

UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Pertama  
Sidang 1992/93

Oktober/November 1992

RMK 351 - Ekonomi Bangunan 2

Masa : (3 Jam)

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Sila pastikan bahawa kertas peperiksaan ini mengandungi DUA PULUH SEMBILAN muka surat yang tercetak sebelum anda memulakan peperiksaan ini.

Jawab soalan SATU dan TIGA soalan lain.

1. Universiti Sains Malaysia bercadang membina sebuah pusat kemudahan untuk kakitangan bagi menampung beberapa keperluan kakitangan beraktiviti dan berinteraksi.

Cadangan bangunan ini berdasarkan kepada data-data awal dalam Lampiran A.

- (i) Sediakan anggaran kos untuk cadangan bangunan ini dengan menggunakan analisis kos (Lampiran B) dan data-data pelarasan (Lampiran C). Anggaran kos bangunan yang dicadangkan perlu diisi dengan menggunakan Pelan Kos di Lampiran D. Isikan Indeks Pelarasan di dalam Lampiran C.

(25 markah)

- (ii) Berdasarkan kepada data-data yang digunakan untuk menyediakan pelan kos tersebut, bincangkan dua faktor yang boleh mempengaruhi kos tender bangunan tersebut.

(15 markah)

2. Perancangan kos bangunan di peringkat rekabentuk (berpandukan RIBA Pelan of Work (Lampiran E)) adalah teori yang tidak mudah untuk dipraktikkan.

Bincangkan kekangan-kekangan/masalah-masalah yang wujud terutama dalam konteks industri binaan di Malaysia yang menyebabkan keadaan ini berlaku.

(20 markah)

...2/-

3. Bincangkan konsep pengkosan kitar hayat dari aspek objektif, kepentingan dan komponen-komponen kos kepada bangunan tinggi untuk pejabat.

(20 markah)

4. Kos sesebuah projek bukan sahaja bergantung kepada kos bangunan. Senaraikan dan jelaskan dengan tepat komponen-komponen kos lain yang akan ditanggung oleh klien dalam sesebuah projek.

Penjelasan anda mestilah mengambil kira definasi komponen tersebut, kenapa ianya ditanggung, implikasinya kepada kos keseluruhan projek dan julat kos komponen-komponen tersebut. Sebagai salah satu contoh dari komponen tersebut ialah kos tanah.

(20 markah)

...3/-

5. Sebuah projek bangunan tinggi memerlukan pemasangan penyaman udara untuk keselesaan pengguna bangunan. Sebagai pakar ekonomi bangunan, anda telah dikemukakan dengan dua alternatif sistem pemasangan penyaman udara. Jangka umur bangunan tersebut ialah 50 tahun, hayat untuk kedua-dua sistem ialah 25 tahun dan modal untuk projek tersebut ialah 10%. Anggaran kos untuk alternatif tersebut ialah:

	Sistem A	Sistem B
1. Kos Awal	\$105,000	\$150,000
2. Kos kerja binaan semasa pemasangan	15% dari 1	10% dari 1
3. Kos tahunan		
- peralatan	5% dari 1	5% dari 1
- senggaraan	5% dari 1	10% dari 1
- elektrik	\$100,000	\$90,000
4. Kos berkala		
- tahun 5	5,000	5,000
- tahun 10	10,000	7,000
- tahun 15	15,000	10,000
- tahun 20	20,000	15,000

Gunakan Lampiran F untuk asas pengiraan.

- i. Kirakan kos semasa penggunaan untuk kedua-dua sistem tersebut.

(15 markah)

- ii. Cadangkan sistem yang paling sesuai untuk digunakan.

(5 markah)

6. Jelaskan istilah berikut dengan TEPAT

- a. Perancangan Kos
- b. Kawalan Kos
- c. Analisis Kos
- d. Pelan Kos
- e. Kos Semasa Penggunaan (Cost in use)

(20 markah)

...4/-

LAMPIRAN A

CADANGAN PUSAT KAKITANGAN

1. Bangunan

- (a) 2 tingkat.
- (b) Bentuk - belum ditentukan.
- (c) Kualiti - belum ditentukan.
- (d) Tinggi tingkat - belum ditentukan.

2. Keperluan Ruang

Ruang untuk memenuhi fungsi di atas dapat dirumuskan seperti dalam Jadual.

Jadual Cadangan Kegunaan Ruang

Ruang	Luas Maksimum
1. Bilik bacaan/sunyi	1500 kp
2. Bilik riadah	2000 kp
3. Dewan tayangan/seminar/ banquet kecil	3000 kp
4. Dewan makan dan dapur	3000 kp
5. Ruang rehat/bar ringan	1500 kp
6. Bilik mandi dan persalinan	1000 kp
7. Pejabat/Alumini	1500 kp
8. Ruang sirkulasi dan ansilari (25%)	3500 k0
Jumlah keluasan kadar	17000 kp

Nota: kp - kaki persegi  
1 meter persegi = 10.74 kaki persegi

...5/-

ELEMENTAL COST ANALYSIS - FORM 1

5-Refreshment, Entertainment & Recreation Buildings

A-2-3277

JOB TITLE: Dining Hall and Student's Centre  
LOCATION: Selangor

CLIENT: Government  
TENDER DATE: December 1989

INFORMATION ON TOTAL PROJECT

Project and Contract Information

Project Details and Site Conditions:  
Construction of 2-Storey Student's Centre cum  
Dining Hall in a confined area

Contract:  
PWD 203A (Rev 10/83)

Market Conditions:

Contract Particulars:

Type of Contract: PWD 203A (Rev 10/83)

Cost Fluctuation: Yes

Competitive Tender List

Basis of Tender  Bills of Quantities  Open/Selected Competition   
Bills of Appr. Quant.  Sched. of Rates/Spec. & Drawings  Negotiated  Serial   
Contract Period Stip. by Client : 9 months  
Contract Period Offered By Builders : 9 months  
Number of Tenders Issued : 6  
Number of Tenders Received : 6

Government   
Private   
Provisional Sum \$ 5000.00  
Prime Cost Sum \$ -  
Preliminaries \$ 54500.00  
Contingencies \$ -  
Contract Sum \$ 1203148.31

\$	Int (Jv) /L
1136009.69	L
1174879.05	L
1203148.31	L
1213435.80	L
1286055.00	L
1448878.53	L

ANALYSIS OF SINGLE BUILDING

Design/Shape Information

Accommodation and Design Features:

Guest room, cafeteria, meeting room, games room, washing area, rest room, service area, kitchen, dining hall.

Areas:

Lower Ground Floor - m<sup>2</sup>  
Ground Floor 1981.00 m<sup>2</sup>  
Upper Floor 1296.00 m<sup>2</sup>  
GROSS FLOOR AREA 3277.00 m<sup>2</sup>  
Usable Area 2598.22 m<sup>2</sup>  
Circulation Area 349.07 m<sup>2</sup>  
Ancillary Area 258.56 m<sup>2</sup>  
Internal Division 71.15 m<sup>2</sup>  
GROSS FLOOR AREA 3277.00 m<sup>2</sup>  
Floor Space NOT Enclosed: - m<sup>2</sup>  
Roof Area: 1841.00 m<sup>2</sup>  
(Structural & Plant Rooms)

Functional Unit:

2598.22 m<sup>2</sup> Usable area  
External Wall Area 1613.00  
Gross Floor Area 3277.00  
= 0.492  
Storey Heights:  
Av. Below Grd. Floor - m  
At Grd. Floor 4.11 m  
Above Grd. Floor 4.38 m

Design/Shape:

Percentage of Gross Floor Area:  
a) Below Grd. Floor -  
b) Single-storey -  
c) 2-storey 100%  
d) 3-storey -  
e) -storey -

Contract Sum \$ 1203148.31  
Provisional Sum \$ 5000.00  
Prime Cost Sum \$ -  
Preliminaries \$ 54500.00 being 4.74% of remainder  
Contingencies \$ - being - % Contract Sum

Brief Cost Information

Functional Unit Cost  
excluding external works:  
Tender \$ 416.36 per m<sup>2</sup> Usable Area

Contract Sum less Contingencies \$ 1203148.31

271

BASE TOTAL COST/m<sup>2</sup> GFA:  
BASE FUNCTIONAL UNIT COST:  
BASE INDEX:  
ANALYSIS INDEX:

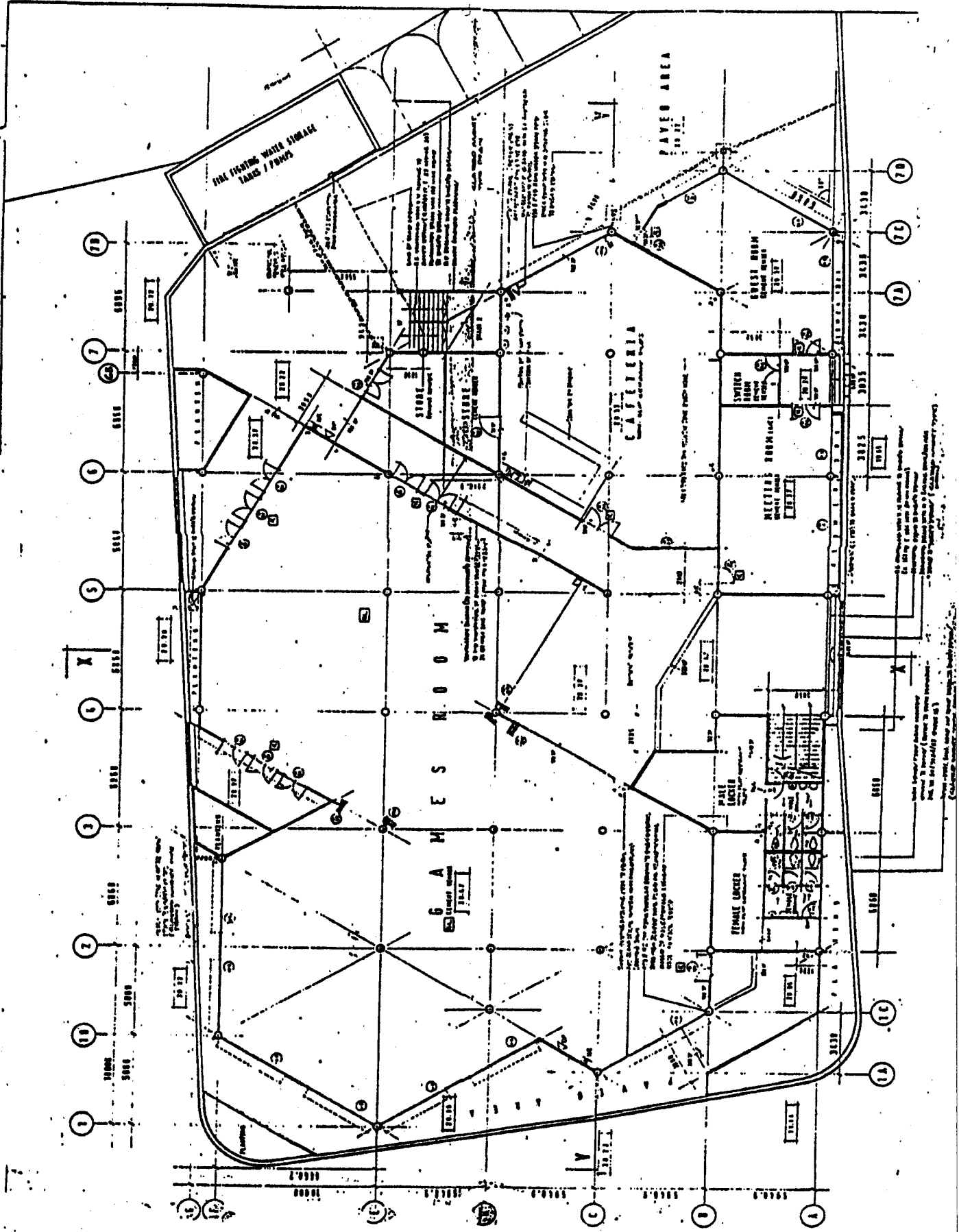
ELEMENTAL COST ANALYSIS - FORM 2

5-Refreshment, Entertainment & Recreational Buildings								
A-2-3277								
SUMMARY OF ELEMENT COSTS								
GROSS FLOOR AREA: 3277 m <sup>2</sup>			TENDER DATE: December 1989					
Preliminaries Shown Separately								
	Total Cost Of Element \$	Cost per m <sup>2</sup> GFA \$	Element Unit Quantity	Element Unit Rate \$	Element Ratio per m <sup>2</sup> GFA	Reinforced Concrete m <sup>3</sup>	Reinforcement kg	Form-work m <sup>2</sup>
<b>1 Substructure</b>								
1A Piling	68937.20	21.04	3132 m	22.01	0.956	-	-	-
1B Work Below Lowest Floor Finish	118341.83	36.11	1981 m <sup>2</sup>	59.74	0.605	335	27101	934
Group Element Total	187279.03	57.15						
<b>2 Superstructure</b>								
2A Frame	130749.93	39.90	3277 m <sup>2</sup>	39.90	1.000	254	39940	2201
2B Upper Floors	57366.27	17.51	1296 m <sup>2</sup>	44.26	0.395	177	12539	1118
2C Roof	180110.25	54.96	1841 m <sup>2</sup>	97.83	0.562	5	570	36
2D Stairs	13653.79	4.17	-	-	-	19	1753	126
2E External Walls	32987.12	10.07	779 m <sup>2</sup>	42.35	0.238	-	-	-
2F Windows & External Doors	70732.80	21.58	351 m <sup>2</sup>	201.52	0.107	-	-	-
2G Internal Walls & Partitions	39473.70	12.05	980 m <sup>2</sup>	40.28	0.299	-	-	-
2H Internal Doors	12232.15	3.73	255 m <sup>2</sup>	54.37	0.069	-	-	-
Group Element Total	537306.01	163.96						
<b>3 Finishes</b>								
3A Internal Wall Finishes	22086.80	6.74	788 m <sup>2</sup>	28.03	0.240	-	-	-
3B Internal Floor Finishes	53601.25	16.36	2953 m <sup>2</sup>	18.15	0.901	-	-	-
3C Internal Ceiling Finishes	31853.85	9.72	2596 m <sup>2</sup>	12.27	0.792	-	-	-
3D External Finishes	5236.00	1.60	-	-	-	-	-	-
Group Element Total	112777.90	34.41						
<b>4 Fittings and Furnishings</b>								
-								
<b>5 Services</b>								
5A Sanitary Appliances	6407.00	1.96						P.C. SUM TENDERED
5B Plumbing Installation	42652.00	13.02						
5C Refuse Disposal	-	-						
5D Air-Conditioning & Ventilation System	-	-						All Tendered Sums
5E Electrical Installation	98073.00	29.93						
5F Fire Protection Installation	29040.00	8.86						
5G Lift & Conveyor Installation	-	-						
5H Communication Installation	-	-						
5J Special Installation	-	-						
5K Builder's Profit & Attendance on Services	-	-						
5L Builder's Work In Connection With Services	13766.49	4.20						
Group Element Total	189938.49	57.96						
Sub-total exc. External Works Preliminaries & Contingencies	1027301.43	313.49						
<b>6 External works</b>								
6A Site Work	61812.93	18.86						
6B Drainage	37100.95	11.32						
6C External services	22433.00	6.85						
6D Ancillary Buildings	-	-						
6E Recreational Facilities	-	-						
Group Element Total	121346.88	37.03						
Preliminaries	54500.00	16.63						
TOTAL (less Contingencies)	1203148.31	367.15	272					

**INSTITUTION OF SURVEYORS, MALAYSIA  
BUILDING COST INFORMATION CENTRE**

**ELEMENTAL COST ANALYSIS - FORM 3**

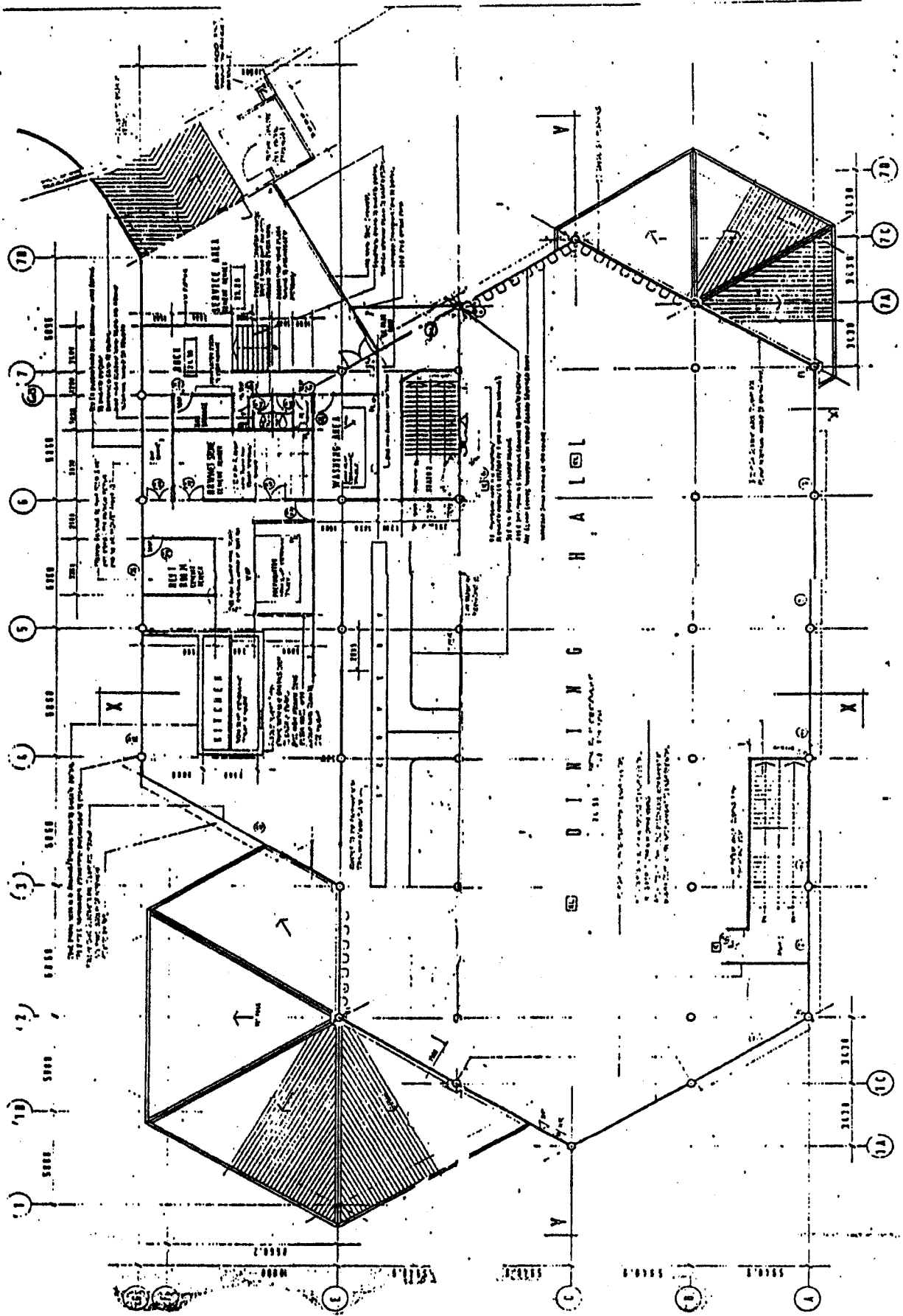
5- Refreshment, Entertainment & Recreational Buildings	
A-2-3277	
<b>BRIEF SPECIFICATION</b>	
GROSS FLOOR AREA: 3277 m <sup>2</sup>	TENDER DATE: December 1989
ELEMENT	SPECIFICATION
1 Substructure	
1A Piling	150mm x 150mm timber piles.
1B Work Below Lowest Floor Finish	Reinforced concrete pile caps, footings, column stump, beams & slab.
2 Superstructure	
2A Frame	Reinforced concrete frame.
2B Upper Floors	Reinforced concrete upper floor slab.
2C Roof	Metal roof deck on timber roof trusses, waterproofing membrane & polycarbonate skylight.
2D Stairs	Reinforced concrete stairs, steps & ramp.
2E External Walls	Reinforced concrete wall, concrete hollow block wall.
2F Windows & External Doors	Timber framed adjustable & fixed louvred windows, timber flush & louvred doors, pressed steel sunscreen.
2G Internal Walls & Partitions	Reinforced concrete hollow block walls.
2H Internal Doors	Timber flush-sliding & folding doors, timber flush doors, timber flush & louvred doors.
3 Finishes	
3A Internal Wall Finishes	Cement sand plaster, paint & hollow block wall.
3B Internal Floor Finishes	Cement sand paving, ceramic tiles.
3C Internal Ceiling Finishes	Cement sand plaster, paint, cornboard ceiling.
3D External Finishes	Cement sand plaster & paint
4 Fittings and Furnishings	
5 Services	
5A Sanitary Appliances	'Armitage Shanks' w.c., wash basin, soap dish & toilet roll holder.
5B Plumbing Installation	Cold & hot water piping, sanitary plumbing.
5C Refuse Disposal	-
5D Air-Conditioning & Ventilating System	-
5E Electrical Installation	Electrical installation.
5F Fire Protection Installation	Fire fighting installation.
5G Lift & Conveyor Installation	-
5H Communication Installation	-
5J Special Installation (eg kitchen equipment, laundry, bldg. automation, security system, gas inst.)	-
5K Builder's Profit & Attendance on Services	-
5L Builder's Work in Connection with Services	-
6 External Works	
6A Site Work	Demolition works, concrete floor slab, flower boxes, lamp post, precast concrete pavement, reinforced concrete wall.
6B Drainage	Surface water drain, culverts, external sewerage.
6C External Service	Refuse centre.
6D Ancillary Buildings	-
6E Recreational Facilities	-



