Alpha
Engineering Consultant

PROJECT QUALITY PLAN

PROPOSED POWERGRID 400KV SUBSTATION BUILDING AT PAYA LEBAR

For

M/S POWERGRID LTD

Copy No.	

Prepared By: Soh Kai Yea

Authorised By: Tan L S

Date: 1 September 2003

TABLE OF CONTENTS

SECTION	DESCRIPTION
-	**TITLE PAGE**
-	**TABLE OF CONTENTS**
1	**QUALITY PLAN CONTROL AND DISTRIBUTION**
1.1	List of Copy Holders
1.2	Revision Record
2	**PROJECT INFORMATION**
2.1	Project Description
2.2	Project Cost
2.3	Scope of Works
3	**ORGANISATION**
3.1	Organisation Chart
3.2	AEC's Project Team Member
3.3	Client/Client's Representative
3.4	Other Consultants: Local Overseas - Not Used
3.5	Contractor/Sub-Contractors
3.6	Authorities
4	**PROGRAMME**
4.1	Overall Programme
4.2	Authority Submission Status for M&E Services – 1st Submission
4.3	Not Used

TABLE OF CONTENTS

SECTION	DESCRIPTION
5	**PROJECT RECORDS**
5.1	List of Internal File
5.2	Filing of Drawings
6	**INTERFACING**
6.1	Method of Interface
6.2	Internal Design Interface
6.3	Circulation of Documents to External Parties
7	**WORK AUTHORISATION**
8	**DESIGN INPUT AND METHODOLOGY**
8.1	List of Client's Standards, Reference Documents or Brief
8.2	List of Applicable Code of Practice and Regulations
8.3	List of Design Guide or Handbook Used
8.4	List of Applicable Quality System Procedures
8.5	List of Software Used for Design/Analysis
9	**CLIENT'S REQUIREMENTS**
9.1	List of Output Required by Client
9.2	Specific Procedures Required by Client
10	**LIST OF SUB-JOB**
10.1	List of Sub-Job Numbers

SECTION 1

QUALITY PLAN CONTROL AND DISTRIBUTION

1.1 List of Copy Holders

Copy No.	Copy Holder	Date of Issue
1	1302-PQP File	1 June 2001
2	Soh Kai Yea	1 June 2001

1.2 Revision Record

Revision	Date of Issue	Section Reference	Page(s)	Remarks
0	1 June 2001	1 to 10	26	
1	1 September 2003	1 to 10	32	

SECTION 2

PROJECT INFORMATION

2.1 Project Description

Type of Development	400KV Electrical Transmission Substation
Statistics of Development	
Site Area, m²	15,000
Nett Floor Area, m²	-
Gross Floor Area, m²	43,000
Covered Carpark, m²	-
No. of Covered Carpark Lots	-
No. of Apartments/Houses	-
No. of Beds (for Hospitals)	-
No. of Guestroom (for Hotels)	-
No. of Blocks / No. of Storeys	1 Block/3 Storey with Mezz Floor and 3 Basement
No. of Phases	-

2.2 Project Cost

M&E Services Cost Plan (S$ x 1M)										
Services	EI	ACVI	LEI	FFAI	PSI	HC	EGS			
Estimate	2.58	3.21	0.1	1.13	0.38	0.5	-			
Awarded	2.418	2.656	0.083	0.925	0.52	0.62	0.96			

Total Project Construction Cost (S$ x1M)			
	Site Clearance	Piling Works	Main Contract
Estimate	-	-	-
Awarded	-	-	37.9

Site Clearance shall include earth work, soil improvement, service diversion and termination.

Note: Contract Packages for the various M&E Services as agreed with Client are as follows:

1. M&E Sections of the Main Tender comprising of:
   a) Plumbing & Sanitary DSC
   b) Substation Earthing Grid DSC
   c) Lift Installation NSC

2. Hoist and Crane Installation NSC

3. Mechanical & Electrical Installation NSC comprising of:
   a) Air-Conditioning & Mechanical Ventilation Installation
   b) Fire Fighting & Alarm Installation
   c) Electrical Installation (Including Security System)

Tender Deposit is collected by Client and not reimbursable to AEC.

2.3 Scope of Works

2.3.1 Scope of Consultancy Services

Conceptual/Schematic Design	✓
Detailed Design	✓
Tender Documentation	✓
Tender Evaluation	✓
Contract Supervision	✓
M&E Costing	✓
Submissions to Authority	✓

(✓ *where applicable*)

2.3.2 Scope of M&E Services

ELECTRICAL	✓	AIR CONDITIONING	✓	SPRINKLER	✓	SANITARY	✓	SWIMMING POOL	
LIFT	✓	MECHANICAL VENTILATION	✓	FIRE ALARM	✓	COLD WATER	✓	STEAM BOILER	
ESCALATOR		MECHANICAL SMOKE EXTRACT	✓	HOSEREEL	✓	HOT WATER		FUEL STORAGE	
PABX		COMPUTER A/C		WET RISER		TOWN GAS			
SECURITY	✓	BST CARPARK EXH		DRY RISER	✓	LPG GAS			
TELELIFT		HEATING				MEDICAL GAS			
DATA COMM.		SUBSTATION EARTH GRID	✓						
FLUSHFLOOR TRUNKING		HOIST AND CRANE	✓						

(✓ *where applicable*)

2.3.3 Submission to Relevant Authorities by Others

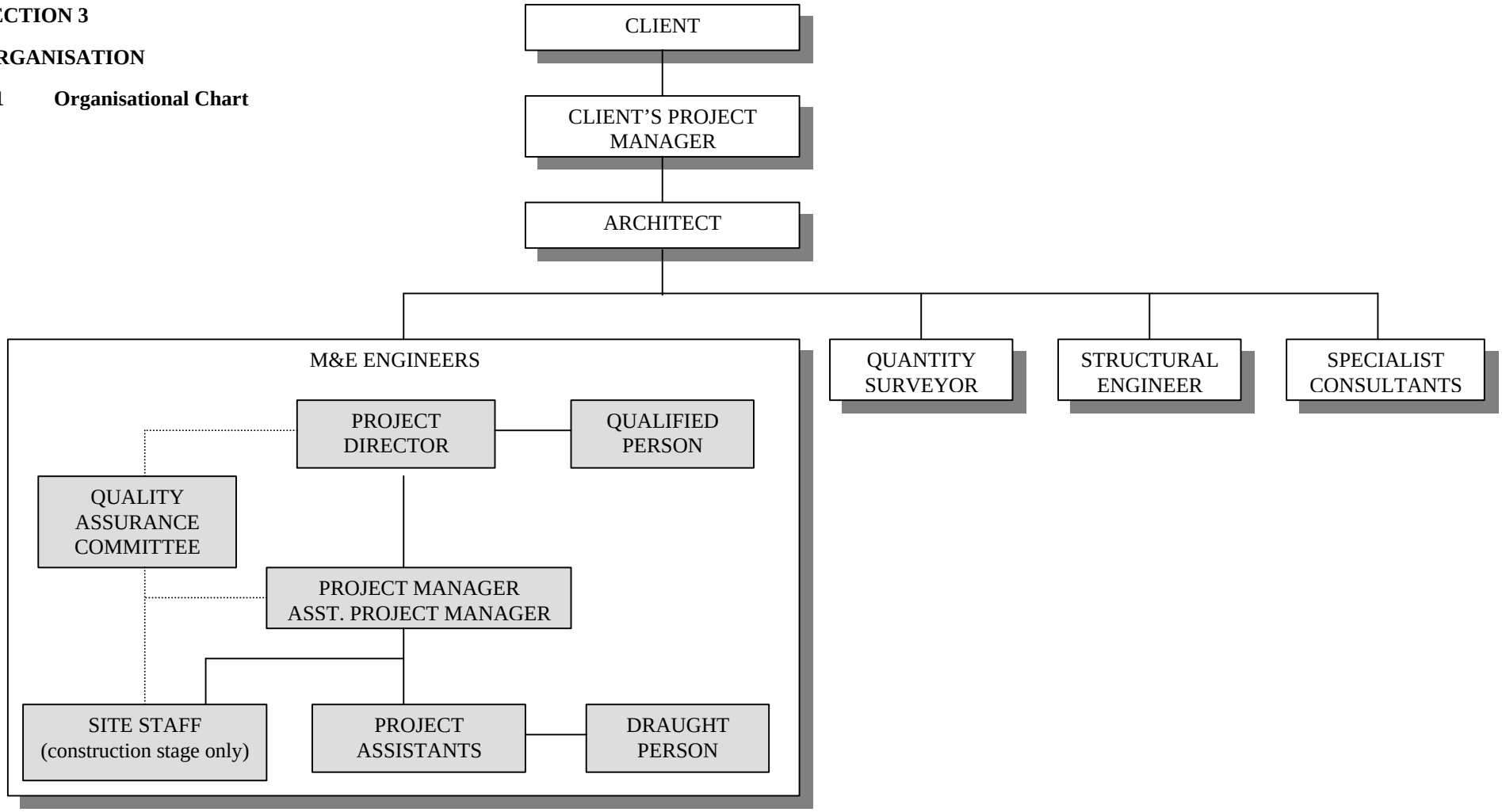
EJECTOR & DIVERTER		SUMP PUMP	✓	FUEL OIL TANK	✓	LIFT & ESCALATOR	✓	PRESSURE VESSEL		HOISTS	✓	FOAM	

