberi kuasa dengan sempurnanya untuk menandatangani untuk dan bagi pihak	Untuk dan bagi pihak Syarikat Air Melaka Berhad
Meterai atau Cap Kontraktor	
Saksi: _____	Saksi:_____
Nama Penuh: _____	Nama Penuh: _____
Pekerjaan: _____	Pekerjaan: _____
Alamat: _____	Alamat: _____
_____	_____
_____	_____

SYARIKAT AIR MELAKA BERHAD

SURAT SETUJUTERIMA TENDER
(KERJA)

Rujukan: **SAMB.** _____

Ketua Pegawai Eksekutif,
Syarikat Air Melaka Berhad,
Wisma Air, Tingkat Bawah, 1,5-9
Jalan Hang Tuah,
75300 Melaka.

Tarikh: _____

_____
_____
_____
_____

Tuan/Puan,

Tender untuk:

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

Dengan ini adalah diberitahu bahawa Tender tuan/puan bagi kerja-kerja tersebut di atas berharga Ringgit Malaysia: _____ _____ **(RM _____)** telah disetujuterima, tertakluk kepada had, syarat dan perjanjian dalam Dokumen Tender yang menjadi asas Tender ini dan juga kepada surat ini.

2. Tuan/Puan dikehendaki melaksanakan Perjanjian Kontrak yang formal dalam sedikit masa lagi. Bagaimanapun, sehinggalah Perjanjian Kontrak yang formal itu dilaksanakan, Tender tuan/puan berserta Surat Setujuterima Tender ini akan menjadi kontrak yang sah mengikat di antara tuan/puan dan Syarikat.

3. Tuan/Puan akan diberitahu bila Dokumen Kontrak siap sedia untuk ditandatangani. Bagaimanapun sebelum Dokumen Kontrak ditandatangani, harga dan kadar harga dalam Jadual Kadar Harga dan/atau Ringkasan Tender atau Senarai Kuantiti, mengikut mana yang berkenaan, hendaklah teliti dan diselaraskan oleh Pegawai Penguasa tentang kemunasabahannya tetapi Jumlah Harga Kontrak seperti tersebut di atas hendaklah tetap tidak berubah.

4. Tuan/Puan dikehendaki menyatakan pilihan kaedah Bon Perlaksanan sama ada:-

i) Jaminan Bank / Bank Islam /Bank Pembangunan & Infrastruktur Malaysia Berhad (BPIMB) atau
ii) Jaminan Syarikat Kewangan atau
iii) Jaminan Insurans/ Takaful

5. Tarikh milik tapak bina, seperti yang disebutkan dalam Syarat-syarat Kontrak, ialah pada _____. Walaubagaimanapun, tuan/puan hanya boleh memulakan kerja setelah tuan/puan menyerahkan kepada Pegawai Penguasa perkara-perkara berikut:-

a) Polisi Insurans Tanggungan Awam (iaitu insurans terhadap bencana kepada orang-orang dan kerosakan kepada harta) nilai insurans tidak kurang daripada **RM** _____

b) Polisi Insurans Kerja iaitu **RM** _____

c) Nombor-nombor pendaftaran di bawah Skim Keselamatan Sosial Pekerja (PERKESO) atau

d) Polisi Insuran Pampasan Pekerja berjumlah tidak kurang daripada **RM** _____

Walau bagaimanapun, bagi memulakan kerja-kerja dan bukan maksud lain, tuan boleh menyerahkan Nota-nota Liputan bagi maksud polisi-polisi insurans tersebut dan resit-resit premium yang telah dibayar itu kepada Pegawai Penguasa. Tuan dikehendaki menyerahkan Polisi-polisi Insurans yang berkenaan (jika belum diserahkan) menurut perenggan 5 di atas, dalam tempoh tidak lewat daripada tiga puluh (30) hari selepas Nota-nota Liputan diserahkan.

6. Tuan/Puan perlu memilih salah satu daripada kaedah di para 4 (i), 4 (ii) atau 4 (iii), tuan/puan hendaklah menyerahkan Bon Pelaksanaan bernilai **RM** _____

7. Kegagalan tuan memulakan kerja dalam tempoh dua (2) minggu dari tarikh milik tapak akan mengakibatkan pengambilan kerja tuan/puan di bawah kontrak ditamatkan sejajar dengan Fasal 51(b) (i) Syarat-syarat Kontrak.

8. Berdasarkan kepada Tempoh Siap Kerja yang ditenderkan selama _____ ~~hari/minggu/~~bulan*. Tarikh Siap untuk seluruh kerja-kerja di bawah kontrak ini ialah _____

9. Surat ini dihantar kepada tuan/puan dalam tiga (3) salinan. Sila kembalikan salinan asal dan satu (1) salinan, yang telah ditandatangai oleh tuan/puan dan disaksikan dengan sempurna, di ruang yang berkenaan, ke pejabat ini dalam tempoh tujuh (7) hari dari tarikh surat ini.

Sekian, terima kasih.

"MELAKAKU MAJU JAYA, RAKYAT BAHAGIA, MENGGAMIT DUNIA"
"BIJAK LAKSANA TUAH, BERANI LAKSANA JEBAT"
"MALAYSIA MADANI"
"INTERGRITI, PROFESIONALISME, IBADAH"

(DATUK MOHD SALEH BIN JUSMAN)
Ketua Pegawai Eksekutif
Syarikat Air Melaka Berhad

Dengan ini yang bertandatangan di bawah ini mengaku penerimaan surat di atas.

Tandatangan Kontraktor	Tandatangan Saksi
Nama Penuh:	Nama Penuh:
	Nama Jawatan:
Atas Sifat:	
Diberikan dengan sempurna untuk menandatangi untuk dan bagi pihak:	Alamat:
Meteri atau Cop Kontraktor	
Tarikh:_____	Tarikh:_____

BAHAGIAN F

BORANG JAMINAN BANK DAN LAIN-LAIN

LAMPIRAN B

BORANG JAMINAN BANK/JAMINAN SYARIKAT KEWANGAN/
JAMINAN INSURANS UNTUK BON PERLAKSANAAN
(KONTRAK KERJA)

Sebagai balasan kepada Kontrak No. _____ yang dibuat antara Syarikat Air Melaka Berhad, kemudian daripada ini dirujuk sebagai "Syarikat" dan _____, kemudian daripada ini dirujuk sebagai "Kontraktor", bagi _____
_____
_____
(nama projek), kemudian daripada ini dirujuk sebagai "Kontrak", kami yang bertandatangan di bawah, atas pemohonan Kontraktor, mengaku janji yang tak boleh batal unuk memberi Jaminan kepada Syarikat ke atas perlaksanaan yang sepatutnya Kontrak tersebut mengikut cara sebagaimana yang terdapat kemudian daripada ini.

MAKA Penjamin dengan ini bersetuju dengan Syarikat seperti berikut:

1. Apabila sahaja Syarikat membuat tuntutan bertulis, maka Penjamin hendaklah dengan serta merta membayar kepada Syarikat nilai yang ditentukan di dalam tuntutan tersebut tanpa mengira sama ada terdapat apa-apa bantahan atau tentangan daripada Kontraktor atau Penjamin atau mana-mana pihak Ketiga yang lain dan tanpa bukti atau bersyarat. Dengan syarat sentiasanya bahawa jumlah tuntutan yang dibuat tidak melebihi sebanyak Ringgit _____ _____ (nyatakan nilai Jaminan dalam perkataan) (RM_____) dan bahawa tanggungan Penjamin untuk membayar kepada Syarikat di bawah Perjanjian ini tidak melebihi nilai tersebut di atas.

2. Syarikat berhak untuk membuat apa-apa tuntutan separa jika dikehendakinya dan jumlah kesemua tuntutan separa itu hendaklah tidak melebihi nili Ringgit _____ _____ (nyatakan nilai Jaminan dalam perkataan) (RM _____) dan liabiliti Penjamin untuk membayar kepada Syarikat jumlah yang disebutkan terdahulu hendaklah dikurangkan dengan perkadaran yang bersamaan dengan apa-apa bayaran separa yang telah dibuat oeh Penjamin.

3. Penjamin tidak boleh dilepaskan dari Jaminan ini oleh sebarang perkiraan yang dibuat antara Kontraktor dan Syarikat sama ada dengan atau tanpa persetujuan Penjamin atau oleh sebarang perubahan tentang kewajipan yang diaku janji oleh Kontraktor atau oleh sebarang penangguhan sama ada dari segi perlaksanaan, masa, pembayaran atau sebaliknya.

4. Jaminan ini adalah Jaminan yang berterusan dan tak boleh batal dan berkuat kuasa sehingga _____ (kemudian daripada ini disebut "Tarikh Mati Asal") (*Initial Expiry Date)* iaitu dua belas (12) bulan selepas tarikh tamat tempoh kecacatan atau dalam keadaan di mana Kontrak dibatalkan, satu (1) tahun selepas tarikh Kontrak dibatalkan. Penjamin hendaklah melanjutkan Tarikh Mati Asal *(Initial Expiry Date)* jaminan ini untuk tempoh tambahan selama tidak melebihi satu (1) tahun daripada Tarikh Mati Asal *(Initial Expiry Date)* (kemudian daripada ini disebut "Tarikh Mati Lanjutan") *(Entended Expiry Date)* apabila diminta oleh Syarikat dan Jaminan ini adalah dengan ini dilanjutkan. Jumlah agregat maksimum yang Syarikat berhak di bawah Perjanjian ini mestilah sentiasa dipastikan tidak melebihi jumlah Ringgit _____
(nyatakan nilai Jaminan dalam perkataan) (RM _____).

5. Apa-apa tanggungjawab dan tanggungan Penjamin di bawah Perjanjian ini hendaklah luput apabila Perjanjian ini tamat pada Tarikh Mati Asal *(Initial Expiry Date)* atau Tarikh Mati Lanjutan *(Entended Expiry Date)* melainkan jika sebelumnya Syarikat telah meminta secara bertulis kepada Penjamin untuk membayar sejumlah wang tertentu yang masih belum dijelaskan mengikut peruntukan kontrak.

6. SEMUA TUNTUTAN BERKAITAN DENGAN JAMINAN INI, JIKA ADA, MESTILAH DITERIMA OLEH PIHAK BANK/SYARIKAT KEWANGAN /SYARIKAT INSURANS DALAM TEMPOH SAH LAKU JAMINAN INI ATAUPUN DALAM MASA EMPAT (4) MINGGU DARI TAMATNYA TARIKH JAMINAN INI, MENGIKUT MANA YANG LEBIH KEMUDIAN.

PADA MENYAKSIKAN HAL DI ATAS pihak-pihak kepada Perjanjian ini telah menurunkan tandatangan dan meteri mereka pada hari dan tahun yang mula-mula tertulis di atas.

Ditandatangani untuk)
Dan bagi pihak Penjamin)
di hadapan)
)
)

_____
Nama: _____
Jawatan:_____
Cop Bank/Syarikat
Kewangan/Syarikat Insurans:

_____
Saksi

Nama: _____
Jawatan:_____
Cop Bank/Syarikat Kewangan/Syarikat Insurans.

BAHAGIAN G

SPESIFIKASI

SECTION G-1: MATERIALS AND WORKMANSHIP

1.0 INTRODUCTION

This part of the Specification sets out the general standards of materials, workmanship and plant design to be supplied by the Contractor and mention of any specific material or plant does not necessarily imply that such is included in the Works.

All component parts of the Works unless otherwise specified or approved by the S.O. shall comply with the provisions of this Section.

The names of the manufacturers of materials and equipment proposed for incorporation in the Works together with performance, capacities, certified test reports and other significant information pertaining to the same, shall be furnished when requested for consideration by the S.O., who shall have power to reject any parts found to be defective or not in compliance with the Specification and such parts shall be made good or replaced by the Contractor at no cost to the Government.

1.1 MATERIALS

All materials incorporated in the Works shall be the most suitable for the duty concerned and shall be new and of first class commercial quality free from imperfections and selected for long life and minimum maintenance. They shall be specifically chosen as suitable for use in a hot and humid tropical climate.

All submerged moving parts of the Plant, or the pins and spindles, etc, of the submerged moving parts or the faces, etc, in contact with them shall be of non-corrodible metals. All parts in direct contact with chemicals shall be completely resistant to corrosion or abrasion by those chemicals, and shall also maintain their properties without ageing due to the passage of time, exposure to light or any other cause.

Where "stainless steel" is specified or used it shall have resistance to atmospheric corrosion not less than that provided by 18% Chrome-8% Nickel steel unless otherwise specified.

Particular attention shall be paid to the prevention of corrosion due to the close proximity of dissimilar metals.

When it is necessary to use dissimilar metals in contact, these shall be so selected that the potential difference between them in the electro-chemical series is not greater than 0.5 millivolt. If this is not possible, the contact surfaces of one or both of the metals shall be electroplated or otherwise finished in such a manner that the potential difference is reduced to within required limits or, alternatively, the two metals shall be insulated from each other by an approved method.

1.2 COMPLIANCE WITH STANDARD SPECIFICATION

Where reference is made in the Specification to a British Standard Specification (hereinafter abbreviated as "BS") issued by the British Standards Institution of 2, Park Street, London W.I. or to any other Standard it shall be the latest issue or revision of the Standard at the Tender Date unless otherwise specified. If the Tenderer offers plant to other standards, they shall be equal or superior to those specified and full details of the differences shall be provided.

All details, materials and equipment supplied and workmanship performed in regard to which specifications or standards have been issued by the British Standards Institution shall be supplied and performed in accordance with such specifications or standards unless otherwise specified or approved even though no standard may be mentioned in the Specification.

Where the relevant standard provides the furnishing of a certificate to the Government, at his request, stating that the materials comply in all respects with the standard, the Contractor shall obtain the certificate and forward it to the S.O.

All mechanical equipment shall be manufactured and tested in accordance with the existing regulations and requirements of the local government.

The electrical installation as a whole shall comply and be tested in accordance with the existing requirements of the local authority. The Contractor shall supply appropriate certificates to the Government.

1.3 WORKMANSHIP

Workmanship and general finish shall be of first class commercial quality and in accordance with best shop practice.

All similar items of Plant and their component parts shall be completely interchangeable. Spare parts shall be manufactured from the same materials as the originals and shall fit all similar items of Plant. Machining fits on renewable parts shall be accurate and to specified tolerances so that replacements made to manufacturer's drawings may be readily installed.

All equipment shall operate without excessive vibration and with a minimum of noise. All revolving parts shall be truly balanced both statically and dynamically so that when running at normal speeds and at any load up to the maximum there shall be no vibration due to lack of balance.

All parts which can be worn or damaged by dust shall be totally enclosed in dustproof housings.

All equipment shall be designed to prevent malfunction due to rust or corrosion, to minimise risk of fire and to be electrically and mechanically safe to operators.

1.4 QUALITY CONTROL

The Contractor shall establish his own inspection organisation directed to ensuring that the quality of the Works, including materials, workmanship and procedures required by the Specification and the Quality Assurance Plans described in the following paragraphs, is maintained in all aspects of the Works, both in respect of the work which he undertakes himself and that which is sublet to any other contractor.

Each sub-contractor, for his own part, shall also establish suitable quality control procedures acceptable to the S.O. with adequate staffing to ensure that the Works undertaken by him meet the Specification and Quality Assurance Plans, such procedures being in addition to those undertaken by the Contractor pursuant to his overall responsibility in this regard.

The Contractor shall establish to the satisfaction of the S.O., Quality Assurance Plans (QA Plans) for all major components of the equipment supplied under this Contract. The QA Plans shall: -

Provide a list of the Contractor's staff engaged in quality control, and a list of any outside testing agencies employed by the Contractor for work in connection with quality control.
Set out the individual tests, both destructive and non-destructive, inspections and verifications required to ensure that the materials and equipment being manufactured or supplied meet the requirements of the specification standards and good manufacturing practice, and are adequate for the design life and operating conditions in which the equipment will be used.

Make reference to the particular equipment items, the standards and drawings applicable, the stage of manufacture at which tests and results are required, responsibility for ensuring that the tests have been carried out, provision for relative notation as to test certificate numbers and details of symbols used.

Contain copies of the reference inspection and test procedures and standards where those items are not available as British or International standards.

The Contractor shall also be responsible for ensuring that suitable QA Plans are established for equipment that he sublets, and in this regard all QA Plans shall be established prior to commencement of manufacture and within four (4) weeks of acceptance of Tender. The QA Plans shall form part of the contractual requirements in that the provisions set out shall be complied with by the Contractor and his sub-contractors.

Unless the S.O. permits otherwise, the approved QA Plans shall be followed throughout the execution of the Works. Any approval by or on behalf of the S.O. of the Contractor's QA Plans shall not relieve the Contractor of his obligation to ensure that the Works comply with the requirements of the Contract.

1.5 TROPICALISATION OF ELECTRICAL COMPONENT

The following general requirements shall be observed: -

Unpainted steel parts	-	Passivated cadmium plated, galvanised or zinc plated as appropriate.
Screws, nuts, bolts	-	The use of steel shall be avoided where possible or when used shall be cadmium, zinc or chromium plated. All non-ferrous screws shall be electro-tinned, or shall have nickel or chromium plate finish. Springs where possible shall be of phosphor bronze or nickel silver.
Wood	-	All wood shall be seasoned primary hardwood.
Insulating materials	-	Non-impregnated paper, fabric, wood or presspahn shall not be used for insulating purposes. Where synthetic resin bonded insulating boards are used, all cut edges shall be sealed with an approved varnish.
Instruments, relays etc.	-	All instruments, relays, etc. shall be provided with tropical finish

Operating coils - Where practicable all fine wire operating coils and wire wound resistors shall be vacuum impregnated with an approved insulating varnish.

Current and voltage Transformer winding - Where practicable these shall be vacuum impregnated with an approved insulating varnish, epoxy resin encapsulating varnish, epoxy resin encapsulated or protected against the ingress of moisture in an approved manner.

1.6 CLEANING, PREPARING AND PAINTING AT PLACE OF MANUFACTURE

The Contractor shall be responsible for cleaning, preparation for painting, and priming or otherwise protecting as specified of all parts of the Plant at the place of manufacture prior to packing.

Parts may be cleaned but may not be stopped prior to testing at the manufacturer's works. Parts subject to hydraulic test shall be tested before any surface treatment. After test all surfaces shall be thoroughly cleaned and dried out if necessary by washing with an approved dewatering fluid prior to surface treatment.

Grit or sand blasting shall be carried out in accordance with BS 7079-0:1990 to a standard between "First Quality" and "Second Quality" given in Table 1 after which the maximum amplitude of the surface shall not exceed 0.1 mm.

Except where the Specification provides to the contrary all painting materials shall be applied in strict accordance with the paint manufacturer's instructions.

Preparation shall take place as follows: -

1.6.1 Bright parts
Bright parts and bearing surfaces shall be thoroughly polished and protected from corrosion by the application of an approved rust preventive lacquer or high melting-point grease, as approved by the S.O., before the parts are packed. A sufficient quantity of the correct solvent for removal of the protective compound shall be supplied and packed with each particular part.

1.6.2 Embedded parts
Embedded parts or those parts of an assembly which will be embedded in concrete shall be thoroughly de-scaled and cleaned to the satisfaction of the S.O. and before being packed shall be protected by a cement wash or other approved method.

1.6.3 Exposed parts
All metal components which will be exposed to the atmosphere after installation, shall be de-scaled and painted with 2 coats of two pack epoxy based red lead primer before packing so that they are ready for finish painting on Site.

1.6.4 Pipes
All steel pipework that is to be buried in ground shall be prepared by cleaning, primed and coated outside with bitumen enamel generally in accordance with BS EN 10224:2002 and BS 4147. The coating shall conform with Clause 29 of BS

EN10224:2002 except that the minimum thickness shall be 6 mm. The primer shall conform with Clause 2.2 of BS 4147. The bitumen enamel shall be type 2 grade C of BS 4147. Cleaning shall be by an approved pickling process, using a suitable inhibitor unless otherwise specified. They shall then be thoroughly washed with hot water and lime before final washing. Alternatively, all surfaces shall be de-scaled by grit or sand blasting to first or second quality standard to BS 7079-0:1990.

The wrapping shall be omitted for a sufficient length to allow for the placing of Johnson couplings or the making and testing of welded joints. Before despatch from the place of manufacture, the Contractor shall test the wrapping of all pipes and specials for continuity with a Holiday detector, and shall make good any discontinuities and pinholes.

The Contractor shall supply a sufficient quantity of approved material (a) to repair damage occurring during delivery to the Site and (b) to complete the wrapping at the joints after laying, together with an approved priming compound in each case to ensure satisfactory adhesion of the covering material. The costs of these materials shall be included in the cost for the supply of the pipes and specials.

All wrapped pipes and specials shall be given a coating of lime wash before despatch from the works. Where a pipe or special is to be embedded in concrete the bitumen primer, enamel and wrapping shall be omitted and two coats of red lead primer applied.

All steel pipework for pump column main and were directed by the S.O. shall be grit or sand blasted and coal tar epoxy lined.

Before lining a priming coat of approved primer shall be supplied within four hours of blasting. The priming shall be applied in accordance with the manufacturer's instructions to give a dry film thickness of approximately 0.013 mm.

Three coats of approved non-toxic coal tar epoxy shall be applied by an airless spray to the priming in accordance with the manufacturer's instructions in coats of equal thickness to give a total dry film thickness of 0.4 mm. An interval of 16 - 24 hours shall be allowed between the application of each coat. The priming and coating shall be taken up to the end of the pipe or special, the coal tar epoxy coating shall be stopped 230 mm short of the weld location. Collars shall be internally primed but not coated.

1.6.5 Tanks

All tank interiors and those of similar containers shall be thoroughly cleaned by grit blasting or wire brushing. In the case of those intended for insulating or lubricating and governor oil, they shall be painted with a suitable oil resisting varnish or enamel; those intended for water shall be treated internally with a coat of an approved lining, eg. epoxy paint.

1.6.6 Cubicles, cabinets, etc.

The inside surfaces of all metal cubicles, cabinets, etc, where condensation is likely to occur shall be suitably treated with anti-corrosive paint or other composition in addition to the installation of anti-condensation heaters. The outside surfaces shall be of a baked-on enamel finish to a colour approved by the S.O.

1.6.7 Parts immersed in water and exposed parts outside buildings

All ungalvanised mild steel parts which will be immersed in water or be exposed to outside atmosphere or exposed in manholes shall be cleaned by grit blasting at the place of manufacture and immediately given two coats of approved two pack epoxy based primer compatible with the type of enamel to be used in the painting at the Site prior to despatch.

1.7 ERECTION MARKS

Before dismantling for packing, all shop assemblies shall be clearly described with reference lines and match marked to facilitate correct reassembly.

All members comprising multi-part assemblies shall be marked with distinguishing numbers and/or letters corresponding to those on the drawings or material list provided. Erection marks impressed before painting or galvanising shall be clearly readable thereafter.

1.8 WORKING STRESSES

Except as otherwise specified under the provisions of Standards or of the Specification the limitation of working stresses shown in the following table shall apply under maximum operating conditions.

Material	Tension	Compression	Shear
Grey Cast Iron	One-tenth of Ultimate Strength	70 MPa	21 MPa
Carbon Cast Steel	83 Mpa	83 MPa	50 MPa
Alloy Cast Steel	One-fifth of Ultimate Strength or one-third of Yield Strength (whichever is the lesser)	One-fifth of Ultimate Strength or one-third of Yield Strength (whichever is the lesser)	60 percent of allowable tensile stress
Plate Steel	One-quarter of Ultimate Strength but not to exceed 103 MPa	One-quarter of Ultimate Strength but not to exceed 103 MPa	60 percent of allowable tensile stress

For other materials used the working stresses in tension or compression due to the most severe conditions shall be one-third (1/3) of the yield strength or one-fifth (1/5) of the ultimate strength of the material whichever is the lesser. Upon request by the S.O. complete information regarding maximum unit stresses used in the design shall be provided by the Contractor.

1.9 STEEL TO BE WELDED

All cast steel parts to be welded shall be manufactured in steel produced by the open hearth or electric processes, acid or basic processes, with an ultimate strength in the range 430/510 MPa and a carbon content not higher than 0.25 percent. It shall show on analysis a phosphorous content of not more than 0.05 percent. The steel used shall not require preheating for efficient welding and shall have high resistance to "Notch Brittleness".

1.10 WELDING

Metal arc welding shall comply with BS EN 1011-2:2002. In all cases where welds are liable to be highly stressed the Contractor shall supply to the S.O. before fabrication commences detailed drawings of all welds and weld preparations proposed. No welding shall be carried out before the S.O. has signified his approval of the details proposed. No alteration shall be made to any previously approved detail of weld preparation without the prior approval of the S.O.

Welders shall be qualified in accordance with the requirements of the appropriate section of BS 4872 Part 1.

Radiographic examination which may be required of highly stressed fusion welds shall comply with the provisions of BS EN 1435:1997 except as otherwise ordered or specified by the S.O.

Mechanical and other non-radiographic test, if required, shall be carried out in the presence of the S.O.

1.11 GALVANISED METALS

All metals to be galvanised shall be of the full dimensions shown or specified and all punching, cutting, drilling, screw tapping and the removal of burrs shall be completed before the galvanising process commences.

All galvanising shall be done by the hot dip process with spilter, not less than 98 percent of which shall be pure zinc. No alternative process may be used without the approval of the S.O. No components shall be galvanised which are likely to come into subsequent contact with oil. Bolts and nuts shall be completely galvanised including the threads.

The galvanising shall be uniform, clean, smooth and as free from spangle as possible. In the case of component parts the galvanising shall weigh not less than 610 grams per square metre of area covered, and be not less than 86 microns in thickness.

All galvanised parts shall be protected from injury due to electrolytic action, white rust and abrasion during the periods of transit, storage and erection. Damaged areas of the coating shall be touched up with approved zinc-chromate paint or other approved metallic compound.

1.12 CASTINGS

All cast iron shall be of standard grey close-grained quality to BS EN 1561:1997 Grade 14 or better. The structure of the castings shall be homogenous and free from excessive non-metallic inclusions and other injurious defects. All surfaces of castings which are not machined shall be smooth and shall be carefully fettled to remove all foundry irregularities.

Castings subject to hydraulic pressure shall be pressure tested to 2 times the maximum working pressure unless otherwise specified and certified copies of test reports shall be forwarded to the S.O. as soon as each test has been completed.

Minor defects not exceeding 25% of the total metal thickness and which will not ultimately affect the strength and serviceability of the castings may be repaired by approved welding techniques. The S.O. shall be notified of larger defects and no repair welding of such defects shall be carried out without prior approval.

If the removal of metal for repair should reduce the stress resisting cross-section of the casting by more than 25% or to such an extent that the computed stress in the remaining metal exceeds the allowable stress by more than 50%, then that casting may be rejected.

Castings required by welding for major defects shall be stress-relieved after such welding.

Non-destructive tests shall be required for any casting containing defects whose extent cannot otherwise be judged, or to determine that repair welds have been properly made.

1.13 NUTS, BOLTS, STUDS AND WASHERS

Nuts, bolts, studs and washers for incorporation in the Plant shall conform to the requirements of the appropriate British or other approved standard. Nuts and bolts for pressure parts shall be of the best quality bright steel, machined on the shank and under the head and nut. Bolts shall be of sufficient length that two threads shall show through the nut when in the fully tightened condition. Nuts, bolts, studs and washers for use with aluminium structures shall be in steel to BS 970 grade EN 58 B all threads being lubricated with graphite grease to prevent fretting.

Fitted bolts shall be a light driving fit in the reamed holes they occupy, shall have the screwed portion of a diameter such that it will not be damaged in driving and shall be marked in a conspicuous position to ensure correct assembly at Site.

Washers shall be provided for all nut and bolt assemblies. Locking devices and anti-vibration arrangements shall be provided where necessary and shall be subject to the approval of the S.O. Where bolts pass through structural members taper washers shall be fitted where necessary to ensure that no bending stress is caused in the bolt.

Where there is a risk of corrosion, bolts and studs shall be designed so that the maximum stress in the bolt and nut does not exceed half the yield stress of the material under all conditions.

All bolts, nuts and screws which are subject to frequent adjustment or removal in the course of maintenance and repair, and which are subject to submergence of water shall be made of nickel-bearing stainless steel.

The Contractor shall supply all holding down, alignment and levelling bolts complete with anchorages, nuts, washers and packings required to attach the Plant to its foundations, and all bedplates, frames and other structural parts necessary to spread the loads transmitted by the Plant to concrete foundations without exceeding the design stresses.

1.14 INSTRUMENT SCREWS, NUTS, SPRING AND PIVOTS

The use of iron and steel screws shall be avoided in instruments and electrical relays wherever possible.

Steel screws, when used, shall be zinc, cadmium or chromium plated or, where plating is not possible due to tolerance limitations, of stainless steel. All wood screws shall be of dull nickel plated brass or of other approved finish. Instrument screws (except those forming part of a magnetic circuit) shall be of brass or bronze. Springs shall be of non-rusting materials e.g. phosphor-bronze or nickel-silver, as far as possible. Pivots and other parts for which non-ferrous material is unsuitable shall be of an approved stainless steel.

Iron and steel shall in general be painted or galvanised as appropriate in accordance with the Specification. Indoor parts may alternatively have chromium or copper-nickel plated or other approved protective finish.

Small iron and steel parts (other than stainless steel) of all instruments and electrical equipment, the poles of electromagnets and the metal parts of relays and mechanisms shall be chromium or copper-nickel plated or have some other approved finish to prevent rust. Cores and the like which are built up of laminations or cannot for any other reason be anti-rust treated, shall have all exposed parts thoroughly cleaned and heavily enamelled, lacquered or compounded.

1.15 RATING PLATES, NAMEPLATES AND LABELS

Each main and auxiliary item of Plant shall have permanently attached to it in a conspicuous position a nameplate and rating plate, each of weather-resistant material. Upon these shall be engraved or stamped the manufacturer's name, type and serial number of Plant, details of the loading and duty at which the item of Plant has been designed to operate, and such diagrams as may be required by the S.O. All indicating and operating devices shall have securely attached to them or marked upon them designations as to their function and proper manner of use.

Details of proposed inscriptions shall be submitted to the S.O. for approval before any labels are manufactured.

Such name plates, rating plates and designations shall be of non-hygroscopic material to be approved by the S.O. with engraved or stamped lettering of a contrasting colour, or of transparent plastic material with suitably coloured lettering engraved on the back. Items such as valves shall have direction of rotation for closing and opening indicated.

Only non-flame propagating material may be used for such plates and labels.

1.16 PIPEWORK

Pipework for conveying treated water shall be steel pipes and other pipes, if used, such as uPVC polythene, copper, ductile iron and fibreglass reinforced plastic shall comply to the following British Standard unless the Contractor shall have proposed alternative standards at the time of tendering:-

BS 1211	:	Cast iron piping
BS EN 10224:2002 and 3601	:	Steel pipes
BS 3506	:	Unplasticised pvc pipes
BS EN 545:2002	:	Ductile iron pipes
BS 6572:1985/ BS 6730:1986	:	Polythene pipe (type 425)
BS 1306	:	Copper tubes for high pressures
BS EN 1057:1996	:	Copper tubes for low pressures
BS 5391	:	Acrylonitrile - butadiene -styrene (ABS) pressure

pipe

BS EN 969:1996 or ISO2531	:	Ductile Iron
BS EN 588-1:1997	:	Asbestos Cement Pipe
BS 5480:1990	:	Glass Reinforced Plastic (GRP) pipes

Flanged joints shall be to BS EN 1092-1-2002 unless otherwise specified or shown on the Drawings. Flexible joints shall be bolted joints or flexible couplings, as necessary.

In the case of flanged steel pipework, flanges shall be in the form of a collar fitting over the end of the pipe welded in position both internally and externally.

Steel pipework shall be coated externally where laid underground and shall be painted externally when laid above ground or in ducts. In both cases they shall be lined internally with concrete. Cast iron pipework shall be painted externally when laid above ground or in ducts and concrete lined internally. The hydraulic test pressure of the steel and cast iron pipework applied at the manufacturer's works shall be twice the maximum working pressure unless otherwise specified.

The Contractor shall note the necessity for providing flexibility in the pipework at joints in the main structure to allow for differential settlement. Flexible joints or collars and cut pipes shall also be allowed on all pipework where necessary to allow for some margin of error in the building work. Flexible joints shall be provided with tie bolts or other means to transfer longitudinal thrusts along the pipework as a whole, so that external anchorages at blank ends, bends, tees and valves may be kept to a minimum. The Contractor shall indicate on his drawings what thrust blocks are required to anchor pipework.

Pipework conveying high pressure water, oil or air for valve operation or instrumentation shall be smooth bore and shall be arranged so that disassembly can be readily effected. Joints shall be located so that no leak can contaminate the water flowing through the Works. Pipe materials shall be at the discretion of the Contractor who shall state the type and class at the time of tendering unless otherwise specified.

Where welded, flanged or flexible joints will be subsequently buried in ground they shall be protected by running hot bitumen into an aluminium mould placed over the joints and overlapping the external sheathing by 76 mm on either side of the joint.

Pipework containing chemical solution and suspensions shall be selected according to the characteristics of the chemicals being handled. Where high pressures or dangerous concentrations of solutions are handled, jointing shall be kept to the minimum and the in-situ test pressure and duration shall be selected bearing the hazards in mind. The highest standard of material selection and workmanship is an inherent requirement both in piping and in jointing. The use of clear perspex for appropriate applications will be considered. Care shall be taken to ensure adequate support is provided for flexible pipework to avoid sagging.

Pipework containing gases shall comply with the requirements of the previous paragraph. In addition, metal piping in the form of coils shall be heat treated to remove manufacturing stresses.

Pipelines shall be identified in accordance with BS 1710 and/or to a code to be provided by the S.O.

