Alpha
Consulting Engineers Pte Ltd

PROJECT QUALITY PLAN

THE METROPOLITAN

For

TANGLIN RESIDENTIAL PTE LTD

Copy No.	

Prepared By: Chong Lai Meng

Authorised By: Richard Teo

Date: 21 December 2007

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	ACEPL'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	Authority Submission Status for M&E Services (Amendment) – 2nd Submission
5	**PROJECT RECORDS**
5.1	List of Internal Files
5.2	Filing of Drawings

TABLE OF CONTENTS

SECTION	DESCRIPTION
6	**INTERFACING**
6.1	Method of Interface
6.2	Internal Design Interface – Not Used
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 – Not Used
9	**ENVIRONMENTAL CONSIDERATIONS**
9.1	Sustainable Design Features / Criteria
9.2	Site PPE Requirement
9.3	Site Emergency Preparedness
9.4	Reporting of Environmental Non-conformances
9.5	List of Applicable Environmental Management System Procedures
10	**CLIENT'S REQUIREMENTS**
10.1	List of Output Required by Client
10.2	Specific Procedures Required by Client – Not Used
11	**LIST OF SUB-JOB**
11.1	List of Sub-Job Numbers – Not Used

SECTION 1

QUALITY PLAN CONTROL AND DISTRIBUTION

1.1 List of Copy Holders

Copy No.	Copy Holder	Date of Issue
1	1440-PQP File	25 May 2006
2	Chong Lai Meng	25 May 2006

1.2 Revision Record

Revision	Date of Issue	Section Reference	Page(s)	Remarks
0	25 May 2006	1 to 10	26	
1	3 October 2006	1 to 10	26	
2	21 June 2007	1 to 10	26	
3	21 December 2007	1 to 11	28	+ 5 pgs (Sect 9.1 - Sustainable Design Features / Criteria)

SECTION 2

PROJECT INFORMATION

2.1 Project Description

Type of Development	Residential/ Condominium

Statistics of Development	
Site Area, m^2	9,742.00
Nett Floor Area, m^2	-
Gross Floor Area, m^2	47,735.8
Covered Carpark, m^2	-
No. of Covered Carpark Lots	
No. of Apartments/Houses	382 apartment units
No. of Beds (for Hospitals)	-
No. of Guestroom (for Hotels)	-
No. of Blocks / No. of Storeys	2 Blocks of 45 Storeys c/w 2 Basement
No. of Phases	1

2.2 Project Cost

M&E Services Cost Plan (S$ x 1M)							
Services	EI	ACVI	LEI	FFAI	PSI	SPFI	
Estimate	-	-	2.2	-	-	-	
Awarded	6.15	2.03 *	1.8	0.88	3.4	0.21	

Total Project Construction Cost (S$ x1M)			
	Site Clearance	Piling Works	Main Contract
Estimate	-	-	-
Awarded	-	-	69

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

* Exclude supply of air-con equipment.

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.	✓								
FLUSHFLOOR TRUNKING									

(✓*where applicable*)