# GROUND FLOOR PLAN

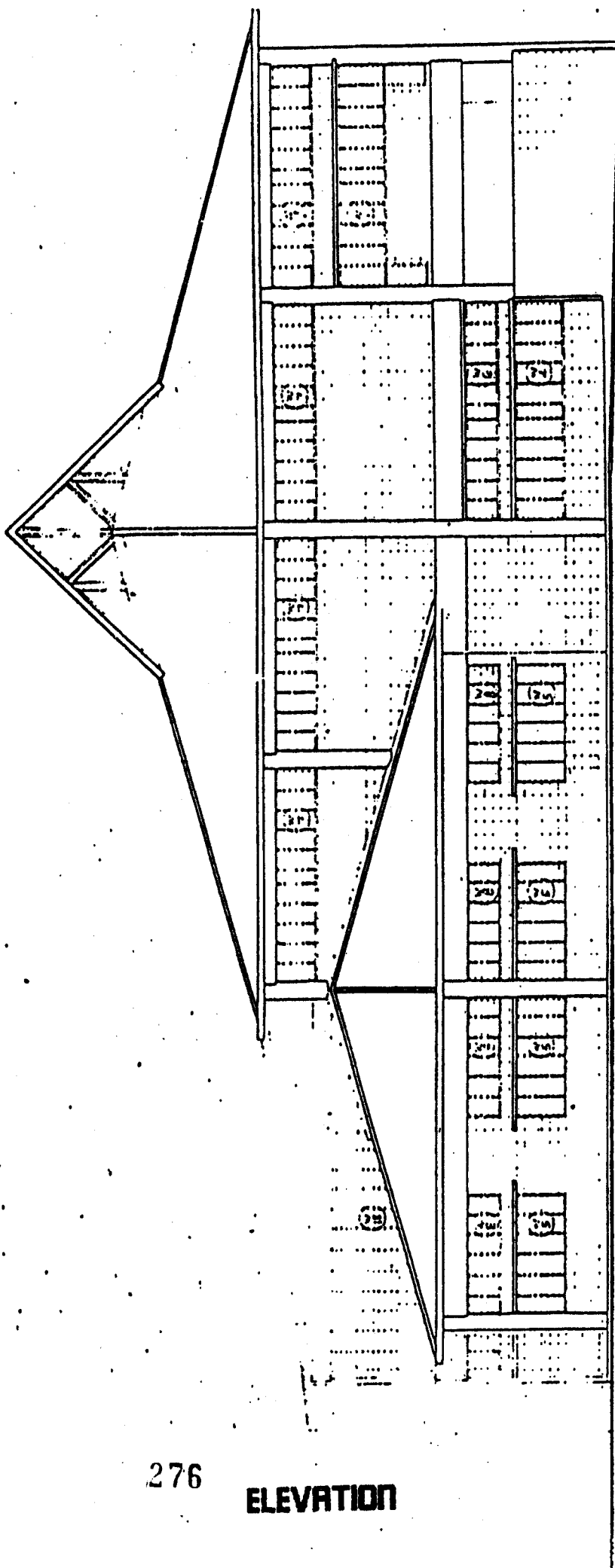
274





FIRST FLOOR PLAN  
275

(A)  
(B)  
(C)  
(D)  
(E)  
(F)



276

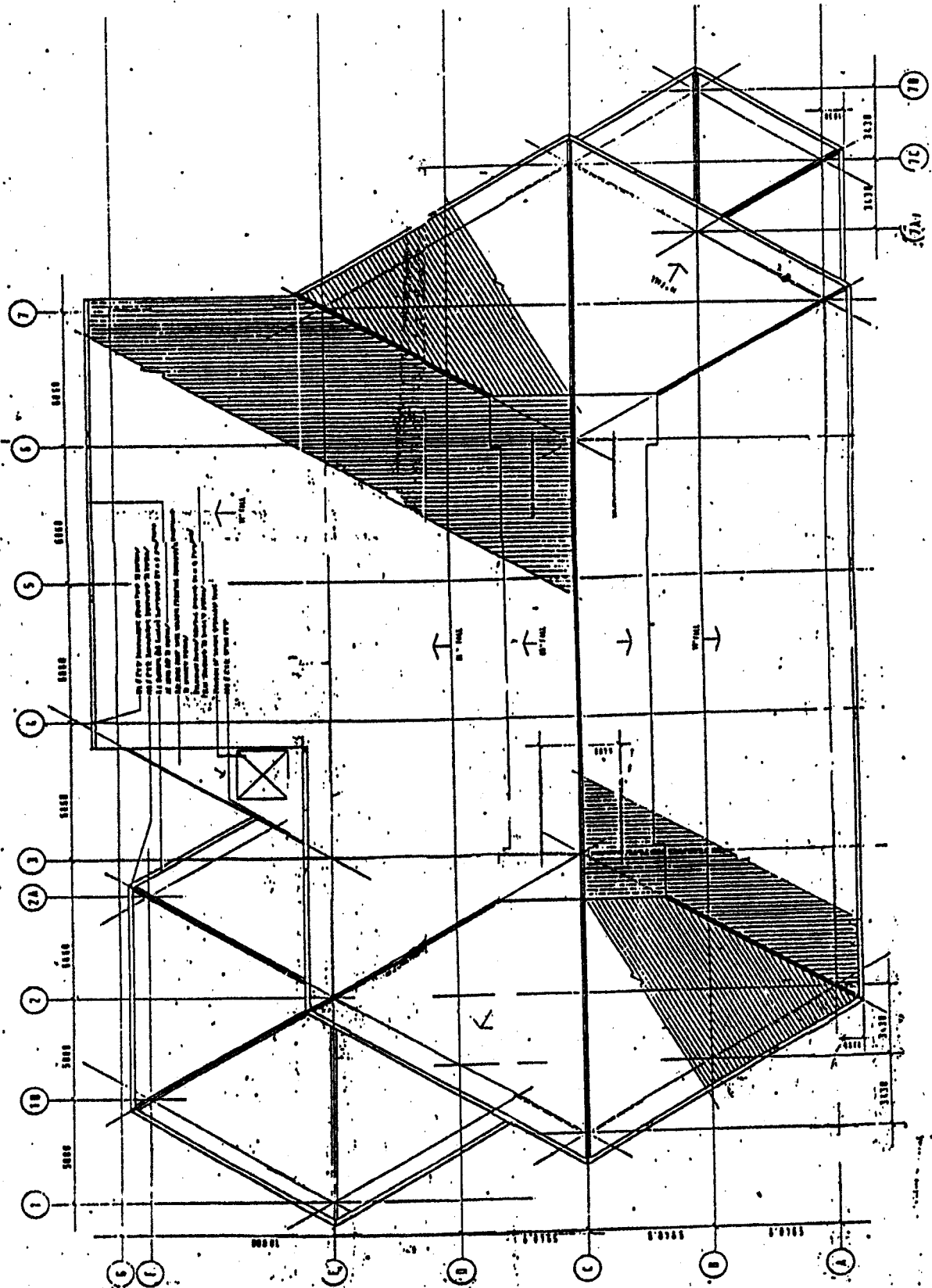
ELEVATION

BCC-3/7-8

(#1-92)

...11/-





ROOF PLAN 278

LAMPIRAN C

Data-Data Pelarasan

- (i) Indeks Bangunan - 1989
- (ii) Indeks Bangunan - 1992
- (iii) Kadar Inflasi - 4½% setahun
- (iv) Kadar pinjaman - 10% setahun
- (v) Jangkamasa pembinaan - 1 tahun
- (iv) Tarikh Tender - Januari 1993

Indek Pelarasan

Masukkan pengiraan di sini.

...14/-

JADUAL 1 - INDEKS KOS BANGUNAN MENGIKUT KATEGORI BANGUNAN DAN KAWASAN

Table 1 - Building Cost Index by Category of Building and Region

(Jan. 1980 = 100)