(✓ *where applicable*)

SECTION 3

ORGANISATION

3.1 Organisational Chart



SECTION 3

ORGANISATION

3.2 AEC's Project Team Member

TITLE		NAME
Project Director		Tan L S (TLS)
Qualified Person	Mechanical	Andrew Loh (LCT)
	Electrical	Tan L S (TLS)
Project Manager		Soh Kai Yea (SKY)
Assistant Project Manager		Choong Choon Guan (CCG)
Project Assistant (Mech)		Chuan Kian Heng (CKH)
Project Assistant (Elect)		Jade Bai Yu Chen (JB)
Draughtsperson		Common Pool
Resident Engineer		Lee Yoke Pung
Assistant Resident Engineer (M&E)		-
Clerk-of-Work (M&E)		Chan Kay Cheong (CKC)

3.3 Client/Client's Representatives

Client: PowerGrid Ltd

Address:- 111 Somerset Road #08-05
Singapore Power Building
Singapore 238164

Tel:- 6823 8888
Fax:- 6823 8564

Client's Representatives:-

Name of Firm	Contact Person	Contact
PowerGrid Ltd (Procurement)	Name: Mr Jeffery Lim Position: Executive Engineer	Tel: 6823 8533 Fax: 6823 8564 Pager: - Handphone: - Email: jefferylc@powergrid.com.sg
PowerGrid Ltd (Transmission Engineering)	Name: Mr Andres Wong Position: Executive Engineer	Tel: 6471 5712 Fax: 6471 0125 Pager: - Handphone: - Email: andreswtg@powergrid.com.sg
PowerGrid Ltd (Transmission Planning)	Name: Ms Yang Oi Ling Position: Principle Technical Officer	Tel: 6823 8535 Fax: 6471 6125 Pager: - Handphone: - Email: -
PowerGrid Ltd (Building and Civil Works)	Name: Mr Yeong Wan Loy Position: Senior Manager	Tel: 6290 9600 Fax: 6290 9144 Pager: - Handphone: - Email: yeongwl@powergrid.com.sg

3.4 Other Consultants (Local)

Function / Name of Firm	Contact Person	Contact
Project Manager Mott MacDonald Singapore Pte Ltd	Name: Mr Bernard Toh Position: Senior Engineer	Tel: 6293 1900 Fax: 6293 1911 (Main Office) Fax: 6842 4175 (Bernard Toh) Pager: - Handphone: - Email: mmspl@pacifc.net.sg Email: big_berd@hotmail.com (Bernard Toh)
Architect James Yip & Partners	Name: Mr C N Suneeth Position: Partner	Tel: 6221 1355 Fax: 6221 5428 Pager: - Handphone: - Email: jyp@jyp.com.sg Email: suneeth@jyp.com.sg (C N Suneeth)
Quantity Surveyor T J Chiam Surveyors	Name: Mr Chiam Toon Jiak Position: Principal Q.S.	Tel: 6293 3266 Fax: 6294 4903 Pager: - Handphone: - Email: chiamtj@singnet.com.sg
Interior Designer N.A.	Name: - Position: -	Tel: - Fax: - Pager: - Handphone: - Email: -
Lighting Consultant N.A.	Name: - Position: -	Tel: - Fax: - Pager: - Handphone: - Email: -
Acoustic Consultant N.A.	Name: - Position: -	Tel: - Fax: - Pager: - Handphone: - Email: -
Landscape Architect N.A.	Name: - Position: -	Tel: - Fax: - Pager: - Handphone: - Email: -

3.4 Other Consultants (Overseas)

NOT USED

3.5 Contractors/Sub-Contractors

Function / Name of Firm	Contract *	Contact Person	Contact
Main Contractor Hexacon Construction Pte Ltd	DC	Name: Mr Ho Choo Ing Position: Project Director	Tel: 6251 9388 Fax: 6253 1638 (Main) Fax: 6842 1693 (Site) Pager: - Handphone: - Email: hexacon@singnet.com.sg
Mechanical & Electrical Installation Sub-Contractor Hitachi Plant Engineering & Construction Co., Ltd	NSC	Name: Mr Abdul Rahman Bin Ali Position: Project Manager	Tel: 6222 0665 Fax: 6225 2010 Pager: - Handphone: - Email:
Plumbing & Sanitary Installation Sub-Contractor Acacia Engineering Pte Ltd	DSC	Name: Mr Tan Boon Yong Position: Director	Tel: 6453 0500 Fax: 6453 0400 Pager: - Handphone: - Email: acacia.epl@pacific.net.sg
Lift & Escalator Installation Sub-Contractor ThyssenKrupp Elevator (Singapore) Pte Ltd	NSC	Name: Mr Peter Lock Position: General Manager	Tel: 6842 5966 Fax: 6848 2307 Pager: - Hp: 9735 1513 (Peter Lock) Email: peterl@thyssen.com.sg
Substation Earthing Grid Sub-Contractor Leong Hum Engineering Pte Ltd	DSC	Name: Mr Patrick Leong Position: Director	Tel: 6296 8473 Fax: 6296 0213 Pager: - Handphone: - Email: lhepl@starhub.net.sg
Hoist & Crane Sub-Contractor MHE-Dematic (S) Pte Ltd	NSC	Name: Mr Patrick Lim Position: Sales Engineer	Tel: 6862 2900 Fax: 6862 1933 Pager: - Handphone: - Email: patrick_lim@mhe-dematic.com.sg

** Type of Contract*
- *NSC (Nominated Sub-Contract)*
- *DSC (Domesticated Sub-Contract)*
- *DC (Direct Contract)*
- *NS (Nominated Supplier)*

3.6 Authorities

Authorities/Department	Contact Person	Tel/Fax Nos./E-mail
PowerGrid/Power Supply:		
(a) Customer Supply	Power Grid (Internal)	
(b) Sub-Station (22KV)	Mr Francis Chang	6823 8555
(c) Installation	Power Grid (Internal)	
(d) Meter Section	Power Grid (Internal)	
(e) Road Lighting	-	
(f) Diversion	-	
Telecom:	-	
(a) Planning/Line Plant	Mr Lee Him Buan/Mr Yip Weng Chow	6848 5855 / 6484 4348
(b) Installation	-	
(c) Diversion	-	
BCA:		
(a) Building Plan	Mr Thung Sek Kwang	6325 2211
FSSD:		
(a) Building Plan	-	
(b) M&E Section	Mr Edmund Choo	6848 1465
PUB (Water)		
(a) Water Conservation	Ms Ling Ning Chun	6731 3576
(b) Plumbing Plan	Mr Ang W S	6731 3548
(c) Diversion	-	
PowerGas:		
(a) Planning/Submission	-	
(b) Installation/Inspection	-	
(c) Diversion	-	
ENV (Sewerage):		
(a) Building Plan	-	
(b) M&E Section	Mr Anselm	6731 9631
(c) Diversion	-	
ENV (Pollution Control)		
(a) Planning/Submission	-	
(b) Inspection	-	
CAAS	Mr Mohd Fadzil	6541 2419
DSTA	Ms Chua Y C	6373 3780

SECTION 4

PROGRAMME

4.1 Overall Programme

ID	TASK NAME	MONTHS	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1.	Preliminary Planning																									
2.	Planning Submission																									
3.	Detail Design																									
4.	BP Submission																									
5.	BP Submission (Amendments)																									
6.	Tender Period for Piling																									
7.	Tender Period for Sub-Structure		* See attached programme																							
8.	Tender Period for Super-Structure																									
9.	Piling Period																									
10.	Sub-Structure Construction Period																									
11.	Super-Structure Construction Period																									
12.	TOP																									
13.	CSC																									