2.3.3 Submission to Relevant Authorities by Others

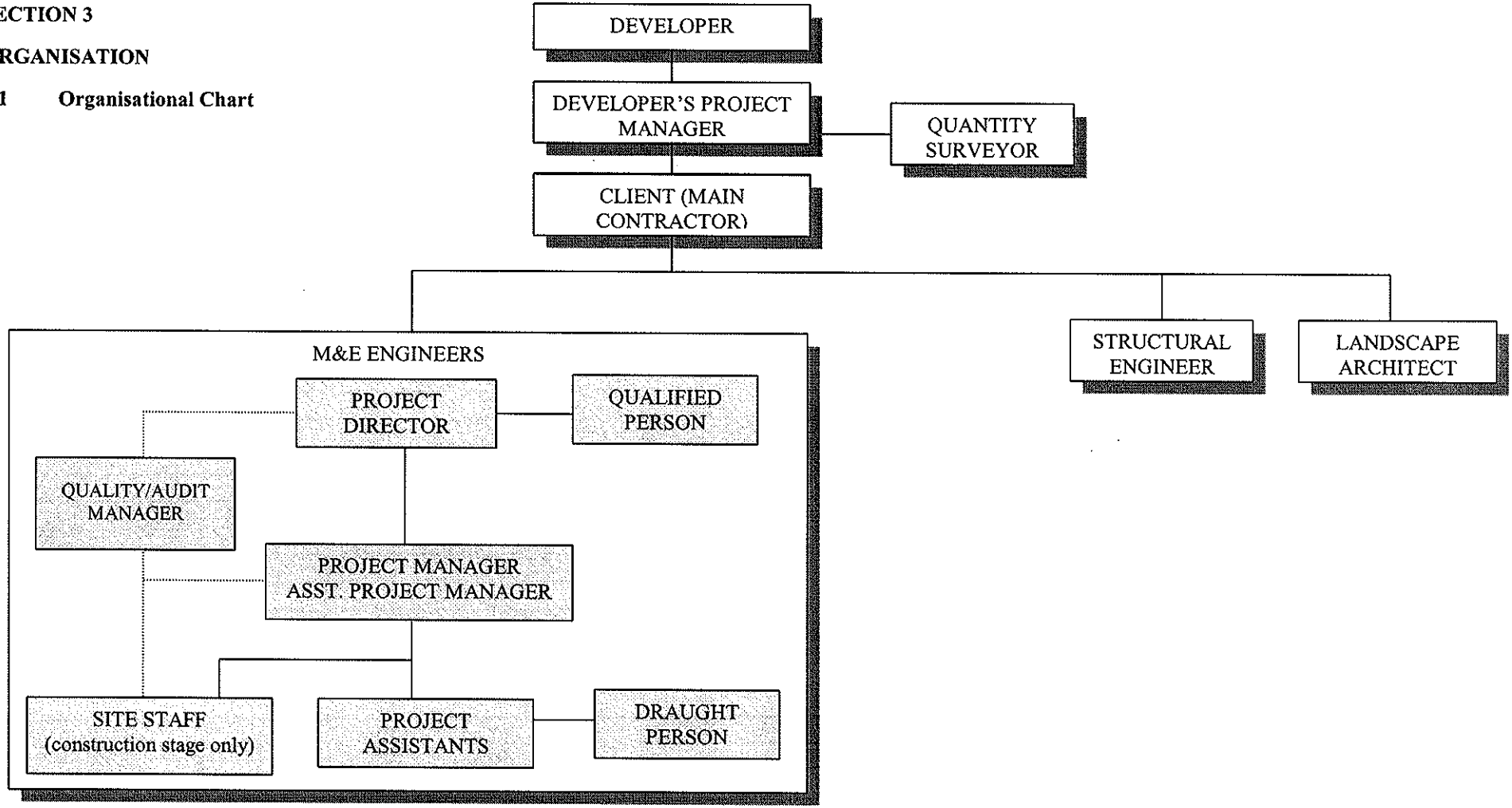
EJECTOR & DIVERTER	✓	SUMP PUMP	✓	FUEL OIL TANK		LIFT & ESCALATOR	✓	PRESSURE VESSEL	✓	HOISTS		FOAM	

(✓*where applicable*)

SECTION 3

ORGANISATION

3.1 Organisational Chart



SECTION 3

ORGANISATION

3.2 ACEPL's Project Team Member

TITLE		NAME
Project Director		Richard Teo (RT)
Qualified Person	Mechanical	Loh Chew Thong (LCT)
	Electrical	Loh Fook Yuen (LFY)
Project Manager		Chong Lai Meng (CLM)
Assistant Project Manager		Loh Fook Yuen (LFY)
Project Assistant (Mech)		Ang Wee Loong (AWL)
Project Assistant (Elect)		Derek Ong (DO)
Draughtsperson		Common Pool
Resident Engineer (M&E)		-
Assistant Resident Engineer (M&E)		-
Clerk-of-Work (M&E)		-

3.3 Client/Client's Representatives

Developer:-	Tanglin Residential Pte Ltd	Client:-	Nakano Singapore (Pte) Ltd
Address:-	8 Shenton Way, #21-01, Temasek Tower, Singapore 068811	Address:-	1 Coleman Street, #06-02, The Adelphi, Singapore 179803
Tel:-	6820 2188	Tel:-	6333 4933
Fax:-	6820 2208	Fax:-	6338 8568