1.17 VALVES

Unless otherwise specified all valve bodies shall be manufactured from close grained cast iron or spheroidal graphite iron as specified and all valves shall be hydraulically tested, open ended; the valve seat shall be tested to the valve rating pressure, at which pressure they shall be drop tight. The valve body shall be tested to 1.5 times the working pressure at which pressure there shall be no leak through the body or gland packing nor shall the body suffer any structural defects. These tests shall be carried out satisfactorily at the manufacturer's works before delivery. Packed glands shall be arranged for easy replacement of the packing, which shall be accessible without removal of the valve from the pipe in which it is fitted.

Precautions shall be taken to prevent corrosion of the valve spindles in contact with the gland packing.

Where valves are to be power operated or remotely or automatically operated by electric power or some other approved means it shall also be possible to open or close the valves using manual means such as handwheel. Unless otherwise specified all valves which are intended for only occasional use may be supplied for manual operation by means of a handwheel or other suitable device which shall be fixed to the valve, but not by means of a tee key and bar. The operating gear of all valves shall be capable of opening or closing the valve against an unbalanced head equal to the maximum working pressure. Handwheels shall be rotated clockwise to close the valves and shall be clearly marked with the words "OPEN" AND "CLOSE" and arrows in the appropriate directions. The rims of handwheels shall be machined to a smooth finish and painted.

Valves 100 mm nominal bore and over shall be fitted with position indicators showing the amount which the valve is open or closed in relation to its full travel.

All similar valves shall be interchangeable as a whole and as regards their components parts.

Valves on chemical delivery lines shall be of the diaphragm type in which the operating spindle and other gear is isolated from the chemical, unless the approval of the S.O. has first been obtained to supply the other types. All parts of the valve in contact with the chemical shall be resistant to corrosion by the chemical or alternatively in the case of the valve bodies shall have resistant linings bonded to them. Valves handling slurries or sludge shall be of the straight through type.

Each valve, or its operating equipment, shall bear an approved nameplate stating its function. All operating spindles, gears and headstocks shall be provided with adequate points for lubrication.

Tapered plug valves shall be of the polyurethane coated types which do not require lubrication and are resistant to corrosion.

All tapered plug valves shall be fitted with packed glands on the operation spindle.

1.18 SUPPORTS OF PIPEWORK AND VALVES

The whole of the pipework and valves included in this Contract shall be supported, mounted and strapped in an approved manner. All necessary slings, saddles, structural steelwork, foundation bolts, fixing bolts, where necessary, and all other attachments shall be supplied. The main building structure for supporting the pipes, valves, etc is indicated as far as possible on the Drawings. Any necessary additional or independent structural work shall be provided whether forming an integral part of supports or not.

All brackets or other forms of hose support, which can conveniently be so designed, shall be rigidly built up of steel sections by rivetting or welding in preference to the use of castings.

No point of passage of pipes through floors or walls shall be used as a point of support, except with the approval of the S.O..

All heavy valves and other such items where necessary shall be supported independently of the pipes to which they connect.

1.19 FLOOR COLLARS AND WALL BOXES

At all points where pipes pass through concrete floors and walls or brickwalls or other walls and are not to be built in, suitable floor collars or wall boxes shall be provided by the Contractor.

The floor collars shall have raised kerbs of suitable height, which shall not be less than 75 mm. The wall boxes shall be flush fitting and of neat design and approved finish.

The Contract also includes the provision of all fittings for the passage of pipes through external walls together with the supply of all components for the boxing-in of the holes against inclement weather.

After the collars and boxes or other fittings have been fixed in position, the floor, walls and roof structures shall be made good by the Contractor.

Where service pipes run adjacent to each other, they shall, wherever possible, pass through a common box. Where pipes of varying bore pass through a common box, a neat plate cover shall be provided and fixed.

In the case of flanged pipework, boxes shall be large enough to permit the passage of the flange.

Where pipes or conduits are to be built into concrete which may be subject to differential water pressure, puddle flanges shall be fitted of such size and number to seal the leakage path and shall be capable of carrying all operation longitudinal forces falling on the pipe or conduit without reliance on adhesion of the pipe surface and without exceeding the bearing pressures normally allowed on concrete.

Where pipes pass through chequer plate floors suitable floor collars of an approved type shall be provided and fixed by the Contractor.

1.20 PAINTING ON SITE

Immediately on arrival at the Site all items of Plant shall be examined by the Contractor for damage to the priming coat or finished coat applied at the manufacturer's works, and any damaged portions shall be cleaned down to the bare metal, all rust being removed, and made good with similar paint. After erection and building in all items of Plant not finish painted at the manufacturer's works shall be cleaned down, filled, and painted as follows to the standard known as "Waterworks Finish":

(a) Cast iron pipework which will be laid in the ground shall be given two coats of approved two pack epoxy based paint on the external surfaces. The internal surfaces of all cast iron pipework shall be painted with two coats of approved non-toxic bituminous enamel.

(b) Cast iron or steel pipework and steelwork which will be submerged below water or which will be exposed to outside atmosphere or in manholes shall be given two coats of approved two pack epoxy based enamel. Where in contact with water the epoxy enamel shall be taint free, non-toxic and chlorine resistant.

(c) Cast iron or steel pipework which are within the building shall be given two coats of approved metallic sealer followed by an undercoat and two coats of approved gloss finish.

(d) Steelwork within the building which have been supplied with two pack epoxy based red lead primer shall be given a further priming coat in-situ followed by an undercoat and two coats of approved gloss finish.

(e) Galvanised surfaces within building shall be washed with I.C.I. lithoform or other approved material and shall be primed with an approved chromate primer followed by one undercoat and two coats of approved gloss finish or two coats of two pack epoxy based paint as directed.

Before painting is commenced the Contractor shall submit for the S.O.'s approval full details of the paints he proposes to use together with colour charts for the gloss finish. The colours for the various pipe runs and items of plant will be decided by the S.O.

Surfaces shall be rubbed down and filled where necessary between coats and no paint shall be applied to dirty, greasy, dusty or damp surfaces. Paints shall be applied in accordance with manufacturer's instructions.

The first in-situ coat shall in all cases be applied immediately the items of plant have been erected and built in. The cost of this coat and the initial priming coat at the manufacturer's works shall be included in the cost of the supply and erection of the Plant.

The painting of all plant shall be completed not later than one month after the Plant has been taken over.

Immediately prior to the end of the Period of Maintenance all damaged paint work shall be touched up, except where the damage is due to fair wear and tear, and the cost of this shall be included in the cost of painting.

1.21 DESIGN LIFE

All materials and equipment shall be designed for long life with a minimum of maintenance and the Contractor may be called upon to demonstrate this for any component either by the service record of similar equipment elsewhere or by records of extensive type tests.

Routine maintenance and repair shall not as far as possible require the services of highly skilled personnel.

Except for consumable items such as gland packings, electric carbon brushes, and the like which normally require replacement more frequently, no part shall have a life from new to replacement or repair of less than five years of continuous normal operation and where major dismantling is required to replace a part, such life shall be not less than ten years.

The following parts shall have lives as described above of not less than the number of years stated:-

Pumps	Years
Impeller	Ten
Neck rings and bushes	Ten
Gland sleeves	
-if replaceable without dismantling pump	Three
-otherwise	Ten
Other Parts	
Sleeve bearings	Ten
Ball and roller bearings	Five
Control valve discs and seats	Five
Other valve discs and seats	Ten
Spindles, axles and shafts	Twenty
Open gearing, chains, sprockets, etc	Ten
Gearing in boxes	Twenty
Wearing parts of screens, strainers, etc.	Ten
Reciprocating parts of motors, compressors, etc.	Ten
Gland packing except initial packing	One

Electrical contactors and switches shall have a minimum life under normal full load working conditions of two million operations without replacement of any part and two hundred thousand operations without maintenance of any kind.

Electrical relays and light current switching devices shall not require maintenance of any kind before completing two million operations under normal full working load.

1.22 LUBRICATION

A complete schedule of recommended oils and other lubricants shall be furnished by the Contractor. The number of different types of lubricants shall be kept to a minimum. The schedule and the name of the supplier of the lubricants shall be submitted to the S.O. for approval before incorporation in the Instruction Manuals. In the case of grease lubricated roller type bearings for electric motors a lithium base grease is preferred.

Where lubrication is effected by means of grease, preference shall be given to a pressure system which does not require frequent adjustment or recharging. "Frequent", for this purpose, means more than once weekly and grease systems having shorter periods between greasings shall be avoided. Where necessary for accessibility grease nipples shall be placed at the end of the extension piping, and when a number of such points can be grouped conveniently, the nipples shall be brought to a battery plate mounted in a convenient position. 'Hydraulic' button head type nipples, in accordance with BS 1486, shall be used for normal grease and all grease nipples shall be of the same size and type for every part of the Plant. Arrangements shall be provided to prevent bearings being overfilled with either grease or oil.

Where more than one special grease is required, a grease gun for each special type shall be supplied and permanently labelled. Location of grease points shall be convenient for maintenance.

Oil containers shall be supplied complete with oil level indicators of the sight glass type, or where this is not practicable, with dipsticks. The indicators shall show the level at all temperatures likely to be experienced in service. The normal, maximum and minimum levels at 20o shall be clearly visible in the sight glass type from the normal access floor to the particular item of plant, and they shall be easily dismantled for cleaning.

All sight glasses shall be firmly held and enclosed in metal protection in such manner that they cannot be accidentally dislodged.

All lubrication systems shall be designed so as not to present a fire hazard and particular care shall be taken to prevent leakage of lubricants and to avoid leaking lubricants coming into contact with any electrical equipment, heated surfaces or any other potential source of fire.

The Contractor shall supply flushing oil for each lubrication system when an item of plant is ready for preliminary running and recommend the type of lubricants for the commercial operation of the Plant.

1.23 NOISE AND VIBRATION

All equipment shall be designed to minimise noise and vibration without the use of acoustic enclosures or special vibration isolators. The Contractor shall give careful consideration to the selection of quiet running electric motors and gearboxes.

The limits of vibration severity measured at the gearbox - motor coupling of each equipment shall not exceed 1.5 mm/s in the frequency range 10-1000 Hz in any plane. In particular, the peak to peak vibration amplitude shall not exceed 0.01 mm at a vibration frequency equal to the rated speed of rotation. Vibration severity shall be the maximum Root Mean Square (R.M.S.) vibration velocity as defined and determined in accordance with BS 4675-2: 1978 and BS 7854-1 : 1996 .

The overall A-weighted sound pressure level of each plant, comprising the electric motor, gearboxes and driven equipment, shall not exceed 85 dB(A) at 1 meter away from the plant, under any operating condition from no load to full rated load, unless otherwise specified.

1.24 MACHINE GUARDS

For the purposes of this Specification, a machine guard is defined as a cover which is fitted over or adjacent to a moving part of the equipment (for example, a shaft coupling, a gear or belt drive, a counterweight or moving linkages) and shall comprise a casing (with or without a frame) and

the necessary mounting fasteners.

Machine guards shall conform to PD 5304:2000 and all other statutory requirements. Guards shall: -

- be made of sheet metal or chain mesh;
- be supported so as to minimise its vibration;
- be capable of ready removal and replacement;
- not restrict access to bearings or other items requiring inspection or maintenance;

For guards located in areas of limited access, be of sectional construction and so arranged that access for maintenance can be obtained by manual removal of a number of section;

- be provided with removable cover plates, where relevant, to provide access to overload protective devices specified so as to allow replacement or resetting of these devices without the use of tools;
- be fitted with a hinged inspection door, secured with wing nuts or dog cleats in the case where the guard covers a belt or chain to enable in-service inspection of the drive without removing the guard;
- be capable of withstanding a pressure of 75 kPa from any direction without permanent distortion.

Guards for personnel protection shall be provided for:-

- all exposed couplings, gears and belt or chain drives;
- moving counterweights and levers;
- as set out in PD 5304:2000 and statutory regulations;
- other moving parts as required by the S.O.

1.25 GEARING AND GEARBOXES

All gearing shall conform to American Gear Manufacturers' Association (AGMA) Standards, or relevant British Standards. All gearing shall be totally enclosed unless otherwise approved. Gearboxes shall be designed and constructed: -

- of cast steel or fabricated mild steel except that cast iron may be used for worm gear housings and for small (in the order of 2 kW) low speed approved applications;

- with all joints sealed against ingress of water and dust and egress of lubricant;
- so that gearing components are readily accessible for inspection and maintenance.

Gearboxes shall have:-

- running and stationary oil levels indicated by clearly marked sight glasses or dipsticks;
- drain connections fitted with easily accessible drain cocks and plugs;
- an inspection opening with bolted cover, oil filling connection and breather and, if necessary, filling and drain connections shall be extended to avoid spillage;
- lugs or eyes for slinging purposes, where necessary.
- After alignment of the drive is complete, each gearbox shall be fitted in position on its base plate by means of dowels or shear strips.

1.26 PROTECTION AND PACKING FOR TRANSPORTATION

The Contractor shall provide all materials and packing cases necessary for the safe handling and delivery of items.

Before an item is despatched from manufacturer's works it shall be properly prepared and packed and the Contractor shall give the S.O. at least fourteen (14) days notice that these preparations are to begin.

Prior to despatch items shall be adequately protected by painting or other approved means for the whole period of transit, storage and installation against corrosion and incidental damage, including the effects of vermin, sunlight, rain, high temperatures and humidity. The Contractor shall be held responsible for items being packed and/or protected to ensure that they reach the Site intact and undamaged. Packing shall be designed and constructed to withstand rough handling in transit and packages shall be suitable for storage.

The flanges of pipes, valves and fittings shall be protected by wooden disc attached by means of service bolts or by other approved means. Service bolts shall not be incorporated in the Works.

All items shall be clearly marked for identification against the packing list.

Every crate or package shall contain a packing list in a waterproof envelope. Three copies of the packing list shall be provided to the S.O. when the package is despatched.

Crates, packages and the like shall be clearly marked with a waterproof material to show the weight, where the slings should be attached, and shall also have an indelible identification mark relating them to the packing list.

1.27 DELIVERY AND STORAGE

All items shall be checked against packing lists immediately on delivery to the Site and shall be inspected for damage and checked for shortages. Damages and shortages shall be remedied with the minimum of delay.

The Contractor may, with prior approval of the S.O.'s representative and at no extra cost to the Government, make arrangements for any other Contractor at the Site or any other agent to take delivery of, unload and store the Plant on the Site on behalf of the Contractor.

The Contractor shall remain responsible to the Government for the case and insurance of the Plant during delivery and storage, and the provisions of this clause shall not relieve the Contractor of any of his liabilities under the Contract.

Stored items shall be laid out to facilitate their retrieval for use in the programmed order.

Stacked items shall be suitably protected from damage by spacers or load distributing supports and shall be safely arranged. No metalwork shall be stored directly on the ground.

1.28 MATERIAL SAMPLES

\Where the Contractor requires the submission of samples, they shall be submitted by and at the expense of the Contractor not less than thirty calendar days prior to the time that the materials represented by such samples are needed for incorporation into any work. Samples shall be subjected to approval by the S.O., and material represented by such samples shall not be manufactured, delivered to the Site or incorporated into any work without such approval.

Separate payment will not be made for complying with the requirements of this clause and all costs shall be deemed to be included in the amounts contained in the Bill of Quantities. All material samples submitted by the Contractor will be retained by the S.O.

1.29 TOOLS AND TEST EQUIPMENT

The Contractor shall supply such special tools and test equipment as the S.O. shall direct to enable any erection, dismantling, reassembly or testing to be carried out on any part of the Works, whether of an electrical, mechanical or other nature during the life of the Works. Payment shall be at the rates entered in the Schedules.

The tools and test equipment shall not be used for the erection of the Plant and except that the S.O. may call upon the Contractor to demonstrate their use or effectiveness, they must be handed over to the Government in a completely new and unused condition. Should the Contractor require any such tools and test equipment at the Site during erection, he shall provide his own.

The tools for each different type of equipment shall be contained in suitable boxes made of teak and clearly marked or labelled with their description. Each tool shall be identified and a list of tools stamped on a stainless steel plate shall be affixed to the inside of the box lid. The cost of boxing, etc., shall be deemed to be included in the rates entered for the tools. Each set of tools shall be supplied with the equipment with which it is associated.

The test equipment shall include only special purpose item essential to the testing or repair of the Works.

SECTION G-2 : MECHANICAL WORKS

1.0 GENERAL INFORMATION

This Section of the Specification provides details of mechanical equipment to be supplied under this Contract. Other aspects such as corrosion protection, motors and drives, installation, materials and workmanship are covered elsewhere in this Specification.

The Specification and Drawings provide for all parts of the works to be completed in every respect for operation to the agreed program and to the requirement and satisfaction of the S.O.

Notwithstanding that any details, accessories etc., required for the complete installation and satisfaction operation of the Plant are not specifically mentioned in the Specification nor indicated on the Drawings, such details are to be considered as being included in the Contract Price.

1.1 SCOPE

The works comprise but not limiting to the design, supply, modification, rehabilitation, installation, testing and commissioning of the following mechanical equipment: -

- Dismantling of equipment necessary for the replacement works and installation of new system
- Replacement of pulsator clarifier existing inclined plate;
- Replacement of pulsator clarifier vacuum system;
- Replacement of pulsator clarifier drain valve;
- Refurbishment of Aquazur filter underdrain system;
- Modification of Aquazur filter air scour pipework and control valve;
- Replacement of Aquazur filter loss of head instrument;
- Replacement of Aquazur filter level instrument;
- Replacement of Aquazur filter local control panel (LCP);
- Replacement of Candy filter local control panel (LCP);
- Refurbishment of Lamella filter underdrain system;
- Replacement of Lamella filter loss of head instrument;
- Replacement of Lamella filter level instrument;
- Replacement of Lamella filter local control panel (LCP);
- New Lamella filter air scour system (mechanical and electrical works);
- Other related equipment and associated works

1.2 STANDARDS

Standards applicable to mechanical equipment and works under this Contract shall be in accordance with the latest International Standards, Malaysia Standard (MS) and/ or British Standard (BS) issued at the date of submission of Tender. The other codes of Practice referred to in the Technical Specifications shall be the minimum acceptance Standard for the relevant section of the works.

The Contractor is responsible for obtaining all the necessary regulatory approvals from relevant authority for the equipment and service under this scope of supply.

1.3 NOISE LEVELS

The design and construction of the mechanical equipment shall be such that noise levels are held to a minimum.

The maximum overall weighted sound pressure levels measured in accordance with AS 1217/ISO1680 for the raw water pump house and items of equipment shall be as 85dB(A) at one (1) meter away.

Equipment offered with sound proofing devices shall be designed so that:

The sound proofing devices form an integral part of equipment.

The sound proofing devices are well designed and manufactured using first class materials and workmanship, are neat fitting around the equipment and do not impede the flow of cooling air such that the motor temperature will rise to an unsafe level during normal load conditions. The sound proofing devices shall be in modular panels, easy to assemble and taken apart for maintenance of equipment.

Easy access is provided for connection/ inspection of the terminal box; maintenance / inspection of bearings, oil filler and dipstick.

1.4 PUMP OPERATING DATA

The pump operating data referred to in this Specifications do not include internal pump head losses, which shall be allowed for by the Tenderer in computing the capacity and efficiency of the pumps. The Tenderer shall confirm the minimum submergence required for the pumps.

The friction head losses where provided are based on the current piping arrangement. The pipe losses are only for the delivery and are calculated based on actual internal diameters using the Hazen William's formula with 'C' equal to 110 for old raw water pumping mains; whereby 'C' equal to 140 for new raw water pumping mains. The minor losses for the fittings are calculated on internal diameters based on the formula kV2/2g. The Contractor shall verify that these figures are correct.

Notwithstanding anything contained in the Specification or the Drawings, the Contractor shall be responsible in determining the pumping head required taking into account all head losses and static lifts to meet the performance requirement of this Specification.

Should the sizing and or arrangement of the piping between the pumps and the delivery main be unsuitable for the Tenderer's equipment, he may amends this section of piping, but amendments must be clearly indicated and the calculations of the total friction head losses involved in the amendments also be submitted with his Tender.

The Contractor shall furnish detailed calculations of pumping heads together with shop drawings to the Engineer or S.O. Notwithstanding these requirement, acceptance of the equipment shall be based on performance tests carried out during testing and commissioning.

1.5 PUMP PROTECTION

The Contract shall include for the supply and installation of a complete working system and shall provide with necessary contacts in the starting equipment to accommodate these precautions. Audible alarms and visual indicators shall be initiated and these alarms shall be included in the respective starter boards and another to be located at a position outside the pumping station, at a location to be agreed by the S.O. The pump or motors shall be manually re-started after fault clearance.

1.6 VACUUM PUMP PROTECTION

In addition to the normal safeguards required elsewhere in the Specification, the vacuum pumps shall include provision for specific protection of the system as described below: -

The vacuum pump/motor shall automatically stop on overload condition. An alarm and visual indicator shall be energized.

The vacuum pump/motors shall be prevented from being started if the water level in the siphon tube reached max allowable level.

The vacuum pump/motors shall be prevented from being started if the motorized air valve not fully open.

The outlet motorized air valves shall be fully closed before the vacuum pump/motors are stopped.

The Contract shall include for the supply and installation of a complete working system and shall provide with necessary contacts in the starting equipment to accommodate these precautions. Audible alarms and visual indicators shall be initiated and these alarms shall be included in the respective starter boards and another to be located at a position outside the pumping station, at a location to be agreed by the S.O. The compressor, vacuum pump or motors shall be manually re-started after fault clearance.

1.7 LOCATIONS OF PUMPSETS

All pump set and associated equipment will be installed at location as shown in the drawings or as stated elsewhere in the specification, Bill of Quantities or Schedule of Particulars.

1.8 LOCATIONS OF OTHER EQUIPMENT

All equipment will be installed at location as shown in the drawings or as stated elsewhere in the specification, Bill of Quantities or Schedule of Particulars.

1.9 PROVISIONS OF PIPEWORK, VALVES AND PUMP CONTROL INSTRUMENT

Item for Pumpset in Bill of Quantities shall deem to include the following works unless specifically measured elsewhere in the Bill of Quantities:

a) All necessary pipeworks, flanges, tie rods, flexible couplings, including harnessed type, and specials ductile iron fittings which submerged in the water.

b) Pumps delivery columns, bell mouths and air valves.

c) All control system; sump level sensors, balancing tank level sensors, penstock interlocking system.

d) Flow metering, recording, and transmitting

e) Miscellaneous other pumps, valves, pipeworks, lifting equipment, etc.
f) All control system; pond level sensors, pump sump level sensors, valve interlocking system, pressure sensor, cabling work and control panel.

g) Lifting equipment, concrete plinth, etc.

h) Pumps suction and delivery branches, taper, tees, bending, structure, pressure gauge, pressure transmitter, flange adaptor and coupling, pipe structure, actuator and valves.

All pipework and valves supplied shall comply with the clause on Pipework & Valves specified elsewhere in the Specification.

1.9.1 Electric Motors for Dry Mounted Pumps

The motors shall be produced by a reputable manufacturer and shall be of three phase, TEFC squirrel cage, suitable to operate at the voltage specified in the electrical section. Motors shall be suitable for continuous operation at a speed not exceeding 1500 rpm and comply with BS 5000 : Part 99:1973 and BS 4999 where applicable.

The motors shall be capable of operating continuously at rated output at any voltage within the ranges of normal voltage fluctuation. Motors shall be designed to operate for a period of not less than 5 minutes at a voltage of 25% below nominal value and at normal frequency without injurious over-heating. Enclosures for motors shall afford a protection of not less than IP55 and shall be designed for IC411 method of cooling.

The motor winding shall have Class “F” insulation and shall be suitably impregnated to withstand damp, tropical conditions.

The motor shall provide at the required speed, adequate torque for the pumping duties at not more than 90% of motor rated output.

Temperature sensitive thermistor devices shall be embedded in each winding of motors. Suitable thermistor control relays shall be provided for mounting in the starter cubicles. A lamp indicator shall also be provided. All bearing shall be fitted with oil or grease lubricators. Terminal boxes shall be conveniently located and of adequate size to accommodate all connection requirements.

The motors shall be coupled to the pumps via a flexible coupling. All motors shall be adequately earthed to meet the requirement of the local electricity supply authority.

The combined speed torque curves for pumps and motors shall be provided by the Contractor.

The power factor of each motor shall not be less than 0.93 lagging under any conditions of load and the Contractor shall if he deems it necessary include capacitors of suitable size to raise the inherent motor power factor to the above figure.

Inter-connecting control cables between the pump switchboards, pump motor and water tank shall be in multi-core PVC/SWA/PVC copper conductor cables and of size recommended by the pump manufacture but not less than 2.5 sq.mm.

1.9.2 Bearings

The pump bearings shall be suitable and water-proof grease. The rotating element shall be carried out in deep groove ball bearing. The lubrication flow shall be extracted from the pump volute.

All bearing life shall be designed for long life of at least 40,000 hours.

1.9.3 Flexible Coupling Units

Drive shall be transmitted from the driving unit to the pump by matched flexible coupling unit. The coupling system shall be strong, robust and flexible to accommodate parallel misalignment up to 6 mm, an angular misalignment up to 40 and vertical misalignment to 8 mm.

The rubber properties shall be able to absorb shock to reduce vibration and torsional oscillation and shall be able to withstand ambient temperature up to 500ºC.

1.9.4 Cooling System

A standard built-in cooling system capable of cooling the motor to enable the pump to operate continuously at rated output. No additional cooling equipment such as circulating pump, heat exchanger or cooling fins shall be used.

1.9.5 Pumps Casings

The material of construction for the casing shall be of close grain cast iron to BS EN 1561 or its approved equivalent. All wearing parts shall be easily renewable. All mating surfaces of major parts shall be machined and fitted with rubber O-ring where watertight sealing is required. Casing wear ring/liner shall be provided for optimum performance. All surface come in contact with the pump liquid shall be protected by approved primer and epoxy coating with thickness at least 100 micron.

The pump volute casing shall be protected equipped with a replaceable stationary wear ring acting as sacrifices, in order to prevent direct contact or wearing between the rotating impeller and the volute.

The material of the wear ring shall be of Stainless Steel to JIS SUS304 or better.

1.10 VALVES

Otherwise specified, all valves supplied shall comply with the clause on Pipework & Valves specified elsewhere in the Specification.

1.11 SUPPORTS FOR PIPEWORKS AND VALVES

The whole of the pipework and valves shall be supported and mounted in an approved manner. The Contractor shall supply all necessary supports, saddles, structural steelwork, foundations bolts, fixing bolts, and all other necessary attachments.

All brackets or other forms of pipe support which can conveniently be so designed shall be rigidly built up of steel sections by bolting or welding.

No point of passage of pipes through floors or walls shall be used as a point of support, except with the approval of the S.O.

All heavy valves and other such items where necessary shall be supported independently of the pipes to which they connect.

Concrete supports where required will be cast by the Contractor. The Contractor shall co-ordinate all details of such works among his Civil and Mechanical sub-contractor or the Contractor from other Contract so that the work will not be delayed and has any abortive works. The Contractor shall absorb all cost related to making good of abortive works.

1.12 Pipework Materials

Unless otherwise specified, the pipework to be supplied and installed under the Contract shall be mild steel pipe and concrete line internally.

All steel pipework shall be manufactured in accordance with BS 534 and BS 3601 and shall be internally lined with concrete and shall be supplied with three coats of zinc chromate primer at the place of manufacture. After installation this pipework shall be painted with a further coat of primer and them painted thoroughly with two (2) coats of polyamide cured epoxy base paint "Camrex" or equivalent.

The Contractor shall note the necessity for providing flexible joints and cut pipes on all pipework where necessary to absorb margins of error and to facilitate ease of dismantling for maintenance purposes. Flexible joints shall be provided with tie bolts to transfer longitudinal thrusts along the pipework so that external anchorage at blank ends, bends, tees and valves may be produced to a minimum. Particular care shall be taken to ensure that pipework thrust are as far as possible not transmitted to machinery or other associated apparatus. All bottom bends shall have integral duck foots for transferring loads to foundations.

The details and requirements of pipework shall be as specified elsewhere in the Tender Document.

1.13 GENERAL REQUIREMENTS OF VALVES

1.13.1 General

Full technical details of all valves shall be provided with the Tender. All valves shall have relevant approval certificate.

The number of different types and makes of valves shall be kept to the practically minimum.

All valves shall be packed and sealed to prevent, during transport and storage, the ingress of water or foreign bodies and./or the effects of ultra-violet light.

Where valves above 50-kg mass are installed a suitable lifting eye shall be fitted to the structure above the valve to facilitate removal and in-situ maintenance.

Where a valve is rated for a higher duty than its associated pipeline, the pipe flange drilling shall be in accordance with the appropriate Standard Specification for the actual valve design conditions.

Valves bodies in horizontal lines shall be installed with the stems oriented as follows (in order of preference):

Preference	Valve orientation	Requirement	
(i)	Vertically upwards		
(ii)	Horizontal		
(iii)	Upwards at 45° approximately, depending on flange drilling		To be used only after approval by the S.O
(iv)	Downwards at 45°C approximately, depending on flange drilling	Diaphragm type valves only	
(v)	Vertically downwards		

1.13.2 Manual Operation

Each valve shall be closed by turning its handwheel (or lever) in a clockwise direction. All valve operating mechanisms shall be adequately sized to operate against the design rating of the valve and be clearly marked to indicate the directions of opening and closing.

The maximum instantaneous initial pull required on the handwheel rim to open the valve manually shall not exceed 350N. The maximum continuous force required on the handwheel rim to open or shut the valve shall not exceed 180 N.

Valve actuator gear boxes shall be worm reduction type. The housings shall be metal, totally enclosed, weatherproofed, with double lip seals on shaft penetration. Each gear

box shall be rated to transmit sufficient torque to the valve shaft to seat and unseat the valve blade, ball or diaphragm under the most arduous specified shut-off and operating pressures and fluid velocities. Worm wheel gears shall be of bronze and worm gears of hardened steel. These shall operate in a bath of lubricating oil. The gear box shall be operated by means of a handwheel.

Where shear keys are fitted to protect the mechanism from overstressing, the keys shall be external to the gearbox and readily accessible.

1.13.3 Power Operation

Power operated may be either electrically actuated in accordance with this clause and as may be specified elsewhere.

Valves and actuator assemblies shall be capable of accepting the maximum possible load which can be produced by the actuator, without overstressing any of the valve/actuator assembly components.

All valves used for essential duties shall be provided with manual means of operation in addition to any electric power actuators with which they may be fitted.

All necessary filtration and separation equipment, including instrumentation, associated with power operated actuators shall be provided by the Contractor.

In case of actuators supplied under another Contract, the Contractor shall co-operate with other contractor in the installation, testing and commissioning of the actuators for valves and penstocks supplied under this Contract. Actuators shall be sealed against the ingress of dust and moisture and shall be suitable for the operating environment.

1.13.4 Valve Position Indication

A means of indication shall be fitted to each valve (including diaphragm type) and to each extended spindle to show clearly the position of the valve element.

Where a power actuator is used to operate a valve, the actuator shall have provision for remote position indication. In addition, there shall be provided an independent mechanically operated local position indicator which shall indicate accurately the position of the valve element.

Where gear boxes are fitted to valves to provide for manual and/or power operation, the gear box shall be designed to ensure positive position indication of the valve opening in the event of sheared input shaft, key, or pin. Any indicating pointer shall be robust and mounted externally to the gear box housing. Designs using transparent (glass or plastic) windows or covers to view an internally located position indicator will not be accepted.

It shall be impossible to attach the pointer in more than one position so that it can only indicate the true position of the valve element, e.g. OPEN, NOT OPEN or SHUT.

1.13.5 Access Requirements

1.13.5.1 General

Unless otherwise approved by the S.O all valves shall be located in positions where operation and maintenance can be readily carried out from floors, permanent walkways or permanent access platforms.

The layout and arrangement of valves, actuators and pipe fittings, shall be co-ordinated with the access platforms and walkways layout to facilitate the operation and maintenance of the valves, actuators and fittings.

The location and arrangement of all valves, actuators, extended spindles and fittings, together with the associated access platforms shall be to the approval of the S.O.

Platforms, walkways and ladders giving access to valves, actuators and fittings shall be provided for all valves by The Contractor.

Where permanent access facilities are to be provided they shall be completed prior to commissioning of the plant. Isolating valves on branch pipelines shall be located as near to the main pipeline as practicable.

Valves shall be located so that no part of the valve in anyway constitutes a hazard to personnel. There must be no encroachment on recognised walkways, assembly or movement areas, or areas set aside for maintenance. This particularly applies to capstan style handwheels where the spikes could cause serious injury to personnel.

1.13.5.2 Valve Operation

For small valves requiring only single-handed operation the height of the handwheel above foot level shall be between 0.5 and 1.6 metres.

Opening or closing of valves shall be possible by a pull operation.

Adequate clearance shall be provided, as follows, to permit the operation of valves without injury to the hands:

- between valve handwheels and adjacent equipment;
- between valve handwheels and attachments on the valves, such as position indicators and labels.

The valve installed below or above operation level shall be complete with Pedestal. Pedestals shall be suitable for bolting onto concrete floors, and shall rigidly support the electric motor actuator or handwheel. Each pedestal shall be of such height that the horizontal axis of the handwheel, both in the case of handwheel operated penstocks and electric motor actuated penstocks, is approximately 900 mm above the operating level, which corresponds to the base of the pedestal. Pedestals shall be machined and drilled to receive the gear housing and drilled for bolting to the concrete floor.

1.13.5.3 Maintenance

Where permanent access is not required for maintenance, as approved by the S.O., sufficient space shall be provided to enable temporary access, including access for mobile lifting equipment where necessary.

Valves and fittings shall be located so that permanent structures and any other equipment shall not interfere with the maintenance access requirements. Permanent lifting eyes and other similar attachments above valves shall allow for the clearance required when removing valve spindles and internals.