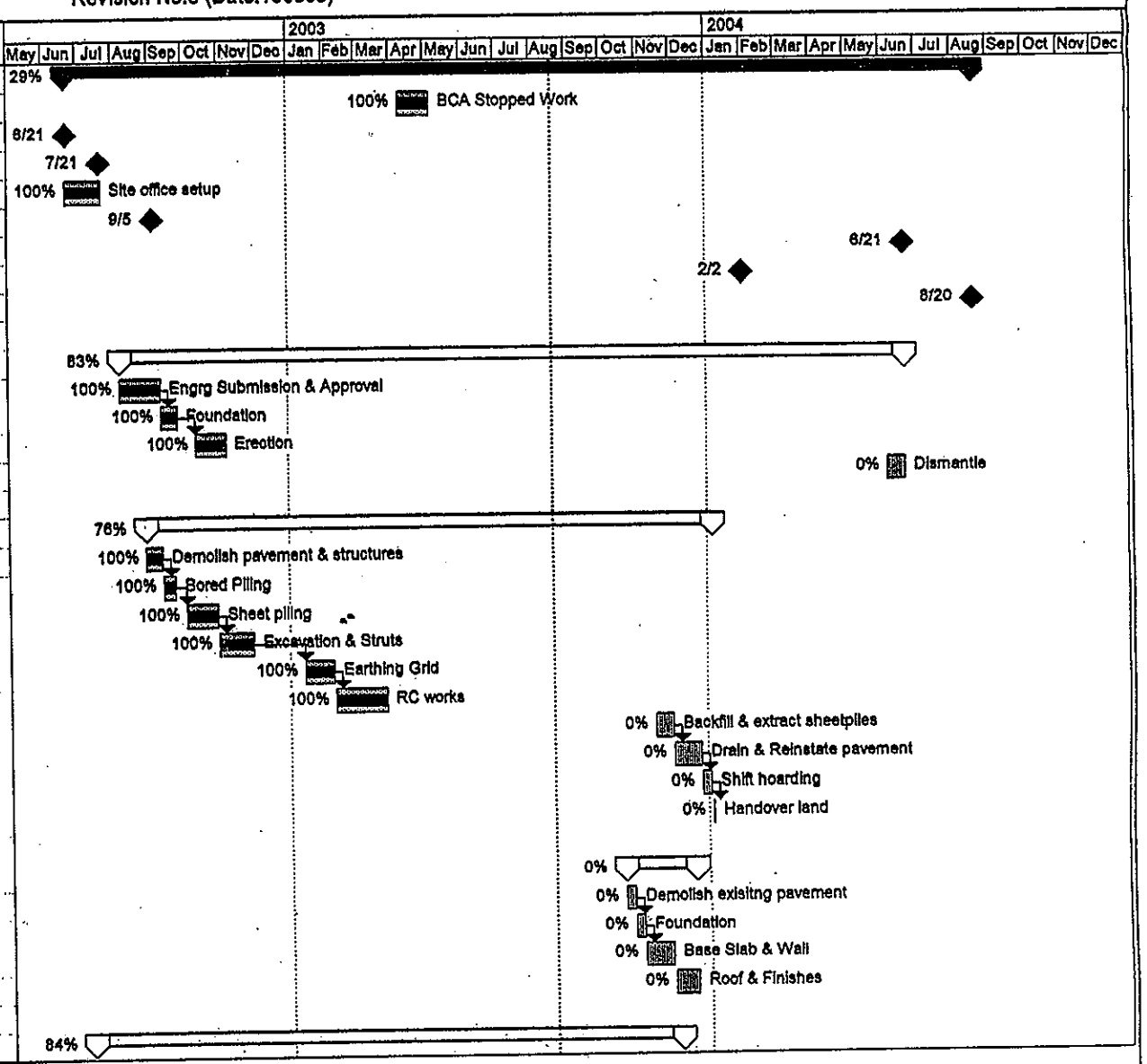
Proposed Paya Lebar 400 kV Substation

MASTER PROGRAMME

Revision No.6 (Date:150803)

Hexacon Construction

ID	Task Name	Duration	Start	Finish
0	MASTER PROG2	688 days	Jun 21 '02	Aug 20 '04
1	BCA Stopped Work	28 days	Apr 9 '03	May 6 '03
2	Site possession	0 days	Jun 21 '02	Jun 21 '02
3	Permit to commence work	0 days	Jul 21 '02	Jul 21 '02
4	Site office setup	27 days	Jun 21 '02	Jul 22 '02
5	* Allow access for Tunnel Contractor	0 days	Sep 5 '02	Sep 5 '02
6	* Allow for Equipment Contractor	0 days	Jun 21 '04	Jun 21 '04
7	* Handover 22kV Substation	0 days	Feb 2 '04	Feb 2 '04
8	* Final completion	0 days	Aug 20 '04	Aug 20 '04
9				
10	Tower Crane	698 days	Aug 7 '02	Jun 22 '04
11	Engrg Submission & Approval	31 days	Aug 7 '02	Sep 11 '02
12	Foundation	13 days	Sep 12 '02	Sep 26 '02
13	Erection	23 days	Oct 12 '02	Nov 7 '02
14	Dismantle	14 days	Jun 7 '04	Jun 22 '04
15				
16	Ramp Driveway (GL1)	434 days	Aug 29 '02	Jan 5 '04
17	Demolish pavement & structures	13 days	Aug 29 '02	Sep 12 '02
18	Bored Piling	9 days	Sep 13 '02	Sep 23 '02
19	Sheet piling	24 days	Oct 3 '02	Oct 30 '02
20	Excavation & Struts	27 days	Oct 31 '02	Nov 30 '02
21	Earthing Grid	23 days	Jan 14 '03	Feb 8 '03
22	RC works	39 days	Feb 10 '03	Mar 26 '03
23	Backfill & extract sheetpiles	14 days	Nov 17 '03	Dec 2 '03
24	Drain & Reinstate pavement	21 days	Dec 3 '03	Dec 26 '03
25	Shift hoarding	7 days	Dec 27 '03	Jan 3 '04
26	Handover land	1 day	Jan 5 '04	Jan 5 '04
27				
28	Bin Centre Constrn at Comfort Aut	64 days	Oct 20 '03	Dec 20 '03
29	Demolish exisitng pavement	7 days	Oct 20 '03	Oct 27 '03
30	Foundation	7 days	Oct 28 '03	Nov 4 '03
31	Base Slab & Wall	21 days	Nov 5 '03	Nov 28 '03
32	Roof & Finishes	18 days	Dec 1 '03	Dec 20 '03
33				
34	Instrumentation & monitoring	452 days	Jul 10 '02	Dec 6 '03



Task — Summary — Rolled Up Progress — Project Summary

Progress — Rolled Up Task — Split — Group By Summary

Milestone — Rolled Up Milestone — External Tasks

Client: POWERGRID LTD
Architect: JAMES YIP & PARTNERS
Q. Surveyor: T.I CHIAM

Principal Consultant: MOTT MACDONALD SINGAPORE
M&E Consultant: ALPHA ENGINEERING CONSULTANT