Client's Representatives:-

Name of Firm	Contact Person	Contact
Tanglin Residential Pte Ltd	Name: Mr Aron Teo Position: Project Manager	Tel: 6826 6681 Fax: 6820 2208 Handphone: - Email: aron.teo@capitaland.com
Tanglin Residential Pte Ltd	Name: Mr William Wong Position: Project Manager	Tel: 6826 6669 Fax: 6820 2208 Handphone: 94508421 Email: William.wong@capitaland.com
Nakano Singapore (Pte) Ltd	Name: Mr Kutsuzawa Position: Senior Project Manager	Tel: 6479 7597 Fax: 6479 7438 Handphone: 9850 5102 Email: kutsuzawa@nakano.com.sg
Nakano Singapore (Pte) Ltd	Name: Mr Paul Yam Position: Senior M&E Manager	Tel: 6479 7597 Fax: 6479 7438 Handphone: 94507027 Email: paul@nakano.com.sg
Nakano Singapore (Pte) Ltd	Name: Mr Teh Tiong Lai Position: Site Manager	Tel: 6479 7597 Fax: 6479 7438 Handphone: 9107 7779 Email:
	Name: Position:	Tel: Fax: Handphone: Email:

3.4 **Other Consultants** (Local)

Function / Name of Firm	Contact Person	Contact
Architect TSP Architects & Planners Pte Ltd	Name: Mr Yeo Eng Choon Position:	Tel: 6225 0606 Fax: 6323 0353 Handphone: - Email: 0510@tsparchitects.net
Quantity Surveyor Davis Langdon & Seah	Name: Ms Tan Bee Lay Position: Quantity Surveyor	Tel: 6222 3888 Fax: 6224 7089 Handphone: - Email: TanBeeLay@dls.com.sg
Structural Engineer SCE Consultants (Pte) Ltd	Name: Mr Henry Gunawan Position: Senior Engineer	Tel: 6337 2828 Fax: 6339 9313 Handphone: - Email: henry@sce.com.sg
Landscape Architect DLQ Design Pte Ltd	Name: Ms Lena Quek Position: Director	Tel: 6738 0171 Fax: 6738 3124 Handphone: - Email: lenaquek@dlqdesign.com
Lighting Consultant	Name: Position:	Tel: Fax: Handphone: - Email:
_____	Name: Position:	Tel: Fax: Handphone: Email:
_____	Name: Position:	Tel: Fax: Handphone: Email:
_____	Name: Position:	Tel: Fax: Handphone: Email:

3.4 **Other Consultants** (Overseas) – **NOT USED**

Function / Name of Company	Contact Person	Contact
Architect	Name: Position:	Tel: Fax: Handphone: Email:
M&E Consultant	Name: Position:	Tel: Fax: Handphone: Email:
Quantity Surveyor	Name: Position:	Tel: Fax: Handphone: Email:
Structural Engineer	Name: Position:	Tel: Fax: Handphone: Email:
Interior Designer	Name: Position:	Tel: Fax: Handphone: Email:
Lighting Consultant	Name: Position:	Tel: Fax: Handphone: Email:
Acoustic Consultant	Name: Position:	Tel: Fax: Handphone: Email:
_____	Name: Position:	Tel: Fax: Handphone: Email:

3.5 Contractors/Sub-Contractors

Function / Name of Firm	Contract *	Contact Person	Contact
Main Contractor Nakano Singapore (Pte) Ltd	D&B contractor	Name: Mr Katsuzawa Position: Sr Project Manager	Tel: 6333 4933 Fax: 6338 8568 Handphone: - Email: ling@nakano.com.sg
Air Conditioning & Ventilation Installation Sub-Contractor Design Aire Engineering (S) Pte Ltd	DSC	Name: Mr William Liew Position: Project Director	Tel: 6746 9611 / 6252 4981 Fax: 6747 4922 Handphone: 96726277 Email: igiam@dae.com.sg
Plumbing & Sanitary Installation Sub-Contractor WTC Engineering Pte Ltd	DSC	Name: Mr Wang T C Position: Director	Tel: 6745 9733 Fax: 6745 6806 Handphone: - Email: wtc97@mbox2.singnet.com.sg
Electrical Installation Sub-Contractor Bond Electrical Pte Ltd	DSC	Name: Mr Vincent Chin Position: Project Director	Tel: 67411968 Fax: 67416763 Handphone: 91458782 Email: bepl@bondgrp.net
Lift & Escalator Installation Sub-Contractor Hitachi Asia Ltd	DSC	Name: Mr Sunny Chong Position: Section Manager	Tel: 6415 1819 Fax: 6561 0766 Handphone: - Email: sunny.chong@hee.hitachi.com.sg
Fire Fighting & Alarm Installation Sub-Contractor Chubb Singapore Pte Ltd	DSC	Name: Mr Tommy Cheok Position: Project Manager	Tel: 6292 8421 Fax: 6298 7310 Handphone: 9675 5579 Email: -
Swimming Pool Filtration Plant Installation Sub-Contractor Men's Pool Pte Ltd	DSC	Name: Mr Sam Eng Position: Project Engineer	Tel: 6266 1211 Fax: 6261 4414 Handphone: 8288 8205 Email: project@menspool.com.sg
		Name: Position:	Tel: Fax: Handphone: Email:
_____		Name: Position:	Tel: Fax: Handphone: Email:

** 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
SP PowerGrid:		
(a) Sub-Station	Mr Chin Yoke Fah	6823 8556
(b) Diversion		
SP Services:		
(a) Customer Supply	Mr Rick Lim	6823 8008
(b) Installation	Mr Lim Choon Poh	6309 2603
(c) Meter Section.		
(d) Road Lighting	Mr Chin Chee Wah	6396 2467
TFCC:		
(a) SCV	Ms Valerie Ang	6825 6367
(b) SingTel	Mr Lee Chong Beng	6484 4362
(c) IDA	Mr Tan Huay San	6211 1870
BCA:		
(a) Building Plan		
FSSD:		
(a) Building Plan		
(b) M&E Plan	Mr Ding Tuen Cheng	6848 1415
PUB (Water Supply) Network Dept:		
(a) Water Conservation		
(b) Plumbing Plan	Ms Pratheip A Rajendram	6731 3553
(c) Diversion	Mr Ramlan	90671890
PUB Water Reclamation (Network) Dept:		
(a) Building Plan/CBPU		
(b) M&E Plan		
(c) Diversion		
City Gas Pte Ltd:		
(a) Planning/Submission	Mr Tan Kah Hock/Mr Ivan Lim	6586 8854
(b) Installation/Inspection		
PowerGas Pte Ltd		
(a) Diversion		
NEA (Pollution Control)		
(a) Planning/Submission		
(b) Inspection		

SECTION 4

PROGRAMME

4.1 Overall Programme

ID	TASK NAME	MONTHS	2006 J	F	M	A	M	J	J	A	S	O	N	D	2007 J	F	M	A	M	J	J	A	S	O	N	D
1.	Preliminary Planning	3																								
2.	Planning Submission	2																								
3.	Detail Design	10																								
4.	BP Submission	2																								
5.	BP Submission (Amendments)	2																								
6.	Tender Period for Piling																									
7.	Tender Period for Sub-Structure																									
8.	Tender Period for Super-Structure																									
9.	Piling Period	3																								
10.	Sub-Structure Construction Period	5																								
11.	Super-Structure Construction Period	21																								
12.	Architectural & M&E Works	24																								

ID	TASK NAME	MONTHS	2008 J	F	M	A	M	J	J	A	S	O	N	D	2009 J	F	M	A	M	J	J	A	S	O	N	D
11.	Super-Structure Construction Period	21																								
12.	Architectural & M&E Works	24																								
13.	TOP	1																								
14.	CSC	7																								

SECTION 4

PROGRAMME

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

Service	Authority	Original Submission		Comments/Resubmission						Approval/
		Scheduled	Actual	Comment	Resubmit	Comment	Resubmit	Comment	Resubmit	Clearance
Application for Electricity Supply	SP Services Ltd	-	28/3/06							7/4/06
Power Supply Substation	SP PowerGrid Ltd	30/6/06	8/6/06	22/6/06	26/6/06	7/8/06	14/8/06			29/8/06
Metering Layout	SP Services Ltd									
Sanitary Installation	PUB Water Reclamation (Network) Dept	30/6/07	1/10/07							
Domestic Water Supply	PUB (Water Supply) Network Dept	30/1/07	12/1/07	21/2/07	26/3/07					27/4/07
Gas Supply Installation	City Gas Pte Ltd	20/10/06	19/10/06	27/10/06	7/11/06					14/11/06
Air Conditioning & Ventilation Inst.	FSSD	30/6/07	30/11/07							9/1/08
Fire Fighting & Alarm Installation	FSSD	7/6/07	22/6/07							12/7/07
Telephone Installation	TFCC	30/6/07	6/6/07							28/6/07
Broadband Co-axial Cable System (BCS)	Starhub Cable Vision									
Fuel Storage	FSSD									
	NEA (Pollution Control)									