Valves and fittings which require setting and adjusting shall have their adjusting mechanisms visible and accessible.

1.13.6 Materials

1.13.6.1 General

The valves and accessories shall be manufactured from materials specified in the clauses appropriate to the particular item. Where the material to be used has not been laid down in this Specification, the Contractor shall use only those materials in such compositions as have been proved in actual service to be the most suitable for the particular purpose.

All castings shall be reasonably smooth and free from flaws and defects. The valve trims including pins, spindles and face rings, etc. shall be of corrosion resistant metals and such parts that may show signs of corrosion or wear at the end of the Defect Liability Period shall be replaced by non-corrodible material of special quality for the purpose at the Contractor's expense. Care shall be exercised in the selection of various types of metals for use in the valves to reduce the effects of bi-metallic corrosion to the minimum.

Clauses on materials, standards, samples, tests and testing facilities under Section 2.1.6.2 of the Specification shall be applicable where appropriate.

1.13.6.2 Grade of Materials

Materials used shall be of a quality not inferior to the following:-

Grey Cast Iron	:	To BS EN1561:1997 Grade 220
Spheroid or Nodular Graphite Cast Iron Grade 600/3	:	To BS EN 1563:1997
Stainless Steel	:	To BS 970 Grade 316S16
Cast Steel 161	:	Plain carbon steel to BS 1504- Grade 430 BS 3100 Steel Al
Gunmetal Designation LG2	:	To BS EN1982:1999

High Tensile Brass	:	To BS 2872 CZ114
Phosphor Bronze	:	To BS 2870

1.13.6.3 Design

The Contractor shall design the valves to the S.O.'s satisfaction and in accordance with the Specification. The design shall be in accordance with the best modern practice and shall be such as will facilitate inspection, cleaning, lubrication and repair to ensure satisfactory operation under all service conditions.

The valves or any part thereof may be of the Contractor's standard design provided that such design is generally in accordance with the Specification.

Approval by the S.O. of the Contractor's design or drawings shall not relieve the Contractor of any of his obligations or liabilities under the Contract except in so far as provided for by the Conditions of Contract.

1.13.6.4 Castings

The structure of castings shall be homogeneous and free from non-metallic inclusions and other injurious defects. All castings shall be close-grained, sound, smooth, symmetrical and shall be carefully cleaned and dressed off. No stopping or plugging will be permitted in the case of holes or flaws appearing therein, and casting shall be made from first running.

If any casting should prove defective, the S.O. shall have the power to reject it and the Contractor shall replace it at no extra expense to the Employer.

1.13.6.5 Forging

All major stress bearing forging shall be made to a standard specification which shall be submitted if required to the S.O. for approval before work is commenced. Forging shall be subjected to non-destructive tests to detect flaws if any. Forging shall be heat treated for the relief of residual stresses. The name of the maker and particulars of the heat treatment proposed for each such forging shall be submitted to the S.O. The S.O. may inspect such forging at the place of manufacture with a representative of the Contractor.

1.13.6.6 Workmanship and Finish

Workmanship and general finish shall be of first class commercial quality and in accordance with best workshop practice.

All parts which can be worn or damaged by dust shall be totally enclosed in dust proof housings.

1.13.6.7 Lubrication

The Contractor shall submit full details of the method of lubrication to be employed for valves and penstocks to be supplied under the Contract. The Contractor shall supply all necessary lubricating equipment, including sufficient grease and other lubricants of each required grade for setting valves to work and the cost of this shall be deemed to have been included by the Contractor in the Contract Rates.

1.13.7 Protection against Climatic Conditions

The valves and penstocks supplied shall be of the appropriate grade and quality and shall be adequately protected against the climatic conditions at the site. The Contractor shall take these conditions into account in deciding what grade, quality and protection is required. Any valves which are found to be unsuitable for use under these conditions shall be removed and replaced by suitable ones by the Contractor at no extra expense to the Employer.

Valve bodies, surface boxed and all other castings shall be coated in accordance with BS 4164 for tropical conditions. Where this is not applicable, they shall be thoroughly cleaned and be given two coats of coal tar epoxy with a resin base. Machined surfaces shall be covered by a suitable rust inhibitor, such as high melting point grease of approved quality.

All submerged moving parts, or the pins, spindles and faces, etc. in contact with them, shall be of non-corrodible materials. Any parts that show signs of corrosion or wear during the Period of Liability shall be replaced by non-corrodible material of special quality for the purpose at no extra expense to the Employer. Care shall be exercised in the choice of metals for use in the valves to reduce the effects of bi-metallic corrosion to a minimum. The foregoing shall apply also the moving parts exposed to the weather.

1.13.8 Inspection

All valves shall be inspected by the S.O. at the Contractor's premises or at the place of manufacture. The Contractor shall provide such office facilities, assistance, labour, materials, apparatus and instruments as may be necessary to allow a thorough and extensive inspection to be carried out.

The S.O. shall have free access to the Works of the Contractor or the manufacturers at all reasonable times, and shall be at liberty to inspect the manufacture of valves, and component parts at all stages. The charging of cupolas, melting, drawing off, conveying and pouring of all metals shall be carried out in such a manner and at such time or times that the S.O. desire to see that the work is carried out in accordance with this Specification, particularly but not limiting to the following requirements/conditions:-

(a) The manufacture of valves, and component parts at all stages shall be inspected and if found defective or inferior in quality to, or differing in form or material from, the requirements of the Contract, may be rejected. The whole of any consignment may be rejected if any valve or component part is found not to conform in every respect to the requirements of the Contract.

(b) The Contractor shall, if called upon to do so, obtain the S.O.'s

approval of the manner in which the Contractor proposes to supply the valves and shall furnish such drawings and information as the S.O. may require.

(c) The Contractor shall notify the S.O. in advance of the date on which any of the component parts or valves will be ready for inspection.

(d) The S.O. shall not be required to sign any form of waiver or indemnity concerning his presence or actions at the place of inspection.

(e) If any of the items, whether completed or in the course of production, are rejected by the S.O., they shall be marked or segregated in such manner satisfactory to the S.O. as to ensure their subsequent identification as rejected work.

(f) When independent tests and analyses, in addition to those made by the S.O. at the Contractor's or manufacturer's premises, are considered necessary by the S.O., such tests or analyses will be made by persons appointed by the S.O. The Contractor shall bear the cost of supply and carriage of samples and in addition where the results of such tests or analyses show that the items are not in accordance with the Specification, the cost of such tests or analyses.

(g) The Contractor shall not deliver any of the valves or report them as ready for deliver until the S.O. shall have given his consent.

(h) The inspection, examination or testing including the approval of the valves by the S.O. shall not release the Contractor from any of his obligations and liabilities under the Contract.

The Contractor shall allow in his rates where applicable and related expenses for inspection of valves by the S.O.

1.13.9 Defective Valves

No portions of the valves shall in any way be damaged, repaired or altered and the S.O. may reject any valve and penstock which has been so treated, notwithstanding that it may have been previously passed.

1.13.10 Rejected Valves

Any valves delivered to the Site which have been rejected by the S.O. or his Representative shall immediately be removed from the Site.

Any valves which have been rejected shall be marked in a distinctive manner which will preclude any possibility of their use for the purposes of the Contract. Such valves may be submitted for re-test following the correction of any defects, where such correction is permitted.

1.13.11 Handling Valves

(a) Notices of deliveries

The Contractor shall send to the S.O. advance notices of all consignments. Every consignment shall be accompanied by a detailed delivery note with the item number of each valve.

(b) Protection against damage during transit

All valves shall be securely packed in crates or boxes for protection against damage during transit. Valves of 450 mm diameter and above shall be individually crated, battened and bound with steel strip.

Flanges of valves shall be protected by wooden discs temporarily bolted on or secured by steel strapping. Spindle caps of sluice valves shall be removed and secured to the inner side of one of the wooden discs by means of a steel strip. Otherwise they shall be packed in a case. The projecting end of the spindle shall be well wrapped with straw rope covered by hessian cloth and secured in place by binding wire which shall be carried under the flange of the gland.

All plain ends shall be adequately protected by straw rope secured in place by binding wire or strap. None of the packings will be returnable. The cost of packing shall be included for in the Contract Rates.

(c) Identification plates and labels

Each main and auxiliary item of the valves and penstocks shall, unless otherwise specified, have permanently attached to it in a conspicuous position an identification plat of weather-resistant material on which are engraved or stamped the manufacturer's name, service rating, loading and duty at which the item of valves and penstocks has been designed to operate, serial number, weight and reference number.

Additionally, each item shall have marked upon its body in raised letters the manufacturer's name, service rating, year of manufacture and size of the valve.

Details of proposed inscriptions shall be submitted to S.O. for approval before any labels are manufactured.

1.14 VALVES

1.14.1 General

Unless otherwise specified, the body and disc of the sluice valve, butterfly valve and check valve shall be manufactured from Spheroid Graphite Cast Iron to BS EN 1563 grade 420/12. All valve of 600 mm and above shall be provided with integrated cast footing to facilitate of holding-down bolt installation on to the concrete plinth.

All valves shall be designed to avoid cavitations and vibration in all positions, to minimise head loss in the open position and to seal the water passage completely when shut. All operating spindles and gears shall be provided with adequate points for lubrication. Unless otherwise specified, all valves shall be closed in a clockwise direction. Lifting lugs shall be provided for valves of size 600 mm and above. Head loss

curves through the valves for throttled flow conditions shall be provided for all valve sizes.

The valve trims including pins, spindles and face rings, etc. shall be of corrosion resistant metals and such parts that may show signs of corrosion or wear at the end of the Defects Liability Period shall be replaced by non-corrodible material of special quality for the purpose at the Contractor's expense. Care shall be exercised in the selection of various types of metals for use in the valves and accessories to reduce the effects of bi-metallic corrosion to the minimum.

All protective coatings shall be non-toxic and shall not foster microbiological growth nor impart any odour, taste, cloudiness or discolouration to the water.
All ferrous surfaces in contact with water shall be given two coats of epoxy coal tar bitumastic paint. The external surfaces shall be painted with two coats of a two pack epoxy based red lead oxide primer before delivery. After installation the external surfaces shall be painted with two coats of a two pack coal for epoxy paint.

The Contractor shall take note that all valves will normally be installed with one end fixed and the other end to a flexible joint either a flange adaptor or mechanical coupling joint. Unless otherwise stated, all valves shall be flanged.

1.14.2 Flanges

All valves are to be installed on steel pipes with flange details generally in accordance with table provided in BS 1092 the flange thickness to be designed and to suit the existing pipework (if connected to the existing pipework).

All valve flanges shall be designed to withstand the stresses of the valve rating. They shall be at right angles to and concentric with bore axes. They shall be of the raised face type, truly faced over their whole width and drilled in accordance with table provided in BS 1092 with the flanges for the steel pipes. Bolt holes shall be drilled off centre lines and shall be truly in line end to end with the longitudinal axis.

1.14.3 Works Test

After completion of assembly each valve shall be shop operated three times from the fully open position to the fully closed position and return to fully open under no flow condition to demonstrate that the assembly is working smoothly. The torque required on each valve shall be ascertained. Where electric motor actuators are provided, the complete assembly of valve actuator shall be tested.

All valves shall be hydrostatically tested at the place of manufacture to the pressures specified and shall satisfactorily pass the specified tests before they are packed for delivery. All valves shall be body tested to 1.5 the valve rating pressure. Seat tests to the valve rating pressure shall be carried out on all valves.

All valves shall be subjected to "open end" test in accordance with BS 5163-2:2004 or BS EN 1171:2002 as applicable and to BS EN 12266:2003. The back seat test shall not apply. Each valve shall be subjected to three separate hydrostatic tests as follows:-

(a) Seat Tests
The tightness of seats shall be tested as follows:-

(i) with the wedge or disc closed and with the valve fixed at one end only and the other end free, the test pressure (1.1 times valve rating) shall be applied to that face of the wedge or disc, the other face being at atmospheric pressure. There shall be no visible leakage past the wedge or disc at the hydrostatic test pressure (gauge) specified;

(ii) the above procedure shall be repeated but with the valve fixed at the other end and with the pressure (1.1 times valve rating) applied to that end of the valve.

(b) Body Test
With the wedge or disc open and the test pressure (1.5 times valve rating) shall be applied to the whole body of the valve. There shall be no visible leakage through the metal, the flanged joint or the valve packing gland nor shall any part be permanently deformed.

The test durations for all tests shall be as in the table below:-

Nominal Diameter (mm)	Minimum Test Duration (minutes) for	
	Body	Seat
Up to and including 150	1	1
200 to 300	3	2
350 and above	5	3

The cost of testing shall be included in the contract.

1.14.4 Sluice Valve

Sluice valves shall conform generally to BS5163-2:2004, Type B for valves up to 600mm diameter and to BS EN 1171:2002 for valves 700 mm diameter and above.

They shall be of the double flanged, inside screw non-rising stem wedge gate of resilient seated type for valves up to 600mm and metal seated type for valves 700mm and above suitable for waterworks purposes. The valve shall be closed by turning the key or handwheel in a "clockwise" direction when facing the top of the valve. All flanges and bolting shall comply with Table 9 BS EN 1092-2:1997.

The valve body, gate (wedge), bonnet, stuffing box, gland and cap/handwheel shall be ductile iron to BSEN 1563:1997 Grade 420/12, 500/7 or 600/3; or BS EN 1563 with grade 400/15, 500/5 or 600/3.

The valve gate/wedge for resilient seat shall be double faced made in one piece and vulcanized with synthetic rubber made of EPDM or Nitrile conforming to MS 672:99 or AS 1646:92 or BS2494:1990 on all faces of the gate to form an axial and butt seal against the valve body. Dust seal/excluder and spindle seal shall be of rubber O-ring made of EPDM or Nitrile conforming to MS 672: 99 or AS 1646:92 or BSEN 682:2002 for valve sizes up to and including 600mm diameter.

Stuffing box and bonnet gasket shall be not less than 3mm thick gasket made of EPDM or NITRILE conforming to MS672:99 or AS 1 646:92 with 66-75 IRHD. Gland Packing shall be Asbestos free Teflon braided packing or rubber O-ring made of EPDM or NITRILE conforming to MS672:99 or AS 1 646.

The wedge seats (ring faces) and corresponding body seats shall be copper alloy to BS EN 1982:1999 Grade LG2, machined and having broad bearing surfaces securely fixed to machined recesses. These shall be accurately fitted and faced in together to give a watertight bearing for valve sizes exceeding 600mm diameter.
The recesses for the spindle nuts shall be smooth and even so that on opening or closing the valve stresses are evenly distributed over the bearing areas. Internal surfaces of the valve shall be smooth and clear.

The valve shall be designed so that the gate may be removed without removing the body from the connecting pipework. The gate guides shall be cast integrally with the valve body and be of adequate strength and of sufficient length to guide the gate throughout their full travel. In the fully open position, the gate shall be withdrawn well clear of the flow stream and the spindle shall not protrude into the bore of the valve. The clearance between the gate and the valve body gate guide shall not be greater than 3mm.

The spindle shall be of the inside screw non-rising type of stainless steel 431S29 or 304S31 conforming to BS970 or high tensile brass CZI16 or CZI14 conforming to BS EN 12165:1998/2874 and shall have machined square or ACME threads. It shall be truly circular throughout and be of such length that when the valve is closed the bottom end of the spindle engages fully in the spindle nut. The spindle collar or thrust plate shall be concentric and machined, suitable for the specified test pressure.

The spindle nut shall be of gumnetal LG2 or LG4 conforming to BS 1400 or stainless steel 431 S29 or 316 conforming to BS970, square or ACME threaded to suit the spindle. The thickness and bearing area of the shoulder of the nut shall be adequate to resist operating thrusts.

Spindle sealing shall consist of two numbers O-rings made of synthetic rubber to BS EN 682:2002 mounted inside the housing assembly in accurately machined 'O' ring grooves within a close tolerance bore. The O-rings shall be fully capable of withstanding the full body test pressure of 1.5 times the maximum allowable working pressure with the valve in the partially-open position and with valve ends blanked. Sealing Cartridge shall be of gunmetal LG2 or LG4 of BS EN 12165:1998 or acetal resin.

All valves shall be installed in an up-right position unless otherwise specified. Valves of 400 mm diameter and above shall be supplied complete with built-in sluice valve by-passes (min DN80mm). The by-pass valve shall comply with BS5163-2:2004, nominal pressure designations shall comply with the pressure rating of main pipeline. In addition, valves 600 mm and above shall be operated by suitable reducing gears.

A manually operated spur gear assembly totally enclosed in a conceal ductile iron gear box and secured to a valve body to BS EN ISO 5211:2001, shall be provided for the smooth operation of the valve. The gear shaft shall be vertical and square at the top for operation with a mild steel key held in a vertical position. The gearing shall be arranged for the smooth operation of the valve with a mild steel tee key with a maximum force of 270 Newton applied on each side simultaneously from a distance 750 mm from the centre of the key against the full unbalanced pressure of the valve rating. Suitable

means shall be provided to prevent overstressing of the valve seat in the closed position. The gears and bearings shall be protected by suitable watertight corrosion resistant enclosures permanently packed with grease. The Contractor shall detail the type of gearings in the schedules and shall state in his Tender the type of test to be carried out to demonstrate the water tightness of the assembly under a head of 4.5 metres of water column.

Ductile iron caps shall be supplied to fit the spindles for all the valves and these be secured by brass or galvanised set screws with the direction of closing indicated on the caps.

All internal and external parts of the ductile iron valve shall undergo the necessary surface preparation for polymeric coating purposes. Bituminous coating is not allowed. Either one of
the following polymeric coating is acceptable:

For coating using either fusion-bonded epoxy powder or polyamide 11 (Rislan) materials, the coating thickness shall not be less than 250um for fusion bonded polyamide 11 or not less than 350um for fusion bonded epoxy as specified in AS/NZ4158.1 Part I.

For coating using cold applied high solid liquid epoxy (solvent or solventless) which met the requirement of AWWA C210-84, the coating shall not be less than 356um.

1.14.5 Butterfly Valves

The valves shall conform generally to BS EN 593: 2004 except as specified herein.

The butterfly valve shall be eccentric type. The Contractor shall provide details of the materials of manufacture and the design of butterfly valves, including the access route to repair or replace seals. He shall provide evidence to show that the proposed materials and designs for the sealing and seating arrangements have given satisfactory performance in similar condition elsewhere.

1.14.5.1 Eccentric Type Butterfly Valve

The valve design shall be double flanged, resilient seated, double or triple eccentric type. The disc shall have a smooth profile for easy flow and reduced turbulence to minimise pressure drop across the valve and to ensure stable hydraulic flow characteristics. The rubber seal shall be secured on the disc circumference by a stainless steel ring. The seal shall be replaceable. The method of the rubber ring being secure to the disc shall be clearly shown in the valve drawings.

The valve shall be fully bi-directional i.e. capable of being completely tight shut off under the full differential pressure (valve rating) in both directions. The valve body in contact with the rubber ring when in closed position shall be lined with stainless steel. The stainless steel liner shall be of stainless steel 316 L. The minimum thickness for the liner shall be at least 500 micron. Spray-on liner is not allowed. The method of the stainless steel liner being secure to the valve body shall be clearly shown in the valve drawings.

The disc shall have a smooth streamlined profile for easy flow and reduced

turbulence to minimize pressure drop across the valve and to ensure stable hydraulic flow characteristics. Valve shafts shall be a one-piece unit extending completely through the disc, or of the “stub shaft” type which comprises two separate shafts inserted into the disc hubs. Disc connection to drive shaft (and stub shaft) shall be achieved with an approved and robust key connection to ensure secure force transmission without fluttering even under maximum dynamic load conditions. The key connection shall be fitted precisely for connecting the shaft and disc as secure as if they were made of one single casting. Key securing feature shall be of proven design.

Across the valve body section, the drive shaft (and stub shaft or trunnion) shall be adequately designed for running in maintenance-free, self-lubricating robust high-load plain bearings. Thin-wall steel bearings shall be provided with PTFE bearing surface to achieve low coefficient of friction and long life. Double shaft sealing with robust o-rings and support rings, enclosed in stainless steel material, shall be encapsulated against blow-out under full designed pressure.

The sealing between the body and the disc at the shaft area will be fully leak tight and no leakage of fluids is allowed. The valve and shaft shall be constructed without any packing gland.

The disc shall be off-seated after a few degree of opening movement. The sealing ring shall be completely unstressed in open position. The disc shall be secured to the shaft by disc pin, which shall not pass through the disc completely.

In compliance to BSEN 593:2004, the valve manufacturer shall compile the flow velocity characteristic as described under clause 5.2.3.1 for flow velocity and 5.2.3.2 for flow coefficient Kv.

A mechanical position indicator shall be provided. All valves shall be provided with gearing, pedestal, headstock and extension spindles for electric actuators whenever necessary. Extension spindle for immersed valve shall be made of 316 stainless steel. The headwheel or actuators shall be installed at a height accessible during maintenance.

The valve shall be mounted with a self-supporting footing as directed by the S.O.
Butterfly valve materials shall be as follows:-

Body and disc	:	Ductile iron to BS EN 1563: 1997 grade 420/12 or BS EN 1503: part 3 and BS 1563;
Shaft	:	Stainless steel solid one-piece to BS 970 420 S45
Sealing ring	:	Elastomer EPDM
Internal fasteners	:	Stainless steel 316 L
Finishing (internal)	:	non-toxic fusion bonded epoxy

Finishing (external) 6290	:	300 ± 50 µm of approved epoxy tested to BS
Additional external coating for epoxy valve	:	minimum 50 microns non-toxic epoxy primer immersed and minimum 80 microns non-toxic finishes.

Valves shall be suitable for mounting in any position. Valves of 450 mm diameter and above shall be provided with suitable reducing gears. Quadrant worm reducing gear totally enclosed in a cast iron gear box and secured to the valve body shall be provided for the smooth operation of the valves.

Cast iron caps shall be supplied to fit the spindles or operating gears of all the valves and these shall be secured by mild steel set screws with the direction of closing indicated on the caps.

Opening /closing indicators shall be provided and mounted on all valves.

Gearbox shall be lubricated for life without the need for regular or periodical maintenance for both exposed and immersed valve.

The gearing shall be arranged for the smooth operation of the valve with a mild steel tee key with a maximum force of 270 Newton applied on each side simultaneously from a distance 750 mm from the centre of the key against the full unbalanced pressure of the valve rating.

The valve manufacturer shall have been regularly engaged in the design for at least twenty (20) years. Proven installation records, preferably with local references, shall be submitted together with ISO9001 certification for acceptance by the Engineer.

1.14.6 Markings

The following marks and figures shall be cast on the bodies of the valves:

(a) the nominal diameter (DN)

(b) the nominal pressure designation (PN)

(c) the body material identification in accordance with BS5163-2:2004 Table 11 or BS EN
1171:2002 Table 11

(d) the manufacturer's name or trade mark

(e) the initials of the water supply authority (SAMB)

(f) the word CLOSE and the arrow indicating the clockwise direction

(g) the designation of the valve type (Type B)

(h) year of manufacture

1.14.7 Check Valves

The check valves shall be of double flanged to ISO 2531, metal seated with zero leakage, short body tilting disc design achieving two (2) opening ports with a single tilting disc during operation. The valves shall be suitable for the entire range of the respective pumping operation and for the associated average flow velocities which vary well below and above 1.5 m/s. Suitable range of operating flow velocities for a proposed check valve shall be duly confirmed by its valve manufacturer for the Engineer's vetting and acceptance. The head loss through the check valve shall not exceed 0.5 m for the flow velocity below 1.5 m/s.

The check valve shall be complete with robust body accommodating an off-centre pivoted streamline disc with its swiveling axis in the upper half of the valve. Two short support shafts shall be situated beside the body and disc seat ring, protruding on both sides to facilitate mounting of external level with counter-weight and provision for hydraulic damping device and/or pneumatic full-opening device. Shaft bearing bushes shall be of maintenance free, self-lubricating design and be protected behind double shaft sealing against dirt from the flow media. Robust disc-to-shaft connection shall be guaranteed with an approved key securing device against loosening through vibration, using a safety/locking plate. Solid rolled-in body seat ring and disc facing ring shall be of conical design to ensure easy disc opening and closing without wear and tear action. Absolute tightness against leakage shall also be achieved with proven resilient precision seal smartly incorporated into the disc facing ring without defeating the metal seat arrangement.

The materials of construction of the check valve shall be as follows:

Body	:	Ductile iron to BS EN 1563: 1997
Disc	:	Ductile iron to BS EN 1563: 1997
Shaft	:	Stainless steel to BS970 / 4-70 431 S29
Seats	:	Austenitic stainless steel shall be made corrosion proof and wear resistant nickel weld overlay, microfinished
Seals	:	EPDM
Shaft bearing bushes	:	Self lubricating steel-tin-PTFE
Surface Protection	:	Shot-blasting to SA2.5 followed by an approved epoxy coating (with third party certification for potable water application) to a minimum dry film thickness of 250 micron

The valve manufacturer shall have been regularly engaged in the design and

manufacture of the double flanged short body tilting disc check valves for at least twenty (20) years. Proven installation records, preferably with local references, shall be submitted together with ISO9001 certification for acceptance by the Engineer.

The contractor shall duly check the space requirement for safe operation of the check valve to the adjacent butterfly valve and/or pipe fittings to ensure no collision whatsoever during valve operation.

The contractor shall dully check the space requirement for the safe installation of the check valve to the adjacent butterfly valve and or pipe fittings to ensure no collision whatsoever during valve operation.

1.14.8 Air Valves

Air valve shall be of one of the following types :-

a) Double orifice type with a large orifice for automatic ventilation or exhaust of the pipeline and a smaller orifice for automatic release of air under normal working pressure;

b) Single large orifice type for automatic exhaust of air when filling and admission of air during emptying of pipeline;

c) Single small orifice type for automatic release of air under normal working pressure.

Large orifice air valves, including those incorporated in double air valves, shall be constructed so that the air flow actively holds the valve open during the discharge of air at all flows up to and including sonic velocities. They shall, when coupled to their respective isolating valves, be capable of admitting to or exhausting from the pipeline to which they are connected the required quantities of free air without the pressure differential across the combined air valve and isolating valve exceeding 0.5 bars. The Contractor shall submit with his tender curves for free air discharge and inflow.
Small orifice air valves, including those incorporated in double air valves, shall be capable of opening and discharging up to not less than 0.5 m3/min of free air when the pressure in the pipeline is at the maximum working pressure for which the valve is designed.

Balls or floats shall be of ABS plastic, vulcanite, rubber-covered metal or stainless steel, and shall operate automatically at all pressures up to the test pressure when installed in their valves. Orifices shall be bronze or stainless steel.
Air valves shall be designed so that each float seats against its orifice or causes the orifice to be closed without leakage at all pressures between 0.2 bars and the specified test pressure. Balls and seats shall be designed so as to minimise the risk of adhesion of the ball to the seat. They shall be of a type proven by experience to be suitable for the specified duties.

Each air valve shall be provided with an isolating valve. Air valve with a connection not exceeding 25 mm diameter to the main pipeline shall each have an integral lever-operated isolating ball valve. All other air valves shall have a separate resilient seated, double flanged, butterfly valve with lever operation.

Each small orifice or double air valve shall be fitted with a test cock in the valve body to

permit easy verification that the small orifice air valve is operating properly and that its orifice is not blocked.

1.14.9 Knife-Gate Valves

Knife-gate valves shall be designed for corrosive and abrasive services and shall be proven reliability. It shall be able to last for long term application of at least 25 years with reference.

The valve bodies shall be of Ductile Iron Grade 420/12 or better, casted as one-piece, extending through the chest and the packing chamber. The valves shall be suitable for flange connection and the flanged face shall be raised.

Rugged gate guides and jams shall be welded to the valve bodies to provide proper support of the moving gate and to ensure positive seating. Guides and jams shall be machined.

Valve gates shall be circular, made of stainless steel Type 316, finish ground on both side with bevelled, knife-like edge to push aside or cut through solids in the flow.

Resilient seal seats shall be nitrile-butadiene or similar approved, suitable for use in acid medium. The resilient seal material shall be bonded into a stainless steel seat ring. O-ring seal will not be acceptable.

The spindles and extensions shall be solid high tensile stainless steel rising type with strong square or acme threads.

The spindle nuts shall be gunmetal and threaded to suit the spindle.

Packing shall be easily replaceable without dismantling the valves from the line and shall be tight seal. The packing gland shall be of corrosive resistance material.

Valves shall be subjected to hydrostatic tests in factory. Valve bodies shall be shell tested to BS EN 12266-1:2003 or better. Each assembled valve shall be tested for seat leakage with air at 2.8 bars. The testing shall be carried out under water and no visible seat leakage shall be detected.

1.14.10 Fittings

Extension spindles for operating of valves shall be of stainless steel 316 or better. The bottom end of the spindle shall be in the form of a socket to fit the cast iron cap and the top end squared to suit the valve key.

Extension spindles shall be of suitable cross section to prevent buckling or permanent distortion under all operating conditions and shall be capable of withstanding at least twice the rated output torque of the electric motor actuator or at least twice the torque developed at the stem created by a maximum force of 340 N at the rim of the handwheel.

The length of the spindle required between the top of the valve and the horizontal axis of the handwheel, both in the case of handwheel operated valves and electric motor actuated valves, shall be as shown on the Drawings. The spindle shall be supported

such that the L/R ≤ 200 for the unsupported part of the spindle (L = length or span between supports, R = radius of gyration).

Where spindles are furnished in more than one piece, the different sections shall be joined together by rigid couplings. The couplings shall be threaded and keyed or threaded and bolted, and shall be of greater strength than the spindle.

The threads of the spindle shall be machine cut and of the square or ACME type. The number of threads per decimeter shall be such as to work most effectively with the actuator.
Rising spindles shall be provided with adjustable limit nuts or stop collars above and below the pedestal lift nut to prevent over-travel of the sluice or disc gate in either direction.

Bracket-mounted and floor-mounted spindle guides, including both the guide housing and the bracket, shall be so constructed that when properly spaced they will hold the stem in alignment and yet allow it enough play to permit easy operation. The inside diameter of the guide shall not be more than 3 mm larger than the outside diameter of the spindle. The guides shall be spaced in accordance with the manufacturer's recommendations for each spindle size. The L/R ratio shall not exceed 200.

The guides shall be adjustable with regard to the bracket to provide concentric alignment with the spindles and shall be lined, and provisions shall be made to hold the lining rigidly in place so as to prevent loosening while in service.

Brackets shall be fixed to the concrete walls with sufficient anchor bolts to prevent twisting or sagging under load. Valve keys shall be of mild steel suitable to operate the extension spindles.

Cast iron surface boxes shall have square openings with top supporting flanges and be 100 mm deep suitable for heavy traffic. The covers shall be of the chained type.

The Contractor shall obtain from the S.O. confirmation of the exact length of extension spindles required before manufacturing them.

1.14.11 Gear Box

The gearbox shall be greased pack and lubricated for life.

The material for the gear shall be cast steel or carbon steel. The gear casing shall be ductile iron and the spindle shall be stainless steel 316 L. The flange to the valve body shall be ductile iron accordance to ISO 5211/1 1977.

The torque requirement shall be accordance to ISO 5210:1991 (E). Sizing of torque and thrust against the flange shall follow the table 1 of the standard. Calculations for the value of bare shaft operating torque and the gearbox input torque shall be submitted for review.

Valve position indicator shall be provided for every gearbox. The indicator shall be protected against water intrusion; the manufacturer shall confirm the valve indicator is designed for buried condition. The gasket for the gear box shall be either NBR or EPDM rubber.

All bolts and nuts used for the gearbox shall be stainless steel 316 L.

Safety pin shall be incorporated to the gearbox to protect the valve from over tuned. The safety pin shall break before damaging other parts in the gearbox or valve.

1.14.12 Measurement and Payment

Valves, fittings and all works in connection therewith as specified shall be valued by measurement only such items as are provided in the Bill of Quantities unless otherwise specified. The cost of all works testing and all other requirements of the Specification including painting and packing involved in the manufacture and delivery of the valves and fittings shall be deemed to be included in the Contract Rates.

All valves and fittings other than spares shall only be measured for payment after they have been installed and incorporated in the Works.

1.15 PNUEMATIC SYSTEM

Pneumatic actuators and the control accessories such as solenoid valve, tubing, fitting and limit switch shall be of the same brand, mix and match of brand is not acceptable.

All proposed products must have at least 10 years of similar application installation referring in Malaysia.

1.15.1 Pneumatic Part Turn Actuators

Part-turn-actuators shall be designed and calculated for an effective output torque at the drive shaft, rated at 5.6 bar air-supply pressure and subject to a minimum safety margin of at least 30% on the required torque of any specific process valve. All part turn actuators shall be designed to be maintenance free and for use with oil-free compressed air. All part turn actuators shall be designed, certified and tested as follows:

- Part turn actuator shall be scotch-yoke design. Rack and Pinion design is not acceptable
- Every specific actuator shall come with an end-position-adjustment for at least 1 direction
- Butterfly valves to be adjusted in closed position, to guarantee maximum lifetime of the sealing systems of the process valves as well as preventing from cavitational / erosional effects
- Ball valves to be adjusted in open position, to guarantee maximum lifetime of the materials on preventing from cavitational / erosional effects.
- The operating media shall be of dry, non lubricated air and the maximum particle size must not exceed 40microns
- The air supply maximum pressure shall be 10.0 bar (The pressure shall generally be adjusted between 2.5 up to 8,4 bar)
- The actuator must come with end position adjustment. The actuator

must be suitable for both indoor and outdoor installation with minimum corrosion resistant class: CRC 3

- The pneumatic actuator shall have a minimum 1,000,000 cycle

The material of construction shall be of:

- Body must be aluminium alloy with AlMgSi compound
- End cap cover must be aluminium alloy with AlMgSi compound
- Piston must be minimum SS304
- Dynamic sealing design must come with protective slide ring. Only O-ring sealing is not acceptable.