Perkara Item	Tempoh Period	Kawasan* Region						
		A	B	C	D	E	F	
<b>Kategori Bangunan Category of Building</b>								
(1) Bangunan (K.T.) Satu Tingkat Single Storey (R.C.) Buildings	1989	Jan.	124.5	124.3	130.8	133.4	133.5	139.0
		Feb.	126.2	125.7	131.7	135.6	135.1	141.6
		Mac	126.8	126.2	132.3	136.4	136.9	142.0
		April	127.1	127.1	133.1	137.4	137.0	142.7
		Mei	130.2	130.9	136.6	140.9	139.9	145.6
		Jun	132.6	133.4	138.2	144.2	142.9	150.4
		Julai	133.6	134.5	138.6	145.5	143.9	152.9
		Ogos	135.0	136.0	139.2	147.0	145.2	153.8
		Sept.	135.2	136.4	139.2	146.7	145.2	154.7
		Okt.	134.8	136.3	139.1	146.3	144.9	153.9
		Nov.	135.6	137.3	140.2	148.0	146.2	155.3
		Dis.	135.7	137.2	140.4	148.1	147.0	155.2
(2) Bangunan (K.T.) 2 - 4 Tingkat (berbumbung rata) 2 - 4 Storey (R.C.) Buildings (flat roof)	1989	Jan.	124.2	123.3	130.0	130.9	130.1	134.5
		Feb.	125.6	124.6	130.9	132.8	131.5	136.5
		Mac	126.1	125.0	131.4	133.4	132.7	136.9
		April	126.4	125.6	132.1	134.4	133.1	137.4
		Mei	132.1	132.1	138.2	140.5	138.6	143.0
		Jun	134.1	134.2	139.6	143.2	141.0	147.0
		Julai	134.9	135.2	140.0	144.3	141.8	148.9
		Ogos	136.0	136.3	140.6	145.7	142.9	149.7
		Sept.	136.3	136.7	140.5	145.2	142.9	150.4
		Okt.	136.0	136.6	140.6	145.2	142.8	149.8
		Nov.	136.5	137.4	141.9	146.6	143.8	150.9
		Dis.	136.5	137.4	142.2	146.8	144.0	151.1
(3) Bangunan (K.T.) 2 - 4 Tingkat (berbumbung curam) 2 - 4 Storey (R.C.) Buildings (pitched roof)	1989	Jan.	125.1	125.0	130.6	132.9	132.3	137.2
		Feb.	126.6	126.3	131.3	134.9	133.8	139.5
		Mac	127.2	126.7	132.0	135.5	135.0	139.9
		April	127.5	127.4	132.6	136.4	135.3	140.5
		Mei	132.0	132.6	137.5	141.2	139.7	144.9
		Jun	134.2	134.9	139.0	144.1	142.5	149.2
		Julai	135.1	135.8	139.4	145.3	143.3	151.4
		Ogos	136.2	137.0	140.0	146.7	144.5	152.3
		Sept.	136.4	137.3	139.9	146.3	144.4	153.1
		Okt.	136.1	137.1	140.0	146.1	144.2	152.4
		Nov.	136.6	138.0	141.1	147.6	145.3	153.6
		Dis.	136.7	138.0	141.3	147.7	145.8	153.7
(4) Bangunan (K.T.) (untuk penginapan) 3 Storey and above (R.C.) Buildings (for accommodation)	1989	Jan.	126.1	126.0	131.0	131.3	130.1	136.8
		Feb.	126.3	126.1	131.0	131.3	130.1	136.8
		Mac	126.8	126.3	131.5	133.4	131.6	137.2
		April	127.1	126.8	132.0	134.2	131.9	137.6
		Mei	133.4	133.8	138.6	140.8	137.9	143.9
		Jun	135.1	135.7	139.9	143.2	140.1	147.5
		Julai	135.8	136.5	140.3	144.1	140.8	149.2
		Ogos	136.7	137.3	140.8	145.3	141.8	150.0
		Sept.	137.0	137.7	140.8	144.9	141.7	150.6
		Okt.	136.7	137.5	140.9	144.9	141.6	150.1
		Nov.	137.1	138.3	142.1	146.2	142.5	151.1
		Dis.	137.1	138.2	142.4	146.3	142.7	151.2

Lihat catatan-catatan di hujung jadual.  
See footnotes at end of table.

JADUAL 1 - INDEKS KOS BANGUNAN MENGIKUT KATEGORI BANGUNAN DAN KAWASAN

Table 1 - Building Cost Index by Category of Building and Region

(Jan. 1980 = 100)

Perkara Item	Tempoh Period	Kawasan** Region						
		A	B	C	D	E	F	
<b>Kategori Bangunan</b> <i>Category of Building</i>								
(1) Bangunan (K.T.) * Satu Tingkat Single Storey (R.C.) Buildings	1992	Jan.	142.3	142.7	148.1	154.1	152.6	159.9
		Feb.	142.4	142.8	148.0	154.1	152.8	159.9
		Mac	142.4	142.8	148.0	153.8	152.6	159.7
		April	142.8	143.4	148.3	154.3	153.2	161.1
		Mei	142.9	143.8	148.5	155.1	153.7	161.5
		Jun	142.9	144.0	148.5	155.0	153.7	161.8
		Julai						
		Ogos						
		Sept.						
		Okt.						
		Nov.						
		Dis.						
(2) Bangunan (K.T.) * 2 - 4 Tingkat (berbumbung rata) 2 - 4 Storey (R.C.) Buildings (flat roof)	1992	Jan.	143.1	142.5	151.1	153.3	149.7	155.6
		Feb.	143.2	142.7	151.1	153.3	149.9	155.6
		Mac	143.1	142.7	151.1	153.0	149.7	155.4
		April	143.5	143.2	151.4	153.5	150.2	156.5
		Mei	143.5	143.5	151.6	154.1	150.6	156.8
		Jun	143.5	143.8	151.6	154.0	150.7	157.0
		Julai						
		Ogos						
		Sept.						
		Okt.						
		Nov.						
		Dis.						
(3) Bangunan (K.T.) * 2 - 4 Tingkat (berbumbung curam) 2 - 4 Storey (R.C.) Buildings (pitched roof)	1992	Jan.	143.0	143.1	149.3	153.7	151.2	158.1
		Feb.	143.0	143.2	149.3	153.7	151.4	158.1
		Mac	143.0	143.2	149.3	153.4	151.2	157.8
		April	143.4	143.7	149.6	153.9	151.8	158.9
		Mei	143.4	144.1	149.8	154.6	152.2	159.3
		Jun	143.4	144.3	149.8	154.5	152.2	159.5
		Julai						
		Ogos						
		Sept.						
		Okt.						
		Nov.						
		Dis.						
(4) Bangunan (K.T.) * 5 Tingkat Ke atas (untuk kediaman) 5 Storey and above (R.C.) Buildings (for accommodation)	1992	Jan.	143.3	143.2	151.1	152.6	148.3	155.6
		Feb.	143.4	143.3	151.1	152.6	148.5	155.6
		Mac	143.3	143.3	151.2	152.4	148.3	155.4
		April	143.6	143.7	151.4	152.7	148.8	156.2
		Mei	143.7	144.0	151.5	153.3	149.1	156.5
		Jun	143.7	144.3	151.5	153.2	149.2	156.7
		Julai						
		Ogos						
		Sept.						
		Okt.						
		Nov.						
		Dis.						

Lihat catatan-catatan di hujung jadual.  
See footnotes at end of table.

LAMPIRAN D

PELAN KOS

ANGKA GILIRAN .....

Soalan 1(i)

RINGKASAN KOS-KOS ELEMEN

Jenis Bangunan:

Keluasan Lantai Kasar: M<sup>2</sup> Tarikh:

Elemen	Jumlah Kos Elemen \$	Kos/m <sup>2</sup> Keluasan Lantai Kadar \$
1. <u>SUBSTRUKTUR</u> 1A. Kerja-kerja cerucuk 1B. Kerja-kerja bawah kemasan lantai ..... o Jumlah Elemen Terkumpul		
2. <u>SUPERSTRUKTUR</u> 2A. Rangka 2B. Lantai-lantai atasan 2C. Bumbung 2D. Tangga 2E. Dinding Luar 2F. Tingkap & Pintu Luar 2G. Dinding dalam & Dinding sekatan 2H. Pintu-pintu Dalam ..... o Jumlah Elemen Terkumpul		

...17/-



LAMPIRAN D

Elemen	Jumlah Kos Elemen \$	Kos/m <sup>2</sup> Keluasan Lantai Kasar \$
<p>3. <u>KEMASAN</u>                      3A. Kemas Dinding Dalam                      3B. Kemas Lantai Dalam                      3C. Kemas Siling Dalam                      3D. Kemas Luar</p> <p>.....</p> <p>o Jumlah Elemen Terkumpul</p>		
<p>4. <u>PEMASANGAN &amp; KEPERABOTAN</u></p>		
<p>5. <u>PERKHDIMATAN</u>                      5A. Pemasangan Sanitari                      5B. Pemasangan Air                      5C. Pembuangan Sampah                      5D. Penghawa Dingin &amp; Sistem Pengudaraan                      5E. Pemasangan Elektrik                      5F. Pemasangan Pencegah Kebakaran                      5G. Pemasangan Lif \$ Konveyor                      5H. Pemasangan Komunikasi                      5J. Pemasangan Khas (Contoh: alat-alat dapur, automasi bangunan, sistem sekuriti, pemasangan fas, dsb.)                      5K. 'Profit &amp; Attendance' Pembinaan terhadap perkhidmatan.                      5L. Kerja-kerja Pembina bersangkutan dengan perkhidmatan</p> <p>Jumlah Elemen Terkumpul</p>	<p>.....</p> <p>283</p>	<p>.....</p>

LAMPIRAN D

Elemen	Jumlah Kos Elemen \$	Kos/m <sup>2</sup> Keluasan Lantai Kasar \$
JUMLAH KECIL tidak termasuk kerja-kerja luar, Preliminaries & Kontigensi		
6. KERJA-KERJA LUAR 6A. Kerja-kerja Tapak 6B. Perparitan & Saliran 6C. Perkhidmatan Luar 6D. Bangunan-bangunan Tambahan 6E. Kemudahan Riadah  o Jumlah Elemen Berkumpul		
"PRELIMINARIES"		
KOS BANGUNAN		
KOMEN		

Table 7.1 Plan of work for design team operation

Plan of Work		Purpose of work and decisions to be reached	Tasks to be done	People directly involved	Usual terminology
A. Introduction	To prepare general outline of requirements and plan future action.	Set up client organisation for briefing. Consider requirements, appoint architect.	All client interests, architect.	Briefing	
B. Feasibility	To provide the client with an appraisal and recommendation in order that he may determine the form in which the project is to proceed, ensuring that it is feasible, functionally, technically and financially.	Carry out studies of user requirements, site conditions, planning design, and cost, etc., as necessary to reach decisions.	Clients' representatives, architects, engineers, QS according to nature of project.		
C. Outline proposals	To determine general approach to layout, design and construction in order to obtain authoritative approval of the client on the outline proposals and accompanying report.	Develop the brief further. Carry out studies on user requirements, technical problems, planning, design and costs, as necessary to reach decisions.	All client interests, architect, engineers, QS and specialists as required.	Sketch plans	
D. Scheme design	To complete the brief and decide on particular proposals, including planning arrangement, appearance, constructional method, outline specification, and cost, and to obtain all approvals.	Final development of the brief, full design of the project by architect, preliminary design by engineers, preparation of cost plan and full explanatory report. Submission of proposals for all approvals.	All client interests, architects, engineers, QS and specialists and all statutory and other approving authorities.		
<i>Brief should not be modified after this point</i>					
E. Detail design	To obtain final decision on every matter related to design, specification, construction and cost.	Full design of every part and component of the building by collaboration of all concerned. Complete cost checking of designs.	Architects, QS, engineers and specialists, contractor (if appointed).	Working drawings	
<i>Any further change in location, size, shape, or cost after this time will result in abortive work.</i>					
F. Production information	To prepare production information and make final detailed decisions to carry out work.	Preparation of final production information i.e. drawings, schedules and specifications.	Architects, engineers and specialists, contractor (if appointed).		
G. Bills of quantities	To prepare and complete all information and arrangements for obtaining tender.	Preparation of Bills of Quantities and tender documents.	Architects, QS, contractor (if appointed).		
H. Tender action	Action as recommended in paras. 7-14 inclusive of 'Selective Tendering'.*	Action as recommended in paras. 7-14 inclusive of 'Selective Tendering'.*	Architects, QS, engineers, contractor, client.		
I. Project planning	Action in accordance with paras. 5-10 inclusive of 'Project Management'.*	Action in accordance with paras. 5-10 inclusive of 'Project Management'.*	Contractor, sub-contractors.	Site operations	
J. Operations on site	Action in accordance with paras. 11-14 inclusive of 'Project Management'.*	Action in accordance with paras. 11-14 inclusive of 'Project Management'.*	Architects, engineers, contractors, sub-contractors, QS, client.		
K. Completion	Action in accordance with paras. 15-18 inclusive of 'Project Management'.*	Action in accordance with paras. 15-18 inclusive of 'Project Management'.*	Architects, engineers, contractor, QS, client.	Site operations	
L. Hand-back	To analyse the management, construction and performance of the project.	Analysis of job records. Inspections of completed building. Studies of building in use.	Architect, engineers, QS, contractor, client.		