SECTION 4

PROGRAMME

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

Service	Authority	Original Submission		Comments/Resubmission						Approval/
		Scheduled	Actual	Comment	Resubmit	Comment	Resubmit	Comment	Resubmit	Clearance
Application for Electricity Supply	SP Services Ltd									
Power Supply Substation (1st Amendment)	SP PowerGrid Ltd	-	27/8/07	17/9/07	25/9/07					16/10/07
Power Supply Substation (2nd Amendment)	SP PowerGrid Ltd	-	26/10/07							29/11/07
Metering Layout	SP Services Ltd									
Sanitary Installation	PUB Water Reclamation (Network) Dept									
Domestic Water Supply	PUB (Water Supply) Network Dept									
Gas Supply Installation	City Gas Pte Ltd									
Air Conditioning & Ventilation Inst.	FSSD									
Fire Fighting & Alarm Installation	FSSD									
Telephone Installation	TFCC									
Broadband Co-axial Cable System (BCS)	Starhub Cable Vision									
Fuel Storage	FSSD									
	NEA (Pollution Control)									

SECTION 5

PROJECT RECORDS

5.1 List of Internal Files

Standard Files

File Ref:		File Ref:	
- Owner	✓	- Architect	✓
- Authorities	✓	- Other Consultants	✓
- Contractors	✓	- CC/CF	✓
- CF		- PQP/QSP	✓

Project Files to be initiated by PM as and when required

File Ref:		File Ref:		File Ref:	
- EC/MC	✓				

(✓*where applicable*)

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	Derek Ong
Incoming Architectural Sketches/Details	Derek Ong
Incoming Structural Drawings	Derek Ong
M&E Drawings	
- Electrical Installation	Derek Ong
- Lift & Escalator Installation	Derek Ong
- Air Conditioning & Ventilation Installation	Ang Wee Loong
- Fire Fighting & Alarm Installation	Ang Wee Loong
- Plumbing & Sanitary Installation	Ang Wee Loong
- Swimming Pool & Filtration Installation	Ang Wee Loong
Other Drawings	
- Interior Design	Derek Ong
- Landscape/Waterscape	Derek Ong

SECTION 6

INTERFACING

6.1 Method of Interface

Description	Method of Interface	
Client's Review & Approval	M&E Design Report	✓
	Pre-planned meeting at fixed intervals	✓
	Telefax, letter and telephone	✓
	Email	✓
Interface With External Design Teams	M&E Design Report	✓
	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 – NOT USED

Item No.	Description*	Required From	Required By	Date Required	Remarks

** 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	C	-	
b.	Project Administration	I	-	C	C	C	
c.	Project Cost Estimate/Contract Cost	A	-	I	-	C	
2.	**Drawings**						
a.	Outline Design Drgs.	-	-	-	-	-	
b.	Sketch Design Drgs.	-	-	-	-	-	
c.	Final Design Drgs.	-	-	-	-	-	
d.	Shop Drawings	C	-	A	C	-	
e.	As Built Drgs.	-	-	-	-	-	
3.	**Other Document**						
a.	Specification	A	-	I	-	-	
b.	Tender Document	A	-	C	-	C	
c.	Tender Evaluation Report	-	-	-	-	-	
d.	Design Report	-	-	-	-	-	
e.	Progress Report	-	-	-	-	-	
f.	Financial Report	-	-	-	-	-	
g.	Minutes of Meeting	I	-	I	-	-	
h.	Inspection Report	-	-	-	-	-	
i.	Testing & Comm. Report	-	-	-	-	-	
j.	O & M Manual	-	-	-	-	-	

SECTION 7

WORK AUTHORISATION

Activity \ Authorised Signatories	PD	QP	PM	AE	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 Questionnaires					
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
AE : Assistant Engineer
SS : ACEPL Site Staff