1.15.2 Pneumatic Linear actuators

All linear pneumatic actuators shall be designed and calculated for an effective output force at the piston-rod, rated at 5.6 bar air-supply pressure and subject to a minimum safety margin of at least 30% on the required force of any specific process valve.

All linear actuators shall be designed to be maintenance free and for use with oil-free compressed air. All linear actuators shall be designed, certified and tested as follows:

- The actuators for valve/penstock diameter ≤160 mm must designed as extruded profile without anchor bolts.

- The actuators for valve/penstock diameter ≥ 200 mm must designed as anchor bolt type with a tube and anchor bolts of stainless steel of minimum quality AISI 304.

- The actuator shall comply to NAMUR VDI/VDE 3845 standard for solenoid valve attachment

- The actuator-valve mounting shall comply to DIN 3358 , ISO5210

- The actuator body must come with profile slot for sensor mounting. Additional bracket for sensor mounting is not allowed.

- The sealing design must be of self-sharpening lip sealing system. O-ring sealing as dynamic sealing is not acceptable.

- The actuator diameter of ≤160 mm must come with internal air channelling system to avoid fittings / tubing whilst fitted with Namur solenoid valves

- All linear actuators must have in standard, pistons with magnetic strap giving the possibility for electrical position indication

- The operating media shall be of dry, non lubricated air and the maximum particle size must not exceed 40microns

- The air supply maximum pressure shall be 10.0 bar (The pressure shall generally be adjusted between 2.5 up to 8,4 bar)

- The actuator must be suitable for both indoor and outdoor installation with minimum corrosion resistant class: CRC 3

The material of constructions shall be of:

- Extruded profile must be AlMgSi alloy with anodised surface
- Non extruded profile must be minimum SS304
- Cover and flanges must be AlMgSi alloy with anodised surface
- Piston must be AlMgSi alloy
- Piston rod must be minimum SS304

1.15.3 Air pressure regulator, filtration and Auto drain service unit

Sizing of service unit shall be dependent on the air requirement and the distribution pipe size. The compressed air filter must be able to provide minimum air quality at 40µ and pressure regulating range from 0 to 10bar.

The electrical driven auto drain unit must be able to detect condensate level even with high oil contain and provide immediate discharge by itself. The auto drain unit must be able to operate in both automatic drain as well as manual drain. Besides that, it should allow either end of line installation or combine installation with filter regulator unit.

Where the use of electro-pneumatic positioner is required in the systems, additional micro filter of 0.01µ must be used.

1.15.4 Solenoid Valves (stand-alone unit)

All solenoid valves must have a connection interface to the actuator or must come with a conversion plate to the appropriate interface.

Materials used for the solenoid valves and the surface protection must in any case prepare for a minimum corrosion protection CRC3 and a minimum enclosure of IP65 to allow outdoor and indoor installation without restriction under the weather conditions of Malaysia with high temperatures and high humidity along with condensing water.

All solenoid valves shall be designed to be maintenance free and for use with oil-free compressed air. All solenoid valves shall be designed, certified and tested as follows:

- Working temperature range : –10 C up to + 60 C
- Working pressure : 2 to 10 bar
- Air flow capacity : min. 900 l / min
- Coil must be exchangeable
- Cycle time “ON” time not more than 50ms
- Cycle time “OFF” time not more than 100 ms

1.15.5 Valve terminals (integrated with/without bus interface)

The valve terminals must be a modular design with capability of supporting up to minimum 25 units of solenoid valve. The design of the valve terminal must be base on the following,

- The configuration of the valve terminal must be flexible and able to assembly with mixture of flow pattern, port size, etc

- Double coil actuation and Single coil actuation
- Valve terminal must have basically a multi-pin connector
- Valve Terminal with bus interface must be able to integrate with digital/ analogue In-and Outputs module
- Valve terminal with multi pin connection must be extendable for Bus-Interfaces without exchanging the coils and terminals.
- The material used for the valve terminal must be able to use for outdoor and indoor installation and with a minimum corrosion protection up to CRC3 and minimum IP protection of grade 65.
- Working temperature range : –10 C up to + 60 C
- Working pressure : 2 - 10 bar
- Air flow capacity : min. 360 l / min
- Cycle time “ON” not more than 50ms
- Cycle time “OFF” not more than 100 ms

1.15.6 Pneumatic Plastic Air Tubing

For guaranteed optimum in connection of elastic tubing the tubing must be outside calibrated to guarantee a proper and absolutely tight connection as well as a multiple releasing and clamping. All tubes are subject to a special defined thickness, Shore-hardness, surface and ovality. The fittings to be used must not have any reduction of the nominal size of the piping system. The surface of the tubes must not have any manufacturing dependant defects as scoring. The Shore hardness to be 90 Shore A to 70 Shore D

The tubing to be used must base on the following design,

Material	:	Polyethylene
Colour	:	Black
Resistant	:	UV resistant, Hydrolysis resistant, Chemical resistant and Microbes resistant
Bending radius min.	:	65 mm (for 12mm OD tubing) Calibrated inside / outside diameter
Maximum working pressure	:	10 bar
Temp.-range	:	- 35 C up to + 80 C

1.15.7 Pneumatic Fittings and connections

All fittings for connection of elastic tubing must be of quick-connecting type to allow a multiple releasing and clamping. Securing by means of interlock / threaded clamping ring is non acceptable.

The locking of the elastic tubing is to be done by only pushing the tube into the fitting – a self locking mechanism, consisting of push / pull- ring and a stainless steel claw (which has to secure the tube without damage) has to guarantee a proper and 100% secure and leakage- free holding of the tube without damage the tubing. Additionally the mechanism must allow removal of the elastic tube from the fitting by just pushing the push/pull- ring without damage of any part.

For guaranteed optimum in connection of elastic tubing the appropriate tubing must be outside calibrated to guarantee a proper and absolutely tight connection

Additionally the tubes are subject to a special defined thickness, Shore-hardness, surface and ovality.

Fitting to be used must design base on the following:

Push / pull- ring	:	Polycarbonate
Elastomer	:	Nitrile / fluor caoutchouc
Body	:	Nickel plated brass / SS 304
Clamping segment	:	Nickel plated brass / SS 304
Threaded piece	:	Nickel plated brass / SS 304

1.15.8 Pneumatic Training

The pneumatic supplier / system provider must be able to conduct pneumatic automation training to the client, operator and maintenance team.

The training shall be carried out by the pneumatic brand principle. The trainer and courses must be approved by Malaysia Human Resources Development Council (HRDC). This is to ensure the training courses is well structured and there is continues skill development for the end user technical team.

1.16 FILTER UNDERDRAIN

1.16.1 Scope of Work

The work under this section includes furnishing, and testing a filter system consisting of filter underdrain system complete with underdrain blocks, flume bridging, Anchor rite mechanical anchor wedge and anchor rods.

One manufacturer shall supply the above equipment. The installation contractor shall install all equipment. Concrete, grout, sealant, anchor adhesive, mechanical equipment anchor bolts, filter system piping and electrical conduit/wire shall be furnished and installed by the installation contractor.

1.16.2 Manufacturer

The underdrain system shall be a standard product of a filter manufacturer who has been actively providing air/water backwash filter underdrain systems for at least 10 years.

1.16.3 Performance Requirement and Design Basis

The filter system shall be designed to operate and incorporate using the existing air blower and backwash pump except for Lamella filter which a new air scour system will be provided. The design must be guarantee in terms of backwash performance, filtered water quality and filter run time or as per specification written in this tender document.

1.16.4 Underdrain Equipment

A. General

The filter underdrain system shall be designed and installed to ensure long-term stability in its operating characteristics. It shall be resistant to changes in headloss, flow uniformity, and any other effects, which would in time cause loss of efficiency or effectiveness in its operation.

B. Underdrain Block

The underdrain system for the filters shall be of the 'Dual-Parallel Lateral' type whereby two feeder and two compensating laterals are provided in a single block system. The cross-section of the underdrain shall be so arranged that the feeder (or primary) laterals are adjacent and connected to the compensating (or secondary) laterals through a series of orifices.

The orifices shall be located at four different elevations and sized to provide uniform distribution of air at a rate in the range of 2.5 - 5 scfm/ft^2 (46-91 m/hr) and water up to 25 m/hr. The feeder primary laterals should provide at least 60 square inches (387 cm^2) of cross-sectional area per block to minimize flow velocity during backwash.

The height of the block shall be of Low Profile Type. The Low Profile Block is required in order to allow for greater media depth and more height for air/water backwash, also less error for block installation and consume less grout.

The compensating laterals shall provide essentially uniform pressure and flow distribution from the top of the blocks. The discharge flow from the top of the blocks into the filter bed shall be provided by a minimum of twenty-two (22) dispersion orifices per square foot of filter area (237 per square meter). The orifices shall be not less than 6mm diameter and shall be recessed from the surface by approximately 3.2 mm. The top of each orifice shall be encircled by a depression approximately 3/8" x 3/4" (9.5 x 19 mm) which shall act to prevent the gravel support media from resting directly on and thereby blocking the dispersion orifice.

The individual blocks used in the system shall be of impervious high-strength, completely corrosion resistant high density polyethylene material, having uniform smooth surfaces and all orifices properly molded. The blocks shall

have ridges and pockets for structural rigidity and to key into surrounding grout, preferably with Grout Grip that prevents Blowout. The block dimensions and weight shall permit ease of handling and installation. The blocks shall be mechanically joined to form a continuous lateral run equivalent to the length of the filter cell. The joints shall be single gasketed, snap lock, bell and spigot type with internal registers, and the joints are to be air and watertight.

The plastic underdrain shall be suitable for use with backwash air temperatures to 200°F (93.3°C).

The manufacturer of the filter underdrain blocks shall submit 3rd party certified test report for pull out strength test, burst pressure testing & internal pressure testing to the Tender.

The filter underdrain system shall also be designed to withstand a net downward loading of not less than 1400 psf (0.67 Bar), plus its own deadweight.

The filter media support gravel layer shall be lightweight and robust design of the M-plate type, manufactured of HDPE material that ensure even distribution of backwash air and water for increased run times and lower operating cost. The media retainer shall be ¾" thick (19mm).

Each block shall have wedge shaped ribs on the bottom of the block to key into the floor grout and provide uplift resistance. Threaded rod shall be inserted between each block lateral and embedded a minimum 5" (125 mm) in to the filter floor and fastened by suitable epoxy adhesive.

Accessories required to complete the underdrain lateral shall be provided. These shall be, as applicable, end caps to close the ends of the laterals, sealant for the end caps and block joints, and carbon steel anchor rods for the flume block.

The manufacturer shall also have successful track record of minimum 5 years for the type of underdrain system that have been previously installed in a filter of similar dimension in South-East Asia. The contractor shall submit the references for the above in the Tender.

The underdrain block shall be able to allow mechanical anchoring option in the middle part of the block, with the approved method / mechanism to be ANCHOR-RITE or equivalent.

1.16.5 Installation

1. The grout used in installing the blocks shall have a minimum compressive strength of 2500 psi after 30 days of curing. All grout used in installing the blocks shall be made of one part cement and two parts clean sand. The grout shall be furnished by the contractor.

2. Care shall be exercised in preparing the filter floor slab that it is level in elevation.

3. Anchor rods shall be installed across water distribution flumes to hold the underdrain block against uplift force during filter backwash. They shall therefore be properly installed and grouted as recommended by the underdrain manufacturer. Height of the anchor rods shall be measured from the high point of the filter floor and the top of each anchor rod shall be at the same elevation within ± ¼ - inch.
4. The filter blocks shall be set in relatively level rows on a bed of grout over the filter floor slab. Plates for closing the ends of each row of blocks shall be furnished by the filter manufacturer. After setting and aligning the blocks, all spaces between the rows of blocks and walls shall be filled with grout so that the entire bed is totally sealed and held firmly in place. Care shall be taken to prevent any grout from entering the lateral channels, orifices or from being deposited in any manner which would interfere with flow.

5. Following the installation, the system shall be completely cleaned and washed free of all loose materials and debris. The underdrain shall be allowed to set for three days before applying internal water pressure.

6. The system shall be checked by following the backwash procedures. The uniformity of distribution, and factors such as structural stability of the installation, shall be observed. The system shall be installed and tested completely in accordance with the specifications of the filter manufacturer, and under the direction of an experienced superintendent provided by the filter manufacturer.

7. Place filter media and support gravel in strict accordance with the filter media supplier recommendation. The filter media must comply with SIRIM MS 1816:2005 – SAND AND GRAVEL FOR USE IN POTABLE WATER SUPPLY SPECIFICATION.

8. Wash each layer of media by backwashing. Each media layer shall have fines scraped after backwashing.

1.16.6 Manufacturer Services

The filter manufacturer shall furnish the services of a competent and experienced representative who has complete knowledge of proper operation and maintenance of the equipment.

The manufacturer must be represented by an exclusive distributor with local support which is preferred. After sales service of the product from an exclusive distributor appointed no less than 2 years from the manufacturer is required.

1.17 AIR SCOUR SYSTEM

The scope of work shall include but not limited to: -

- Two (2) sets of air scour blowers (one duty and one standby)
- Two (2) sets of suction filters complete with silencers (for each air blower)
- Two (2) sets of pressure indicators (for each air blower)
- Pressure relief valves designed to exhaust the entire output of the blower without overloading the blower motor.
- Check valve and pressure indicators.
- Soft start device with motorised butterfly valve.
- Venturi pressure differential flow meter.
- Motorised butterfly valves for filter bed air scour inlet pipe.
- Pipework, valves, fittings and all ancillaries necessary for complete installation and proper functioning of the system.

The blower shall be rotary positive displacement `Roots' type driven by an electric motor directly coupled through a flexible coupling or a belt pulley drive. Each blower shall be capable of providing sufficient air at the necessary pressure to the most remote filter bed. The speed of the blower shall not exceed 1500 rpm. The blowers shall be suitable for continuous and intermittent operations.

Air shall be drawn from the atmosphere through a filter with silencer and shall discharge into the delivery mains to the filter where it will discharge through holes drilled in the air header system, or into a plenum system under the filters. The air delivered shall be completely oil-free. The suction filter shall be suitable for continuous service and readily cleanable. Air must be completely oil free.

Pipework for air scouring system shall be arranged such that no water will be collected in any part of the pipe system. The pipework shall be fabricated from mild steel spiral welded sections with surface treatment as specified elsewhere in the specification.

1.17.1 Electric Motors for Blower

The motors shall be produced by a reputable manufacturer and shall be of three phase, TEFC squirrel cage, suitable to operate at the voltage specified in the electrical section. Motors shall be suitable for continuous operation at a speed not exceeding 1500 rpm and comply with BS 5000: Part 99:1973 and BS 4999 where applicable.

The motors shall be capable of operating continuously at rated output at any voltage within the ranges of normal voltage fluctuation. Motors shall be designed to operate for a period of not less than 5 minutes at a voltage of 25% below nominal value and at normal frequency without injurious over-heating. Enclosures for motors shall afford a protection of not less than IP55 and shall be designed for IC411 method of cooling.

The motor winding shall have Class “F” insulation and shall be suitably impregnated to withstand damp, tropical conditions.

The motor shall provide at the required speed, adequate torque for the pumping duties at not more than 90% of motor rated output.

Temperature sensitive thermistor devices shall be embedded in each winding of motors. Suitable thermistor control relays shall be provided for mounting in the starter cubicles. A lamp indicator shall also be provided. All bearing shall be fitted with oil or grease lubricators. Terminal boxes shall

be conveniently located and of adequate size to accommodate all connection requirements.

The motors shall be coupled to the pumps via a flexible coupling. All motors shall be adequately earthed to meet the requirement of the local electricity supply authority.

The combined speed torque curves for pumps and motors shall be provided by the Contractor.

The power factor of each motor shall not be less than 0.85 lagging under any conditions of load and the Contractor shall if he deems it necessary include capacitors of suitable size to raise the inherent motor power factor to the above figure.

Inter-connecting control cables between the pump switchboards, pump motor and water tank shall be in multi-core PVC/SWA/PVC copper conductor cables and of size recommended by the pump manufacture but not less than 2.5 sq.mm

1.18 BACKWASHING SYSTEM

1.18.1 Flow Rate

The filter backwash system shall be utilizing the existing backwash pump. The washing rate shall be design as to the existing pump capacity.

A flow indicator shall be duplicate on each the filter local control panel. The local control panels shall be located in the filter gallery.

The contractor shall design the backwash system to ensure no media carry over during backwash.

1.18.2 Backwash Initiation

Backwashing shall be initiated by any one of the followings: -

- When the headloss across the filter reaches a preset amount (corrected for actual plant flow);
- Turbidity breakthrough;
- When a predetermined period since last backwashing has elapsed;
- Manually.

When a filter is initiated for backwashing, the backwashing operation shall only commence if the water level in the wash water storage is at or above a minimum setpoint to ensure adequate wash water is available.

The control system shall be such that only one filter (whether the existing filters or the new filters) is washed at a time. If a second filter is initiated for backwashing while one filter is being backwashed, then the second filter shall be placed in queue until the washing of the first filter is completed.

1.18.3 Backwash Sequence

The individual filter beds shall be backwashed sequentially by a two-step process consisting of a air scour followed by a period of water wash. The design of the backwash shall allow stratification of the filter media either during backwash or at the end of the backwash, the weir level of wash water channel shall be correctly design and set to avoid loss of media. The bed expansion shall be around 25-30% for stratification purposes. The duration of the wash and wash rate shall be fine tuned by the contractor according to the selection of filter media.

1.18.4 Pipework Velocity

The filter valving, pipework and underdrain system shall be designed such that the specified maximum wash rate can be achieved with velocities not exceeding the following:

- 2.5 m/s for valves;
- 2.5 m/s for wash water supply pipework to filters;
- 2.5 m/s for waste wash water pipework.

1.18.5 Air Scour Rate

Air scour rate shall be manually adjustable.

A flowrate indicator shall be provided. Measurement shall be by a flow transmitter of the differential pressure type (see specification on Instrumentation section). The indicator shall be located in a suitable position in the control room as well as in the filter control gallery.

Pipework of the air scouring system shall be designed to avoid any water to become trapped in the pipework.

SECTION G-3: INSTRUMENTATION, SCADA SYSTEM AND CONTROL

1.0 SCOPE OF WORKS

The Contractor shall design, supply, install and commission all instruments, programmable logic controllers (PLC) and associated software, operator interface workstations (SCADA) and associated software, PLC/SCADA communications equipment, local man-machine interface, control panels, cabling, and software. These systems and equipment shall be collectively referred to as the instrumentation and control (I & C) system.

1.1 REGULATIONS

Materials and workmanship shall be in accordance with the appropriate Malaysian standards unless specified otherwise.

In the absence of appropriate Malaysian Standards or local codes or guidelines, international or overseas standards, codes or guidelines recognised in Malaysia, shall be observed.

1.2 INSTRUMENT, SUPERVISORY AND LOCAL PANEL

1.2.1 Panel Design and Construction

All instrument, local control and supervisory panels complete with all associated equipment and terminal racks, etc., shall generally be free-standing floor-mounted cabinets of the cubicle or desk pattern as indicated in the Drawings and will hereafter be referred to as panels. The panels shall generally conform with the requirements of Section 10.2 unless otherwise specified in the following clauses.

The height of panels shall not be greater than 2250 mm overall excepts for panels of the desk-pattern which shall not exceed 1400mm above the finished floor level unless otherwise shown on the Drawings. Front-of-panel instruments and controls shall be so mounted that the heights of their centers above the floor shall, unless otherwise agreed by the S.O., be between 1800mm and 900mm for indicators, 1500mm ad 900mm for recorders and 1800mm and 1200mm for alarm fascias and signal lamps and 1500mm and 750mm for manual control devices. Control switches and pushbuttons shall be positioned below or adjacent to any associated reading instrument. Panels for use in locations other than control rooms shall have anti-vibration mountings.

Status indication lamps on supervisory panels and mimic diagrams shall be of the multi-coloured LED type capable of providing at least red, green and amber coloured illumination depending on the status of the equipment it represent.

The clearance between the extremities of apparatus mounted on the internal walls shall allow safe and convenient access to all terminals and to parts requiring maintenance and in the case of foot-ways between such apparatus the clearance shall be not less than 750mm.

Panels shall be made of prime quality, cold rolled and annealed mild steel sheet of adequate thickness and suitably braced to form a rigid structure without welded cross-struts, and is to be of such a width and depth convenient to house the associated instruments, annunciators, terminal boards, etc. so as to permit easy access for maintenance of such equipment. The panel sheet thickness shall be chosen with due regards to the panel size, number of cut-outs, instruments weight, position of centre of gravity and method of fabrication, with the following minimum thickness: -

Instrument bearing surfaces)

Gland plate	)	
Pneumatic distribution plates	)	3 mm
Desktops	)	
Internal mounting plate	)	
Doors, covers, filler panels	)	2.52 mm
Hollow square sections	)	40 x 40 x 3 mm
Main frame angle	)	50 x 50 x 6 mm

Panel fronts shall be flat and free from bow or ripple. Exterior corners and edges shall be rounded to give a smooth overall appearance.

Stiffeners shall be provided where necessary and shall be welded to the interior of the panels in places where they do not interfere with the access to or operation of any part or with the installation of future instrument or component. Supporting frameworks, where used shall be of all-welded construction using mild steel angle or hollow square sections. The framework shall be suitable for supporting all cable trays, terminals, air headers and pipe runs to individual instruments and for any item of equipment mounted within the panel. Secondary support may be provided by specially designed structural sections. The framework shall not interfere with connections to instruments or with access required for adjustment, maintenance servicing or removal.

Unless otherwise approved, each panel shall be mounted on self-draining base frame fabricated from 150mm deep, steel channel section and which shall be drilled or provided with clamps for bolting to the floor. The base frame shall be set back from the panel front face to give a toe space of not less than 25mm. The outside of the base frame shall be covered with an approved kicking strip.

All welds used during panel construction shall be full and continuous except those for stiffeners which may be intermittent.

Ceiling and other filler panels shall be fabricated from sheet steel and adequately stiffened. Each section shall have 50mm returned edges along all four sides and shall be braced to the main steelwork of the panel.

A gland plate shall be provided inside and 300mm above the level of the base frame, having openings suitable for the bottom entry of cables. The panels shall be bolted to hot dipped galvanized `U' channels across the trench.

Sufficient removable, undrilled gland plates shall be fitted close to the appropriate terminal blocks not less than 300mm above the floor level. Removable size covers to the gland plates shall be incorporated, or any other arrangement that shall give adequate access to the underside of the gland plates and at the same time a vermin proof construction.

Panels containing pneumatic or other instruments using a fluid transmission medium shall have distribution plates with bulkhead unions for the termination of internal and external pipework.

Panel shall be supplied with hinged access doors fitted with chrome plated lockable car-type handle operable from inside even when locked. All doors in one panel shall use the same lock and key combination. Doors shall be rigid, of folded construction, open outwards and provided with close fitting flexible seals to prevent ingress of dust and vermin. Hinges shall be of the lift-off pattern and one hinge shall engage before the other for ease of fitting.

No equipment other than front-of-panels items shall be mounted on internal panel surfaces and adequate provision shall be included for mounting-plates and brackets which shall, if necessary, be hinged or otherwise arranged to give quick and easy access to equipment securing screws, terminals and wiring.

A drawing pocket of minimum size 250 mm x 250 mm x 20 mm shall be provided on the inside door of each panel.

The panels shall be designed to ensure adequate ventilation and air circulation without permitting the entry of vermin or the ingress of dust as far as practicable. Panels installed in a dusty environment shall be provided with non-combustible dust filters over the air circulation louvres.

If electrical and non-electrical instruments are mounted in the same panel, the panel shall be sub-divided internally to separate the electrical and non-electrical sections. All connections shall be arranged to ensure that no accidental damage to cabling or electrical components can occur in the event of failure of any non-electrical components or connection.

All panel constructional details and arrangements shall be approved before manufacture and will be subject to inspection at agreed stages.

The panel shall be made of electro galvanised sheet steel of rigid construction. Before painting, the plates shall undergo pre-treatment process of cleaning with water and chemical solutions as follows:-

- Degreasing and rinsing
- Derusting/Descaling and rinsing (Applicable for cut off edges and welded areas)
- Zinc phosphating and rinsing and
- Chromate passivation and final rinsing

Metal surfaces shall be finished with a rust proof polyester power coating with an electrostatic spray process and shall be oven baked at 150C for 10 minutes. The dry film thickness shall be at least 65 microns. The paint thickness shall be made on dry film using magnetic or eddy current properties.

The painting shall also conform with the requirements of Section 10.2.

The final coat shall be to a colour and finish approved by the S.O.

1.2.2 Panel Lighting

Each floor mounted panel shall be adequately illuminated internally, as evenly and as free from dazzle as possible, by fluorescent lighting controlled from totally enclosed door operated switches. The lighting circuit shall be independently fused and designed to allow lamps to be replaced safely.

1.2.3 Panel Heating

Each cubicle shall be fitted with one or more thermostatically controlled tubular heaters to prevent condensation and assist ventilation. The rating shall not exceed 100 watts per metre, and the surface temperature of any part that may be contacted accidentally shall not exceed 650c.

The heaters shall be so situated that no deterioration can be caused to any of the apparatus or wiring in the cubicle. The heating circuit shall be independently switched and fused complete with an ELCB of 30mA sensitivity, and controlled by a suitably labelled, rotary pattern, enclosed switch mounted in an accessible position within the cubicle. Heat resistant cables shall be used for connection to the heaters.

Thermostats shall be mounted remote from the heaters and shall be fully adjustable over a range of not less than 0 to 500C.

1.2.4 Panel Wiring

Panel circuits shall be segregated into the following categories:-

Group 1 Power, control and very high level signal wiring (above 50V)

- ❒ 1 AC power supplies;
- ❒ DC power supplies;
- ❒ AC current signals above 50 MA (eg CT circuits);
- ❒ AC voltage and control signals above 50 volts (eg VT circuits);

Group 2 High level signal wiring (6 to 50 V de)

- ❒ signals from conventional electronic transmitters and controllers (eg 4-20 mA);
- ❒ circuits to alarm annunciators and other solid state devices (excluding those in categories 2.1, 2.5, 3.1, 3.2 and 3.3);
- ❒ digital signals;
- ❒ emergency shut-down and tripping circuits;
- ❒ on/off control circuits.

Group 3 Low level signal wiring (5 V DC and below)

- ❒ signals from thermocouples;
- ❒ signals from resistance thermometers and re-transmitting slide-wires;
- ❒ signals from analytical equipment and strain gauges.

Group 4 Interconnecting wiring (between relays etc)

- ❒ AC above 50 V;
- ❒ DC above 50 V;
- ❒ DC 50 V and below.

For Group 3 wiring, the external cable shall be gland to the panel gland plate. Internal connections to the instruments shall be carried out by one of the following methods

(a) The twisted, screened conductors of the external cable shall be led direct to their appropriate instruments via ducting systems installed for this purpose during construction of the panel.

(b) The conductors of the external cable shall be terminated on terminals segregated from each other and from all other categories and the connections to the appropriate instruments shall be made using twisted pairs with individual screening installed for this purpose during construction of the panel.

The maximum potential between any two points within the panel shall not exceed 250 volts. Separate ducts, thinking, cable looms, tray work etc. shall be provided within the panel for each category with at least 150 mm between parallel paths of Group 1 cables and those of any other Group.

Internal wiring for all circuits in Group 2 except those sharing a common connection shall be multi-stranded, twisted pair, 1.5 sq. mm minimum copper conductors with HDPE or PVC insulated cable of adequate grade and rating. Wiring for circuits in other Groups or sharing a common connection shall be run in stranded, 1.5 sq. mm minimum copper conductor with 600 V grade, PVC insulated cable of adequate grade and rating.

Wiring sheath colours shall be red for phase and black for neutral for AC circuits, grey for DC circuits and white for emergency shut-down and tripping circuits. Circuits supplied at 240 V A.C. or above, between 24 V and 1 10 V DC, shall also be segregated from each other and from other circuits. Access to wiring and components of circuits having voltages exceeding 240 V shall not be possible unless and until the circuit has been isolated.

All wiring shall be neatly and securely fixed by insulated cleats, bunched and secured by approved plastic strapping or run in approved insulated wiring trunking or non-corrodible flexible tubing. Not more than 75% of the capacity of g, ducts, or tubing shall be used. Insulated earth wiring shall be so arranged that access to any equipment or connection point or the removal of any item of equipment is unimpeded. Wiring for future equipment shall be secured and terminated on terminal blocks. Lacing for wiring looms shall be of rot-proof cord or plastic strips. Inter-section wiring in multi-section cabinets shall be via a terminal block in each section.

Any panel mounted device to which connections are made by means of a plug and socket instead of a terminal block, shall be wired in a flexible cable of adequate rating between the 'free' plug and socket and a fixed terminal block.

Identification ferrules shall be fitted at both ends of all wires. The ferrules shall be of insulating material with permanent black characters on a glossy white or yellow background unaffected by oil or water. They shall be arranged so that they can be read logically from left to right when viewed normally.

A terminal block shall be provided as an interface between the corresponding conductors of each internal and external connection. The terminal blocks shall be mounted vertically where possible and at least 230 mm from the gland plate. Each wire connected to a stud type or screw type terminal in panel mounted equipment shall be terminated onto a crimped-on terminal. Not more than one core of any external cable or internal wire shall be connected to any terminal.

Terminal blocks for analogue current signals shall be of Klippon type SAKC which permits the introduction of a test milliammeter without disconnecting any wiring. Terminal blocks for circuits containing volt free contacts internal or external to the cabinet shall be of the Klippon type SAKC or equal permits the introduction of a test continuity meter without disconnecting any wiring. Each row of terminal blocks provided shall contain at least 25% spare terminal over the number required for terminating all cores of external cables in that row. All spare cores of external cables shall be terminated in the terminal block and labelled accordingly.

Panel wiring identification and terminal blocks shall generally comply with appropriate clauses in Section 10.2.

1.2.5 Panel Earthing

A continuous copper earth bar of not less than 25 mm x 6 mm cross section shall run the full length of each panel and be securely fixed and bonded electrically to the main frame. The cable gland plates and the earth bar shaft be provided with suitable brass terminal of not less than 8 mm International Standard screw thread for connection to the metal cladding or armouring of all incoming and outgoing cables and to the station system.

A second continuous earth bar of not less than 25 mm x 6 mm cross section, electrically isolated from the steelwork of the panel and metal cladding and armouring of cables, shall be provided for the signal earth connection of each instrumentation and control device to the station instrumentation earth mat. The earth bar shall have sufficient brass terminals as specified above for each instrumentation and control device and the screen of every shielded cable plus 25% spare terminals.

Each earth bar shall be electrically bonded to the corresponding bars in the adjacent section(s).

1.2.6 Panel Protection

Adequate facilities for isolation and protection by miniature circuit breaker or fuse for each circuit and sub-circuit shall be provided and shall be so arranged that any fuse failure causes minimum disruption of plant, operates and appropriate alarm and cannot result m any unsafe operating condition.

All miniature circuit breakers shall comply with Section 10. All fuses shall be of the HRC cartridge type. Fuse and solid link carriers and bases shall be made of plastic moulded insulating material of an approved make. Ceramic materials will not be accepted. All live connections shall be effectively shrouded and it shall be possible to change fuses with the circuit live without danger of contact with live metal. The fuses shall be rated to give maximum protection to the apparatus in circuit and the rating shall be inscribed on the fuse label and on the fuse carrier.

An adequate number of spare fuse cartridges for each rating shall be supplied and fitted in clips inside the panel. Fuses and links in the same circuit shall be mounted opposite each other in separate rows and shall not alternate in the same row. At least 20% spare fuses and links shall be provided. Descriptive circuit labels shall be fitted adjacent to all fuses and links, the layout of which shall correspond with the wiring diagram.

Each instrument requiring a power supply shall be individually wired and protected so that in the event of a failure of one circuit, the remainder are unaffected. Power supply circuits shall be of sufficient rating that any protective device may operate without reducing the voltage at the terminals of any other component to an unacceptable level. Remote alarms shall be operated on failure of the electrical supply to a panel.

1.2.7 Alarm Annunciating System

Alarm functions shall be indicated on internally illuminated annunciator units bearing appropriate legends and arranged on the panel m groups to be agreed with the S. O.

Each annunciator shall have at least 20% spare ways for possible future use and shall be as compact as possible without unnecessary decorative trim.

The alarm indications on each annunciator shall be logically arranged in a format to be agreed

with the 5.0. The alarm lights shall have secret legends which are invisible until illuminated. The legends area of each indication shall not be more than 30 mm high and 60 mm wide. The wording of all legends shall be approved by the S.O. before manufacture.

“Alarm accept", "Reset" and "Lamp test" pushbuttons shall be provided in the middle of the panel.

A buzzer and a siren of approved make approximately 80 decibels at 3 metres and of not less than 30 minute rating shall be mounted within the panel together with muting switches mounted inside for use during commissioning and testing. Audible devices in the same room or area shall have distinguishable sounds and adjustable sound levels.

Panel alarm annunciators and audible alarm shall operate as follows

(1) When an alarm condition occur a light behind the appropriate legend shall flash on and off intermittently and the audible &m shall sound. The flashing rate shall not be less than 2 Hz and shall not exceed 5 Hz.

(2) On pressing the "Alarm accept" push-button, the audible alarm shall be silenced and the flashing light shall become steady.

(3) The alarm indication shall remain illuminated whether or not the alarm condition has returned to normal until the “alarm reset” pushbutton has been operated whereupon the light shall be extinguished if the fault condition no longer exists.

(4) Operation of the "lamp test" pushbutton shall cause all the alarm lamps to be illuminated simultaneously and the audible alarm to be sounded.

(5) The alarm system shall respond to any new condition that might arise while an existing condition is being indicated, whether accepted or not, and to any that might occur during a "lamp test" operation.