\* Specification of National Joint Consultative Council of Architects, Quantity Surveyors and Builders.

# APPENDIX

APPENDIX

AMOUNT OF

Years	Rate per cent							
	2	2½	3	3½	4	4½	5	5½
1	1.0200	1.0250	1.0300	1.0350	1.0400	1.0450	1.0500	1.0550
2	1.0403	1.0506	1.0608	1.0712	1.0815	1.0920	1.1024	1.1130
3	1.0612	1.0768	1.0927	1.1087	1.1248	1.1411	1.1576	1.1742
4	1.0824	1.1038	1.1255	1.1475	1.1698	1.1925	1.2155	1.2388
5	1.1040	1.1314	1.1592	1.1876	1.2166	1.2461	1.2762	1.3069
6	1.1261	1.1596	1.1940	1.2292	1.2653	1.3022	1.3400	1.3788
7	1.1486	1.1886	1.2298	1.2722	1.3159	1.3608	1.4071	1.4546
8	1.1716	1.2184	1.2667	1.3168	1.3685	1.4221	1.4774	1.5346
9	1.1950	1.2488	1.3047	1.3628	1.4233	1.4860	1.5513	1.6190
10	1.2189	1.2800	1.3439	1.4105	1.4802	1.5529	1.6288	1.7081
11	1.2433	1.3120	1.3842	1.4599	1.5394	1.6228	1.7103	1.8020
12	1.2682	1.3448	1.4257	1.5110	1.6010	1.6958	1.7958	1.9012
13	1.2936	1.3785	1.4685	1.5639	1.6650	1.7721	1.8856	2.0057
14	1.3194	1.4129	1.5125	1.6186	1.7316	1.8519	1.9799	2.1160
15	1.3458	1.4482	1.5579	1.6753	1.8009	1.9352	2.0789	2.2324
16	1.3727	1.4845	1.6047	1.7339	1.8729	2.0223	2.1828	2.3552
17	1.4002	1.5216	1.6528	1.7946	1.9479	2.1133	2.2920	2.4848
18	1.4282	1.5596	1.7024	1.8574	2.0258	2.2084	2.4066	2.6214
19	1.4568	1.5986	1.7535	1.9225	2.1068	2.3078	2.5269	2.7656
20	1.4859	1.6386	1.8061	1.9897	2.1911	2.4117	2.6532	2.9177
21	1.5156	1.6795	1.8602	2.0594	2.2787	2.5202	2.7859	3.0782
22	1.5459	1.7215	1.9161	2.1315	2.3699	2.6336	2.9252	3.2475
23	1.5768	1.7646	1.9735	2.2061	2.4647	2.7521	3.0715	3.4261
24	1.6084	1.8087	2.0327	2.2833	2.5633	2.8760	3.2250	3.6145
25	1.6406	1.8539	2.0937	2.3632	2.6658	3.0054	3.3863	3.8133
26	1.6734	1.9002	2.1565	2.4459	2.7724	3.1406	3.5556	4.0231
27	1.7068	1.9477	2.2212	2.5315	2.8833	3.2820	3.7834	4.2444
28	1.7410	1.9964	2.2879	2.6201	2.9987	3.4296	3.9201	4.4778
29	1.7758	2.0464	2.3565	2.7118	3.1180	3.5840	4.1161	4.7241
30	1.8113	2.0975	2.4272	2.8067	3.2433	3.7453	4.3219	4.9839
35	1.9998	2.3732	2.8138	3.3335	3.9460	4.6673	5.5160	6.5138
40	2.2080	2.6850	3.2620	3.9592	4.8010	5.8163	7.0399	8.5133
45	2.4378	3.0379	3.7815	4.7023	5.8411	7.2482	8.9850	11.1265
50	2.6915	3.4371	4.3839	5.5849	7.1066	9.0326	11.4673	14.5419
55	2.9717	3.8887	5.0821	6.6331	8.6463	11.2563	14.6356	19.0057
60	3.2810	4.3997	5.8916	7.8780	10.5196	14.0274	18.6791	24.8397
65	3.6225	4.9779	6.8299	9.3566	12.7987	17.4807	23.8398	32.4645
70	3.9995	5.6321	7.9178	11.1128	15.5716	21.7841	30.4264	42.4299
75	4.4158	6.3722	9.1789	13.1985	18.9452	27.1469	38.8326	55.4542
80	4.8754	7.2095	10.6408	15.6757	23.0497	33.8300	49.5614	72.4764
85	5.3828	8.1569	12.3357	18.6178	28.0436	42.1584	63.2543	94.7237
90	5.9431	9.2288	14.3004	22.1121	34.1193	52.5371	80.7303	123.8002
95	6.5616	10.4416	16.5781	26.2623	41.5113	65.4707	103.6346	161.8019
100	7.2446	11.8137	19.2186	31.1914	50.5049	81.5885	131.5012	211.4686

...21/-

£1 TABLE

compound interest

6	6½	7	7½	8	9	10
1.0600	1.0650	1.0700	1.0750	1.0800	1.0900	1.1000
1.1235	1.1342	1.1448	1.1556	1.1663	1.1880	1.2099
1.1910	1.2079	1.2250	1.2422	1.2597	1.2950	1.3309
1.2624	1.2864	1.3107	1.3354	1.3604	1.4115	1.4640
1.3382	1.3700	1.4025	1.4356	1.4693	1.5386	1.6105
1.4185	1.4591	1.5007	1.5433	1.5868	1.6771	1.7715
1.5036	1.5589	1.6057	1.6590	1.7138	1.8280	1.9487
1.5938	1.6549	1.7181	1.7834	1.8509	1.9925	2.1435
1.6894	1.7625	1.8384	1.9172	1.9990	2.1718	2.3579
1.7908	1.8771	1.9671	2.0610	2.1589	2.3673	2.5937
1.8982	1.9991	2.1048	2.2156	2.3316	2.5804	2.8531
2.0121	2.1290	2.2521	2.3817	2.5181	2.8126	3.1384
2.1329	2.2674	2.4098	2.5604	2.7196	3.0658	3.4522
2.2609	2.4148	2.5785	2.7524	2.9371	3.3417	3.7974
2.3965	2.5718	2.7590	2.9588	3.1721	3.6424	4.1772
2.5403	2.7390	2.9521	3.1807	3.4259	3.9703	4.5949
2.6927	2.9170	3.1588	3.4193	3.7000	4.3276	5.0544
2.8543	3.1066	3.3799	3.6758	3.9960	4.7171	5.5599
3.0255	3.3085	3.6165	3.9514	4.3157	5.1416	6.1159
3.2071	3.5236	3.8696	4.2478	4.6609	5.6044	6.7274
3.3995	3.7526	4.1405	4.5664	5.0338	6.1088	7.4002
3.6035	3.9966	4.4304	4.9089	5.4365	6.6586	8.1402
3.8197	4.2563	4.7405	5.2770	5.8714	7.2578	8.9543
4.0489	4.5330	5.0723	5.6728	6.3411	7.9110	9.8497
4.2918	4.8276	5.4274	6.0983	6.8484	8.6230	10.8347
4.5493	5.1414	5.8073	6.5557	7.3963	9.3991	11.9181
4.8223	5.4756	6.2138	7.0473	7.9880	10.2450	13.1099
5.1116	5.8316	6.6488	7.5759	8.6271	11.1671	14.4209
5.4183	6.2106	7.1142	8.1441	9.3172	12.1721	15.8630
5.7434	6.6143	7.6122	8.7549	10.0626	13.2676	17.4494
7.6860	9.0622	10.6765	12.5688	14.7853	20.4139	28.1024
10.2857	12.4160	14.9744	18.0442	21.7245	31.4094	45.2592
13.7646	17.0110	21.0024	25.9048	31.9204	48.3272	72.8904
18.4201	23.3066	29.4570	37.1897	46.9016	74.3575	117.3908
24.6503	31.9321	41.3149	53.3906	68.9138	114.4082	189.0591
32.9876	43.7498	57.9464	76.6492	101.2570	176.0312	304.4816
44.1449	59.9410	81.2728	110.0398	148.7798	270.8459	490.3706
59.0759	82.1244	113.9893	157.9764	218.6063	416.7300	789.7468
79.0569	112.5176	159.8760	226.7956	321.2045	641.1908	1271.8952
105.7959	154.1589	224.2343	325.5945	471.9547	986.5515	2048.4000
141.5788	211.2110	314.5002	467.4330	693.4564	1517.9319	3298.9687
189.4645	289.3774	441.1029	671.0605	1018.9149	2335.5264	5313.0221
253.5462	396.4721	618.6696	963.3942	1497.1203	3593.4969	8556.6753
339.3020	543.2012	867.7162	1383.0771	2199.7612	5529.0406	13780.6110