SECTION 8

DESIGN INPUT & METHODOLOGY

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

ITEM	KEPT BY
Owner's Design Brief	Chong Lai Meng/ Derek Ong

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~~
Wet Riser System	~~BS~~	SS	~~NFPA~~	~~AS~~	~~MS~~
Automatic Fire Alarm System	~~BS~~	SS	~~NFPA~~	~~AS~~	~~MS~~
Sanitary System	~~BS~~	SS	~~NFPA~~	~~AS~~	~~MS~~
Plumbing System	BS	SS	~~NFPA~~	~~AS~~	~~MS~~
Town Gas/~~LPG Supply System~~	~~BS~~	SS	~~NFPA~~	~~AS~~	
~~Boiler and Steam Supply System~~	~~ASME~~	~~BS~~	~~AS~~		
~~Mechanical Smoke Control System~~	~~BS~~	~~NFPA~~	~~AS~~		

(Delete where necessary)

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 Consulting Engineers Pte Ltd's Quality Management System Procedures

Section	Title	✓ where applicable
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 & Environmental 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	
QE1	Quality & Environmental System Audit	
QE2	Feedback Reporting	
QE3	Clients Feedback	
QE4	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 Consulting Engineers Pte Ltd	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 Consulting Engineers Pte Ltd	Calculation of voltage drop and fault level	

(✓*where applicable*)

SECTION 9

ENVIRONMENTAL CONSIDERATIONS

9.1 Sustainable Design Features / Criteria

Item	Remarks
Green Mark criteria	-
Green Design Features	See attached

9.2 Site PPE Requirement

The necessary Personal Protective Equipment (detailed below) shall be provided by the main contractor / Company in accordance to the site EHS requirements prior to the site monitoring.

PPE	✓ where applicable
Safety Helmet	✓
Safety Shoes	✓
Eye Protection	✓
Ear Protection	✓
Safety Harness / Belt	✓
Others:	✓

9.3 Site Emergency Preparedness

Site staff shall comply with the site emergency preparedness and response procedure, established by the main contractor / owner, which shall include the following details.

Item	✓ where applicable
Evacuation Route	✓
Emergency Exit	✓
Assembly Point	✓
Emergency Contact List / Person	✓
Alarm system / methods	✓

THE METROPOLITAN CONDOMINIUM AT ALEXANDRA / TIONG BAHRU ROAD

SUMMARY OF GREEN FEATURES

Category	List of green features	Installation Costs	Potential saving
1 Design for Energy Efficiency	ENE-1 Building Envelope Design a. Building is orientated North South facing		
	ENE-2 Energy Efficiency Index a. Calculation of energy consumption		
	ENE-3 Electrical Sub-metering a. Sub-meter for common area b. Sub-meter for tenancy area		
	ENE-4 Energy Efficient Systems & Features a. Use energy efficient air-con system for all apartment units and common area b. Use of natural ventilation opening for basement carpark fresh air intake c. Energy efficient lift d. Energy efficient Lighting - lighting using PLC lamps - clubhouse toilet lights operate using motion detectors - landscape lighting with alternate looping - basement carpark lighting with alternate looping e. Solar lighting		 $995.22/year $28,662.44/year $81,441.45/year $24,378.50/year $218.95/year $14,928.35/year $7,256.84/year
	ENE-5 Office Lighting Zoning		
	ENE-6 Roof Top Garden & Landscaping a. Sky garden are provided at 22nd storey b. Apartment units area provided with extensive planter boxes		

THE METROPOLITAN CONDOMINIUM AT ALEXANDRA / TIONG BAHRU ROAD

SUMMARY OF GREEN FEATURES

Category	List of green features	Installation Costs	Potential saving
2 Design for Water Efficiency	WAT-1 Water Efficient Equipment a. Making the most of modern technology's distinct advancements to regulate, save and/or minimize water wastage - for apartment unit (based on unit type D1) - for common area		 $57.60/year $990.14/year
	WAT-2 Water Usage & Leakage Detection a. Private water sub-meter for common area b. Flow sensors to PUB incoming and overflow pipes for swimming pool balancing tank		
	WAT-3 Water Efficient Irrigation for Landscaping a. Provision of rainwater collection sump and automatic irrigation system		
3 Site/Project Management	SPD-1 Conservation & restoration of site ecology a. 1 no. existing mature tree to conserve b. Waste disposal c. Use of compost recycled form horticulture waste		
	SPD-2 CONQUAS a. Target set at 87		
	SPD-3 Public Transport Accessibility a. Bus stop, taxi stands and MRT station is next to development		
	SPD-4 Environmental Management System a. Award of BCA ISO 14000 certificate b. Method of construction waste management		