The operation or acceptance of one alarm shall not inhibit the operation of the appropriate audible device or the flashing of the appropriate alarm indicator if a further alarm condition occurs. Alarms operated on two or more annunciator shall require acceptance at each annunciator. Alarms shall be accepted automatically and the appropriate audible device silenced after an adjustable period of 1 to 5 minutes.

Alarms shall be initiated by opening or closing of volt-free contacts which shall remain unchanged throughout the periods in which the alarm conditions exist.

Alarm circuitry, shall be arranged so that spurious or transient alarm states persisting for less than 0.5 seconds do not initiate any action. However, the suppression circuitry shall be such that repeated spurious or transient status for the same alarm occurring in a five second period shall initiate the appropriate action. The alarm system shall operate on a 24 V DC supply and be designed on the 'fail safe' principle so that a fault in any circuit component causes an alarm to be given.

1.2.8 Interposing Relays

All interposing relays shall be low voltage and be of the plug-in type and fitted with plastic dust proof covers, retaining clips, a base into which the relay plugs and external connections shall be made using easily accessible screw clamp terminals. Bases and relays shall be keyed to prevent relays being plugged into incorrect bases. If mounted on DIN rails, blocking pins shall

be provided. Space and drillings shall be provided for a minimum of 1 0% additional relays.

Relays shall be fitted with neon or LED indicator connected across the operating coil and easily visible when the compartment door is open. Relays fitted with mechanical indicator will not be accepted.

D.C. relays shall be ringed with a diode (1200 V, IA).

The number of different contact configurations on relays shall be kept to a minimum even if some relays have unused contacts, to assist in keeping spares stock to a minimum.

Multi-contact interposing relays shall be incorporated into panel circuitry where only one pair of initiating contacts is provided on the plant being monitored, for the operation of different functions simultaneously, e.g. a control initiation with alarm annunciation and data logging. The relay contacts shall be so connected that a failure in any one circuit shall have no effect on any other.

The use of spare contacts on interface relays fitted within annunciator units or other secondary circuit equipment, or any other form of cascade operation other than that controlled by the plant contacts, in which the performance of one circuit is dependent on the correct operation of another, will not be accepted.

1.2.9 Trip Amplifiers

Trip amplifiers shall be suitable for back of panel or rack mounting and shall accept a 4-20 mA DC linear signal as an input.

Single input single trip level or single input dual trip level models shall be provided according to the requirements of the Specification.

The trip amplifier shall drive down scale an open circuit.

The trip adjustment shall be mounted on the instrument front and shall be infinitely variable by a lockable single turn 260 degrees calibrated knob with 0 to 100% scale with calibration accuracy of + 1%; repeatability shall be + 0.2% span.

The trip amplifier shall be suitable for operation on a nominal 240 volt 50 HZ power supply. The power supply shall be fused and a spare fuse shall be included on the printed circuit board.

The output relay for each point shall be provided with switch contacts rated at 250 volt 5 amp 100VA AC resistive load. The state of the relay shall be indicated by a red light emitting diode (LED) display for each trip on the front of the trip amplifier. A 'power on' indication shall also be provided.

Input and output and power supply isolation to 1000 volts root mean square (RMS) shall be provided.
The trip amplifiers shall be suitable for the following environmental conditions:-

- ambient temperature : working - 20 to + 60 degrees C;
  storage - 40 to + 70 degrees C;
- humidity : 5 to 98% relative humidity
- vibration : 1 g at 15 Hz to 1 5 0 Hz no effect

Input and output terminals shall be suitable for conductors up to 2.5 sq. mm.

The trip amplifier performance shall be equal to or better than the following:

- series mode : less than 0.1 % error for 50 Hz input rejection at 50% span;
- common mode rejection : less than 0.1 % error for 250 volts RMS;
- temperature effect on trip point : less than 0.01% per °C or 7 micro volts per °C, whichever is the greater;
- supply voltage on trip point : less than 0.01% per %;
- radio frequency : all normal industrial interference and
- rejection : radio frequency up to 460 MHz shall have no effect on performance,

1.2.10 Signal Isolators

Signal or buffer isolators shall be suitable for back of panel or rack mounting and shall accept a linear 4 to 20 mA DC signal as an input. Signal isolators shall be provided in the respective supervisory panels for all signals that are required for onward transmission to the SCADA system. In addition, each signal that is to be duplicated shall be provided with a signal isolator.

The input impedance for each isolator shall be typically greater than one Mohm for voltage.

The controls for zero and range adjustment shall be mounted on the instrument front and shall include a "power on" indication.

The signal isolator shall be suitable for operation on a nominal 240 volts 50 Hz power supply. The power supply shall be fused and a spare fuse shall be mounted on the printed circuit board.

The output signal shall be 4 to 20 mA DC directly proportional to the input signal.

Input to output mid power supply isolation to 1000 volts RMS by opto-electric devices shall be incorporated.
The equipment shall be suitable for the following environmental conditions:

- ambient temperature : working -20 to +60 degrees C;
- humility : 5 to 98% relative humidity;
- vibration : 1 g to 15 Hz to 15 0 Hz no effect.

Input and output terminals shall be suitable for conductors up to 2.5 sq. mm.

The instrument performance figures shall be equal to or better than the following:

- series mode rejection : less than 0.29% error for 250 volt RMS;
- common mode rejection : less than 0.29% error for 250 volt RMS;
- radio frequency rejection : all normal industrial interference and radio frequency up to 460 MHz shall have no effect on performance.

1.3 INSTRUMENTATION

1.3.1 General

The following sections describe the minimum requirements for each type of instrument.

After the installation, the calibration of each instrument shall be proved to the satisfaction of the S.O. by direct measurement of the process variable.

1.3.2 Digital Indicators

Indicating instruments shall be of the digital type and shall be provided where indicated on the drawings. The display indication shall be a 4 digit LED display with minimum digit size of 13.5 mm. The display shall have a fully programmable decimal point.

1.3.3 Level Switches

1.3.3.1 Float Type

Each level switch shall be of the encapsulated magnetic level switch type. Each shall be supplied complete with a sufficient length of heavy duty flexible cable to provide a generous allowance for adjustment of the operating level. Switch rating shall be 24 V 10 mA.

Each level switch shall be suspended from a bracket mounted cable gland. The cable length allowed for adjustment of the operating level shall be neatly coiled and tied. The switch is to be set at the initial operating level by the Contractor as directed on Site by the S.O.

The Contractor shall provide adequate mechanical support for the level switch cables in the vessel to prevent lateral movement caused by any turbulence in the vessel.

1.3.3.2 Paddle Type

The level switch shall be of the paddle wheel type, specifically designed to be used for fine and granular solids as applicable. The switch shall be suitably mounted such that the shaft is protected from the falling material.

Switch rating shall be 24 V 10 mA.

1.3.4 Level Transmitters

1.3.4.1 Hydrostatic Pressure Type

The level sensor used in the filters 1 to 8 and the Clearwater Tank shall be of the hydrostatic pressure continuous level sensing type using piezo-resistive sensors.

The sensor shall be supplied complete with sufficient length of connecting cable, stilling tube, brackets and cable clamps. The contact diaphragm of the sensor shall have a barrier or protective cover. The sensor tube and contact diaphragm shall be stainless steel.

The sensor shall have a minimum measuring range of 4 meters (0.4 bar) with an accuracy to less than 0.5% of the output span. The sensor shall be rated to withstand a continuous overload pressure of at least 200% without sustaining damage or requiring recalibration.

The sensor shall be supplied complete with a two-wire pressure transmitter. The transmitter shall have integral over voltage protection and have an output range from 4 to 20 mA. The transmitter housing shall be IP65 and installed locally in a dry area.

1.3.4.2 Ultrasonic Type

The level sensors used in the alum and fluoride storage tanks shall be of the non-contact type, using an ultrasonic source, and designed for use with powdered solids.

The sensor shall be supplied with sufficient length of connecting cable and suspension clamps. The sensors shall be suitably constructed such that all parts liable to come into contact with corrosive substances shall be of suitable corrosion resistant material and properly sealed.

The measuring range of the sensor shall be selected in accordance with the manufacturer's guidelines such as allowing for application-specific effects on echo attenuation. The accuracy of the sensor shall not be less than 0.5% of the output span.

The sensor shall be supplied complete with a two-wire pressure transmitter with an output range from 4 to 20 mA. The transmitter shall have programmable features for storing vessel profiles and memorisation of signals under normal operation so that extraneous echoes can be accounted for.

1.3.5 Pressure Gauges

Pressure gauges shall not be less than 100mm in diameter shall be constructed of bronze or stainless steel. Gauges made of aluminium will not be acceptable.

The gauges may be mounted directly on the main system pipework or side by side on a board or panel.

Each pressure gauge shall be fitted with a stop cock immediately adjacent to the gauge, and all pressure gauge piping shall be fitted with an isolating valve at each point of connection to the main system. Where pressure gauges are mounted on panels, the isolating valve shall be suitable for the connection of a test gauge. Stop cocks of gauges shall be clearly identified by means of separate labels of approved type and lettering.

All pipe materials shall be subject to the approval of the S.O.

1.3.6 Pressure Transmitters

Each electronic pressure transmitter shall be of the capacitance, strain gauge or similar manufacture and shall transmit a current signal proportional to pressure.

The pressure shall be applied to a sensing diaphragm in the measuring section and transmitted to a measuring element connected to an electronic transmitter.

All wetted materials shall be suitable for the application. The range and maximum working pressure shall be suitable for the application. The transmitter shall provide a linear output signal of 4 to 20mA with an accuracy of not less than ±0.5% of span.

The transmitter shall be suitable for operating under 100% humidity.

Interconnecting pipework shall be arranged as short as possible and in accordance with the manufacturer's recommendations. Process isolating valves shall be provided on interconnecting pipework.

1.4 LIGHTNING AND SURGE PROTECTION

The Contractor shall provide lightning and surge protection as specified below.

In general, lightning protection units shall be provided for:

- all outdoor equipment containing sensitive solid-state electronic components
- control power cables which are installed outdoors (not inside any building), irrespective of any protective housing or enclosures which have been provided for these cables
- control panels located in an elevated, exposed location
- all analogue instrument cables

This equipment shall provide protection to the instrument circuits against surges and transients induced in signal and power lines and antennas by lightning or electrical switching.

The manufacturer's instructions for earthing surge protection devices shall be rigidly adhered to. The Contractor shall supply and install all earthing equipment required to carry out the manufacturer's instructions. Circuit earth of protected equipment shall be connected to the earth terminals of the respective lightning protection units except when such connections affect the normal operation of the protected equipment. The Contractor shall perform earth resistance tests on each earth utilised for surge protection devices and report the results in writing to the S.O.

Lightning protection units for analogue signal wiring shall be suitable for use for 4-20 mA signals at the loop power supply voltage. The units shall be rated to withstand a peak impulse current of at least 10 kA for a 8/20 microsecond pulse (8 microsecond rise time, 20 microsecond exponential decay time) for line-to-line and line-to-earth transients and shall fail to the short circuit condition.

The units shall not require manual resetting and shall self-reset when over voltage conditions have ceased.

Lightning protection units for 240 V AC control cables shall have a continuous rating of at least 4 A at 240 V AC. The units shall be rated to withstand a peak impulse current of at least 5 kA for 8/20 microsecond pulse and shall be capable of absorbing at least 100 J of energy.

The units shall provide both differential (active-neutral) and common (active- and neutral-earth) mode protection and shall be capable of being used in conjunction with a 10 mA earth leakage circuit breaker.

1.5 INSTALLATION REQUIREMENTS

1.5.1 General

The installation of all instrumentation shall generally be to the manufacturers recommendations. The final location and mounting arrangement of all equipment is to be subject to the approval of the S.O.

Where the equipment design requires earth segregation, separate protective and instrumentation earthing system shall be provided.

1.5.2 Cable Installation

1.5.2.1 General

Cables shall be carefully installed to ensure that insulation is not damaged nor is likely to be damaged in service. Cables shall either be contained in conduit or cable ducting or alternatively secured to perforated cable tray. Power cables and signal cables shall not be run in the same conduit or duct or on the same cable tray. Cables shall be run as one continuous length with no joints unless otherwise approved by the S.O.

1.5.2.2 Power Cables and Control Cables

Power cables shall be of circular section 0.6/l kV PVC insulated and sheathed cables complying with AS 3147. Sheathing shall be coloured orange.

Control cables complying with AS2373 Parts 1 & 2 shall be utilised for status and alarm signals. Sheath colour shall be black.

1.5.2.3 Instrument Cabling

All cables other than power supply cables glanded to the panels or to any plant mounted instrument shall be considered as instrument cables. All instrument cables shall include individual and overall screen, single galvanised wire armour and overall PVC sheath.

Instrument cables shall be considered in the following duty groups:-

(a) high level analog signals (e.g. 4 to 20 mA);
(b) plant state and repeat alarm signal of 24 volts DC;
(c) emergency shut down and tripping circuits;
(d) control circuits;
(c) low level analog signals.

Each instrument cable shall carry signals of only one duty group.
The cables in groups (a), (b), (c) and (d) shall be as recommended by the manufacturer of the

equipment providing the signal, but shall not be less than 7/0.5 mm.

The cores of cables in groups (a) to (d) shall be laid up in pairs with approximately one twist per 30 mm and shall include an overall screen of copper braid or mylar backed aluminium foil giving a minimum coverage of 85%. Individual and overall drain wires shall be provided.
The group (e) cables shall be as recommended by the manufacturer of the equipment providing the signal.

Instrument cables shall be segregated into duty groups; each group shall be separately fixed to trays, walls, etc. All instrument cables shall be separated by at least 600 mm from all other cables. Parallel runs of instrument cables and other types of cable shall be avoided. However, if parallel runs are unavoidable, a separation distance of not less than 1% of the length of any parallel run shall be provided with a minimum of 600 mm and a maximum of 4000 mm.

Installation of cables shall generally comply with the requirements of Section 9.5 of the Specifications.

1.5.2.4 Wiring in outdoor ducts

Wirings, cables and accessories laid in outdoor ducts which may be submerged by groundwater shall be waterproof, termite proof and shall be to the approval of the S.O.

1.5.2.5 Cable Gland for Copper Cables

Compression type cable glands shall be provided to accommodate the entry of all power, control and instrument signal cables at each enclosure.

Cable glands shall be of cadmium plated brass and shall provide a moisture proof seal onto the cables sheathing.

Glands shall be correctly sized to suit the particular cable in each instance. When required for earthing purposes, cable glands shall be provided with slip-on earth tags.

1.5.3 Conduits

1.5.3.1 General

Generally all conduits shall be rigid PVC and installed on the 'draw-in loop in' system. No wires shall be installed until all conduits are in place. Where cabling requires mechanical protection then metallic conduit shall be used or the PVC conduits shall be mechanically protected to approval by the S.O.

No conduit less than 20 mm shall be installed for any part of the installation.

All conduits shall have a minimum spare space capacity of 25% for future additions except where otherwise specified. Conduits shall be installed in such a manner to allow easy draw-in and replacement of cables; draw-in boxes shall be used where necessary to enable draw in of long runs of cables and shall not exceed spacing of 20 m. A draw wire shall be installed in each conduit. The draw wire shall be tagged as such.

Wherever inaccessible or concealed conduits change direction, the conduit shall be set with as large a radius as practicable.

Single conduit runs shall have their ends bushed via nylon bushings wherever cables exit onto neighbouring cable trays or to enclosures.

All screw or fastenings used for fixing conduit saddles shall be plated or galvanised.

Conduit saddles shall be two holed and finished to match the conduit. Saddles shall be provided within 150 mm of fittings and terminations.

1.5.3.2 Rigid PVC Conduits

Rigid PVC Conduit and fittings shall be of high impact strength heavy gauge complying with AS 2053. All fittings and accessories shall be secured with an approved solvent cementing compound. Screwed joints shall not be permitted.

Rigid PVC conduits will not be permitted in the following locations, unless otherwise specified:

- where exposed to mechanical damage
- where exposed to direct sunlight
- where subject to an ambient or contact temperature exceeding 60°C or below 5°C.

Rigid PVC conduit shall be installed so as to enable cables to be 'drawn-in' after erection and junction boxes are to be provided for this purpose. Inspection type fittings are not permitted as draw-in points.

Rigid PVC conduit shall be securely fastened with two hole saddles at a maximum spacing of 460 mm, where necessary to eliminate sagging in the conduit additional saddles shall be provided. Where rigid PVC conduit is installed across rafter or joists in roof spaces, it shall be fastened to the side of a timber batten to approval.

Where any straight section of rigid PVC conduit exceeds 3 800 mm in length, an approved expansion joints shall be provided for each 3 800 mm or part thereof along the entire length of the straight section. Conduit clips shall be installed so as to allow the conduit to move freely, longitudinally, while expanding or contracting.

All sets and bends in rigid PVC conduit shall be made using approved internal springs of correct size to prevent wall collapse. Conduits in which any collapse of walls is evident will be condemned.

1.5.3.4 Flexible Conduits

PVC sheathed flexible metallic conduit shall be used for final connections to plant devices subject to vibration or where mechanical protection is required. The flexible metallic conduits shall be complete with oil-tight, water proof end fittings. Where cables are required to enter an enclosure via cable glands, the flexible conduit end fittings shall be attached via a bracket secured to the device or nearby structure at a short distance from the able gland.

Flexible PVC hose shall be used to enclose building wire between rigid PVC or metallic conduit and final devices, eg, switches, general power outlets, light fittings, etc. Screw in hose fittings shall be used to terminate the PVC hose at the conduit and final device.

1.5.3.5 Metal Conduits

Metallic conduit and fittings shall be screwed steel complying with AS 2052.

Fittings shall comprise screwed elbows, tees, bends and draw-in boxes.

Conduits and fittings shall be of black enamelled or galvanised finish as specified elsewhere.

1.5.3.6 Surface Conduit Installation

Conduit run on the surface and exposed to view shall be run parallel to walls, doors and structural members. The conduits shall be symmetrically set and evenly spaced with sufficient saddles to eliminate sagging.

All elbows, tees, draw-in boxes and other fittings shall be of the inspection type and shall be securely fixed individually.

1.5.3.7 Underground Conduit Installation

These shall be installed at a minimum depth of 600 mm and embedded in selected material. All backfilling and compaction shall be to the satisfaction of the S.O.

1.5.4 Brackets and Fixing

All necessary brackets for mounting of wiring systems, etc, shall be provided by the Contractor. In general brackets shall be fabricated from mild steel sections or plate of adequate size and thickness and shall be hot dipped galvanised after completion of fabrication and drilling.

Fixings shall be by means of galvanised bolts, nuts and washers. Fixings into brickwork or concrete shall be by means of galvanised expansion bolts excepting that plastic plugs with stainless steel screws or locking pins may be used for securing conduit saddles. All holes for fixings shall be neatly drilled to the correct size and depth. Explosive powered fixings shall not be used.

Fixings to structural steel shall be in the form of the clamping to webs, rails, etc. Drilling or welding of structural steel members will not be permitted.

1.5.5 Earthing

The earthed neutral system is in use by the Supply Authority and the Contractor shall observe all related requirements. The earth cable shall be bonded to every individual item of electrical equipment so that the earthing is electrically continuous.

Earth wires shall be enclosed with their respective circuit runs throughout their length.

Earthing links of sufficient size for all incoming and outgoing cables shall be provided in all electrical cabinets.

All exposed metals in SCADA equipment shall be solidly earthed to the incoming earth conductor. Where the equipment design requires earth segregation separate protective and instrumentation earthing system shall be provided.

1.6 TESTING AND COMMISSIONING

1.6.1 Inspection and Tests

All reasonable tests considered necessary by the S.O shall be carried out in accordance with the appropriate British Standard.

All work will be subject to inspection and factory witness of testing by the S.O prior to delivery. Full and uninterrupted access to the Contractor's works shall be provided at all times during manufacture. Three working days prior notice shall be given by the Contractor to the S.O.
Should any defect show up or develop or the capacity or efficiency fall below that guaranteed, either during tests or during the period of warranty maintenance whether due to defective design, materials or workmanship, or to any fault of the Contractor or his Agent, the S.O shall allow the Contractor a reasonable period of time to make good such defects at his own expense.
Test certificates of all tests carried out in the factory shall be supplied.

As soon as possible after installation of the equipment, the S.O may carry out a series of tests under the specified working conditions, at which the Contractor will be required to be present, to determine whether the performance, in situ, agrees with the guarantees.

1.6.2 Pre-commissioning and Commissioning

The Contractor shall be responsible for carrying out the following checks and any other that the S.O may reasonably consider necessary to prove that the Works, as installed, operates correctly and meets the requirements of the Contract.

a Electrical continuity of all wiring.

b Verifying the setting of all adjustable devices such as level regulators, float switches, timers, etc including software timers and registers.

c Provide fully documented test of commissioning records including the result of all measurements and settings of all adjustable devices such as level regulators, float switches, motor on-load and full load current, etc.

d On completion of the pre-commissioning tests, the Contractor shall notify the S.O that the installations are ready for commissioning tests which shall be carried out by the Contractor and witnessed by the S.O.

SECTION G-4 : TESTING AND COMMISSIONING (SITE TESTS)

1.0 ERECTION PERSONNEL

The Contractor's Representative and workmen referred to in the Conditions of Contract shall include at least one approved skilled working erector to supervise the erection of the Plants and sufficient skilled, semi-skilled and unskilled labour to ensure completion of the Works in the time required. The Contractor shall not remove any supervisory staff or skilled labour from the site without the S.O.'s prior approval.

The Contractor's erection staff shall arrive on the site on dates to be agreed by the S.O., who will give to the Contractor one month's notice in writing of the dates on which they will be required. Before they proceed to the site, however, the Contractor shall first satisfy himself, as necessary, that sufficient Plant of his (or his sub-contractor's) supply has arrived on site so that no delay will be incurred on this account.

The Contractor also shall submit to the S.O. full particulars of his (or his sub-contractor's workers including their experience etc. for approval before they are sent to the Site. Should the S.O. feel that the staff, workers are not sufficiently qualified or experienced to provide such first class installation as required by this Specification, the Contractor shall provide such approved workmen to the S.O.'s satisfaction as part of this Contract.

The Contractor shall be responsible for setting up and erecting the Plants to the line and level required and shall ensure that the Plant is kept in position whilst being built-in and he shall not pass this responsibility to another contractor.

1.1 ERECTION

The Contractor shall be responsible for setting up and erecting the Plants to the line and level required and shall ensure that the Plant is kept in position whilst being built in, and he shall not pass this responsibility to any other Contractor.

The Contractor shall supply all necessary flange jointing materials and make the joints or tapping at the "Limit of Contract" for connection to other pipework. The cost of this work shall be deemed to be included in the appropriate item for erection of the Plant in the Bill of Quantities.

Leakage tests at maximum working pressure shall be carried out on all erected pipework and valves immediately after erection and before being built-in or connected to existing works. The cost of providing the necessary pumps, gauges, equipment, tools and the like for carrying out these tests shall be included in the Contract price. The Contractor shall give advance notice to the S.O.'s Representative when these tests are to be carried out.
The erector in charge shall be conversant with the erection, commissioning, operation and maintenance of the Works. Should there be more than one erector, one shall be in charge and the Contractor shall inform the S.O. in writing which erector is so designated.

Where the Works are associated with any work being carried out under a separate Contract, the Contractor shall satisfy himself that the plant is consistent with the correct operation of the treatment plant. In the event of the Contractor considering any work being carried out or any work already completed to be detrimental to the ultimate operation of the Plant, he shall report the matter at once to the S.O.'s Representative in writing.

The programme for the procedure of site erection will be provided by the S.O. During the final stages of erection, testing and commissioning of the Plant, it shall be the responsibility of the

Contractor to liaise with all other contractors associated with the completion of any part of the Works to ensure that all parties concerned are present during such tests to maintain their responsibilities within the defined limits of their individual Contracts.

1.2 LEVELLING AND GROUTING OR CONCRETING

The associated pipework shall be properly and accurately levelled, aligned and firmly fixed in position before grouting and/or concreting. It shall be the Contractor's responsibility to check that the position and level are correctly maintained before, during and after any grouting or concreting whether the work is carried out by him or by his sub-contractors.

Any grouting of bolts for fixing equipment to the civil structures and grouting of base plates shall be carried out by the Contractor.

The grouting mixture other than for grouting holding down bolts shall contain the following proportions by weight :

- 1 part of Portland cement
- 1 part of clean sharp sand
- Setting agent approved by the S.O.
- Water-cement ratio of not exceeding 0.55

Grouting of holding down bolts shall be by Hilti HVA adhesive anchors or approved equivalent.

The S.O.'s Representative shall be informed at all times when any checks on alignment and level are to be carried out so that he may witness the checks if he so requires. The approval of the S.O.'s Representative or his knowledge that the alignment or level of the Plant is to his satisfaction shall in no way relieve the Contractor of his obligation under the Contract to properly install and align the Plant and shall in no way prejudice the S.O.'s rights to order the rectification of any installation work later found to be improperly carried out.

1.3 FOUNDATION, BOLTS AND FITTINGS

Foundations shall be provided for the erection of the Plant and/or equipment. The Contractor shall provide fully detailed and dimensioned Drawings showing all civil work (including piling if any) to be carried out in connection with the erection of the Plants together with full technical information for consent. It is to be understood however, that approval of the Drawings will not exonerate the Contractor from any responsibility in connection with his Work.

The Contractor shall supply all holding down, alignment and levelling bolts complete with anchorages, nuts, washers and packings and all bed-plates, frames and other structural parts as may be necessary.

All holding down bolts shall be of grade 316 stainless steel with grade 304 nuts and washers.

1.4 BUILDERS' WORK

Builders' work such as forming and reinstating holes through walls and floors, and making good will be done by the Contractor. The Contractor shall mark out all builders' work and shall provide all necessary information and drawings showing performed holes, ducts and the like and shall be responsible for the accuracy of the information provided by him.

Should the Contractor fail to provide such necessary information on time, he shall be responsible to make such openings at his own cost and to reinstate to the S.O.'s approval.

1.5 FIXINGS

The drilling of holes for raw plugs or other fixing devices will not constitute builders' work and shall be carried out by and be the responsibility of the Contractor. Holes shall preferably be made with a drill of the rotary rather than the percussion type. A single shot cartridge tool may be used at the discretion of the S.O.

Structural steel or work woodwork shall not be drilled without the prior approval of the S.O.

Any damage caused by the Contractor during the fixing of items of plant to any surface shall be made good by the Contractor to the satisfaction of the S.O.

The Contractor shall make his own arrangements for any scaffolding required.

1.6 TERMINATION OF POWER AND ANCILLARY CABLING

All power and ancillary cables included in the Works shall be supplied, laid and jointed in accordance with the programme agreed. It shall be the responsibility of the Contractor to ensure that all cables, including those connected to existing equipment installed under other Contracts, are satisfactorily glanded and that all cores are correctly terminated and with ferrule.

Where supply is to be provided from one contract to another contract, the “source” Contractor shall provide the supply cable, gland and accessories up to the isolator of the load equipment. The “load” Contractor shall carry out the necessary termination of the “source” supply cable, including installation of the “source” cable gland and supply and installation of cable lugs if required.

Prior to any testing of cables, the Contractor

1.6.1.1 shall inform the S.O. of his intentions, and

1.6.1.2 shall be responsible for liaison with Authorities and any other Contractor to whose equipment the cables may be terminated to ensure that all parties concerned are aware of the impending tests for the safety of personnel and equipment. Any special isolation or preparation required to be carried out to the Plants and equipment to which cables are connected prior to cable testing will be carried out by the Contractor responsible for the Plant and equipment. All tests shall be carried out under the supervision of the S.O.'s Representative.

1.7 INSTALLATION INSPECTION

During the setting of work or during the period of one week's operation by the Contractor or when the Contractor is satisfied that the Plant is in good working order (whichever is the suitable period) he shall inform the S.O.'s Representative who will carry out the installation inspection.

The Plant will be inspected with regard to compliance with the Specification and correct operation. In the event of any Plant failing to meet the requirements of the Specification or the workmanship being defective, the Contractor shall take immediate steps to remedy the deficiency to the satisfaction of the S.O.

1.8 PRE-COMMISSIONING TESTS IN GENERAL

Upon completion or substantial completion of erection of various components of Plant and Equipment, the Contractor may apply to the S.O.'s Representative for the pre-commissioning tests to be conducted.

The Contractor shall furnish one (1) set of the "Forms for Pre-Commissioning". Various components of works tested, readings taken, etc shall be recorded on such forms and shall be duly certified by the Contractor and the S.O.'s Representative respectively. Such records shall be compiled for future reference as to limits, variability, reliability etc. of the Plant.

All the Plant and Equipment shall be tested unless otherwise specified or instructed by the S.O.

1.9 PRE-COMMISSIONING TESTS OF ELECTRICAL WORKS

The electrical installation of the Plant shall not be energised until Pre-commissioning tests as described below have been carried out on all electrical components and cabling to the satisfaction of the S.O. The list below may not preclude the S.O. from adding such tests that he feels necessary and the Contractor shall comply with such written requests. The Contract price is deemed to have also included all such tests.

1.9.1.1 Cabling Services and Auxiliaries

The insulation resistance of every cable shall be measured and recorded before commencement of installation.. After installation and termination, the following tests shall be carried out on every run of cables.

- insulation resistance test
- core phase identification
- core continuity and armour over the whole length of cable including cable termination glands for the matter

Note: Voltage pressure tests may not be required on PVC/SWA/PVC control cables, but the Contractor shall test the insulation of these cables both between cores and from cores to earth after installation with a 500 volt `Megger' hand generator.

The Contractor shall test all cables after installation and termination to ensure the correct phasing out of cores and the continuity of the cores, sheath and armour over the whole length of the cable, including cable terminations glands for the latter.

1.9.1.2 Switchgear and starter panel

a. Pressure Testing

Power frequency pressure test on equipment for use on systems above 1000 volts. For systems up to 1000 volts, the insulation resistance of the equipment shall be tested with a 500 volt hand generator Megger. These tests shall be carried out between all circuit phases and between phase to earth. All small wiring shall be similarly tested.

b. Mechanical Tests

All mechanical tests to be conducted on the Contractor's premises shall be re-checked to ensure satisfactory operation of the Plant in the final erected state.

c. Protection and Control Circuit

The satisfactory operation of all current operated protection circuits over their whole operating range shall be tested by primary current injection.

The satisfactory operation of all DC auxiliary relays such as transformer protection relays shall be tested at normal operating voltage including actual operation from remote actuating relays.

The satisfactory operation of all tripping circuits shall be tested.

The satisfactory operation of control circuits shall be tested from local and from remote positions.

d. Indicating Ammeters

Indicating ammeters shall be checked for calibration at 0.25, 0.5, 0.75 and full scale deflection by primary current injection.

e. Indicating Voltmeters

Indicating voltmeters shall be checked for normal operating voltage range by voltage application.

f. Integrating kWh meters

Where possible kWh meters shall be tested for correct rotation. Creep tests shall be carried out to ensure that the meter is inoperative with voltage alone, if the secondaries of current transformers are left connected with the primary current interrupted.

g. Other indicating meters

Other indicating meters including frequency, power factor and kilowatt meters shall be tested for accuracy of indication.

h. Transducers

All transducers shall be tested for at least 5 different points in the complete working range for each unit.

i. Current transformers

Current transformers shall be tested for the following:-

- Verification of terminal markings
- Test for accuracy.

For all forms of current transformer protection the following information shall be made available to the S.O. prior to the time of testing:-

- current transformer magnetising curve,
- recommended relay testing,
- calculated primary operating current at this setting,
- calculated through fault stability values where applicable,
- values of stabilising and setting resistors.

j. Operational sequence tests

Tests shall be carried out on all starter panels to test operational sequence and operation of protection devices.

k. Continuity of earth conductors

Continuity tests shall be carried out on the earth conductor of the switchboard, such tests being by heavy current injection.

This does not include earth resistance test of the station earthing system, which shall be tested as detailed elsewhere in the Specification.

1.9.1.3 Tests on earthing system

After the completion of the earthing installation the Contractor shall demonstrate to the S.O. that the resistance of electrodes to earth and the continuity of the earth conductors is less than one ohm.
The earth contact resistance and the earth conductor continuity from each major piece of the Works, i.e. main switchboards and transformers etc., shall be measured by using an earth loop impedance tester and auxiliary return conductor.

Operation of ELCB's shall be tested.

The Contractor shall also demonstrate that the resistance to earth for lightning protection is less than 5 ohms.

1.10 TESTS ON CABLES

The insulation resistance of every cable shall be measured and recorded before commencement of installation. After installation and termination the following tests shall be carried out on every run of cable:-

1.10.1.1.1 High voltage d.c. insulation pressure test to the specified level, between cores and from individual cores to earth, metallic sheath or armour as appropriate, for cables rated above 1000 volts.

1.10.1.1.2 Insulation resistance test,

1.10.1.1.3 core phase identification,

1.10.1.1.4 continuity of core and armour over the whole length of cable, including cable termination glands for the latter.

High voltage pressure test voltages shall conform to the relevant British Standards. Direct current voltage shall be supplied at full value continuously for 15 minutes for high voltage XLPESWAPVC cables.

Witnessed high voltage pressure tests shall not be carried out on PVCSWAPVC control cables but the Contractor shall test the insulation of PVCSWAPVC control cables both between cores and from cores to earth during the installation with a 500 volt 'Megger' hand generator.

1.11 TESTS ON ELECTRICAL APPARATUS

Insulation resistance tests on any electrical apparatus supplied and/or erected under the Contract before and after connecting such apparatus to the supply.

1.12 TESTS ON EARTHING SYSTEM

After the completion of the earthing installation the Contractor shall demonstrate to the S.O. that the resistance of the electrodes to earth and the continuity of the earth conductors is less than one ohm.