...22/-

Building Economics

APPENDIX

PRESENT VALUE OF

Years	Rate per cent							
	2	2½	3	3½	4	4½	5	5½
1	0.98039	0.97560	0.97087	0.96618	0.96153	0.95693	0.95238	0.94786
2	0.96116	0.95181	0.94259	0.93351	0.92455	0.91573	0.90702	0.89845
3	0.94232	0.92859	0.91514	0.90194	0.88899	0.87629	0.86383	0.85161
4	0.92384	0.90595	0.88848	0.87144	0.85480	0.83856	0.82270	0.80721
5	0.90573	0.88385	0.86260	0.84197	0.82192	0.80245	0.78352	0.76513
6	0.88797	0.86229	0.83748	0.81350	0.79031	0.76789	0.74621	0.72524
7	0.87056	0.84126	0.81309	0.78599	0.75991	0.73482	0.71068	0.68743
8	0.85349	0.82074	0.78940	0.75941	0.73069	0.70318	0.67683	0.65159
9	0.83675	0.80072	0.76641	0.73373	0.70258	0.67290	0.64460	0.61762
10	0.82034	0.78119	0.74409	0.70891	0.67556	0.64392	0.61391	0.58543
11	0.80426	0.76214	0.72242	0.68494	0.64958	0.61619	0.58467	0.55491
12	0.78849	0.74355	0.70137	0.66178	0.62459	0.58966	0.55683	0.52598
13	0.77303	0.72542	0.68095	0.63940	0.60057	0.56427	0.53032	0.49856
14	0.75787	0.70772	0.66111	0.61778	0.57747	0.53997	0.50506	0.47256
15	0.74301	0.69046	0.64186	0.59689	0.55526	0.51672	0.48101	0.44793
16	0.72844	0.67362	0.62316	0.57670	0.53390	0.49446	0.45811	0.42458
17	0.71416	0.65719	0.60501	0.55720	0.51337	0.47317	0.43629	0.40244
18	0.70015	0.64116	0.58739	0.53836	0.49362	0.45280	0.41552	0.38146
19	0.68643	0.62552	0.57028	0.52015	0.47464	0.43330	0.39573	0.36157
20	0.67297	0.61027	0.55367	0.50256	0.45638	0.41464	0.37688	0.34272
21	0.65977	0.59538	0.53754	0.48557	0.43383	0.39678	0.35894	0.32486
22	0.64683	0.58086	0.52189	0.46915	0.42195	0.37970	0.34184	0.30792
23	0.63415	0.56669	0.50669	0.45328	0.40572	0.36335	0.32557	0.29187
24	0.62172	0.55287	0.49193	0.43795	0.39012	0.34770	0.31006	0.27665
25	0.60953	0.53939	0.47760	0.42314	0.37511	0.33273	0.29530	0.26223
26	0.59757	0.52623	0.46369	0.40883	0.36068	0.31840	0.28124	0.24856
27	0.58586	0.51339	0.45018	0.39501	0.34681	0.30469	0.26784	0.23560
28	0.57437	0.50087	0.43707	0.38165	0.33347	0.29157	0.25509	0.22332
29	0.56311	0.48866	0.42434	0.36874	0.32065	0.27901	0.24294	0.21167
30	0.55207	0.47674	0.41198	0.35627	0.30831	0.26700	0.23137	0.20064
35	0.50002	0.42137	0.35538	0.29997	0.25341	0.21425	0.18129	0.15351
40	0.45289	0.37243	0.30655	0.25257	0.20828	0.17192	0.14204	0.11746
45	0.41019	0.32917	0.26443	0.21265	0.17119	0.13796	0.11129	0.08987
50	0.37152	0.29094	0.22810	0.17905	0.14071	0.11070	0.08720	0.06876
55	0.33650	0.25715	0.19676	0.15075	0.11565	0.08883	0.06832	0.05261
60	0.30478	0.22728	0.16973	0.12693	0.09506	0.07128	0.05353	0.04025
65	0.27605	0.20088	0.14641	0.10687	0.07813	0.05720	0.04194	0.03080
70	0.25002	0.17755	0.12629	0.08998	0.06421	0.04590	0.03286	0.02356
75	0.22645	0.15693	0.10894	0.07576	0.05278	0.03683	0.02575	0.01803
80	0.20510	0.13870	0.09397	0.06379	0.04338	0.02955	0.02017	0.01379
85	0.18577	0.12259	0.08106	0.05371	0.03565	0.02372	0.01580	0.01055
90	0.16826	0.10835	0.06992	0.04522	0.02930	0.01903	0.01238	0.00807
95	0.15239	0.09577	0.06032	0.03807	0.02408	0.01527	0.00970	0.00618
100	0.13803	0.08464	0.05203	0.03206	0.01980	0.01225	0.00760	0.00472

£1 TABLE

compound interest

6	6½	7	7½	8	9	10
0.94339	0.93896	0.93457	0.93023	0.92592	0.91743	0.90909
0.88999	0.88165	0.87343	0.86533	0.85733	0.84168	0.82644
0.83961	0.82784	0.81629	0.80496	0.79383	0.77218	0.75131
0.79209	0.77732	0.76289	0.74880	0.73502	0.70842	0.68301
0.74725	0.72988	0.71208	0.69655	0.68058	0.64993	0.62092
0.70496	0.68933	0.66634	0.64796	0.63016	0.59626	0.56447
0.66505	0.64350	0.62274	0.60275	0.58349	0.54703	0.51315
0.62741	0.60423	0.58200	0.55070	0.54026	0.50186	0.46650
0.59189	0.56735	0.54393	0.52158	0.50024	0.46042	0.42409
0.55839	0.53272	0.50834	0.48519	0.46319	0.42241	0.38554
0.52678	0.50021	0.47509	0.45134	0.42888	0.38753	0.35049
0.49696	0.46968	0.44401	0.41985	0.39711	0.35553	0.31863
0.46883	0.44101	0.41496	0.39056	0.36769	0.32617	0.28966
0.44230	0.41410	0.38781	0.36331	0.34046	0.29924	0.26333
0.41726	0.38882	0.36244	0.33796	0.31524	0.27453	0.23939
0.39364	0.36509	0.33873	0.31438	0.29189	0.25186	0.21762
0.37136	0.34281	0.31657	0.29245	0.27026	0.23107	0.19784
0.35034	0.32188	0.29586	0.27204	0.25024	0.21199	0.17985
0.33051	0.30224	0.27650	0.25306	0.23171	0.19448	0.16350
0.31180	0.28379	0.25841	0.23541	0.21454	0.17843	0.14864
0.29415	0.26647	0.24151	0.21898	0.19865	0.16369	0.13513
0.27750	0.25021	0.22571	0.20371	0.18394	0.15018	0.12284
0.26179	0.23494	0.21094	0.18949	0.17031	0.13778	0.11167
0.24697	0.22060	0.19714	0.17627	0.15769	0.12640	0.10152
0.23299	0.20713	0.18424	0.16397	0.14601	0.11596	0.09229
0.21981	0.19449	0.17219	0.15253	0.13520	0.10639	0.08390
0.20736	0.18262	0.16093	0.14189	0.12518	0.09760	0.07627
0.19563	0.17147	0.15040	0.13199	0.11591	0.08954	0.06934
0.18455	0.16101	0.14056	0.12278	0.10732	0.08215	0.06303
0.17411	0.15118	0.13136	0.11422	0.09937	0.07537	0.05730
0.13010	0.11034	0.09366	0.07956	0.06763	0.04898	0.03558
0.09722	0.08054	0.06678	0.05541	0.04603	0.03183	0.02209
0.07265	0.05878	0.04761	0.03860	0.03132	0.02069	0.01371
0.05428	0.04290	0.03394	0.02688	0.02132	0.01344	0.00851
0.04056	0.03131	0.02420	0.01872	0.01451	0.00874	0.00528
0.03031	0.02285	0.01725	0.01304	0.00987	0.00568	0.00328
0.02265	0.01668	0.01230	0.00908	0.00672	0.00369	0.00203
0.01692	0.01217	0.00877	0.00633	0.00457	0.00239	0.00126
0.01264	0.00888	0.00525	0.00440	0.00311	0.00155	0.00078
0.00945	0.00648	0.00445	0.00307	0.00211	0.00101	0.00048
0.00706	0.00473	0.00317	0.00213	0.00144	0.00065	0.00030
0.00527	0.00345	0.00226	0.00149	0.00098	0.00042	0.00018
0.00394	0.00252	0.00161	0.00103	0.00066	0.00027	0.00011
0.00294	0.00184	0.00115	0.00072	0.00045	0.00018	0.00007

...24/-

## Building Economics

## APPENDIX

## AMOUNT OF £1

Years	Rate per cent							
	2	2½	3	3½	4	4½	5	5½
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.019	2.024	2.029	2.034	2.039	2.044	2.049	2.054
3	3.060	3.075	3.090	3.106	3.121	3.137	3.152	3.168
4	4.121	4.152	4.183	4.214	4.246	4.278	4.310	4.342
5	5.204	5.256	5.309	5.362	5.416	5.470	5.525	5.581
6	6.308	6.387	6.468	6.550	6.632	6.716	6.801	6.888
7	7.434	7.547	7.662	7.779	7.898	8.019	8.142	8.266
8	8.582	8.736	8.892	9.051	9.214	9.380	9.549	9.721
9	9.754	9.954	10.159	10.368	10.582	10.802	11.026	11.256
10	10.949	11.203	11.463	11.731	12.006	12.288	12.577	12.875
11	12.168	12.483	12.807	13.141	13.486	13.841	14.206	14.583
12	13.412	13.795	14.192	14.601	15.025	15.464	15.917	16.385
13	14.680	15.140	15.617	16.113	16.626	17.159	17.712	18.286
14	15.973	16.518	17.086	17.676	18.291	18.932	19.598	20.292
15	17.293	17.931	18.598	19.295	20.023	20.784	21.578	22.408
16	18.639	19.380	20.156	20.971	21.824	22.719	23.657	24.641
17	20.012	20.864	21.761	22.705	23.697	24.741	25.840	26.996
18	21.412	22.386	23.414	24.499	25.645	26.855	28.132	29.481
19	22.840	23.946	25.116	26.357	27.671	29.063	30.539	32.102
20	24.297	25.544	26.870	28.279	29.778	31.371	33.065	34.863
21	25.783	27.183	28.676	30.269	31.969	33.783	35.719	37.786
22	27.298	28.862	30.536	32.328	34.247	36.303	38.505	40.864
23	28.844	30.584	32.452	34.460	36.617	38.937	41.430	44.111
24	30.421	32.349	34.426	36.666	39.082	41.689	44.501	47.537
25	32.030	34.157	36.459	38.949	41.645	44.565	47.727	51.152
26	33.670	36.011	38.553	41.313	44.311	47.570	51.113	54.965
27	35.344	37.911	40.709	43.759	47.084	50.711	54.669	58.989
28	37.051	39.859	42.930	46.290	49.967	53.993	58.402	63.233
29	38.792	41.856	45.218	48.910	52.966	57.423	62.322	67.711
30	40.568	43.902	47.575	51.622	56.084	61.007	66.438	72.435
35	49.994	54.928	60.462	66.674	73.652	81.496	90.320	100.251
40	60.401	67.402	75.401	84.550	95.025	107.030	120.799	136.605
45	71.892	81.516	92.719	105.781	121.029	138.849	159.700	184.119
50	84.579	97.484	112.796	130.997	152.667	178.503	209.347	246.217
55	98.586	115.550	136.071	160.946	191.159	227.917	272.712	327.377
60	114.051	135.991	163.053	196.516	237.990	289.497	353.583	433.450
65	131.126	159.118	194.332	238.762	294.968	366.237	456.797	572.083
70	149.977	185.284	230.594	288.937	364.290	461.869	588.528	753.271
75	170.791	214.888	272.630	348.529	448.631	581.044	756.653	990.076
80	193.771	248.382	321.362	419.306	551.244	729.557	971.228	1299.571
85	219.143	286.278	377.856	503.367	676.090	914.632	1245.086	1704.068
90	247.156	329.154	443.348	603.204	827.983	1145.268	1594.607	2232.730
95	278.084	377.664	519.271	721.780	1012.784	1432.684	2040.693	2923.670
100	312.232	432.548	607.287	862.611	1237.623	1790.855	2610.025	3826.702