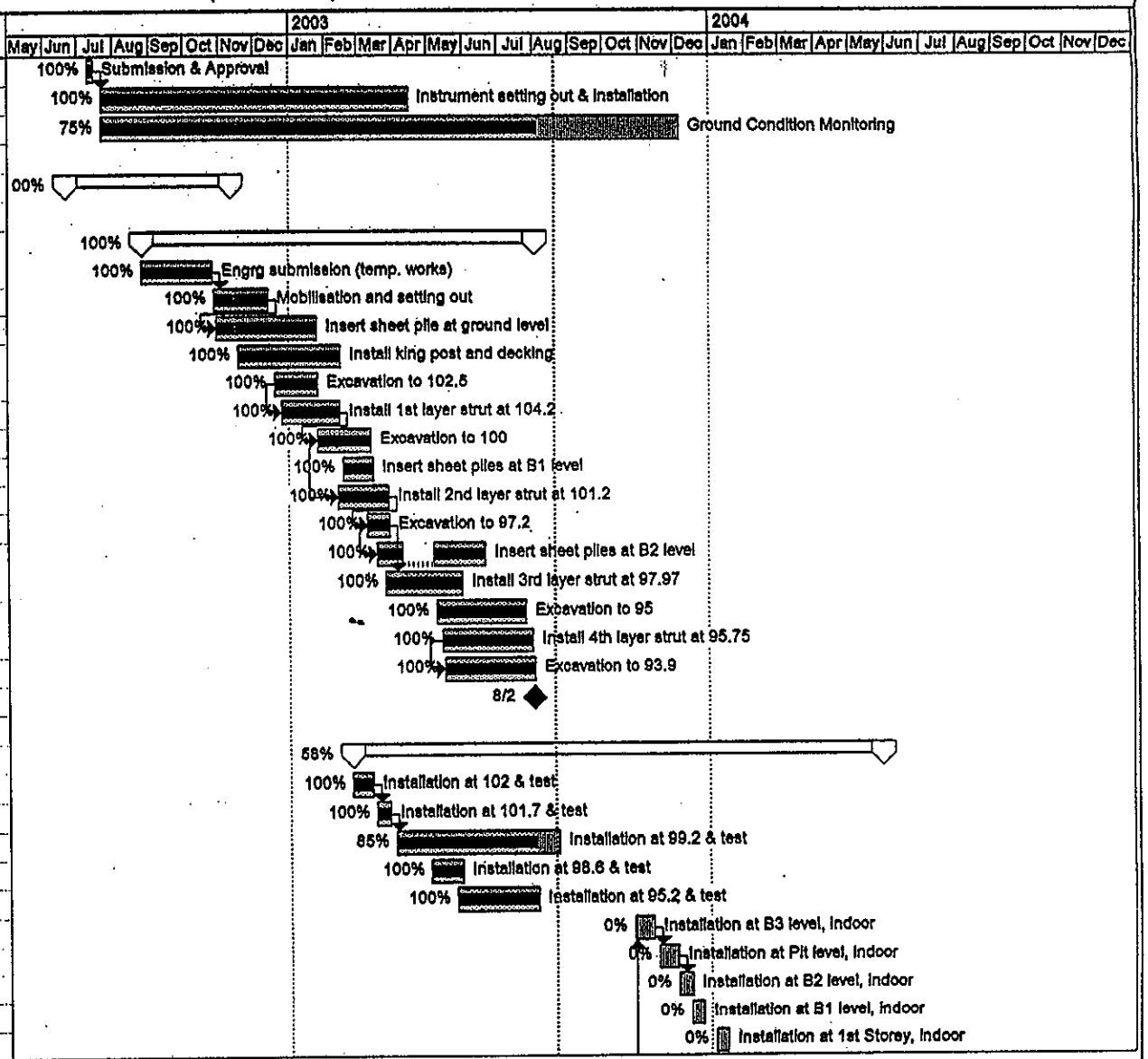
Proposed Paya Lebar 400 kV Substation

MASTER PROGRAMME

Revision No.6 (Date:150803)

Hexacon Construction

ID	Task Name	Duration	Start	Finish
35	Submission & Approval	5 days	Jul 10 '02	Jul 15 '02
36	Instrument setting out & installa	232 days	Jul 22 '02	Apr 15 '03
37	Ground Condition Monitoring	442 days	Jul 22 '02	Dec 6 '03
38				
39	Piling work and set-up	123 days	Jun 21 '02	Nov 11 '02
47				
48	Sheet pile and Excavation works	299 days	Aug 26 '02	Aug 2 '03
49	Engrg submission (temp. works	54 days	Aug 26 '02	Oct 26 '02
50	Mobilisation and setting out	42 days	Oct 28 '02	Dec 14 '02
51	Insert sheet pile at ground level	76 days	Oct 30 '02	Jan 25 '03
52	Install king post and decking	78 days	Nov 18 '02	Feb 16 '03
53	Excavation to 102.5	32 days	Dec 20 '02	Jan 26 '03
54	Install 1st layer strut at 104.2	44 days	Dec 26 '02	Feb 14 '03
55	Excavation to 100	40 days	Jan 26 '03	Mar 13 '03
56	Insert sheet piles at B1 level	24 days	Feb 17 '03	Mar 15 '03
57	Install 2nd layer strut at 101.2	38 days	Feb 13 '03	Mar 28 '03
58	Excavation to 97.2	18 days	Mar 10 '03	Mar 29 '03
59	Insert sheet piles at B2 level	60 days	Mar 18 '03	Jun 20 '03
60	Install 3rd layer strut at 97.97	63 days	Mar 26 '03	May 31 '03
61	Excavation to 95	67 days	May 9 '03	Jul 25 '03
62	Install 4th layer strut at 95.75	68 days	May 14 '03	Jul 31 '03
63	Excavation to 93.9	68 days	May 18 '03	Aug 2 '03
64	* End of basement excavation	0 days	Aug 2 '03	Aug 2 '03
65				
66	Installation of Earthing grid	406 days	Feb 24 '03	May 29 '04
67	Installation at 102 & test	16 days	Feb 24 '03	Mar 13 '03
68	Installation at 101.7 & test	11 days	Mar 17 '03	Mar 28 '03
69	Installation at 99.2 & test	130 days	Apr 3 '03	Aug 22 '03
70	Installation at 98.6 & test	25 days	May 3 '03	May 30 '03
71	Installation at 95.2 & test	62 days	May 26 '03	Aug 4 '03
72	Installation at B3 level, indoor	15 days	Oct 27 '03	Nov 12 '03
73	Installation at Pit level, indoor	15 days	Nov 17 '03	Dec 3 '03
74	Installation at B2 level, indoor	10 days	Dec 4 '03	Dec 15 '03
75	Installation at B1 level, indoor	10 days	Dec 15 '03	Dec 25 '03
76	Installation at 1st Storey, indoor	10 days	Jan 5 '04	Jan 15 '04



Task | Summary | Rolled Up Progress | Project Summary

Progress | Rolled Up Task | Split | Group By Summary

Milestone | Rolled Up Milestone | External Tasks

Client: POWERGRID LTD
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Q. Surveyor: TJ CHIAM

Principal Consultant: MOTT MACDONALD SINGAPORE
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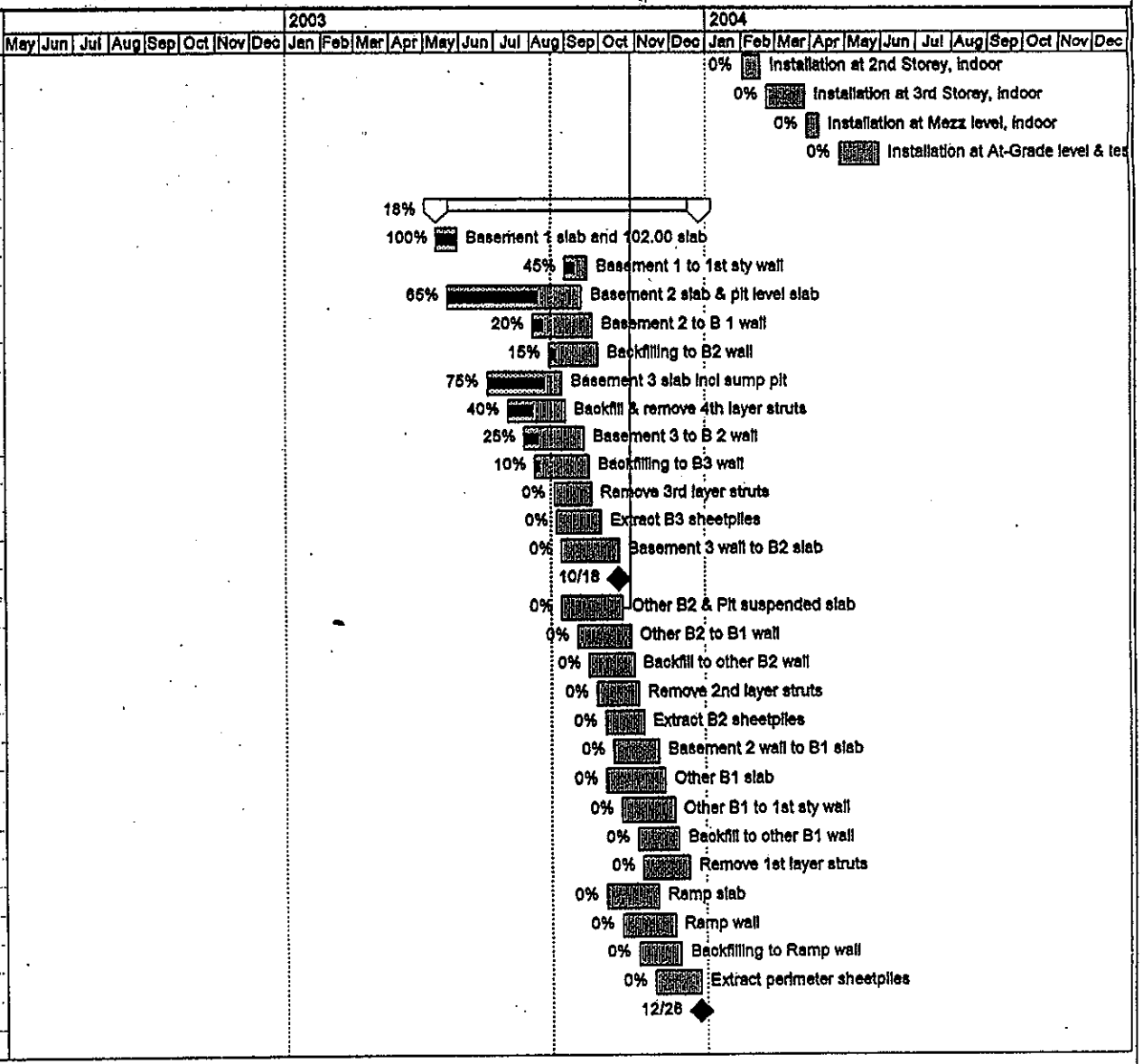
Proposed Paya Lebar 400 kV Substation