The earth contact resistance and the earth conductor continuity from each major piece of the Works, i.e. main switchboards and transformers etc., shall be measured by using an earth loop impedance tester and auxiliary return conductor.

Operation of ELCB's shall be tested.

The Contractor shall also demonstrate that the resistance to earth for lightning protection is less than 5 ohms.

1.13 PRE-COMMISSIONING TEST OF INSTALLED SYSTEMS

After complete installation of a system, the system shall be tested to ensure correct operation of the equipment installed.

The Contractor shall notify the S.O.'s Representative in writing the intended date for the tests to be conducted. All tests shall be carried out in the presence of the S.O.

The Contractor shall be responsible for testing of all equipment under the contract and all test shall be conducted by or under the supervision of a capable Commissioning Engineer during the whole of the period required for the tests.

The contractor shall prepare a "checklist for system pre-commissioning" and shall supply a copy of such checklist to the S.O. before commencement of any tests. The contractor shall complete the checklist as testing progresses. On completion, the completed checklist shall be duly signed by the contractor and three (3) copies submitted to the S.O.

All equipment shall be cleared internally and externally before any test is carried out.

The tests shall be carried out on each completed system of the Plant and shall include but shall not be limited to:

- Smooth operation of valves without any failure to the system.
- Functional testing including sequential operation and simulation of protective devices of each pump, compressor, surge vessel, drainage pump and fan to prove correct operation, absence of fluid leaks, correct bearing temperatures and absence of undue vibration and noise for period of not less than four hours.
- Functional testing of auxiliary items including lubrication system and valve actuators.

The following inspection and tests shall be carried as appropriate:

1.13.1 Inspection to check the assembly of the Plant and conformity with the Specification and approved Drawings.

1.13.2 Hydrostatic testing of all pipework systems at 1.5 times the maximum working pressure for a period of at least one hour during which the pressure shall not change.

1.13.3 Test on ejectors.

- Operation of instruments and alarm devices installed under the Contract.
- Insulation resistance tests
- Continuity tests
- Tests to prove correct operation of interlocks, tripping and closing circuits, Indications etc.
- Vector group and phasing tests
- Operation of all protective gear circuits by primary injection and system fault tests to check sensitivity and stability.
- Protective gear timing tests as necessary
- Test operation of alarm devices
- A test to verify the continuity of all conductors, correct connections to terminals and effective bonding to the existing system.
- Insulation resistance tests to earth and between conductors before and after fitting of lamps. The standard of acceptance for electrical insulation tests shall be as recommended in the current edition of the I.E.E. Regulations.
- Insulation resistance tests on any electrical apparatus supplied and/or other contract before and after connecting such apparatus to the supply or existing installation.
- Earth continuity tests for each final sub-circuit and the completed installation to ensure that the impedance of the earth fault loop is such as to permit compliance with the requirements of the current edition of the Ferranti Phase - Earth Loop Impedance Tester (Model 2) and the Contractor shall employ such instrument or other approved equivalent type.

Any items of equipment not functioning correctly shall be rectified, repaired or replaced immediately as appropriate.

BAHAGIAN H

SCHEDULE OF GUARANTEE & PARTICULAR

SCHEDULE OF GUARANTEES AND PARTICULARS

TABLE OF CONTENT

SCHEDULE A1

DECLARATION

We, the undersigned, hereby declare that the particulars given by us in this Schedule shall be binding on us and will not be varied in any respect except as provided for under the terms of the Contract. We further agree that the approval or otherwise by the S.O of any of the said particulars shall in no way relieve us of any of our obligations and responsibilities under the Contract.

Official Stamp

Signature of Tenderer

……

Date: ……..

Notes on Particulars of Plant and Equipment

The tenderer shall complete all schedules, for items of plant included in the Works and shall sign all the schedules. If an item of plant is not included in the Works, the Tenderer shall enter 'Not Included'.

The Tenderer shall complete the whole Schedule for the basic tender. If the Tenderer offers an alternative for any section or part-section, he shall also submit the relevant parts of the Schedule for the alternative plant offered.

If insufficient space is provided in any Schedule for the Tenderer to complete the information to be provided, the Tenderer shall add his own continuation sheets to the Schedule.

SCHEDULE A2

WORKS PROGRAMME

The Contractor shall submit his Works Programme which shall include but not limited to the following items:

1. The works programme shall generally be in accordance with Specification;
2. Completion period in accordance with Instructions to Tenderers;
3. Covers all major work components/activities;
4. Appropriate sequence and timing for submission of approval, Contractor's procurement of materials and services, works executions, testing, etc.;
5. Appropriate interfacing with other Contractors;
6. Work programme with critical path using Microsoft Project 2007 to be submitted;
7. Project S-curve for both physical and financial to be submitted.

Official Stamp

Signature of Tenderer

……

Date: ……

SCHEDULE A3

PROJECT MANAGEMENT

A) Quality Assurance and Quality Control (QA/QC) Plan.
The Tenderer shall submit his QA/QC Plan which shall include but not limited in the following items:
1. The QA/QC Plan shall generally be in accordance with project requirement;
2. Quality statement;
3. Outline of quality procedures;
4. Outline of inspection and test plan, documentation and close-out;
5. Audit and verification of implementation;
6. Reporting.

B) Health, Safety and Security (HSE) Plan
The Tenderer shall submit his HSE Plan which shall include but not limited to the following items:
1. The HSE Plan shall generally be in accordance with project requirement;
2. Outline HSS procedures;
3. Outline HSS equipment/facilities to be provided;
4. Monitoring control and reporting.

Official Stamp

Signature of Tenderer

……

Date: ……

SCHEDULE B1

FILTER PERFORMANCE

We guarantee that:

(a) Filtered Water Quality
For plant inflows of up to 80 Mld the continuous quality of the filtered water (before chlorination) shall be equal to or better than the quality specified below:

Colour	: not exceeding 4 Hazen units
Turbidity	: not exceeding 1 NTU (before pH correction)
Iron	: not exceeding 0.1 mg/l
Manganese	: not exceeding 0.05 mg/l
Aluminium	: not exceeding 0.15 mg/l
Taste and odour	: unobjectionable

(b) Average Consumption of Filter Washwater
Average consumption of filter washwater shall not exceed +/- …… percent of the total amount of the water filtered;

(c) Filter Run
The average filter run of any filter over any seven-day period for raw water suspended solids up to 1000 mg/l shall not be less than …… hours;

Official Stamp

Signature of Tenderer

…….

Date: ……..

SCHEDULE C1

CLARIFICATION PLANT

Item	Description	Requirement	Particular
	PULSATOR CLARIFIER		
(a)	LAMELLA SETTLING TUBES		
1	Type/Shape		
2	Material		
3	Supplier of raw material/country of origin		
4	Method of binding lamella sheets into modules/packing		
5	Modules/packing size (L x W x H)		
6	Modules/packing weight		
7	Total numbers of modules/packing per tank		
8	Degree of inclination		
9	Total projected area per tank		
10	Hydraulic capacity		
11	Lamella sheet thickness		
12	Density		
13	Type of module/packing support		
14	Materials of construction		
	VACUUM SYSTEM		
(b)	VACUUM PUMP		
1	Vacuum Blower Type	Roots	
2	Brand		
3	Model		
4	Bore	mm	
5	Capacity	m3/min	
6	Rated Pressure	kPa	
7	Motor	kW	
8	Voltage/Phase/Hz	V/Ph/Hz	
9	Motor Speed	Rpm	
10	Mechanical Connection	Belt & Pulley	
11	Vacuum Gauge Brand		
12	Vacuum Gauge Size	mm	
13	Vacuum Gauge Range		
14	Vacuum Safety Valve Brand		
15	Vacuum Safety Valve Relief Setting		
16	Internal Vacuum Pump Pipe Material		

Official Stamp

Signature of Tenderer

……

Date: ……

CLARIFICATION PLANT

Item	Description	Requirement	Particular
	VACUUM PIPEWORK AND VALVES		
(c)	ISOLATION VALVE		
1	Valve size		
2	Type		
3	Manufacturer		
4	Country of manufacture		
5	Standard to which manufactured		
6	Material of construction		
	• *Sizing as per existing equipment/tenderer design*		
(d)	VACUUM BREAKER VALVE		
1	Valve size		
2	Type		
3	Manufacturer		
4	Country of manufacture		
5	Standard to which manufactured		
6	Material of construction		
7	Operating torque		
8	Valve actuator manufacturer		
9	Country of manufacture		
10	Valve opening time		
11	Motor rating		
12	Motor speed		
13	Rated torque		
14	Enclosure		
	• *Sizing as per existing equipment/tenderer design*		
(e)	PIPEWORK		
1	Pipe material		
2	Manufacturer		
3	Standard to which manufactured		
4	Pipe class		
	• *Sizing as per existing equipment/tenderer design*		

Official Stamp

Signature of Tenderer

……

Date: ……

CLARIFICATION PLANT

Item	Description	Requirement	Particular
	DRAIN PIPEWORK AND VALVES		
(f)	ISOLATION VALVE		
1	Type	Gate	
2	Manufacturer		
3	Country of manufacture		
4	Standard to which manufactured		
5	Material of construction		
(g)	PIPEWORK		
1	Pipe material		
2	Manufacturer		
3	Standard to which manufactured		
4	Pipe class		

Official Stamp

Signature of Tenderer

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Date: ……

CLARIFICATION PLANT

Item	Description	Requirement	Particular
(h)	VACUUM SYSTEM CONTROL PANEL		
1	Manufacturer		
2	Type of Construction		
3	Thickness of Cubicles Plates:		
4	Front	mm	
5	Sides	mm	
6	Rear	mm	
7	Roof	mm	
8	Panel Length	mm	
9	Panel Width	mm	
10	Panel Height	mm	
11	MCCB: Manufacturer/Country of Manufacture Type/Model No.		
12	MCB: Manufacturer/Country of Manufacture Type/Model No.		
13	Fuse Link: Manufacturer/Country of Manufacture Type/Model No.		
14	Control Relays: Manufacturer/Country of Manufacture Type/Model No.		
15	PID Controller: Manufacturer/Country of Manufacture Type/Model No.		
16	Signal Isolators: Manufacturer/Country of Manufacture Type/Model No.		
17	Trip Amplifiers: Manufacturer/Country of Manufacture Type/Model No.		
18	Timers: Manufacturer/Country of Manufacture Type/Model No.		
19	Surge Protection Device: Manufacturer/Country of Manufacture Type/Model No.		
20	Terminal Blocks: Manufacturer/Country of Manufacture Type/Model No.		

Official Stamp

Signature of Tenderer

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Date: ……

CLARIFICATION PLANT

Item	Description	Requirement	Particular
21	Indicating Lamp: Manufacturer/Country of Manufacture Type/Model No.		
22	Push Button: Manufacturer/Country of Manufacture Type/Model No.		
23	Annunciators: Manufacturer/Country of Manufacture Type/Model No.		
24	Annunciators Relay: Manufacturer/Country of Manufacture Type/Model No.		
25	Digital Indicators: Manufacturer/Country of Manufacture Type/Model No.		
26	Label: Manufacturer/Country of Manufacture Type/Model No.		
(i)	<u>LEVEL ELECTRODES</u>		
1	Manufacturer		
2	Diameter of Electrodes		
3	Housing Material		
4	Electrode Material		
5	Electrode Holder Material		

Official Stamp

Signature of Tenderer

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Date: ……

CLARIFICATION PLANT

Item	Description	Requirement	Particular
(j)	ELECTRICAL CABLES		
1	POWER CABLE (XLPE/SWA/PVC): Manufacturer/Country of Make Standard To Which Manufactured		
2	MULTICORE CABLE (XLPE/SWA/PVC): Manufacturer/Country of Make Standard To Which Manufactured		
3	Compression Glands: Manufacturer/Country of Make		
4	Cable Tray: Manufacturer/Country of Make		
5	Cable Trunking: Manufacturer/Country of Make		
6	Conduits: Manufacturer/Country of Make		
7	Cable Labels: Manufacturer/Country of Make		
8	Tinned Copper Earth Tape: Manufacturer/Country of Make		

Official Stamp

Signature of Tenderer

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Date: ……

SCHEDULE D1

FILTRATION PLANT

Item	Description	Requirement	Particular
	UNDERDRAIN SYSTEM		
(a)	FILTER UNDERDRAIN BLOCK		
1	Type		
2	Low Profile Design	Yes/No	
3	Make		
4	Country of Origin		
5	Manufacturer		
6	Brand		
7	Block Dimension (L x W x H)		
8	Material		
9	Orifice Size	mm	
(b)	FILTER MEDIA		
1	Type of Filter Media	Sand	
2	Effective Size	mm	
3	Depth of Media	mm	
4	Uniformity Coefficient		
5	Type of Filter Media	Gravel	
6	Effective Size		
7	Depth of Media		
(c)	AIR SCOUR PIPEWORK FILTER GALLERY		
1	Pipe material		
2	Pipe diameter		
3	Manufacturer		
4	Standard to which manufactured		
5	Pipe class		
(d)	AIR SCOUR PIPEWORK INSIDE FILTER		
1	Pipe material		
2	Pipe diameter		
3	Manufacturer		
4	Standard to which manufactured		
5	Pipe class		

Official Stamp

Signature of Tenderer

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Date: ……

FILTRATION PLANT

Item	Description	Requirement	Particular
(e)	AIR BLOWER		
1	Manufacture		
2	Country of Manufactured		
3	Brand/Model		
4	Method of Connection to Motor		
5	Duty Capacity	m3/min	
6	Rated Pressure	bar	
7	Speed	rpm	
8	Weight	kg	
9	Motor Manufacture		
10	Country of Manufactured		
11	Brand/Model		
12	Enclosure Protection Class		
13	Insulation Class		
14	Motor Rating		
15	Operating Power Factor		
16	Maximum Motor Speed		
17	Full Load Current		
(f)	AIR FLOWMETER		
1	Manufacture		
2	Country of Manufactured		
3	Brand/Model		
4	Flowrate		
5	Pressure Rating		
(g)	ISOLATION VALVE		
1	Valve size		
2	Type		
3	Manufacturer		
4	Country of manufacture		
5	Standard to which manufactured		
6	Material of construction		
(h)	CHECK VALVE		
1	Manufacture		
2	Country of Manufactured		
3	Brand/Model		
4	Operating Pressure		

Official Stamp

Signature of Tenderer

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Date: ……

FILTRATION PLANT

Item	Description	Requirement	Particular
(i)	STARTER PANEL		
1	Manufacturer		
2	Ingress of Protection	Min IP54	
3	Thickness of Cubicles Plates:		
4	Front	mm	
5	Sides	mm	
6	Rear	mm	
7	Roof	mm	
8	Panel Length	mm	
9	Panel Width	mm	
10	Panel Height	mm	
11	Ammeter: Manufacturer/Country of Manufacture Type/Model No.		
12	Voltmeter: Manufacturer/Country of Manufacture Type/Model No.	mm	
13	MCCB: Manufacturer/Country of Manufacture Type/Model No.		
14	MCB: Manufacturer/Country of Manufacture Type/Model No.		
15	Fuse Link: Manufacturer/Country of Manufacture Type/Model No.		
16	Control Relays: Manufacturer/Country of Manufacture Type/Model No.		
17	PID Controller: Manufacturer/Country of Manufacture Type/Model No.		
18	Signal Isolators: Manufacturer/Country of Manufacture Type/Model No.		
19	Trip Amplifiers: Manufacturer/Country of Manufacture Type/Model No.		
20	Timers: Manufacturer/Country of Manufacture Type/Model No.		

Official Stamp

Signature of Tenderer

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Date: ……

FILTRATION PLANT

Item	Description	Requirement	Particular
21	Surge Protection Device: Manufacturer/Country of Manufacture Type/Model No.		
22	Terminal Blocks: Manufacturer/Country of Manufacture Type/Model No.		
23	Indicating Lamp: Manufacturer/Country of Manufacture Type/Model No.		
24	Push Button: Manufacturer/Country of Manufacture Type/Model No.		
25	Annunciators: Manufacturer/Country of Manufacture Type/Model No.		
26	Annunciators Relay: Manufacturer/Country of Manufacture Type/Model No.		
27	Digital Indicators: Manufacturer/Country of Manufacture Type/Model No.		
28	Label: Manufacturer/Country of Manufacture Type/Model No.		
29	Ammeter: Manufacturer/Country of Manufacture Type/Model No.		
30	Hour Run Meter: Manufacturer/Country of Manufacture Type/Model No.		
31	C.T: Manufacturer/Country of Manufacture Type/Model No.		
32	Soft Starter: Manufacturer/Country of Manufacture Type/Model No.		

Official Stamp

Signature of Tenderer

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Date: ……

FILTRATION PLANT

Item	Description	Requirement	Particular
(j)	DIFFERENTIAL PRESSURE TRANSMITTER		
1	Manufacturer		
2	Make/Type		
3	Operating Voltage	V	
4	Output Current	mA	
5	Accuracy	%	
(k)	LEVEL ELECTRODES		
1	Manufacturer		
2	Diameter of Electrodes	20 mm	
3	Housing Material		
4	Electrode Material	SS304	
5	Electrode Holder Material		
(l)	ELECTRICAL CABLES		
1	POWER CABLE (XLPE/SWA/PVC): Manufacturer/Country of Make Standard To Which Manufactured		
2	MULTICORE CABLE (XLPE/SWA/PVC): Manufacturer/Country of Make Standard To Which Manufactured		
3	Compression Glands: Manufacturer/Country of Make		
4	Cable Tray: Manufacturer/Country of Make		
5	Cable Trunking: Manufacturer/Country of Make		
6	Conduits: Manufacturer/Country of Make		
7	Cable Labels: Manufacturer/Country of Make		
8	Tinned Copper Earth Tape: Manufacturer/Country of Make		

Official Stamp

Signature of Tenderer

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Date: ……

SCHEDULE E1

LABORATORY EQUIPMENT

Item	Description	Requirement	Particular
(a)	JAR TESTER		
1	Manufacturer/Brand	Phipps&Birds or equivalent	
2	Model		
3	Jar station	6 nos.	
4	Jar size	1 liter	
5	Power supply	240V	
6	Programmable memories	Yes	
(b)	PORTABLE TURBIDITYMETER		
1	Manufacturer/Brand	Hach or equivalent	
2	Model		
3	Measurement range	NTU	
(c)	BENCHTOP SPECTROFOTOMETER		
1	Manufacturer/Brand	Hach or equivalent	
2	Model	g	
3	Weight	240V	
4	Power supply	Gas-filled	
5	Light Source	Tungsten 320-1100nm	
6	Wavelength range	+/- 1.5nm	
7	Wavelength accuracy		
(d)	ANALYTICAL BALANCE		
1	Manufacturer/Brand		
2	Weighing capacity	g	
3	Readability	mg	
4	Minimum unit mass	mg	

Official Stamp

Signature of Tenderer

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Date: ……

BAHAGIAN I

RINGKASAN TAWARAN DAN SENARAI KUANTITI

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

NOTES :

1 Tenderers are required to supply catalogues and technical data to susbstantiate their offer. Prices offered should include to supply, provide, lay and install all scopes as mentioned in this BQ, drawings and specifications.

2 Unless otherwise stated all items to be complete inclusive of supply, delivery, installation, testing, setting to work and commissioning.

3 This whole BQ is based on provisional quantity, with the exception of a few, and rates will be based on these offered rate prices and Schedule Of Prices, wherever applicable. Final re-measurement will be carried out, if necessary.

4 All items are meant to be a complete supply and installation with other items necessary to complete the installation including hacking, coring, making hole, make good wall, slab, partition & etc for electrical work. No extras will be entertained.

5 Tenderers are advised to visit the site to understand the site conditions and difficulty and price it accordingly.

6 The Client have the right to adjust, reduce, add and omit the relevant items as and when necessary; no extras will be entertained.

7 The drawings serves as a guide only. A proper arrangement and dimension will be determine during construction and installation stage.

8 Works shall be carried out such that there is minimum disruption to the plant operation.

9 Where equipment is to be disposed in whole or in part, rate/cost shall include disposal.

10 All disposal shall to be contractor's own dump site approved by the S.O.

11 The cost for preparing as built drawings and operation and maintenance manuals shall be priced in Bill - General and Preliminaries

12 Allow for costs on testing and training of the plant.

13 In calculating the completion period, no extension of time shall be granted under the Contract.

14 All necessary steel supports, concrete supports and pipe straps shall be provided by the tenderer. All submerged steel support including anchoring, bolt & nut to use SS304, others to use hot dip galvanised.

15 All valves should be complete with flange adaptors unless specified otherwise.

16 All pipes, valves and fittings should be rated PN16 unless specified otherwise. Rate to include all modification works at site to suit existing flange drilling rating.

17 All plastic pipes and fittings should be of Class E (PN15) unless specified otherwise.

18 All electrical cable to use armoured cable and heavy duty cable tray unless specified otherwise.

19 All necessary HDG steel or concrete supports and HDG straps shall be provided by the tenderer.

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

NOTES :

20 Tenderer to determine correct all equipment sizing including mechanical, electrical and instrumentation.

21 All electrical installations and brand of materials to be in accordance to the latest JKR, I.E.E. Wiring Regulations and Electricity Act. All brands of materials offered are subject to scrutiny by the S.O. and need to be changed if necessary due to quality and non-compliance, etc.

22 All cables are to be new stranded copper conductor unless otherwise specified.

23 All wiring to be PVC cable in concealed G.I. or heavy duty uPVC conduit or unless otherwise specified, while PVC cable in surface G.I. conduit for areas within the ceiling space; or unless otherwise specified.

24 All wiring to be completed with CPC according to I.E.E. using separate conduits/trunkings for essential & non-essential circuits. Separate conduits are also required for power & lighting circuits.

25 All trunkings to be electrogalvanize with 3mm x 25mm copper tape at trunking joints for effective earthing. Tenderer can choose of either installing an earth wire or copper tape 3mm x 25mm the entire trunking length.

26 All cables used must using the standard colour coding to identify their usage and phases.Termination costs should be included.

27 All installations, including trunkings, cable trays, conduits,light fittings, fans, switches, s/s/o, etc. must be labelled with circuit number and DB name for maintenance purposes.

28 Any discrepencies between the BQ and the drawings and quantity etc. must be informed before works are carried out.

29 Cable jointing to be done by a registered jointer with Suruhanjaya Tenaga (with valid registration).

30 Allow for allnecessary precautins and provide all necessary protection so as not to damage any existing equipments, facilities or services and to arrange temporary relocation works including reinstatement works if required.

31 Tenderer shall make good all damage occur during construction and installation and at tenderer own cost.

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILLS OF QUANTITY
GRAND SUMMARY

NO.	DESCRIPTION	BILL	AMOUNT (RM)
1	GENERAL AND PRELIMINARIES	1	
2	REFURBISHMENT OF PULSATOR CLARIFIER SYSTEM	2	
3	REFURBISHMENT OF FILTER SYSTEM	3	
4	LABORATORY EQUIPMENT	4	
5	PROVISIONAL AMOUNT	5	108,000.00
6	SST 6%		
	TOTAL SUM TO BE CARRIED TO FORM OF TENDER (AMOUNT INCLUSIVE OF SST)		

RINGGIT MALAYSIA (RM): ….....

PERIOD OF COMPLETION: …..... MONTHS

….....
(Signature of Tenderer)

Name: ….....

Designation:….....

I/..C No.: ….....

Date: ….....

….....
(Signature of Witness)

Name: ….....

Designation:….....

I/..C No.: ….....

Date: ….....

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 1 - GENERAL AND PRELIMINARIES

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	PRELIMINARIES The preliminary items set out hereunder are deemed to apply to the whole of the Contract Works all as shown on the Drawings and/or described in this Bill of Quantities, and the Tenderer shall allow for complying with the same and for any clause or item listed in this section which has not been included elsewhere in this section or in Bill of Quantities section and no claim will be entertained for those unpriced clause. **BILL OF QUANTITIES AND PRICING** The Quantities in this Bill, which form part of the Contract are provisional and shall be re-measured if necessary and valued in accordance with the Conditions of Contract. Should re-measurement of the Bill of Quantities results in items being substantially reduced or totally omitted, or the overall scope of the contract Works being reduced, the Tenderer will not be reimbursed for any lost of profit. The Bill of Quantities shall be priced in Malaysian Currency (in Malaysian Ringgit and Sen Only). Pricing shall be in 'ink' throughout. The rates set down against each time in the Bill of Quantities shall be held to include for providing and delivering all materials including waste on materials, storage, carriage and cartage, labour, plants, equipment and everything else necessary for the due and proper completion of each item. Any item left unpriced shall be deemed to have been incorporated elsewhere in the Bill of Quantities and the Tender Sum, and no subsequent claim against such item will be considered. Any error or ommission in the rates and calculations in the Bill of Quantities shall, before the signing hereof, be so rectified and adjusted that the total amount shall represent the same amount as that tendered in the Form of Tender. There shall be no alteration or amendment, specifying or submission of condition in contravention to those contained in Bill of Quantities. If such condition are included, the tender submitted may not be considered and liable to be disqualified.				
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 1 - GENERAL AND PRELIMINARIES

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
1A.1	**PRELIMINARIES AND GENERAL ITEMS** **PERFORMANCE BOND** Prior to the commencement of any Contract Works under this Contract and on or before the day he executes the formalContract agreement, the Electrical Contractor will be requiredto deposit with the Employer an approved Banker's Guaranteeor Insurance Guarantee or Finance Guarantee on an approvedForm from an approved Bank for a sum equivalent to 5% (fivepercent) of the Contract for the whole Contract period and shallremain valid and effective for such period as is provided in theapproved Banker's Guarantee or Insurance Guarantee or Finance Guarantee.	L.S			
1A.2	**INSURANCE OF WORK (WORKMAN COMPENSATION & CONTRACTOR ALL RISK)** The Tenderer shall forthwith and as a condition precedent to the commencement of any work under this Contract take out at his own expenses all the relevant policy or policies as required by this Contract and produce all Cover Notes and receipts for premiums paid for inspection of the S.Oand or S.O's Representative before the commencement of anywork included in this Contract. All excesses, if any, imposedby the Insurance Company shall be borne by the Tenderer.	L.S	1		
1A.3	**EMPLOYEES' SOCIAL SECURITY ACT, 1969** The Tenderer shall register his work people employed in the Contract Works who are liable for coverage under the Employees' Social Security Act, 1969 and contribute under the Social Security Scheme (SOSCO) and comply with the provisions of the said Act. The Tenderer shall submit the Code Number and Insurance Numbers of all the work people on the site to the S.O for checking. The Tenderer shall make payment of all contributions from time totime on the first day on which the same bought to be paid and until the completion of the Contract Works, and upon demand the Tenderer shall produce to the S.O. and/or S.O's Representative contribution cards or stamp vouchers as evidence of payment of such contribution.	L.S	-		
Total Carried to Summary					

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 1 - GENERAL AND PRELIMINARIES

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	CONTRACTOR'S PLANT, EQUIPMENTS, FACILITIES AND SITE AGENT				
1A.4	Contractor's Superintendence Contractor's Superintendence and site management team including provision of full time and experienced site agent.	Month	12		
1A.5	Contractor's Storage and Office Contractor's shall provide and maintaine storage and office.	L.S	1		
1A.6	Water and Electricity Supply Provide for all the cost and charges adequate for use in the works and shall pay all cost and fees in connection therewith.	L.S	1		
1A.7	Project Signboard Contractor shall provide, eract, paint and maintain a project signboard including demolition and removal upon completion of project.	L.S	1		
1A.8	Keeping Site Clean and Tidy Remove all debris, rubbish and waste from the site and keep the working area clean all the time during construction period.	L.S	1		
	PROJECT REQUIREMENT Quality Assurance/Quality Control (QA/QC) Factory acceptance test (FAT) for materials and equipments testing manufacturer's local facilitiy. FAT to be inspected and witnessed by three (3) person of the S.O's representative for the following:				
1A.9	Testing for air blower.	no	3		
1A.10	Testing for electrical panels.	no	3		
1A.11	Testing for instrument panel.	no	3		
1A.12	Testing for valve.	no	3		
1A.13	Testing for filter media.	no	3		
	SAFETY, HEALTH AND WELFARE OF WORKPEOPLE				
1A.14	The Tenderer to comply all Safety, Health and Welfare Regulations, pertaining to all work people employed on the site by the Tenderer. Provide qualified Site Safety & Health Officier throughout the contract period and extension of time (if any).	L.S	1		
1A.15	Provide complete First Aid Kit.	set	1		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 1 - GENERAL AND PRELIMINARIES

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	PROJECT MONITORING Provide for implementing the Critical Path Method programmein conjuction with Main Contract Works for planning, monitoring,control of resources and progress of work shall include:-				
1A.16	Planning, preparing, maintaining and updating the CPM programme using latest version of Microsoft Project.	L.S	1		
1A.17	Provide 5 copies monthly reports to the S.O's Representative inclusive of all updated data on computer medium and printed copies.	L.S	1		
1A.18	Provide manufacturer's specification, instruction etc.	L.S	1		
1A.19	Provide relevant shop drawing's.	L.S	1		
1A.20	Provide preparation of mock-up.	L.S	1		
1A.21	Contractor shall provide five (5) sets of As-Built drawing's of all services incorporated into the works. The contract price shall be deemed to include the cost of preparation, supply and delivery of all drawing's and information.	L.S	1		
1A.22	Provide hard bound Operating & Maintenance (O&M) Manual's consisting of A3 size drawing's, catalogues, technical data sheets, test results, etc.	no	5		
	CONSULTANCY SERVICES				
1A.23	Provide design and calculation for all required equipment and system.	L.S	1		
1A.24	CIDB Levy			0.125% of the contract sum	
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 1 - GENERAL AND PRELIMINARIES
BILL 1 -SUMMARY

	PAGE No.	AMOUNT (RM)
	From Page 2/5 From Page 3/5 From Page 4/5	
Total Carried to Grand Summary		

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 2 - REFURBISHMENT OF PULSATOR CLARIFIER

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISIONING				
	PULSATOR CLARIFIER No.1				
	TUBE SETTLER				
2A.1	To dismantle existing inclined plate, existing supports and access ladder.All items to be properly pack, store and transported out of the plant.	L.S	1		
2A.2	Design, manufacture, supply, deliver, assemble and install new tube settler including new stainless steel 304 tube settler support.	L.S	1		
2A.3	Supply and install new aluminium access ladder. Rate to include support bracket.	set	3		
	VACUUM SYSTEM				
2A.4	Design, supply and install new vacuum pump (1 no.) complete with silencer, pressure indicator, SS304 checked valve, SS304 isolation valve, galvanised iron pipework and pipe support. Pipework is from vacuum pump to vacuum chamber. Rate inclusive of all necessary items deem required for a complete vacuum system.	L.S	1		
2A.5	Supply and install new manual gate valve and motorised butterfly valve (breaker valve) as per existing system/tenderer design.	L.S	1		
2A.6	Replacement of level electrode (heavy duty type).	set	1		
2A.7	Replace existing vacuum chamber manhole gasket for proper vacuum sealing and make good the manhole cover. Rate to include necessary work to seal the vacuum chamber for vacuum process.	L.S	1		
2A.8	Design and install a SS304 10mm plate to seal opening at the vacuum chamber equipment area.	L.S	1		
2A.9	Design, manufacture, supply, deliver and install new control panel, termination panel and cabling works. Rate to include all incoming and out-going power cable, control cable and heavy duty cable tray for vacuum pump, motorised valve, level electrode, etc. Rate inclusive of all necessary items deem required for a complete system.	L.S	1		
	DRAIN SYSTEM				
2A.10	Supply and install new manual gate valve c/w pipework. Rate to include dismantle existing valve, pipework and chamber cleaning. All items to be properly pack and store at designated area to be determine by S.O. Valve size: 1 no. DN400 (to confirm, valve body iscovered with mud), 1 no. DN150 and 3 nos. DN100.	L.S	1		
2A.11	Testing and commissionning.	L.S	1		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 2 - REFURBISHMENT OF PULSATOR CLARIFIER

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	PULSATOR CLARIFIER No.2				
	TUBE SETTLER				
2A.12	To dismantle existing inclined plate, existing supports and access ladder.All items to be properly pack and store at designated area to be determine by S.O.	L.S	1		
2A.13	Design, manufacture, supply, deliver, assemble and install new tube settler including new stainless steel 304 tube settler support.	L.S	1		
2A.14	Supply and install new aluminium access ladder. Rate to include support bracket.	set	3		
	VACUUM SYSTEM				
2A.15	Design, supply and install new vacuum pump (1 no.) complete with silencer, pressure indicator, SS304 checked valve, SS304 isolation valve, galvanised iron pipework and pipe support. Pipework is from vacuum pump to vacuum chamber. Rate inclusive of all necessary items deem required for a complete vacuum system.	L.S	1		
2A.16	Supply and install new manual gate valve and motorised butterfly valve (breaker valve) as per existing system/tenderer design.	L.S	1		
2A.17	Replacement of level electrode (heavy duty type).	set	1		
2A.18	Replace existing vacuum chamber manhole gasket for proper vacuum sealing and make good the manhole cover. Rate to include necessary work to seal the vacuum chamber for vacuum process.	L.S	1		
2A.19	Design, manufacture, supply, deliver and install new control panel and cabling work. Rate to include all incoming and out-going power cable, control cable and heavy duty cable tray for vacuum pump, motorised valve, level electrode, etc for a complete system.	L.S	1		
	DRAIN SYSTEM				
2A.20	Supply and install new manual gate valve c/w pipework. Rate to include dismantle existing valve, pipework and chamber cleaning. All items to be properly pack and store at designated area to be determine by S.O. Valve size: 1 no. DN400 (to confirm, valve body cover with mud inside chamber), 1 no. DN150 and 3 nos. DN100.	L.S	1		
2A.21	Testing and commissionning.	L.S	1		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 2 - REFURBISHMENT OF PULSATOR CLARIFIER