...25/-



PER ANNUM TABLE

compound interest

6	6½	7	7½	8	9	10
1.000	1.000	1.000	1.000	1.000	1.000	1.000
2.059	2.064	2.069	2.074	2.079	2.089	2.099
3.183	3.199	3.214	3.230	3.246	3.278	3.309
4.374	4.407	4.439	4.472	4.506	4.573	4.640
5.637	5.693	5.750	5.808	5.866	5.984	6.105
6.975	7.063	7.153	7.244	7.335	7.523	7.715
8.393	8.522	8.654	8.787	8.922	9.200	9.487
9.897	10.076	10.259	10.446	10.636	11.028	11.435
11.491	11.731	11.977	12.229	12.487	13.021	13.579
13.180	13.494	13.816	14.147	14.486	15.192	15.937
14.971	15.371	15.783	16.208	16.645	17.560	18.531
16.869	17.370	17.888	18.423	18.977	20.140	21.384
18.882	19.499	20.140	20.805	21.495	22.953	24.522
21.015	21.767	22.550	23.365	24.214	26.019	27.974
23.275	24.182	25.129	26.118	27.152	29.360	31.772
25.672	26.754	27.888	29.077	30.324	33.003	35.949
28.212	29.493	30.840	32.258	33.750	36.973	40.544
30.905	32.410	33.999	35.677	37.450	41.301	45.599
33.759	35.516	37.378	39.358	41.446	46.018	51.159
36.785	38.825	40.995	43.304	45.761	51.160	57.274
39.992	42.348	44.865	47.552	50.422	56.764	64.002
43.392	46.101	49.005	52.118	55.456	62.873	71.402
46.995	50.098	53.436	57.027	60.893	69.531	79.543
50.815	54.354	58.176	62.304	66.764	76.789	88.497
54.864	58.887	63.249	67.977	73.105	84.700	98.347
59.156	63.715	68.676	74.070	79.954	93.323	109.181
63.705	68.856	74.483	80.631	87.350	102.723	121.099
68.528	74.332	80.697	87.679	95.338	112.968	134.209
73.639	80.164	87.346	95.255	103.965	124.135	148.630
79.058	86.374	94.460	103.399	113.283	136.307	164.494
111.434	124.034	138.236	154.251	172.316	215.710	271.024
154.761	175.631	199.635	227.256	259.056	337.882	442.592
212.743	246.324	285.749	332.064	386.505	525.858	718.904
290.335	343.179	406.528	482.529	573.770	815.083	1163.908
394.172	475.879	575.928	698.542	848.923	1260.091	1880.591
533.128	657.689	813.520	1008.656	1253.213	1944.791	3034.816
719.082	906.785	1146.755	1453.865	1847.247	2998.288	4893.706
967.932	1248.068	1614.134	2093.019	2720.079	4619.223	7887.468
1300.948	1715.655	2269.657	3010.608	4002.556	7113.232	12708.952
1746.599	2356.290	3189.062	4327.926	5886.934	10950.572	20474.000
2342.981	3234.016	4478.575	6219.107	8655.705	16854.798	32979.687
3141.075	4436.576	6287.185	8934.140	12723.936	25939.182	53120.221
409.103	6084.187	8823.852	12831.922	18701.503	39916.632	85556.753
5638.367	8341.557	12381.661	18427.694	27484.515	61422.673	137796.110

*Building Economics*

APPENDIX

ANNUAL SINKING

Years	Rate per cent							
	2	2½	3	3½	4	4½	5	5½
1	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2	0.49505	0.49382	0.49261	0.49140	0.49019	0.48899	0.48780	0.48661
3	0.32675	0.32513	0.32353	0.32195	0.32034	0.31877	0.31720	0.31565
4	0.24262	0.24081	0.23902	0.23725	0.23549	0.23374	0.23201	0.23029
5	0.19215	0.19024	0.18835	0.18648	0.18462	0.18279	0.18097	0.17917
6	0.15852	0.15654	0.15459	0.15266	0.15076	0.14867	0.14701	0.14517
7	0.13451	0.13249	0.13050	0.12894	0.12660	0.12470	0.12281	0.12096
8	0.11650	0.11446	0.11245	0.11047	0.10852	0.10660	0.10472	0.10286
9	0.10251	0.10045	0.09843	0.09644	0.09449	0.09257	0.09069	0.08883
10	0.09132	0.08925	0.08723	0.08524	0.08329	0.08137	0.07950	0.07766
11	0.08217	0.08010	0.07807	0.07609	0.07414	0.07224	0.07038	0.06857
12	0.07455	0.07248	0.07046	0.06848	0.06655	0.06466	0.06282	0.06102
13	0.06811	0.06604	0.06402	0.06206	0.06014	0.05827	0.05645	0.05468
14	0.06260	0.06053	0.05852	0.05657	0.05466	0.05282	0.05102	0.04927
15	0.05782	0.05576	0.05376	0.05182	0.04994	0.04811	0.04634	0.04462
16	0.05365	0.05159	0.04961	0.04768	0.04582	0.04401	0.04226	0.04058
17	0.04996	0.04792	0.04595	0.04404	0.04219	0.04041	0.03869	0.03704
18	0.04670	0.04467	0.04270	0.04081	0.03899	0.03723	0.03554	0.03391
19	0.04378	0.04176	0.03981	0.03794	0.03613	0.03440	0.03274	0.03115
20	0.04115	0.03914	0.03721	0.03536	0.03358	0.03187	0.03024	0.02867
21	0.03878	0.03678	0.03487	0.03303	0.03128	0.02960	0.02799	0.02646
22	0.03663	0.03464	0.03274	0.03093	0.02919	0.02754	0.02597	0.02447
23	0.03460	0.03269	0.03081	0.02901	0.02730	0.02568	0.02413	0.02266
24	0.03287	0.03091	0.02904	0.02727	0.02558	0.02398	0.02247	0.02103
25	0.03122	0.02927	0.02742	0.02567	0.02401	0.02243	0.02095	0.01954
26	0.02969	0.02776	0.02593	0.02420	0.02256	0.02102	0.01956	0.01819
27	0.02829	0.02637	0.02456	0.02285	0.02123	0.01971	0.01829	0.01695
28	0.02698	0.02508	0.02329	0.02160	0.02001	0.01852	0.01712	0.01581
29	0.02577	0.02389	0.02211	0.02044	0.01887	0.01741	0.01604	0.01476
30	0.02464	0.02277	0.02101	0.01937	0.01783	0.01639	0.01505	0.01380
35	0.02000	0.01820	0.01653	0.01499	0.01357	0.01227	0.01107	0.00997
40	0.01655	0.01483	0.01326	0.01182	0.01052	0.00934	0.00827	0.00732
45	0.01390	0.01226	0.01078	0.00945	0.00826	0.00720	0.00626	0.00543
50	0.01182	0.01025	0.00886	0.00763	0.00655	0.00560	0.00477	0.00406
55	0.01014	0.00865	0.00734	0.00621	0.00523	0.00438	0.00366	0.00305
60	0.00876	0.00735	0.00613	0.00508	0.00420	0.00345	0.00282	0.00230
65	0.00762	0.00628	0.00514	0.00418	0.00339	0.00273	0.00218	0.00174
70	0.00666	0.00539	0.00433	0.00346	0.00274	0.00216	0.00169	0.00132
75	0.00585	0.00465	0.00366	0.00286	0.00222	0.00172	0.00132	0.00101
80	0.00516	0.00402	0.00311	0.00238	0.00181	0.00137	0.00102	0.00076
85	0.00456	0.00349	0.00264	0.00198	0.00147	0.00109	0.00080	0.00058
90	0.00404	0.00303	0.00225	0.00165	0.00120	0.00087	0.00062	0.00044
95	0.00359	0.00264	0.00192	0.00138	0.00098	0.00069	0.00049	0.00034
100	0.00320	0.00231	0.00164	0.00115	0.00080	0.00055	0.00038	0.00026