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Hexacon Construction

ID	Task Name	Duration	Start	Finish
77	Installation at 2nd Storey, indoor	14 days	Feb 2 '04	Feb 17 '04
78	Installation at 3rd Storey, indoor	30 days	Feb 23 '04	Mar 27 '04
79	Installation at Mezz level, indoor	10 days	Mar 29 '04	Apr 8 '04
80	Installation at At-Grade level & t	30 days	Apr 26 '04	May 29 '04
81				
82	Basement RC Works	202 days	May 12 '03	Dec 26 '03
83	Basement 1 slab and 102.00 sl	17 days	May 12 '03	May 30 '03
84	Basement 1 to 1st sty wall	18 days	Sep 1 '03	Sep 20 '03
85	Basement 2 slab & pit level slab	105 days	May 22 '03	Sep 15 '03
86	Basement 2 to B 1 wall	50 days	Aug 4 '03	Sep 25 '03
87	Backfilling to B2 wall	40 days	Aug 18 '03	Sep 30 '03
88	Basement 3 slab incl sump pit	60 days	Jun 26 '03	Aug 29 '03
89	Backfill & remove 4th layer strut	48 days	Jul 14 '03	Sep 1 '03
90	Basement 3 to B 2 wall	50 days	Jul 28 '03	Sep 17 '03
91	Backfilling to B3 wall	45 days	Aug 8 '03	Sep 22 '03
92	Remove 3rd layer struts	30 days	Aug 23 '03	Sep 24 '03
93	Extract B3 sheetpiles	35 days	Aug 25 '03	Oct 2 '03
94	Basement 3 wall to B2 slab	45 days	Aug 29 '03	Oct 18 '03
95	* Complete B3 RC works	0 days	Oct 18 '03	Oct 18 '03
96	Other B2 & Pit suspended slab	47 days	Aug 29 '03	Oct 21 '03
97	Other B2 to B1 wall	40 days	Sep 12 '03	Oct 28 '03
98	Backfill to other B2 wall	35 days	Sep 22 '03	Oct 31 '03
99	Remove 2nd layer struts	32 days	Sep 29 '03	Nov 4 '03
100	Extract B2 sheetpiles	30 days	Oct 6 '03	Nov 8 '03
101	Basement 2 wall to B1 slab	35 days	Oct 13 '03	Nov 21 '03
102	Other B1 slab	45 days	Oct 6 '03	Nov 26 '03
103	Other B1 to 1st sty wall	40 days	Oct 20 '03	Dec 4 '03
104	Backfill to other B1 wall	31 days	Nov 3 '03	Dec 8 '03
105	Remove 1st layer struts	35 days	Nov 7 '03	Dec 17 '03
106	Ramp slab	40 days	Oct 6 '03	Nov 20 '03
107	Ramp wall	40 days	Oct 20 '03	Dec 4 '03
108	Backfilling to Ramp wall	32 days	Nov 3 '03	Dec 9 '03
109	Extract perimeter sheetpiles	35 days	Nov 17 '03	Dec 26 '03
110	* Complete basement RC works	0 days	Dec 26 '03	Dec 26 '03
111				



Task | Summary | Rolled Up Progress | Project Summary

Progress | Rolled Up Task | Split | Group By Summary

Milestone | Rolled Up Milestone | External Tasks

Client: POWERGRID LTD
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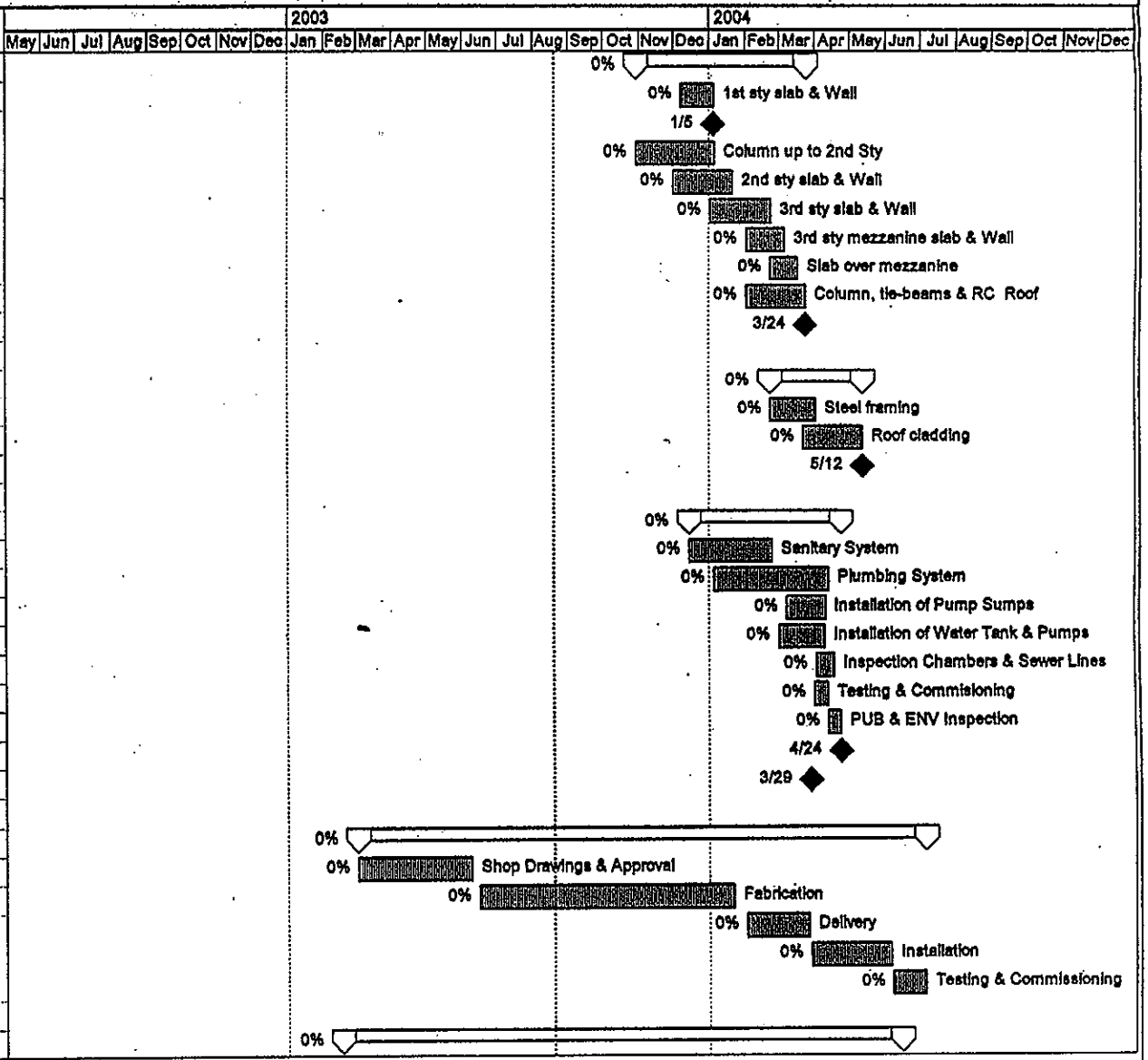
Proposed Paya Lebar 400 kV Substation

MASTER PROGRAMME

Revision No.6 (Date:150803)