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	PULSATOR CLARIFIER No.3				
	TUBE SETTLER				
2A.22	To dismantle existing inclined plate, existing supports and access ladder.All items to be properly pack and store at designated area to be determine by S.O.	L.S	1		
2A.23	Design, manufacture, supply, deliver, assemble and install new tube settler including new stainless steel 304 tube settler support.	L.S	1		
2A.24	Supply and install new aluminium access ladder. Rate to include support bracket.	set	3		
	VACUUM SYSTEM				
2A.25	Design, supply and install new vacuum pump (1 no.) complete with silencer, pressure indicator, SS304 checked valve, SS304 isolation valve, galvanised iron pipework and pipe support. Pipework is from vacuum pump to vacuum chamber. Rate inclusive of all necessary items deem required for a complete vacuum system.	L.S	1		
2A.26	Supply and install new manual gate valve and motorised butterfly valve (breaker valve) as per existing system/tenderer design.	L.S	1		
2A.27	Replacement of level electrode (heavy duty type).	set	1		
2A.28	Replace existing vacuum chamber manhole gasket for proper vacuum sealing and make good the manhole cover. Rate to include necessary work to seal the vacuum chamber for vacuum process.	L.S	1		
2A.29	Design, manufacture, supply, deliver and install new control panel, termination panel and cabling works. Rate to include all incoming and out-going power cable, control cable and heavy duty cable tray for vacuum pump, motorised valve, level electrode, etc. Rate inclusive of all necessary items deem required for a complete system.	L.S	1		
	DRAIN SYSTEM				
2A.30	Supply and install new manual gate valve c/w pipework. Rate to include dismantle existing valve, pipework and chamber cleaning. All items to be properly pack and store at designated area to be determine by S.O. Valve size: 1 no. DN400 (to confirm, valve body cover with mud inside chamber), 1 no. DN150 and 3 nos. DN100.	L.S	1		
2A.31	Testing and commissionning.	L.S	1		
	SPARE UNIT				
2A.32	Supply vacuum pump complete unit (loose standby unit)	no	1		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 2 - REFURBISHMENT OF PULSATOR CLARIFIER
BILL 2 - SUMMARY

	PAGE No.	AMOUNT (RM)
	From Page 1/4 From Page 2/4 From Page 3/4	
Total Carried to Grand Summary		

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 3 - REFURBISHMENT OF FILTER

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISIONING				
	AQUAZUR FILTER No.1 TO No.6				
	CIVIL & STRUCTURAL				
3A.1	Provision of covered storage area and a shelter to cover the sand filter tank during installation work as per recommendation of filter underdrain manufacturer.	L.S	1		
3A.2	Removal and storing of filter sand at the designated location. The rate shall include proper disposal of filter sand as instructed by S.O.	set	6		
3A.3	Hacking, dismantling, removal and dismantle of the existing false floor, all debris and waste including old lateral pipes, concrete, rebar, filter media, filter nozzles and all unwanted material to the approved dumping site. Including hacking and cleaning to the original structural concrete floor level, repairs to the structural floor damaged by hacking and levelling of the floor as per recommendation of the filter underdrain manufacturer.	set	6		
3A.4	Clearing of sand from the settled water inlet channel and filtered water collecting channel.	set	6		
3A.5	Jet washing of channels and walls of the filter tank.	set	6		
3A.6	Plastering and waterproofing of the channels, floors and walls of the filter tank as per product manufacturer recommendation.	set	6		
3A.7	Touch up and make good all concrete repaired works, joints, railing, cracks line and necessary paint at the existing filter walkway.	set	6		
3A.8	Design and construct flume box/drain in individual filter tanks for effective backwash as per the recommendation of the filter underdrain manufacturer.	set	6		
3A.9	Design, fabricate, supply and install SS304 inlet water distribution trough with support bracket.	set	6		
3A.10	Design, supply and install new SS304 air supply pipework (pipe size as per tenderer design) for the air supply main ring and individual filter supply pipeline inclusive of all bracketing and fixtures to suit the backwash air rate as per underdrain manufacturer recommendation. The air header manifold to be installed inside filter gallery with dropper pipes. Rate to include all modification at the existing air scour pipe, to relocate the air inlet valve, wall opening for the air pipe and service platform for the air inlet valve.	set	6		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 3 - REFURBISHMENT OF FILTER

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	UNDERDRAIN BLOCK				
3A.11	Design, supply, deliver, install and commission underdrain blocks. Rate to include roller bonding agent, grout floor levelling, base and side grouting, fabricate anchor U-rod, heavy duty coupling with short flexible hose (to connect on underdrain block for air scour) and all necessary accessories for a complete system.	set	6		
	FILTER MEDIA				
3A.12	Design, supply, deliver, install and disinfection filter media as per filter underdrain design. Rate to include cost for disinfection and rinsing of the filter media after newly placing of the filter tank. To allocate cost for top up of filter media due to potential media loss during water rinsing/disinfection.	set	6		
3A.13	Allow for filter media sieve analysis test for LOI, acid solubility and laboratory test, sieve test and specific gravity comply to BS 1377 std. The test shall be carry out upon submission material for approval, during FAT sample collect and after material deliver to site for each filter before discharge to the filter bed. All the report must comply to the specification requirement otherwise will be rejected and replace with new filter media and repeat the same test again until it approve accordingly.	set	6		
	INSTRUMENTATION				
3A.14	Supply, deliver, install & commission differential pressure transmitter complete with point connection before and after sand filter complete with SS tubing & connectors. The installation work comprise of mechanical installation of the field instrument and current loop cable laying from field instrument to respective local control panel (LCP) for analogue signal transmission.	set	6		
3A.15	Supply, deliver, install & commission ultrasonic level sensor complete with support bracket. The installation work comprise of mechanical installation of the field instrument and current loop signal cable supply and laying from field instrument to respective local control panel (LCP) for analogue signal transmission.	set	6		
	LOCAL CONTROL PANEL (LCP)				
3A.16	Design, supply, deliver, install and commission filter local control panel (LCP) complete with separate pneumatic actuator termination compartment. Rate to include dismantle existing panel, re-route existing power and signal cables to new control panel complete with new truncking, cable termination and air tubing termination. Control of the filter backwash is by HMI touch screen panel either in manual, semi-auto full auto mode. Backwash water flow and air scouring flow will be duplicate at each LCP.	set	6		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 3 - REFURBISHMENT OF FILTER

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	DRAIN SYSTEM				
3A.17	Supply and install new manual gate valve complete with pipework. Rate to include dismantle existing valve and pipework. All items to be properly pack and store at designated area to be determine by S.O.	set	6		
	CANDY FILTER No.1 TO No.3				
	INSTRUMENTATION				
3A.18	Supply, deliver, install & commission differential pressure transmitter complete with point connection before and after sand filter complete with SS tubing & connectors. The installation work comprise of mechanical installation of the field instrument and current loop cable laying from field instrument to respective local control panel (LCP) for analogue signal transmission.	set	3		
3A.19	Supply, deliver, install & commission ultrasonic level sensor complete with support bracket. The installation work comprise of mechanical installation of the field instrument and current loop signal cable supply and laying from field instrument to respective local control panel (LCP) for analogue signal transmission.	set	3		
	LOCAL CONTROL PANEL (LCP)				
3A.20	Design, supply, deliver, install and commission filter local control panel (LCP) complete with separate pneumatic actuator termination compartment. Rate to include dismantle existing panel, re-route existing power and signal cables to new control panel complete with new truncking, cable termination and air tubing termination. Control of the filter backwash is by HMI touch screen panel either in manual, semi-auto full auto mode. Backwash water flow and air scouring flow will be duplicate at each LCP.	set	3		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 3 - REFURBISHMENT OF FILTER

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	LAMELLA FILTER No.1 TO No.6				
	CIVIL & STRUCTURAL				
3A.21	Provision of covered storage area and a shelter to cover the sand filter tank during installation work as per recommendation of filter underdrain manufacturer.	L.S	1		
3A.22	Removal and storing of filter sand at the designated location. The rate shall include proper disposal of filter sand as instructed by S.O.	set	6		
3A.23	Hacking, dismantling, removal and dismantle of the existing false floor, all debris and waste including old lateral pipes, concrete, rebar, filter media, filter nozzles and all unwanted material to the approved dumping site. Including hacking and cleaning to the original structural concrete floor level, repairs to the structural floor damaged by hacking and levelling of the floor as per recommendation of the filter underdrain manufacturer.	set	6		
3A.24	Clearing of sand from the settled water inlet channel and filtered water collecting channel.	set	6		
3A.25	Jet washing of channels and walls of the filter tank.	set	6		
3A.26	Plastering and waterproofing of the channels, floors and walls of the filter tank as per product manufacturer recommendation.	set	6		
3A.27	Touch up and make good all concrete repaired works, joints, railing, cracks line and necessary paint at the existing filter walkway.	set	6		
3A.28	Design and construct flume box/drain in individual filter tanks for effective backwash as per the recommendation of the filter underdrain manufacturer.	set	6		
3A.29	Design, fabricate, supply and install SS304 inlet water distribution trough with support bracket. Rate to include all modification at the existing air scour pipe, to relocate the air inlet valve, wall opening for the air pipe and service platform for the air inlet valve.	set	6		
3A.30	Design, supply and install new SS304 air supply pipework (pipe size as per tenderer design) for the air supply main ring and individual filter supply pipeline inclusive of all bracketing and fixtures to suit the backwash air rate as per underdrain manufacturer recommendation. The air header manifold to be installed inside filter gallery with dropper pipes. Rate to include all modification at the existing air scour pipe, to relocate the air inlet valve, wall opening for the air pipe and service platform for the air inlet valve.	set	6		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 3 - REFURBISHMENT OF FILTER

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	UNDERDRAIN BLOCK				
3A.31	Design, supply, deliver, install and commission underdrain blocks. Rate to include roller bonding agent, grout floor levelling, base and side grouting, fabricate anchor U-rod, heavy duty coupling with short flexible hose (to connect on underdrain block for air scour) and all necessary accessories for a complete system.	set	6		
	FILTER MEDIA				
3A.32	Design, supply, deliver, install and disinfection filter media as per filter underdrain design. Rate to include cost for disinfection and rinsing of the filter media after newly placing of the filter tank. To allocate cost for top up of filter media due to potential media loss during water rinsing/disinfection.	set	6		
3A.33	Allow for filter media sieve analysis test for LOI, acid solubility and laboratory test, sieve test and specific gravity comply to BS 1377 std. The test shall be carry out upon submission material for approval, during FAT sample collect and after material deliver to site for each filter before discharge to the filter bed. All the report must comply to the specification requirement otherwise will be rejected and replace with new filter media and repeat the same test again until it approve accordingly.	set	6		
	INSTRUMENTATION				
3A..34	Supply, deliver, install & commission differential pressure transmitter complete with point connection before and after sand filter complete with SS tubing & connectors. The installation work comprise of mechanical installation of the field instrument and current loop cable laying from field instrument to respective local control panel (LCP) for analogue signal transmission.	set	6		
3A.35	Supply, deliver, install & commission ultrasonic level sensor complete with support bracket. The installation work comprise of mechanical installation of the field instrument and current loop signal cable supply and laying from field instrument to respective local control panel (LCP) for analogue signal transmission.	set	6		
	LOCAL CONTROL PANEL (LCP)				
3A.36	Design, supply, deliver, install and commission filter local control panel (LCP) complete with separate pneumatic actuator termination compartment. Rate to include dismantle existing panel, re-route existing power and signal cables to new control panel complete with new truncking, cable termination and air tubing termination. Control of the filter backwash is by HMI touch screen panel either in manual, semi-auto full auto mode. Backwash water flow and air scouring flow will be duplicate at each LCP.	set	6		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 3 - REFURBISHMENT OF FILTER

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	AIR SCOUR SYSTEM				
3A.37	Design, supply, deliver, install & commission air blower complete with motors, acoustic enclosure, air flowmeter, reducer, check valve, isolation gate valves, flexible absorber, base frame, silencers & pressure gauge with isolation ball valve and to construct air blower plinth. Air blower capacity and head must comply with the new filter underdrain block air scouring design requirement.	L.S	1		
3A.38	Design, supply, install & commission new SS304 air supply pipework from air blower to individual filter inclusive of all bracket and fixtures to suit the backwash air rate as per filter underdrain manufacturer recommendation. The air header manifold to be installed inside filter gallery complete with dropper pipe and valve. Rate to include opening for pipe and service platfor for the air inlet valve.	L.S	1		
3A.39	Design, supply, deliver and install air scour inlet motorised valve.	no	6		
3A.40	Design, supply, deliver, install & commission air blower starter panel.	L.S	1		
3A.41	Design, supply, deliver and install air scour inlet motorised valve power supply panel.	no	1		
3A.42	To modify existing MSB heater compartment for air blower starter panel incoming power supply MCCB. The MCCB sizing to comply with air blower tenderer design. Rate inclusive of cable from busbar to MCCB, busbar termination and MCCB termination.				
3A.43	To modify existing MSB heater compartment for air blower starter panel incoming power supply MCCB. The MCCB sizing to comply with air blower tenderer design. Rate inclusive of cable from busbar to MCCB, busbar termination and MCCB termination.	lin.m	50		
3A.44	Design, supply, lay, install and terminate power cable from MSB to air blower starter panel using 4C/Cu/XLPE/SWA/PVC cable c/w cable tray, trunking, conduit, all suspension and fixing accessories. Cable size to comply with the air blower design requirement. Estimated total cable length 50m.	lin.m	15		
3A.45	Design, supply, lay, install and terminate power cable from air blower starter panel to air blower motor using 4C/Cu/XLPE/SWA/PVC cable c/w cable tray, trunking, conduit, all suspension and fixing accessories. Cable size to comply with the air blower design requirement. Estimated total cable length 15m.	lin.m	10		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 3 - REFURBISHMENT OF FILTER

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
3A.46	Design, supply, lay, install and terminate power cable (1 no.) from air blower starter panel to actuator distribution board using 10mm sq. 4C/Cu/XLPE/SWA/PVC cable c/w cable tray, trunking, conduit, all suspension and fixing accessories. Estimated total cable length 10m.	lin.m	105		
3A.47	Design, supply, lay, install and terminate power cable from actuator distribution board to new air scour inlet valve using 6mm sq. 4C/Cu/XLPE/SWA/PVC cable c/w cable tray, trunking, conduit, all suspension and fixing accessories. Cable length varies for each LCP. Estimated total cable length 105m.	lin.m	90		
3A.48	Design, supply, lay, install and terminate control cable from filter air scour inlet valve to respective LCP using 2.5mm sq. multicore Cu/XLPE/SWA/PVC cable c/w cable tray, trunking, conduit, all suspension and fixing accessories. Cable length varies for each filter. Estimated total cable length 90m.	lin.m	15		
3A.49	Design, supply, lay, install and terminate control cable (1 no.) from air blower starter panel to nearest filter LCP using 2.5mm sq. multicore Cu/XLPE/SWA/PVC cable c/w cable tray, trunking, conduit, all suspension and fixing accessories. Estimated total cable length 15m.	lin.m	75		
3A.50	Design, supply, lay, install and terminate interlocking control cable between LCP using 2.5mm sq. multicore Cu/XLPE/SWA/PVC cable c/w cable tray, trunking, conduit, all suspension and fixing accessories. Estimated total cable length 75m.	lin.m	100		
	<u>BACKWASH PUMP ISOLATION</u>				
3A.51	Design, supply, install & commission DN300 double flange butterfly isolation valve and DN300 checked valve. The location is after the flowmeter. Rate to include existing SS304 pipe modification to be able to install butterfly valve and checked valve.	set	2		
	Total Carried to Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 3 - REFURBISHMENT OF FILTER
BILL 3 - SUMMARY

	PAGE No.	AMOUNT (RM)
	From Page 1/8	
	From Page 2/8	
	From Page 3/8	
	From Page 4/8	
	From Page 5/8	
	From Page 6/8	
	From Page 7/8	
Total Carried to Grand Summary		

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 4 - LABORATORY EQUIPMENT

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISIONING				
	LABORATORY EQUIPMENT				
4A.1	Jar Test Flocculator, six jar type	set	1		
4A.2	Portable turbiditymeter	set	2		
4A.3	Spare turbiditymeter sampling bottle	no	10		
4A.4	Benchtop spectrofotometer	set	1		
4A.5	Analytical balance	set	1		
	Total Carried to Grand Summary				

SYARIKAT AIR MELAKA BERHAD
NO. RUJUKAN TENDER : SAMB / 24 / 2025

KERJA-KERJA MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR DI DAERAH MELAKA TENGAH, MELAKA

BILL 5 - PROVISIONAL AMOUNT

ITEM NO.	DESCRIPTION	UNIT	QTY	RATE (RM)	AMOUNT (RM)
	PROVISIONAL AMOUNT Notes: All provisional sums are to be expended as directed by the S.O. or deducted wholly or in part if not required.				
5A.1	Repair of pulsator clarifier internal pipework if found defective and likely to affect water quality during normal plant operation, inspection to be carried out during pulsator clarifier rehabilitation works	Prov	Sum		60,000.00
5A.2	Repair works or replacement of Aquazur filter drain cast-in pipe if found defective and unsuitable for installation works, inspection to be carried out during filter rehabilitation works.	Prov	Sum		30,000.00
5A.3	To provide necessary method(s) to stop water ingress into the filter during rehabilitation works, with inspection to be carried out during filter rehabilitation installation works	Prov	Sum		18,000.00
	Total Carried to Grand Summary				108,000.00

BAHAGIAN J

LUKISAN TENDER

SAMB

CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR

TENDER DRAWING
AUGUST 2025

Employer :

SYARIKAT AIR MELAKA BERHAB

LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300,
MELAKA.

Tel : 15800
Website : www.samb.com.my

DRAWING NO.	DRAWING TITLE
LAS/TD/TW/GN/001	LIST OF DRAWINGS
LAS/TD/TW/GN/002	LOCATION PLAN
LAS/TD/TW/GN/003	OVERALL LAYOUT PLAN
LAS/TD/TW/GN/004	OVERALL PROPOSED WORK
LAS/TD/TW/GN/005	PLANT OVERALL SCHEMATIC DIAGRAM (SHEET 1 OF 2)
LAS/TD/TW/GN/006	PLANT OVERALL SCHEMATIC DIAGRAM (SHEET 2 OF 2)
LAS/TD/TW/GN/010	PULSATOR CLARIFIER PROPOSED REHABILITATION WORKS (SHEET 1 OF 3)
LAS/TD/TW/GN/011	PULSATOR CLARIFIER PROPOSED REHABILITATION WORKS (SHEET 2 OF 3)
LAS/TD/TW/GN/012	PULSATOR CLARIFIER PROPOSED REHABILITATION WORKS (SHEET 3 OF 3)
LAS/TD/TW/GN/013	PULSATOR CLARIFIER PROPOSED VACUUM PIPE ROUTE
LAS/TD/TW/GN/016	AQUAZUR FILTER PROPOSED REHABILITATION WORKS (SHEET 1 OF 2)
LAS/TD/TW/GN/017	AQUAZUR FILTER PROPOSED REHABILITATION WORKS (SHEET 2 OF 2)
LAS/TD/TW/GN/019	LAMELLA FILTER PROPOSED REHABILITATION WORKS (SHEET 1 OF 2)
LAS/TD/TW/GN/020	LAMELLA FILTER PROPOSED REHABILITATION WORKS (SHEET 2 OF 2)
LAS/TD/TW/GN/021	LAMELLA FILTER PROPOSED CABLE ROUTE

Main Contractor :

Checked : Approved : Date :

Sub-Contractor/Specialist Contractor :

Manufacturer/Supplier :

Consultant :

Consultant Endorsement :

Revision	Description	Date	Init.

Remarks

Drawing Title :

BUKIT SEBUKOR
WATER TREATMENT PLANT
LIST OF DRAWINGS

Drawn : SAMB | Designed : | Checked :

Approved : | Scale : NTS | Date : AUG 2025

Owner :

SAMB

SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA.

CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No : LAS/TD/TW/GN/001 | Rev. 0

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :
	Manufacturer/Supplier :		
Checked :	Approved :	Date :	

Revision	Description	Date	Inst.
	Remarks		

Drawing Title :

BUKIT SEBUKOR
WATER TREATMENT PLANT
LOCATION PLAN

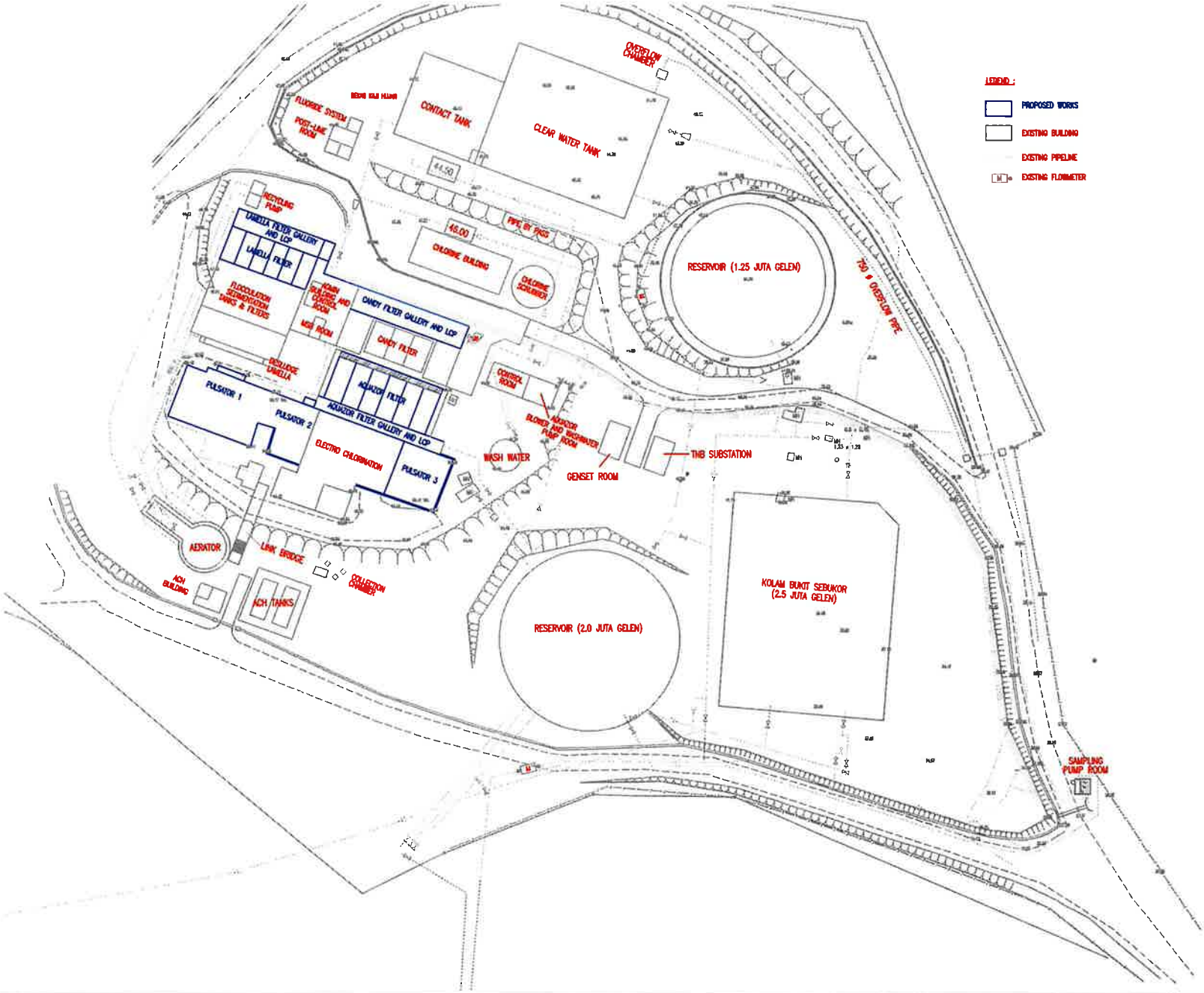
Drawn : SAMB	Designed :	Checked :
Approved :	Scale : NTS	Date : AUG 2025

Owner :

SAMB
SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA

CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No :	Rev.
LAS/TD/TW/GN/002	0



Main Contractor :

Checked : | Approved : | Date :

Sub-Contractor/Specialist Contractor :

Manufacturer/Supplier :

Consultant :

Consultant Endorsement :

Revision	Description	Date	Inst.

Remarks

Drawing Title :

BUKIT SEBUKOR
WATER TREATMENT PLANT
OVERALL LAYOUT PLAN

Drawn : SAMB | Designed : | Checked :

Approved : | Scale : NTS | Date : AUG 2025

Owner :

SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA.

CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No : LAS/TD/TW/GN/003 | Rev. 0

AIR SCOUR SYSTEM:
- TO ADD NEW AIR BLOWER
- TO ADD NEW AIR SCOUR PIPEWORKS
- TO ADD NEW AIR SCOUR ISOLATION VALVES
- TO ADD NEW STARTER PANEL

REPLACE FILTER LOCAL CONTROL PANEL (LCP), FILTER LOSS OF HEAD INSTRUMENT AND LEVEL ELECTRODE

REFURBISH LAMELLA FILTER UNDERDRAIN SYSTEM AND FILTER MEDIA

REPLACE FILTER LOCAL CONTROL PANEL (LCP), FILTER LOSS OF HEAD INSTRUMENT AND LEVEL ELECTRODE

REFURBISH AQUAZUR FILTER UNDERDRAIN SYSTEM AND FILTER MEDIA

REPLACE FILTER DRAIN VALVE AND PIPEWORKS

LABORATORY INSTRUMENT (JAR TESTER, TURBIDITYMETER AND SPECTROFOTOMETER)

MODIFY EXISTING AIR SCOUR INLET PIPEWORK AS PER TENDERER NEW FILTER UNDERDRAIN DESIGN

CLARIFIER PULSATOR NO.1:
- TO REPLACE INCLINED PLATE WITH TUBE SETTLER
- TO REPLACE VACUUM SYSTEM
- TO REPLACE DRAIN VALVE AND PIPEWORKS

REPLACE FILTER LOCAL CONTROL PANEL (LCP), FILTER LOSS OF HEAD INSTRUMENT AND LEVEL ELECTRODE

CLARIFIER PULSATOR NO.2:
-TO REPLACE INCLINED PLATE WITH TUBE SETTLER
-TO REPLACE VACUUM SYSTEM
-TO REPLACE DRAIN VALVE AND PIPEWORKS

CLARIFIER PULSATOR NO.3:
-TO REPLACE INCLINED PLATE WITH TUBE SETTLER
-TO REPLACE VACUUM SYSTEM
-TO REPLACE DRAIN VALVE AND PIPEWORKS

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :
Checked :	Approved :	Date :	Manufacturer/Supplier :

Revision	Description	Date	Init.
Remarks			

Drawing Title :
BUKIT SEBUKOR
WATER TREATMENT PLANT
OVERALL PROPOSED WORKS

Drawn : SAMB	Designed :	Checked :
Approved :	Scale : NTS	Date : AUG 2025

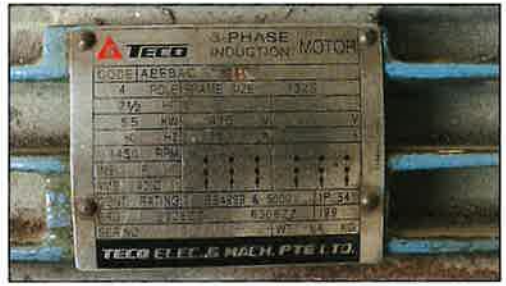
Owner :
SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA.

CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No : LAS/TD/TW/GN/004 Rev. 0

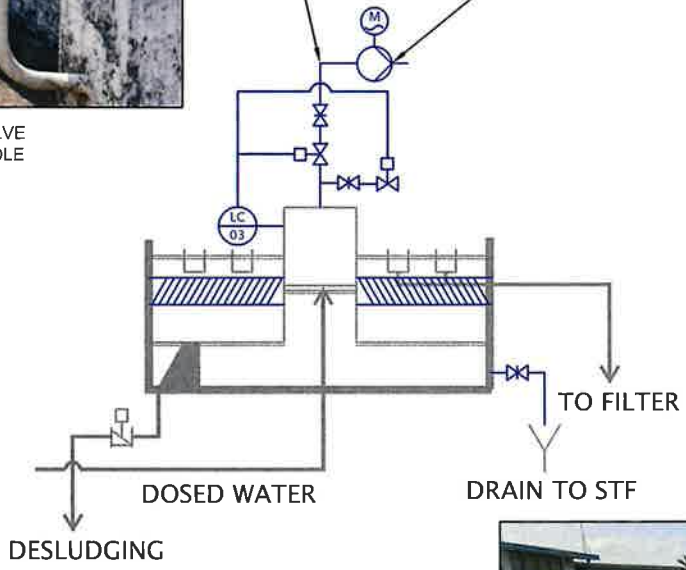
TO REPLACE ISOLATION VALVE, MOTORIZED BREAKER VALVE (AIR INLET VALVE), PIPEWORK, LEVEL ELECTRODE, MANHOLE SEAL, TERMINATION PANEL AND ELECTRICAL WORK.

TO REPLACE VACUUM PUMP, EXISTING VACUUM PUMP NAME PLATE.



EXISTING VACUUM PUMP MOTOR DATA

EXISTING VACUUM PUMP AND PIPEWORK (VACUUM SYSTEM NOT IN WORKING CONDITION)



TO REPLACE EXISTING GALVANIZED PIPE FROM VACUUM PUMP

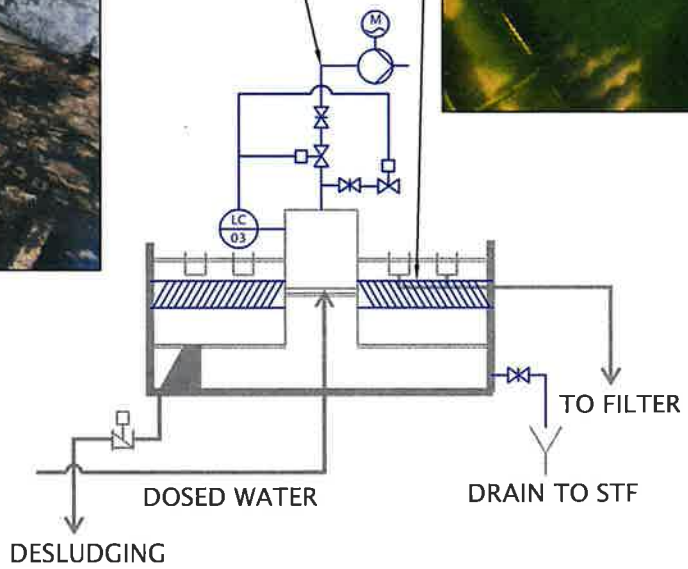
WORK NOTES:

1. TENDERER TO DESIGN VACUUM SYSTEM AS PER EXISTING VACUUM CHAMBER STRUCTURE SIZING.
2. EACH PULSATOR CLARIFIER WILL USE INDEPENDANT VACUUM PUMP.
3. ALL VACUUM PUMP WILL BE PLACE AT THE VACUUM PUMP ROOM.
4. VACUUM PUMP AND MOTOR DATA IS FOR TENDERER REFERENCE.
5. PULSATOR CLARIFIER NO.3 VACUUM PUMP LOCATION WILL BE PLACE NEAR THE VACUUM CHAMBER.
6. THE DELIVERY PIPE LENGTH FROM VACUUM PUMP TO PULSATOR CLARIFIER IS VARIES.
7. TO SEAL LEAK DURING TESTING (IF ANY) AND CLOSE ANY OPENING THAT HINDER THE VACUUM PROCESS.

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :	Revision / Description / Date / Init.	Drawing Title : BUKIT SEBUKOR WATER TREATMENT PLANT PULSATOR CLARIFIER POPOSED REHABILITATION WORKS (SHEET 1 OF 3)	Owner : SAMB SYARIKAT AIR MELAKA BERHAD LOT 897, WISMA AIR, JALAN HANG TUAH, 75300, MELAKA	
Checked : / Approved : / Date :	Manufacturer/Supplier :			Remarks	Drawn : SAMB / Designed : / Checked : / Approved : / Scale : NTS / Date : AUG 2025	CADANGAN MEMBAIKPULIH LOJI RAWATAN AIR BUKIT SEBUKOR CONTRACT NO. : TENDER DRAWING	Drawing No : LAS/TD/TW/GN/010 / Rev. 0

TO CLOSE OPENING AT PULSATOR CLARIFIER NO.1
(PROPOSE TO USE STAINLESS STEEL PLATE)

REPLACED EXISTING INCLINED PLATE WITH
TUBE SETTLER



TO REPLACE EXISTING ALUMINIUM LADDER

REPLACE ALUMINIUM ACCESS LADDER

WORK NOTES:

1. TENDERER TO DESIGN VACUUM SYSTEM AS PER EXISTING VACUUM CHAMBER STRUCTURE SIZING.
2. EACH PULSATOR CLARIFIER WILL USE INDEPENDANT VACUUM PUMP.
3. ALL VACUUM PUMP WILL BE PLACE AT THE VACUUM PUMP ROOM.
4. VACUUM PUMP AND MOTOR DATA IS FOR TENDERER REFERENCE.
5. PULSATOR CLARIFIER NO.3 VACUUM PUMP LOCATION WILL BE PLACE NEAR THE VACUUM CHAMBER.
6. THE DELIVERY PIPE LENGTH FROM VACUUM PUMP TO PULSATOR CLARIFIER IS VARIES.
7. TO SEAL LEAK DURING TESTING (IF ANY) AND CLOSE ANY OPENING THAT HINDER THE VACUUM PROCESS.