THE METROPOLITAN CONDOMINIUM AT ALEXANDRA / TIONG BAHRU ROAD

SUMMARY OF GREEN FEATURES

Category	List of green features	Installation Costs	Potential saving
3 Site/Project Management	c. Rain & construction water collected, treated and can be reused d. Balance concrete from ongoing structural works		
	SPD-5 Environment Friendly Material a. Cleaning-free, pipe-reuse technology R410A conditional refrigerant will be used b. Technical wood (locally manufactured) c. Honeycomb door d. Medium density fiberboard (MDF) e. Solid surface f. 100% recycled aggregates PC channel drains road kerb and wheel stopper g. EPDM recycled shredded rubber @ children playground h. Green label compact fluorescent Lamps i. 100% recycle plastic structure module used for sub-surface drainage		
	SPD-6 Building User's Guide a. Provision of green guide & web portal to raise awareness of energy conservation and water saving among home owners		

THE METROPOLITAN CONDOMINIUM AT ALEXANDRA / TIONG BAHRU ROAD

SUMMARY OF GREEN FEATURES

Category	List of green features	Installation Costs	Potential saving
4 Indoor Environmental Quality & Environmental Protection	IEQEP-1 Effective Ventilation a. Carbon dioxide & Carbon Monoxide monitoring and control - Carbon monoxide sensors for basement carpark - Carbon dioxide sensors for club house fresh air to air-conditioning system - Carbon dioxide sensor for staircase ventilation fan		 $52,685.81/year $38,481.98/year $7,298.31/year
	IEQEP-2 High Frequency Ballasts a. Provision of T5 fluorescent lamps with electronic ballets for basement carpark		
	IEQEP-3 Luminance Level a. Lighting will be provided in accordance to CP 38		
	IEQEP-4 Thermal Comfort a. Inverter air-conditioning system		
	IEQEP-5 Noise Level a. Only equipments complying with NEA noise criteria will be selected b. Acoustic treatment to windows		

THE METROPOLITAN CONDOMINIUM AT ALEXANDRA / TIONG BAHRU ROAD

SUMMARY OF GREEN FEATURES

Category	List of green features	Installation Costs	Potential saving
4 Indoor Environmental Quality & Environmental Protection	IEQEP-6 Indoor air pollutants a. Eco fresh low VOC material to internal wall and ceiling b. Wood adhesive (PLY E3177) c. Air-conditioning equipments		
	IEQEP-7 Refrigerants a. R410A refrigerant is use which has a ODP of zero		
5 Innovations	a. Use of ductless mechanical ventilation system for basement carpark b. Use of solar lighting at deck area c. Use of sun pipes d. Use of motion detectors e. Use of light emitting diodes (LEDs) for exit lights f. Use of variable speed drive (VSD) equipment g. Use of air purifying filter for air-conditioning system h. Use Polypropylene random (PPR) pipe for hot and water supply and distribution PVC free i. Use of precast elements j. Integral waterproofing at basement		$15,217.07/year $2,388.54/year $18,410.02/year

SECTION 9

ENVIRONMENTAL CONSIDERATIONS

9.4 Reporting of Environmental Non-conformances

When encountering environmental non-conformances, Site Staff shall be responsible to feedback to the main contractor.

9.5 List of Applicable Environmental management system Procedures

Alpha Consulting Engineers Pte Ltd's Environmental Management System Procedures

Section	Title	✓ where applicable
E1	Aspect / Impact Identification, Risk Assessment & Risk Control	✓
E2	Identifying Legal & Other Requirements	✓
E3	Objectives, Targets & Programmes	✓
E4	Communication	✓
E5	Emergency Preparedness & Response	✓
E6	Monitoring & Measurement	✓
E7	Control of Air & Noise Pollution	✓
E8	Management of Wastes	✓

SECTION 10

CLIENT'S REQUIREMENTS

10.1 List of Output Required by Client:-

Item	* Remarks
M&E Design Report	C, A
M&E Cost Estimate Report	-
Pre-Qualification of Tenderers	-
Tender Documents	-
Tender Report	-
Payment Valuation for QS	-
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.

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

NOT USED

SECTION 11

LIST OF SUB-JOB

11.1 List of Sub-Job Numbers – NOT USED

Sub Job No	Description	Allocation Details