Hexacon Construction

ID	Task Name	Duration	Start	Finish
112	Superstructure	128 days	Oct 30 '03	Mar 24 '04
113	1st sty slab & Wall	25 days	Dec 8 '03	Jan 5 '04
114	* Complete 1st storey RC works	0 days	Jan 5 '04	Jan 5 '04
115	Column up to 2nd Sty	58 days	Oct 30 '03	Jan 5 '04
116	2nd sty slab & Wall	45 days	Dec 1 '03	Jan 21 '04
117	3rd sty slab & Wall	45 days	Jan 2 '04	Feb 23 '04
118	3rd sty mezzanine slab & Wall	30 days	Feb 2 '04	Mar 8 '04
119	Slab over mezzanine	21 days	Feb 23 '04	Mar 17 '04
120	Column, tie-beams & RC Roof	45 days	Feb 2 '04	Mar 24 '04
121	* Complete superstructure RC w	0 days	Mar 24 '04	Mar 24 '04
122				
123	Roofing works	69 days	Feb 23 '04	May 12 '04
124	Steel framing	35 days	Feb 23 '04	Apr 2 '04
125	Roof cladding	45 days	Mar 22 '04	May 12 '04
126	* Complete Building Roof	0 days	May 12 '04	May 12 '04
127				
128	Plumbing & Sanitary Works	113 days	Dec 16 '03	Apr 24 '04
129	Sanitary System	62 days	Dec 16 '03	Feb 24 '04
130	Plumbing System	86 days	Jan 6 '04	Apr 13 '04
131	Installation of Pump Sumps	30 days	Mar 8 '04	Apr 10 '04
132	Installation of Water Tank & Pur	35 days	Mar 1 '04	Apr 9 '04
133	Inspection Chambers & Sewer L	14 days	Apr 2 '04	Apr 17 '04
134	Testing & Commisioning	10 days	Apr 1 '04	Apr 12 '04
135	PUB & ENV Inspection	10 days	Apr 13 '04	Apr 23 '04
136	* Water Turn-on date	0 days	Apr 24 '04	Apr 24 '04
137	*Elect Turn-on date	0 days	Mar 29 '04	Mar 29 '04
138				
139	Lift Works	431 days	Mar 3 '03	Jul 8 '04
140	Shop Drawings & Approval	90 days	Mar 3 '03	Jun 9 '03
141	Fabrication	195 days	Jun 16 '03	Jan 22 '04
142	Delivery	46 days	Feb 2 '04	Mar 27 '04
143	Installation	60 days	Mar 29 '04	Jun 5 '04
144	Testing & Commissioning	25 days	Jun 7 '04	Jul 8 '04
145				
146	Hoist & Crane Works	426 days	Feb 17 '03	Jun 14 '04



Task | Summary | Rolled Up Progress | Project Summary

Progress | Rolled Up Task | Split | Group By Summary

Milestone | Rolled Up Milestone | External Tasks

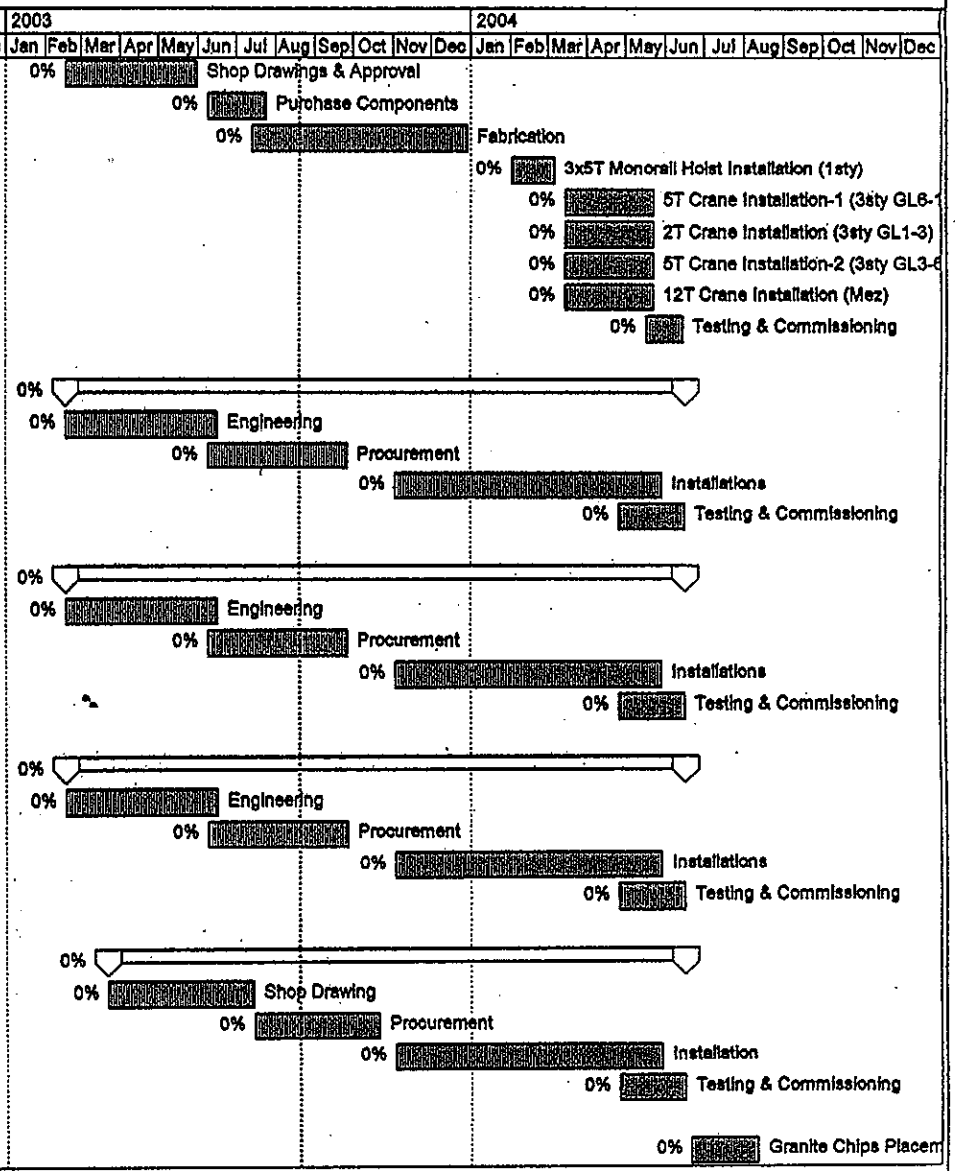
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Principal Consultant: MOTT MACDONALD SINGAPORE
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MASTER PROGRAMME

Revision No.6 (Date:150803)

ID	Task Name	Duration	Start	Finish
147	Shop Drawings & Approval	95 days	Feb 17 '03	May 31 '03
148	Purchase Components	40 days	Jun 9 '03	Jul 24 '03
149	Fabrication	150 days	Jul 14 '03	Dec 29 '03
150	3x5T Monorail Hoist Installation	30 days	Feb 2 '04	Mar 6 '04
151	5T Crane Installation-1 (3sty GL	60 days	Mar 15 '04	May 22 '04
152	2T Crane Installation (3sty GL1-	60 days	Mar 15 '04	May 22 '04
153	5T Crane Installation-2 (3sty GL	60 days	Mar 15 '04	May 22 '04
154	12T Crane Installation (Mez)	60 days	Mar 15 '04	May 22 '04
155	Testing & Commissioning	25 days	May 17 '04	Jun 14 '04
156				
157	Air-Conditioner	427 days	Feb 17 '03	Jun 16 '04
158	Engineering	108 days	Feb 17 '03	Jun 16 '03
159	Procurement	100 days	Jun 9 '03	Sep 26 '03
160	Installations	180 days	Nov 3 '03	May 29 '04
161	Testing & Commissioning	45 days	Apr 26 '04	Jun 16 '04
162				
163	Mechanical Ventilation	427 days	Feb 17 '03	Jun 16 '04
164	Engineering	108 days	Feb 17 '03	Jun 16 '03
165	Procurement	100 days	Jun 9 '03	Sep 26 '03
166	Installations	180 days	Nov 3 '03	May 29 '04
167	Testing & Commissioning	45 days	Apr 26 '04	Jun 16 '04
168				
169	Electrical Installation	427 days	Feb 17 '03	Jun 16 '04
170	Engineering	108 days	Feb 17 '03	Jun 16 '03
171	Procurement	100 days	Jun 9 '03	Sep 26 '03
172	Installations	180 days	Nov 3 '03	May 29 '04
173	Testing & Commissioning	45 days	Apr 26 '04	Jun 16 '04
174				
175	Fire Fighting & Alarm System	398 days	Mar 22 '03	Jun 16 '04
176	Shop Drawing	103 days	Mar 22 '03	Jul 14 '03
177	Procurement	90 days	Jul 15 '03	Oct 21 '03
178	Installation	180 days	Nov 3 '03	May 29 '04
179	Testing & Commissioning	45 days	Apr 26 '04	Jun 16 '04
180				
181	Granite Chips Placement	45 days	Jun 21 '04	Aug 11 '04