...27/-

FUND TABLE

compound interest

6	6½	7	7½	8	9	10
1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
0.48543	0.48426	0.48309	0.48192	0.48076	0.47846	0.47619
0.31410	0.31257	0.31105	0.30953	0.30803	0.30505	0.30211
0.22859	0.22690	0.22522	0.22356	0.22192	0.21866	0.21547
0.17739	0.17563	0.17389	0.17216	0.17045	0.16709	0.16379
0.14336	0.14156	0.13979	0.13804	0.13631	0.13291	0.12960
0.11913	0.11733	0.11555	0.11380	0.11207	0.10869	0.10540
0.10103	0.09923	0.09746	0.09572	0.09401	0.09067	0.08744
0.08702	0.08523	0.08348	0.08176	0.08007	0.07679	0.07364
0.07586	0.07410	0.07237	0.07068	0.06902	0.06582	0.06274
0.06679	0.06505	0.06335	0.06169	0.06007	0.05694	0.05396
0.05927	0.05756	0.05590	0.05427	0.05269	0.04965	0.04676
0.05296	0.05128	0.04965	0.04806	0.04652	0.04356	0.04077
0.04758	0.04594	0.04434	0.04279	0.04129	0.03843	0.03574
0.04296	0.04135	0.03979	0.03828	0.03682	0.03405	0.03147
0.03895	0.03737	0.03585	0.03439	0.03297	0.03029	0.02781
0.03544	0.03390	0.03242	0.03100	0.02962	0.02704	0.02466
0.03235	0.03085	0.02941	0.02802	0.02670	0.02421	0.02193
0.02962	0.02815	0.02675	0.02541	0.02412	0.02173	0.01954
0.02718	0.02575	0.02439	0.02309	0.02185	0.01954	0.01745
0.02500	0.02361	0.02228	0.02102	0.01983	0.01761	0.01562
0.02304	0.02169	0.02040	0.01918	0.01803	0.01590	0.01400
0.02127	0.01996	0.01871	0.01753	0.01642	0.01438	0.01257
0.01967	0.01839	0.01718	0.01605	0.01497	0.01302	0.01129
0.01822	0.01698	0.01581	0.01471	0.01367	0.01180	0.01016
0.01690	0.01569	0.01456	0.01349	0.01250	0.01071	0.00915
0.01569	0.01452	0.01342	0.01240	0.01144	0.00973	0.00825
0.01459	0.01345	0.01239	0.01140	0.01048	0.00885	0.00745
0.01357	0.01247	0.01144	0.01049	0.00961	0.00805	0.00672
0.01264	0.01157	0.01058	0.00967	0.00882	0.00733	0.00607
0.00897	0.00806	0.00723	0.00648	0.00580	0.00463	0.00368
0.00646	0.00569	0.00500	0.00440	0.00386	0.00295	0.00225
0.00470	0.00405	0.00349	0.00301	0.00258	0.00190	0.00139
0.00344	0.00291	0.00245	0.00207	0.00174	0.00122	0.00085
0.00253	0.00210	0.00173	0.00143	0.00117	0.00079	0.00053
0.00187	0.00152	0.00122	0.00099	0.00079	0.00051	0.00032
0.00139	0.00110	0.00087	0.00068	0.00054	0.00033	0.00020
0.00103	0.00080	0.00061	0.00047	0.00036	0.00021	0.00012
0.00076	0.00058	0.00044	0.00033	0.00024	0.00014	0.00007
0.00057	0.00042	0.00031	0.00023	0.00016	0.00009	0.00004
0.00042	0.00030	0.00022	0.00016	0.00011	0.00005	0.00003
0.00031	0.00022	0.00015	0.00011	0.00007	0.00003	0.00001
0.00023	0.00016	0.00011	0.00007	0.00005	0.00002	0.00001
0.00017	0.00011	0.00008	0.00005	0.00003	0.00001	0.00000

*Building Economics*

APPENDIX

PRESENT VALUE OF £1 PER ANNUM

Years	Rate per cent							
	2	2½	3	3½	4	4½	5	5½
1	0.9803	0.9756	0.9708	0.9661	0.9615	0.9569	0.9523	0.9478
2	1.9415	1.9274	1.9134	1.8996	1.8860	1.8726	1.8594	1.8463
3	2.8838	2.8560	2.8286	2.8016	2.7750	2.7489	2.7232	2.6979
4	3.8077	3.7619	3.7170	3.6730	3.6296	3.5875	3.5459	3.5051
5	4.7134	4.6458	4.5797	4.5150	4.4518	4.3899	4.3294	4.2702
6	5.6014	5.5081	5.4171	5.3285	5.2421	5.1578	5.0756	4.9955
7	6.4719	6.3493	6.2302	6.1145	6.0020	5.8927	5.7863	5.6829
8	7.3254	7.1701	7.0196	6.8739	6.7827	6.5958	6.4632	6.3345
9	8.1622	7.9708	7.7861	7.6076	7.4353	7.2687	7.1078	6.9521
10	8.9825	8.7520	8.5302	8.3166	8.1108	7.9127	7.7217	7.5376
11	9.7868	9.5142	9.2326	9.0015	8.7604	8.5289	8.3064	8.0925
12	10.5753	10.2577	9.9540	9.6633	9.3850	9.1185	8.8632	8.6185
13	11.3483	10.9831	10.6349	10.3027	9.9856	9.6828	9.3935	9.1176
14	12.1062	11.6909	11.2960	10.9205	10.5631	10.2228	9.8996	9.5896
15	12.8492	12.3813	11.9379	11.5174	11.1183	10.7395	10.3796	10.0375
16	13.5777	13.0550	12.5611	12.0941	11.6522	11.2340	10.8377	10.4621
17	14.2918	13.7121	13.1661	12.6513	12.1656	11.7071	11.2740	10.8646
18	14.9920	14.3533	13.7535	13.1896	12.6592	12.1599	11.6895	11.2460
19	15.6784	14.9788	14.3237	13.7098	13.1339	12.5932	12.0853	11.6076
20	16.3514	15.5891	14.8774	14.2124	13.5903	13.0079	12.4622	11.9503
21	17.0112	16.1845	15.4150	14.6979	14.0291	13.4047	12.8211	12.2752
22	17.6580	16.7654	15.9369	15.1671	14.4511	13.7844	13.1630	12.5831
23	18.2922	17.3321	16.4436	15.6204	14.8568	14.1477	13.4885	12.8750
24	18.9139	17.8849	16.9355	16.0583	15.2469	14.4954	13.7986	13.1516
25	19.5234	18.4243	17.4131	16.4815	15.6220	14.8282	14.0939	13.4139
26	20.1210	18.9506	17.8768	16.8903	15.9827	15.1466	14.3751	13.6824
27	20.7068	19.4640	18.3270	17.2853	16.3295	15.4513	14.6430	13.8980
28	21.2812	19.9648	18.7641	17.6670	16.6630	15.7428	14.8981	14.1214
29	21.8443	20.4535	19.1884	18.0357	16.9837	16.0218	15.1410	14.3331
30	22.3964	20.9302	19.6004	18.3920	17.2920	16.2888	15.3724	14.5837
35	24.9986	23.1451	21.4872	20.0006	18.6646	17.4610	16.3741	15.3905
40	27.3554	25.1027	23.1147	21.3550	19.7927	18.4015	17.1590	16.0461
45	29.4901	26.8330	24.5187	22.4954	20.7200	19.1563	17.7740	16.5477
50	31.4236	28.3623	25.7297	23.4556	21.4821	19.7620	18.2559	16.9315
55	33.1747	29.7139	26.7744	24.2640	22.1086	20.2480	18.6334	17.2251
60	34.7608	30.9086	27.6755	24.9447	22.6234	20.6380	18.9292	17.4498
65	36.1974	31.9645	28.4528	25.5178	23.0466	20.9509	19.1610	17.6217
70	37.4986	32.8978	29.1234	26.0003	23.3945	21.2021	19.3426	17.7533
75	38.6771	33.7227	29.7018	26.4066	23.6804	21.4036	19.4849	17.8539
80	39.7445	34.4518	30.2007	26.7487	23.9153	21.5653	19.5964	17.9309
85	40.7112	35.0962	30.6311	27.0368	24.1085	21.6951	19.6838	17.9898
90	41.5869	35.6657	31.0024	27.2793	24.2672	21.7992	19.7522	18.0348
95	42.3800	36.1691	31.3226	27.4835	24.3977	21.8827	19.8058	18.0694
100	43.0983	36.6141	31.5989	27.6554	24.5049	21.9498	19.8479	18.0958

...29/-

OR YEARS' PURCHASE TABLE

of compound interest

6	6½	7	7½	8	9	10
0.9433	0.9389	0.9345	0.9302	0.9259	0.9174	0.9090
1.8333	1.8206	1.8080	1.7956	1.7832	1.7591	1.7355
2.6730	2.6484	2.6243	2.6003	2.5770	2.5312	2.4868
3.4651	3.4257	3.3872	3.3493	3.3121	3.2397	3.1698
4.2123	4.1556	4.1001	4.0458	3.9927	3.8896	3.7907
4.9178	4.8410	4.7665	4.6938	4.6228	4.4859	4.3552
5.5823	5.4845	5.3892	5.2966	5.2063	5.0329	4.8684
6.2097	6.0887	5.9712	5.8573	5.7466	5.5348	5.3349
6.8016	6.6561	6.5152	6.3788	6.2468	5.9952	5.7590
7.3600	7.1888	7.0235	6.8640	6.7100	6.4176	6.1445
7.8868	7.6890	7.4986	7.3154	7.1389	6.8051	6.4950
8.3838	8.1587	7.9426	7.7352	7.5360	7.1607	6.8136
8.8526	8.5997	8.3576	8.1258	7.9037	7.4869	7.1033
9.2949	9.0138	8.7454	8.4891	8.2442	7.7861	7.3666
9.7122	9.4026	9.1079	8.8271	8.5594	8.0606	7.6060
10.1058	9.7677	9.4465	9.1415	8.8513	8.3125	7.8237
10.4772	10.1105	9.7632	9.4339	9.1216	8.5436	8.0215
10.8276	10.4324	10.0590	9.7060	9.3718	8.7556	8.2014
11.1581	10.7347	10.3355	9.9590	9.6035	8.9501	8.3649
11.4690	11.0185	10.5940	10.1944	9.8181	9.1285	8.5135
11.7640	11.2849	10.8355	10.4134	10.0168	9.2922	8.6486
12.0415	11.5351	11.0612	10.6171	10.2007	9.4424	8.7715
12.3033	11.7701	11.2721	10.8066	10.3710	9.5802	8.8832
12.5503	11.9907	11.4693	10.9829	10.5287	9.7066	8.9847
12.7833	12.1978	11.6535	11.1459	10.6747	9.8225	9.0770
13.0031	12.3923	11.8257	11.2994	10.8099	9.9289	9.1609
13.2105	12.5749	11.9867	11.4413	10.9351	10.0265	9.2372
13.4061	12.7464	12.1371	11.5733	11.0510	10.1161	9.3065
13.5907	12.9074	12.2776	11.6961	11.1584	10.1982	9.3696
13.7648	13.0586	12.4090	11.8103	11.2577	10.2736	9.4269
14.4982	13.6869	12.9476	12.2725	11.6545	10.5668	9.6441
15.0462	14.1455	13.3317	12.5944	11.9246	10.7573	9.7790
15.4558	14.4802	13.6055	12.8186	12.1084	10.8811	9.8628
15.7618	14.7246	13.8007	12.9748	12.2334	10.9616	9.9148
15.9905	14.9028	13.9399	13.0836	12.3186	11.0139	9.9471
16.1614	15.0329	14.0391	13.1593	12.3765	11.0479	9.9671
16.2891	15.1279	14.1099	13.2121	12.4159	11.0700	9.9796
16.3845	15.1972	14.1603	13.2489	12.4428	11.0844	9.9873
16.4558	15.2478	14.1963	13.2745	12.4610	11.0937	9.9921
16.5091	15.2848	14.2220	13.2923	12.4735	11.0998	9.9951
16.5489	15.3117	14.2402	13.3048	12.4819	11.1037	9.9969
16.5786	15.3314	14.2533	13.3134	12.4877	11.1063	9.9981
16.6009	15.3458	14.2626	13.3194	12.4916	11.1080	9.9988
16.6175	15.3562	14.2692	13.3236	12.4943	11.1091	9.9992

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