EXISTING INCLINED PLATE AND SUPPORT
(VIEW FROM INSIDE PULSATOR CLARIFIER)

EXISTING INCLINED PLATE AND SUPPORT
(VIEW FROM INSIDE PULSATOR CLARIFIER)

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :
Checked :	Manufacturer/Supplier :		
Approved :			
Date :			

Revision	Description	Date	Init.
Remarks			

Drawing Title :

BUKIT SEBUKOR
WATER TREATMENT PLANT
PULSATOR CLARIFIER
PROPOSED REHABILITATION WORKS
(SHEET 2 OF 3)

Drawn :	Designed :	Checked :
SAMB		
Approved :	Scale :	Date :
	NTS	AUG 2025

Owner :

SAMB
SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA.

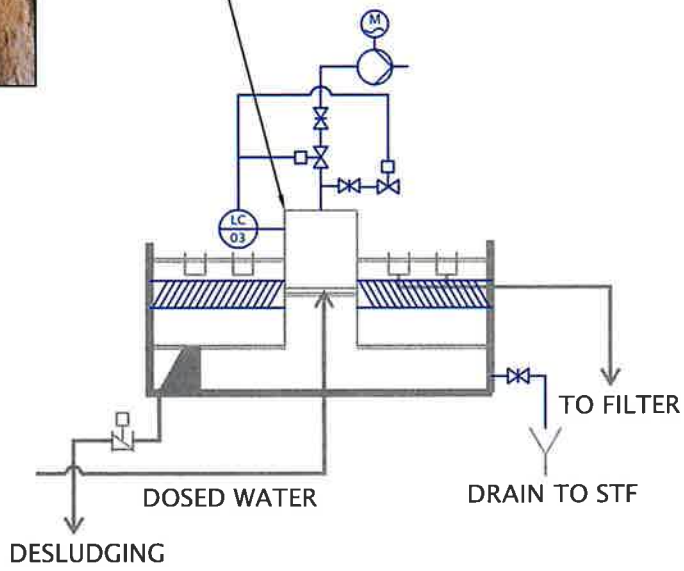
CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No :	Rev.
LAS/TD/TW/GN/011	0

ACCESS INSIDE VACUUM CHAMBER

EXISTING MANHOLE COVER RUBBER SEAL

EXISTING VALVES, LEVEL ELECTRODE AND MANHOLE COVER



EXISTING PANEL

TO CLEAN AND REPLACE DRAIN VALVE

TO CLEAN AND REPLACE DRAIN VALVE

WORK NOTES:

1. TENDERER TO DESIGN VACUUM SYSTEM AS PER EXISTING VACUUM CHAMBER STRUCTURE SIZING.
2. EACH PULSATOR CLARIFIER WILL USE INDEPENDANT VACUUM PUMP.
3. ALL VACUUM PUMP WILL BE PLACE AT THE VACUUM PUMP ROOM.
4. VACUUM PUMP AND MOTOR DATA IS FOR TENDERER REFERENCE.
5. PULSATOR CLARIFIER NO.3 VACUUM PUMP LOCATION WILL BE PLACE NEAR THE VACUUM CHAMBER.
6. THE DELIVERY PIPE LENGTH FROM VACUUM PUMP TO PULSATOR CLARIFIER IS VARIES.
7. TO SEAL LEAK DURING TESTING (IF ANY) AND CLOSE ANY OPENING THAT HINDER THE VACUUM PROCESS.

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :
Checked :	Approved :	Date :	
	Manufacturer/Supplier :		

Revision	Description	Date	Init.
	Remarks		

Drawing Title :

BUKIT SEBUKOR
WATER TREATMENT PLANT
PULSATOR CLARIFIER
PROPOSED REHABILITATION WORKS
(SHEET 3 OF 3)

Drawn :	Designed :	Checked :
SAMB		
Approved :	Scale :	Date :
	NTS	AUG 2025

Owner :

SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA.

CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No :	Rev.
LAS/TD/TW/GN/012	0

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :
Checked :	Approved :	Date :	Manufacturer/Supplier :

Revision	Description	Date	Init.
Remarks			

Drawing Title :

BUKIT SEBUKOR
WATER TREATMENT PLANT
PULSATOR CLARIFIER
PROPOSED VACUUM PUMP PIPE ROUTE

Drawn :	Designed :	Checked :
SAMB		
Approved :	Scale :	Date :
	NTS	AUG 2025

Owner :

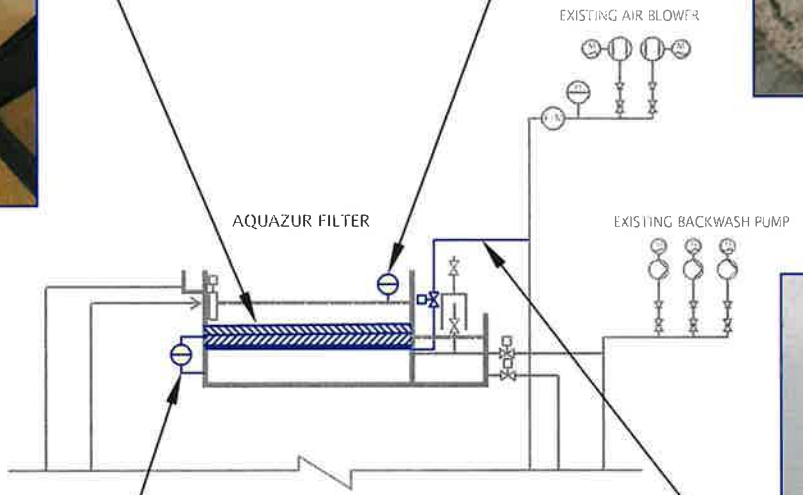
SAMB
SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA

CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No :	Rev.
LAS/TD/TW/GN/013	0

REFURBISH FILTER UNDERDRAIN SYSTEM
AND REPLACE FILTER MEDIA

REPLACE FILTER LEVEL ELECTRODE



REPLACE FILTER LOSS OF HEAD INSTRUMENT

RELOCATION OF THE AIR SCOUR INLET PIPE
AND INLET VALVE AS PER TENDERER DESIGN

WORK NOTES:

1. DESIGN NEW FILTER UNDER DRAIN SYSTEM USING FILTER BLOCK.
2. REMOVE AND DEMOLISH EXISTING FILTER UNDERDRAIN STRUCTURE.
3. REPLACE NEW FILTER MEDIA.
4. MODIFY AIR SCOUR INLET PIPEWORK.
5. REPLACE FILTER DRAIN VALVE AND PIPEWORK.
6. REPLACE FILTER CONTROL PANEL.
7. REPLACE FILTER LEVEL ELECTRDE.
8. REPLACE FILTER LOSS OF HEAD INSTRUMENT.

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :
Checked :	Approved :	Date :	Manufacturer/Supplier :

Revision	Description	Date	Init.
Remarks			

Drawing Title :

BUKIT SEBUKOR
WATER TREATMENT PLANT
AQUAZUR FILTER
PROPOSED REHABILITATION WORKS
(SHEET 1 OF 2)

Drawn :	Designed :	Checked :
SAMB		
Approved :	Scale : NTS	Date : AUG 2025

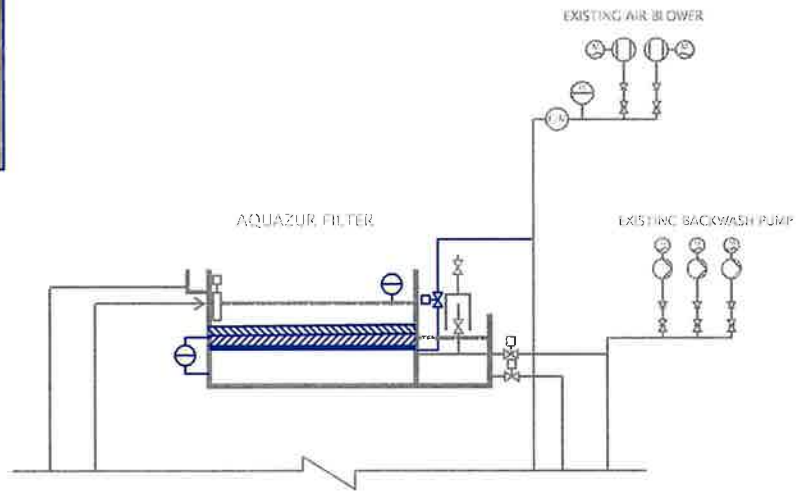
Owner :

SAMB SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA.

PEMULIHAN PROSES DAN PERALATAN
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No :	Rev.
LAS/TD/TW/GN/016	0

REPLACE DRAIN VALVE AND PIPEWORK



REPLACE FILTER LOCAL CONTROL PANEL (LCP)

WORK NOTES:

1. DESIGN NEW FILTER UNDER DRAIN SYSTEM USING FILTER BLOCK.
2. REMOVE AND DEMOLISH EXISTING FILTER UNDERDRAIN STRUCTURE.
3. REPLACE NEW FILTER MEDIA.
4. MODIFY AIR SCOUR INLET PIPEWORK.
5. REPLACE FILTER DRAIN VALVE AND PIPEWORK.
6. REPLACE FILTER CONTROL PANEL.
7. REPLACE FILTER LEVEL ELECTRDE.
8. REPLACE FILTER LOSS OF HEAD INSTRUMENT.

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :
Checked :	Approved :	Date :	Manufacturer/Supplier :

Revision	Description	Date	Init.
Remarks			

Drawing Title :

BUKIT SEBUKOR
WATER TREATMENT PLANT
AQUAZUR FILTER
PROPOSED REHABILITATION WORKS
(SHEET 2 OF 2)

Drawn : SAMB	Designed :	Checked :
Approved :	Scale : NTS	Date : AUG 2025

Owner :

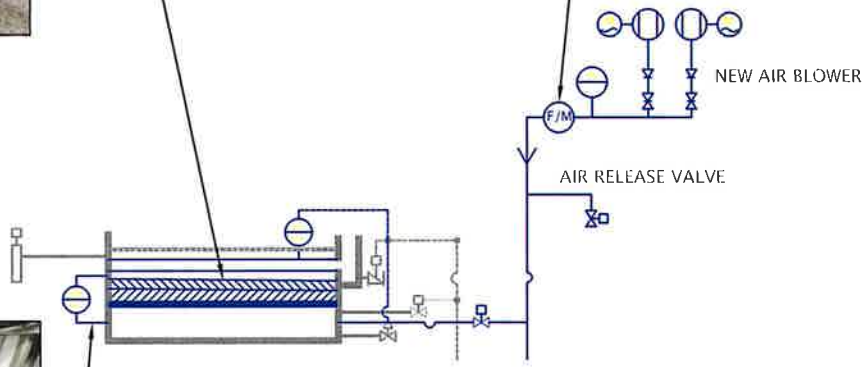
SAMB
SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA

PEMULIHAN PROSES DAN PERALATAN
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No : LAS/TD/TW/GN/017 Rev. 0

REFURBISH FILTER UNDERDRAIN SYSTEM
AND REPLACE FILTER MEDIA

PROPOSED NEW AIR BLOWER LOCATION



REPLACE FILTER LOSS OF HEAD
INSTRUMENT

WORK NOTES:

1. DESIGN NEW FILTER UNDER DRAIN SYSTEM USING FILTER BLOCK.
2. REMOVE AND DEMOLISH EXISTING FILTER UNDERDRAIN STRUCTURE.
3. REPLACE NEW FILTER MEDIA.
4. INSTALL NEW AIR BLOWER.
5. INSTALL NEW AIR SCOUR INLET PIPEWORK.
6. REPLACE FILTER CONTROL PANEL.
7. REPLACE FILTER LEVEL ELECTRDE.
8. REPLACE FILTER LOSS OF HEAD INSTRUMENT.

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :
Checked :	Approved :	Date :	Manufacturer/Supplier :

Revision	Description	Date	Inst.
Remarks			

Drawing Title :

BUKIT SEBUKOR
WATER TREATMENT PLANT
LAMELLA FILTER
PROPOSED REHABILITATION WORKS
(SHEET 1 OF 2)

Drawn : SAMB	Designed :	Checked :
Approved :	Scale : NTS	Date : AUG 2025

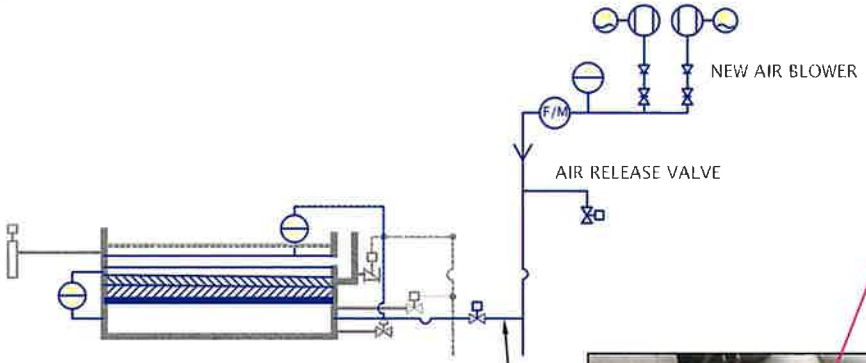
Owner :

SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA.

CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No :	Rev.
LAS/TD/TW/GN/019	0

PROPOSED ISOLATION AND CHECK VALVE
LOCATION FOR FILTER BACKWASH PUMP



PROPOSED NEW AIR SCOUR PIPE TO BE
ABOVE/BESIDE BACKWASH PIPE AND ACCESSIBLE
FOR AIR SCOUR INLET VALVE MANUAL OPERATION

WORK NOTES:

1. DESIGN NEW FILTER UNDER DRAIN SYSTEM USING FILTER BLOCK.
2. REMOVE AND DEMOLISH EXISTING FILTER UNDERDRAIN STRUCTURE.
3. REPLACE NEW FILTER MEDIA.
4. INSTALL NEW AIR BLOWER.
5. INSTALL NEW AIR SCOUR INLET PIPEWORK.
6. REPLACE FILTER CONTROL PANEL.
7. REPLACE FILTER LEVEL ELECTRDE.
8. REPLACE FILTER LOSS OF HEAD INSTRUMENT.

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :
Checked :	Approved :	Date :	Manufacturer/Supplier :

Revision	Description	Date	Init.
Remarks			

Drawing Title :
BUKIT SEBUKOR
WATER TREATMENT PLANT
LAMELLA FILTER
PROPOSED REHABILITATION WORKS
(SHEET 2 OF 2)

Drawn : SAMB	Designed :	Checked :
Approved :	Scale : NTS	Date : AUG 2025

Owner :
SAMB
SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA.

CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No : LAS/TD/TW/GN/020
Rev. 0

Main Contractor :	Sub-Contractor/Specialist Contractor :	Consultant :	Consultant Endorsement :
	Manufacturer/Supplier :		
Checked :	Approved :	Date :	

Revision	Description	Date	Inst.
Remarks			

Drawing Title :

BUKIT SEBUKOR
WATER TREATMENT PLANT
LAMELLA FILTER
PROPOSED CABLE ROUTE

Drawn : SAMB	Designed :	Checked :
Approved :	Scale : NTS	Date : AUG 2025

Owner :

SAMB
SYARIKAT AIR MELAKA BERHAD
LOT 897, WISMA AIR,
JALAN HANG TUAH, 75300, MELAKA

CADANGAN MEMBAIKPULIH
LOJI RAWATAN AIR BUKIT SEBUKOR
CONTRACT NO. : TENDER DRAWING

Drawing No :	Rev.
LAS/TD/TW/GN/021	0

BAHAGIAN K

LATAR BELAKANG PETENDER

LATAR BELAKANG PETENDER

Borang A -	Surat Pengakuan Kebenaran Maklumat dan Kesahihan Dokumen Yang Dikemukakan oleh Petender	} }
Borang B -	Maklumat Am Latar Belakang Petender	}
Borang C -	Data-Data Kewangan	}BORANG
Borang D -	Rekod Pengalaman Kerja	}BORANG
Borang E -	Kakitangan Teknikal	}MAKLUMAT
Borang F -	Keempunyaan Loji Dan Peralatan Pembinaan Utama	} }
Borang G -	Senarai Kerja Kontrak Semasa	}
Borang CA -	Laporan Bank/Institusi Kewangan Mengenai Kedudukan Kewangan Petender	} DOKUMEN } DOKUMEN }
Borang GA -	Laporan Penyelia Projek Atas Prestasi Kerja (Bukan Projek SAMB) Semasa Petender	} SOKONGAN } }
Borang GA 1-	Laporan Jurutera Projek Atas Prestasi Kerja Semasa Petender	} }
Borang H -	Jadual Perancangan kerja	}

BORANG A

SURAT PENGAKUAN KEBENARAN MAKLUMAT DAN KESAHIHAN DOKUMEN YANG DIKEMUKAKAN OLEH PETENDER.

Nama Kontraktor :.....

Alamat :.....

.....

.....

Kepada,

Ketua Pegawai Eksekutif,
Syarikat Air Melaka Berhad.
(Pihak yang akan menilai tender)

Tuan,

MAKLUMAT LATAR BELAKANG, KEWANGAN DAN TEKNIKAL PETENDER

1. Kami telah membaca dan teliti semua arahan-arahan yang terkandung dalam Arahan Kepada Petender termasuk arahan yang menghendakkan kami mengemukakan maklumat-maklumat dan dokumen-dokumen mengenai perkara di atas bersama-sama dokumen tender kami semasa mengemukakan Tender ini untuk membolehkan SAMB menilai keupayaan kami untuk melaksanakan kerja yang ditender, semasa penilaian Tender.

2. Kami faham dan mengambil maklum bahawa penilaian Tender ini akan mengambil kira dan mementingkan keupayaan kami melaksanakan kerja yang ditender. Justeru itu tender kami akan hanya dipertimbang untuk diperakukan kepada Lembaga Tender untuk disetuju terima sekiranya kami didapati berkeupayaan untuk melaksanakan projek yang ditender, mengikut penilaian SAMB berasaskan maklumat-maklumat dan dokumen-dokumen yang kami kemukakan.

3. Kami juga mengambil maklum bahawa kami dikehendaki mengemukakan semua maklumat dan dokumen-dokumen yang diminta bersama-sama tender kami sebelum Tender ditutup dan maklumat-maklumat atau dokumen-dokumen yang dikemukakan kemudian daripada itu tidak akan diterima untuk diambil kira dalam penilaian keupayaan kami.

4. Kami mengaku bahawa maklumat-maklumat dan data-data yang kami berikan bersama-sama ini di Borang B, C, CA, D, E, F,G & GA, H dan dokumen-dokumen yang kami sertakan bersamanya setahu kami adalah semuanya benar dan sah pada semua segi dan kami telah mengambil makluman dan sedar akan tindakan yang boleh diambil oleh SAMB terhadap kami dan/atau tender kami, sekiranya mana-mana maklumat, data-data dan dokumen yang kami berikan itu didapati tidak benar atau palsu.

5. Kami juga mengambil maklum dan sedar bahawa Tender kami akan ditolak (disqualified) dan tidak akan dipertimbangkan sekiranya maklumat-maklumat yang kami berikan tidak mencukupi atau sekiranya kami gagal untuk memberikan bersama-sama ini mana-mana maklumat dan/atau menyertakan mana-mana dokumen penting yang sangat diperlukan untuk membolehkan SAMB menilai keupayaan kami, terutamanya dokumen-dokumen berhubung dengan kedudukan kewangan dan prestasi kerja semasa kami seperti berikut:-

(1) Salinan Akaun Syarikat yang telah disahkan dan diaudit oleh Juru Audit yang bertauliah, bagi dua (2) tahun kewangan terakhir.
(2) Salinan Penyata Bulanan Akaun Bank mengenai Wang Dalam tangan petender bagi (3) bulan terakhir sebelum tarikh tutup Tender;
(3) Laporan Penyelia Projek atas prestasi kerja semasa yang bukan projek SAMB atas Borang GA dalam satu sampul berlakri bagi setiap kerja semasa yang sedang dilaksanakan.

6. Kami dengan ini memberi kuasa kepada mana-mana pegawai kerajaan, jurutera-jurutera projek, bank dan institusi kewangan lain dan lain-lain atau mana-mana orang atau firma yang berkenaan untuk memberikan maklumat-maklumat yang dianggap perlu dan diminta oleh SAMB untuk menyemak maklumat-maklumat yang kami berikan atau untuk mendapatkan maklumat tambahan. Kami mengambil maklum bahawa pihak SAMB juga boleh merujuk apa-apa maklumat yang kami kemukakan dengan mana-mana pihak termasuk Jabatan Hasil Dalam Negeri. Walau bagaimanapun kami tetap bertanggungjawab di atas maklumat-maklumat dan dokumen-dokumen yang kami berikan bersama-sama ini.

Yang Benar,

..... Tarikh:.....
(Tandatangan Petender)

Nama Penuh:.....
No. Kad Pengenalan:.....
Atas Sifat:.....
Yang diberi kuasa dengan sempurnanya untuk mendatangani Tender ini untuk dan bagi pihak:

.....
(Meteri atas Cap Petender)

Saksi:..... Tarikh:.....

Nama Penuh:.....
No. Kad Pengenalan:.....
Pekerjaan:.....
Alamat:.....

BORANG B

MAKLUMAT AM LATAR BELAKANG PETENDER

1. Nama: _____
2. Alamat: _____
   _____
   _____

   No. Telefon: _____ No.Fax: _____

3. Pendaftaran dengan Lembaga Pembangunan Industri Pembinaan Malaysia (CIDB) / Kementerian Kewangan Malaysia (Sertakan Salinan Pendaftaran)
   (i) No. Pendaftaran: _____
   (ii) Tarikh Daftar: _____ Sah hingga _____
   (iii) Gred, Pengkhususan / Kod Bidang : _____
   _____
   (iv) Taraf (Bumiputera / Bukan Bumiputera): _____
   (v) Jika Bumiputera, tempoh sah taraf: Dari :_____ Hingga _____

4. Pendaftaran dengan pihak Kastam DiRaja Malaysia untuk Akta Cukai Barang dan Perkhidmatan 2014 (Akta GST 2014).
   (i) No. Pendaftaran GST : _____

5. Bagi Syarikat Sdn. Bhd. Nyatakan:
   (i) Modal dibenarkan : RM _____
   (ii) Modal dibayar : RM _____

6. Perniagaan Utama lain, jika ada:
   (a) _____sejak tahun _____
   (b) _____sejak tahun _____

7. Ahli-ahli Syarikat
   (i) Ahli-ahli Lembaga Pengarah

Nama	Jawatan	Saham Modal Dipegang

(i) Ahli-ahli Lembaga Pengarah (Samb)

Nama	Jawatan	Saham Modal Dipegang

(ii) Ahli-ahli Pengurusan

Nama	Jawatan	Kelulusan Akademik/Iktias

BORANG C

DATA-DATA KEWANGAN

A. Ringkasan harta dan liabiliti seperti yang ditunjukkan dalam Lembaran Imbangan (Balance Sheet)* yang diaudit bagi tahun kewangan terakhir:-

Asset* (A)	Liabiliti * (B)	Nilai Kewangan (Werth) (A-B)
Semasa : RM Tetap : RM	Semasa: RM Tetap : RM	Model Pusingan: RM Model Tetap : RM
Jumlah : RM	Jumlah : RM	'Nett Worth' : RM

B. Akaun Wang Di Tangan (Cash in Hand)**

1. Nama dan Alamat Bank di mana akaun di buka:

   _____

   _____

2. Nombor Akaun: _____

C Kemudahan Kredit (jika ada) +

1. Nama dan Alamat Bank/Insitusi Kewangan yang memberi Kemudahan Kredit:

   _____

   _____

2. Bentuk dan baki amaun yang boleh digunakan untuk projek pembinaan

(i)	Overdraf atau Talian Kredit	RM
(ii)	Overdraf bercagar	RM
(iii)	Pinjaman Tetap yang akan/layak Diperolehi untuk Projek	RM
(iv)	_____	RM_____
	Jumlah	RM_____

PERINGKATAN PENTING

* Sila sertakan salinan Akaun Syarikat bagi dua (2) tahun kewangan terakhir, yang disahkan dan diaudit oleh Juru Audit bertauliah (certified Accountant) atau sekiranya tiada, bagi tahun kewangan setahun sebelumnya bagi menyokong data-data yang diberi. Tender yang tidak disertakan dengan Akaun ini akan ditolak.

** Sila sertakan salinan Penyata Bulanan Bank bagi tiga (3) bulan terakhir sebelum tarikh tutup Tender. Tender yang tidak disertakan dengan penyata ini akan ditolak.

\+ Sila dapat dan sertakan Laporan sulit daripa Pihak Bank/Institusi Kewangan atas format seperti Borang CA, dalam satu sampul berlakri.

BORANG D – REKOD PENGALAMAN KERJA

(Senarai semua kerja yang disiapkan dalam 5 tahun lepas)

Bil	Nama Kontrak/Projek dan Skop Kerja +	Nilai Kontrak (RM)	Nilai Petender Bertanggungjawab	Tempoh Kontrak**	Tarikh Milik Tapak	Tarikh Siap		Nama dan Alamat Pegawai Penguasa/ Jurutera Perunding		Nama dan Alamat Majikan
						Kontrak	Sebenar			

\+ Salinan Perakuan/Pengesahan Siap Kerja bagi setiap kerja yang disenaraikan hendaklah disertakan.

* Hanya perlu diisi sekiranya petender melaksanakan kerja sebagai ahli syarikat gabungan.

** Tempoh Kontrak hendaklah termasuk lanjutan masa yang diluluskan

BORANG E - KAKITANGAN TEKNIKAL

(Butir-butir Kakitangan Teknikal Yang Ada Dalam Pengajian Petender Masa Kini)

Nama dan No.K/P	Umur	Kelulusan Professional/Pendidikan**	Tahun Kelulusan	Tarikh diambil Bekerja	Jawatan yang Disandang/Tugas-tugas semasa	Pengalaman Lepas (Jawatan disandang, nama projek dan majikan dan tempoh bekerja dan sebagainya)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

* Salinan Borang KWSP 'A' setiap pekerja bagi bulan caruman terakhir dan salinan perjanjian perkhidmatan ahli professional yang diambil khidmat secara kontrak hendaklah disertakan.

** Sila sertakan salinan sijil kelulusan atau sijil keahlian Badan-badan Professional.

BORANG F - KEUPAYAAN LOJI DAN PERALATAN PEMBINAAN UTAMA

(Senarai Loji dan Peralatan Pembinaan Utama Keupayaan Petender Yang Sesuai Yang Boleh Digunakan Untuk Projek).

Bil	Butiran (Jenis, Model, Buatan dan Keupayaan/Saiz)	Dimiliki, disewabeli atau disewapajak*	Bilangan Setiap Satu	Nilai Semasa (RM)	Umur (dari tarikh belian asal)	Tempat simpanan/digunakan sekarang	Catatan
A.	Loji dan Peralatan Asas** (a) Treatment Plant Equipments (b) Pumping and Mechanical Plants (c) Electrical Equipments (all as per Specification)						
B	Loji dan Peralatan Lain						

* Salinan kad pendaftaran dan/atau dokumen-dokumen lain bukti keempunyaan hak milik petender atau perjanjian sewabeli-sewapajak atas setiap Loji dan Peralatan yang disenaraikan hendaklah disertakan.

** Pegawai yang menyediakan Dokumen Tender hendaklah menyenaraikan butir-butir Loji dan Peralatan Asas bagi projek berkenaan (tanpa bilangan AKM)

BORANG G - SENARAI KERJA KONTRAK SEMASA

(Senarai semua kerja di dalam tangan/sedang berjalan dan belum siap termasuk kontrak yang baru dilantik)

Bil	Nama Kontraktor/Projek+	Nilai Kontrak (RM)	Nilai Petender* Bertanggungjawab	Tempoh Kontrak**	Tarikh Milik Tapak	Tarikh Siap Kontrak	Kemajuan Kerja +		Nama dan Alamat Jurutera Projek	Nama dan Alamat Majikan
							Ikut Jadual (%)	Sebenar Dicapai (%)		

* Hanya perlu diisi sekirnya petender melaksanakan kerja sebagai ahli syarikat gabungan.

** Tempoh Kontrak hendaklah termasuk lanjutan masa yang diluluskan.

\+ Peringatan Penting
Bagi setiap kerja semasa yang bukan projek SAMB, sertakan (wajib) Laporan Peyelia Projek atas format seperti Borang GA, dalam satu sampul berlakri. Tender yang tidak disertakan dengan Laporan ini bagi setiap kerja yang disenaraikan, akan ditolak.

SULIT BORANG CA

LAPORAN BANK/INSTITUSI KEWANGAN MENGENAI KEDUDUKAN KEWANGAN PETENDER

(Borang ini hendaklah dilengkapkan oleh pihak bank atau institusi kewangan lain dan diserahkan kepada petender dalam satu sampul berlakri untuk disertakan bersama-sama tendernya sekiranya petender mempunyai kemudahan kredit dengan Bank/Institusi Kewangan yang berkenaan.

Kepada

(Ketua Pegawai Eksekutif, SAMB)

Nama Petender:

Projek:

_____

_____

(A) – Kemudahan Kredit – yang boleh digunakan untuk perlaksanaan Projek: Kemudahan Kredit yang telah dilulus dan kemudahan kredit tambahan minimum yang layak diperelohi oleh petender adalah seperti berikut:-

Bentuk Kemudahan Kredit	Baki drp yang Telah diluluskan	Tambahan Minima Yang akan Diluluskan*	Jumlah
(i) Overdraf	RM	RM	RM
(ii) Overdraf bercagar	RM	RM	RM
(iii) Talian Kredit	RM	RM	RM
(iv) Pinjaman Tetap yang akan/layak Diperolehi untuk projek	RM	RM	RM
(v)	RM	RM	RM
Jumlah:	RM	RM	RM

(B) – Ulasan-ulasan mengenai kedudukan kewangan dan akuan petender:-

Tandatangan untuk dan bagi pihak bank:

Nama Bank:

Materi Bank:

Nama Pegawai : _____

Jawatan : _____

Tarikh : _____

SULIT BORANG GA

LAPORAN PENYELIA PROJEK ATAS PRESTASI KERJA (BUKAN PROJEK SAMB)

SEMASA PETENDER

(Borang ini hendaklah dilengkapkan oleh Penyelia Projek atau Pembantu Kanannya yang mengawasi projek dan diserahkan kepada Kontraktor dalam satu sampul berlakri untuk disertakan bersama-sama tendernya).

Kepada:

Ketua Pegawai Eksekutif,
Syarikat Air Melaka Berhad.

Nama Kontraktor: .....

Nama Projek Yang Dilaksanakan: .....

.....

No.Kontrak: .....

Harga Kontrak (termasuk anggaran nilai kerja perubahan) : RM
Wang Pos Prima dan Peruntukan Sementara : RM
Nilai Kerja Pembina : RM

Tarikh Milik Tapak :
Tarikh Penyiapan Asal :

Tempoh Kontrak: ..... minggu

Lanjutan Masa Yang Telah Diluluskan: ..... hari

Lanjutan Masa seterusnya:
Yang difikir/dijangka layak diperakukan: ..... hari
Atas sebab-sebab

(i)

(ii)

Kemajuan kerja (berdasaran nilaian kerja yang telah dilaksanakan):
Pencapaian sebenar:.....% Mengikut Jadual
Tarikh Kerja dijangka akan dapat disiapkan: .....

Nilai Bahagian Kerja Yang Telah Siap : RM
Nilai Baki Kerja Yang Belum Siap : RM

Ulasan-ulasan mengenai Prestasi Kontraktor;
(Nyatakan apa-apa kepujian dan/atau kelemahan kontraktor dan juga apa-apa tindakan/perakuan yang diambil/dipertimbang berhubung dengan prestasi Kontraktor melaksanakan Kontrak).

Tandatangan Penyelia Projek : .....

Nama : .....

Jawatan : .....

Tarikh : .....

SULIT BORANG GA 1

LAPORAN JURUTERA PROJEK ATAS PRESTASI KERJA SEMASA PETENDER

(Borang ini hendaklah dilengkapkan oleh Jurutera Projek atau Pembantu Kanannya yang mengawasi projek apabila diminta berbuat demikian oleh Pegawai Penilaian dan hendaklah dihantar segera dengan menggunakan mesin fax).

Kepada:

Ketua Pegawai Eksekutif,
Syarikat Air Melaka Berhad.

Nama Kontraktor .....

Nama Projek Yang Dilaksanakan .....

.....

No. Kontrak .....

Harga Kontrak (termasuk anggaran nilai kerja perubahan) :RM
Wang Kos Prima dan Peruntukan Sementara :RM
Nilai Kerja Pembina :RM

Tarikh Milik Tapak:..... Tempoh Kontrak:..... minggu
Tarikh Penyiapan Asal:.....

Lanjutan Masa Yang Telah Diluluskan:..... hari

Lanjutan Masa Seterusnya:
Yang difikir/dijangka layak diperakukan:..... hari

Atas Sebab-sebab:

(i)

(ii)

Kemajuan Kerja (berdasarkan nilaian kerja yang telah dilaksanakan):

Pencapaian sebenar: .....% Mengikut Jadual: .....

Tarikh Kerja dijangka akan dapat disiapkan:.....

Nilai Bahagian Kerja Yang Telah Siap : RM
Nilai Baki Kerja Yang Belum Siap : RM

Ulasan-Ulasan mengenai Prestasi Kontraktor;

(Nyatakan apa-apa kepujian dan/atau kelemahan kontraktor dan juga apa-apa tindakan/perakuan yang diambil/dipertimbang berhubung dengan prestasi Kontraktor melaksanakan Kontrak)

Tandatangan Pegawai Penguasa/

Jurutera Projek/Wakil :.....

Nama :.....

Jawatan :.....

Tarikh :.....

BORANG H - JADUAL PERANCANGAN KERJA

KETERANGAN KERJA	TEMPOH KERJA DALAM MINGGU												
	1	2	3	4	5	6	7	8	9	10	11	12	13

Nota:
Petender hendaklah menyenarai skop kerja yang dijalankan dalam tender ini.

.....
Tandatangan & Cop Rasmi Petender