Task — Summary — Rolled Up Progress — Project Summary

Progress — Rolled Up Task — Split — Group By Summary

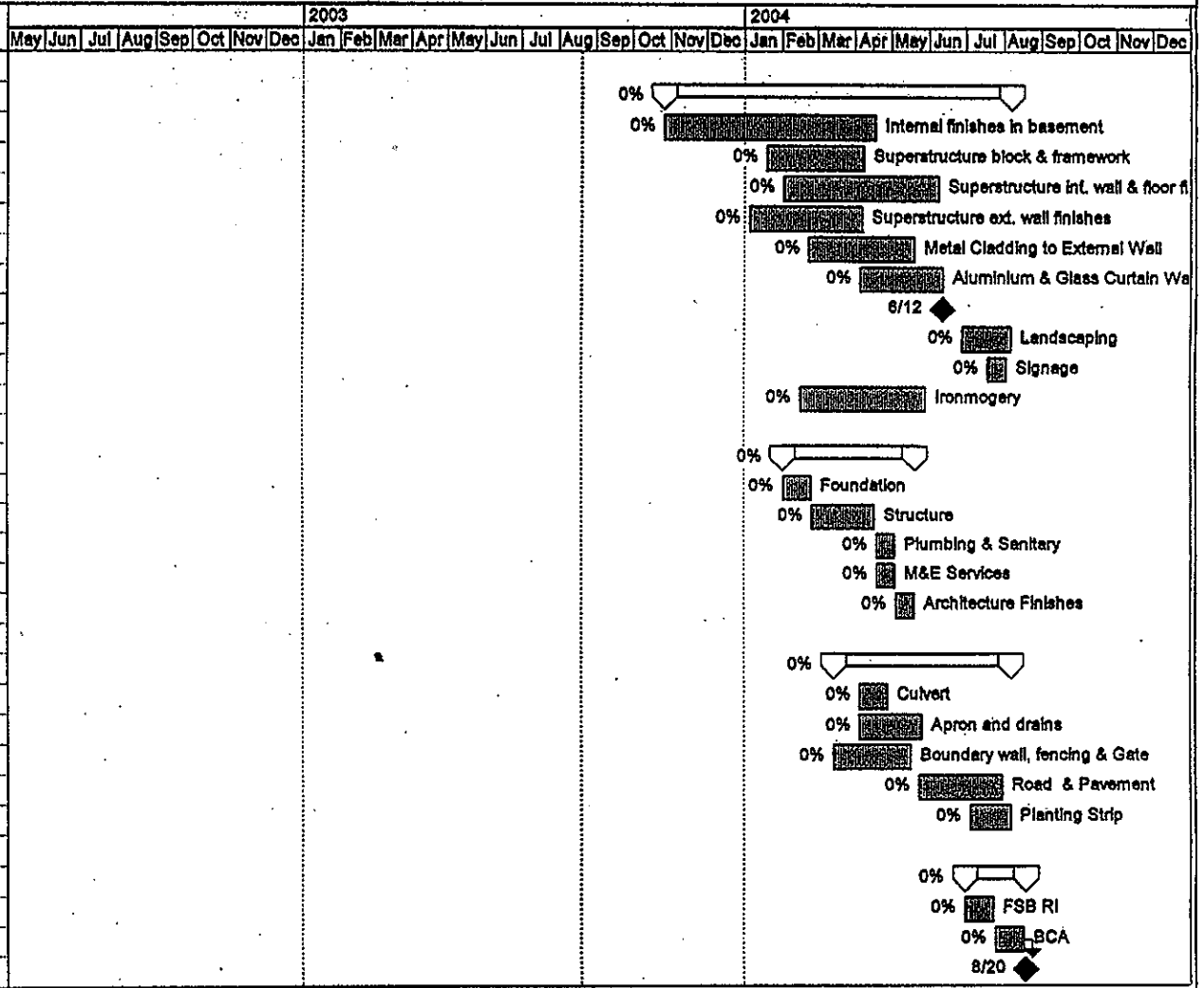
Milestone — Rolled Up Milestone — External Tasks

Client: POWERGRID LTD
Architect: JAMES YIP & PARTNERS
Q. Surveyor: TJ CHIAM

Principal Consultant: MOTT MACDONALD SINGAPORE
M&E Consultant: ALPHA ENGINEERING CONSULTANT

MASTER PROGRAMME
Revision No.6 (Date:150803)

ID	Task Name	Duration	Start	Finish
182				
183	Architectural Finishes	246 days	Oct 27 '03	Aug 7 '04
184	Internal finishes in basement	150 days	Oct 27 '03	Apr 17 '04
185	Superstructure block & framewo	70 days	Jan 19 '04	Apr 8 '04
186	Superstructure int. wall & floor fi	110 days	Feb 2 '04	Jun 8 '04
187	Superstructure ext. wall finishes	80 days	Jan 5 '04	Apr 8 '04
188	Metal Cladding to External Wall	75 days	Feb 23 '04	May 19 '04
189	Aluminium & Glass Curtain Wal	60 days	Apr 5 '04	Jun 12 '04
190	* Completion of all external walls	0 days	Jun 12 '04	Jun 12 '04
191	Landscaping	36 days	Jun 28 '04	Aug 7 '04
192	Signage	14 days	Jul 19 '04	Aug 3 '04
193	Ironmogery	90 days	Feb 16 '04	May 29 '04
194				
195	Guard House	94 days	Feb 2 '04	May 20 '04
196	Foundation	21 days	Feb 2 '04	Feb 26 '04
197	Structure	45 days	Feb 26 '04	Apr 17 '04
198	Plumbing & Sanitary	14 days	Apr 19 '04	May 4 '04
199	M&E Services	14 days	Apr 19 '04	May 4 '04
200	Architecture Finishes	14 days	May 6 '04	May 20 '04
201				
202	External Works	126 days	Mar 15 '04	Aug 7 '04
203	Culvert	21 days	Apr 5 '04	Apr 28 '04
204	Apron and drains	45 days	Apr 5 '04	May 28 '04
205	Boundary wall, fencing & Gate	55 days	Mar 15 '04	May 17 '04
206	Road & Pavement	60 days	May 24 '04	Jul 31 '04
207	Planting Strip	30 days	Jul 5 '04	Aug 7 '04
208				
209	Inspections	43 days	Jul 1 '04	Aug 20 '04
210	FSB RI	21 days	Jul 1 '04	Jul 24 '04
211	BCA	21 days	Jul 26 '04	Aug 18 '04
212	* T.O.P	0 days	Aug 20 '04	Aug 20 '04



Task | Summary | Rolled Up Progress | Project Summary
Progress | Rolled Up Task | Split | Group By Summary
Milestone | Rolled Up Milestone | External Tasks

Client: POWERGRID LTD
Architect: JAMES YIP & PARTNERS
Q. Surveyor: TJ CHIAM

Principal Consultant: MOTT MACDONALD SINGAPORE
M&E Consultant: ALPHA ENGINEERING CONSULTANT

SECTION 4

PROGRAMME

4.2 Authority Submission Status for M&E Services - 1st Submission

Service	Authority	Original Submission		Comments/Resubmission						Approval/ Clearance
		Scheduled	Actual	Comment	Resubmit	Comment	Resubmit	Comment	Resubmit	
Application for Electricity Supply	Power Supply Pte Ltd	1/10/03								
Power Supply Substation	PowerGrid Pte Ltd	6/8/01	6/8/01							23/8/01
Main Single Line Diagram	Power Supply Pte Ltd	N.A.								
Consumer Switchroom Layout	PowerGrid Pte Ltd	N.A.								
Metering Layout	PowerGrid Pte Ltd	N.A.								
Sanitary Installation	ENV (Sewerage)	1/11/03								
Domestic Water Supply	PUB (Water)	9/6/03	9/6/03	24/6/03	10/7/03					1/8/03
Gas Supply Installation	PowerGas Pte Ltd	N.A.								
Air Conditioning & Ventilation Instln	Fire Safety Bureau	1/11/03								
Fire Fighting & Alarm Installation	Fire Safety Bureau	1/11/03								
Telephone Installation	Telecom (Broadband)	25/7/03	25/7/03							11/8/03
	Telecom (TDCS)	N.A.								
	Telecom (Domestic Operation)	N.A.								
Fuel Storage	Fire Safety Bureau	N.A.								
	Pollution Control Department	N.A.								
Broadband Co-axial System	StarHub Cable Vision Ltd	1/11/03								
Aircraft Warning Lights	CAAS/DSTA	5/8/03	5/8/03							14/8/03

SECTION 4

PROGRAMME

4.3 Authority Submission Status for M&E Services (Amendments) - 2nd Submission

NOT USED

SECTION 5

PROJECT RECORDS

5.1 List of Internal Files

Standard Files

File Ref:		File Ref:	
-CM	✓	-QSP	✓
-PC	✓	-BD	✓
-AE	✓	-CC	✓
-AM	✓	-CF	✓
-AA	✓	-GC	✓
-PQP	✓		

Project Files to be initiated by PM as and when required

File Ref:		File Ref:		File Ref:	
-SM	✓	-SR	✓	-ET	
-SC/SC(EGS)	✓	-QM		-MT	
-AI	✓	-EC/MC	✓	-DF	
-SQ	✓	-AD	✓	-EOT	✓
-CO	✓	-PP	✓	-VO	✓

Service Files to be initiated by PM as and when required

	Service										
File Ref:	ACVI	FFAI	PSI	EI	LI	HC					
-G	✓	✓	✓	✓	✓	✓					
-Q											
-VO											
-PP											
-AI											
-AD											
-CF											

SECTION 5

PROJECT RECORDS

5.2 Filing of Drawings

The following team members shall take charge of filing of drawings, stamping "SUPERSEDED" drawings, etc.

Description	Team Member
Incoming Architectural Floor Plans	Soh Kai Yea (SKY)
Incoming Architectural Sketches/Details	Soh Kai Yea (SKY)
Incoming Structural Drawings	Soh Kai Yea (SKY)
M&E Drawings	
- Substation Earthing Grid	Soh Kai Yea (SKY)
- Electrical Installation	Soh Kai Yea (SKY)
- Lift & Escalator Installation	Soh Kai Yea (SKY)
- Air Conditioning & Ventilation Installation	Chuan Kian Heng (CKH)
- Fire Fighting & Alarm Installation	Chuan Kian Heng (CKH)
- Plumbing & Sanitary Installation	Chuan Kian Heng (CKH)
- Hoist & Crane Installation	Chuan Kian Heng (CKH)
Other Drawings	

SECTION 6

INTERFACING

6.1 Method of Interface

Description	Method of Interface	
Client's Review & Approval	M&E Design Report	NA
	Pre-planned meeting at fixed intervals	✓
	Telefax, letter and telephone	✓
	Email	✓
Interface With External Design Teams	M&E Design Report	NA
	Pre-planned meeting at fixed intervals	✓
	Telefax, letter and telephone	✓
	Email	✓
Interface Between Internal Design Teams	Telephone	✓
	Email	✓
	Internal Project Team Meeting	✓
	Circulation of Information	✓

(✓ *where applicable*)

SECTION 6

INTERFACING

6.2 Internal Design Interface

Item No.	Description*	Required From	Required By	Date Required	Remarks
1.	Mechanical Equipment and Plant Power Requirements	CCG/CKH	SKY		
2.	Generator MV Requirement	SKY	CCG/SKY		

** Information required by INTERNAL DESIGN TEAM MEMBERS*

SECTION 6

INTERFACING

6.3 Circulation of Documents to External Parties

	Code: A - Approval Required C - For Comments I - For Information Only	Client/ Client Rep.	Client's Project Manager	Architect	Structural Engineer	Quantity Surveyor	
1.	**Letters/Fax:**						
a.	Project Design	A	C	I	I	I	
b.	Project Administration	A	C	I	I	I	
c.	Project Cost Estimate/Contract Cost	A	C	I	I	I	
2.	**Drawings**						
a.	Outline Design Drgs.	A	C	C	C	I	
b.	Sketch Design Drgs.	A	C	C	C	I	
c.	Final Design Drgs.	A	C	C	C	I	
d.	Shop Drawings	A	C	C	C	I	
e.	As Built Drgs.	I	I	I	I	I	
3.	**Other Document**						
a.	Specification	A	C	I	I	I	
b.	Tender Document	A	C	I	I	I	
c.	Tender Evaluation Report	A	C	I	I	I	
d.	Design Report	A	C	I	I	I	
e.	Progress Report	I	I	I	I	I	
f.	Financial Report	A	C	I	I	I	
g.	Minutes of Meeting	I	A	I	I	I	
h.	Inspection Report	I	I	I	I	I	
i.	Testing & Comm. Report	I	I	I	I	I	
j.	O & M Manual	I	I	I	I	I	

SECTION 7

WORK AUTHORISATION

Activity \ Authorised Signatories	PD	QP	PM	SS
General Correspondences with Client			✓*	
General Correspondences with Other Consultants			✓*	
M&E Cost Estimate Report	✓			
M&E Design Report	✓			
Check Prints			✓	
Tender Drawing Approval			✓	
Tender Specification Approval	✓			
List of Tenderers	✓			
Tender Questionaires			✓	
Tender Reports				
Draft Letter of Award				
Review of Contractor's Shop Drawing			✓*	
Review of Contractor's Technical Submittal			✓*	
Review of Contractor's Sample Submittal			✓*	
Contractor's Request for Deviation			✓	
Progress Payment Valuation Form	✓		✓	
Final Account Valuation	✓		✓	
Draft Variation Order			✓	
Engineer/Architect's Instruction/Direction			✓	
Site Instruction/Direction				✓
Correspondence/Submission to Authorities		✓		

(✓ *where authorised*)

Key to abbreviations:-

PD : Project Director
QP : Qualified Person
PM : Project Manager/Assistant Project Manager
SS : AEC Site Staff

*Denotes Activities which could be authorized by Project Assistants (M&E).

SECTION 8

DESIGN INPUT & METHODOLOGY

8.1 List of Client's Standards, Reference Documents or Brief

ITEM	KEPT BY
Guidelines/Requirements for Transmission Substation Buildings	1302-BD (File No. 1) SKY

8.2 List of Applicable Code of Practice and Regulations

Electrical Wiring	~~BS~~	SS	~~IEE~~	~~NFPA~~	
Lightning Protection System	~~BS~~	SS			
Emergency Voice Communication System	~~BS~~	SS	~~NFPA~~		
Air Conditioning & Ventilation Installation	~~BS~~	~~AS~~	~~NFPA~~	SS	~~MS~~
Lift & Escalator Installation	~~BS~~	SS			
Sprinkler System	~~BS~~	SS	NFPA	~~AS~~	~~LPC~~
Automatic Fire Alarm System	~~BS~~	SS	~~NFPA~~	~~AS~~	~~MS~~
Sanitary System	BS	SS	~~NFPA~~	~~AS~~	~~MS~~
Plumbing System	BS	SS	~~NFPA~~	~~AS~~	~~MS~~
Mechanical Smoke Control System	~~BS~~	~~NFPA~~	~~AS~~		
Earthing Grid System	IEEE				

(Delete where necessary)

SECTION 8

DESIGN INPUT & METHODOLOGY

8.3 List of Design Guide or Handbook Used

Carrier's Handbook of Air Conditioning System Design

ASHRAE Handbooks

Institute of Plumbing's Plumbing Services Design Guide

8.4 List of Applicable Quality System Procedures

Alpha Engineering Consultant's Quality Management System Procedures

Section	Title
M1	Preparation of Consultancy Offer
M2	Project Commissioning and Service Agreement
M3	Design Control
M4	Design Change Control
M5	Tender Process and Evaluation
M6	Authority Submission
M7	Construction Process Control
M8	Testing and Commissioning
S1	Document Control
S2	Documentation of Quality Management System Procedure
S3	Documentation of Project Quality Plan
S4	Specification Control
S5	Library Control
S6	Archive Control
S7	Filing Control
S8	Drawing Control
S9	Administration Control
S10	Purchasing Control
S11	Training Control
S12	Computer Control
Q1	Quality System Audit
Q2	Feedback Reporting
Q3	Clients Feedback
Q4	Management Review

8.5 List of Software Used For Design/Analysis

DESCRIPTION/ PACKAGE NAME	VERSION	SUPPLIER/ SOURCE	PURPOSE	
Calculux	2.30	Philips	Lighting design	✓
Cophos	3.31	Zumtobel	Lighting design	
Carrier E20-II	3.21	Carrier	Programme for determination of heat load, duct size and its losses, etc.	
Gensize 2	2.1	Onan	Generator sizing	
Lift Traffic	-	Alpha Engineering	Lift traffic calculation	
Econdial	2.5	Merlin Gerlin	Design for low voltage network	
Hyena	4.00.1	ACADS-BSG	Fire Sprinkler & Hydrant Analysis	
Fault Level Calculation	-	Alpha Engineering	Calculation of voltage drop and fault level	

(✓ *where applicable*)

SECTION 9

CLIENT'S REQUIREMENTS

9.1 List of Output Required by Client:-

Item	* Remarks
M&E Design Report	NA
M&E Cost Estimate Report	A
Pre-Qualification of Tenderers	A
Tender Documents	A
Tender Report	A
Payment Valuation for QS	I
Certificates of Supervision for TOP/CSC	Re

** Remarks*

A: for approval C: for comment I: for Information Re: for record

Other purposes and for action: please specify.

9.2 Specific Procedures Required By Client *(If applicable)*

1. Special Progress Payment Certification Form which has been accepted by all parties is being used.

2. Main Contractor to submit progress claim by end of the month. Consultants to evaluate by 15th of the following month.

SECTION 10

LIST OF SUB-JOB

10.1 List of Sub-Job Numbers

601 Revision of Fire Protection System at 1st Storey/Part Basement 1.

602 Relocation of Guard House.

603 Revision of Basement Sump System.

604 Revision of New Hydrant System.