Alpha
Consulting Engineers Pte Ltd

PROJECT QUALITY PLAN

PRINCIPAL GARDEN

For

SECURE VENTURE DEVELOPMENT (ALEXANDRA) PTE LTD

Copy No.	1

Prepared By: Yip Yoke Fun/Thin Thin Tun

Authorised By: Loh Fook Yuen

Date: 29 October 2019

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SECTION 1

QUALITY PLAN CONTROL AND DISTRIBUTION

1.1 List of Copy Holders

Copy No.	Copy Holder	Date of Issue
1	6205 PQP	29 October 2019

1.2 Revision Record

Revision	Date of Issue	Section Reference	Page(s)	Remarks
0	15 December 2014	1 to 11	30	+ 3 pgs (Section 9.1 – Sustainable Design Features) + 3 pgs (Section 4.1 – Overall Programme)
1	5 July 2017	1 to 11	30	+ 9 pgs (Section 4.1 – Overall Programme) + 1 pg (Section 9.1 – Sustainable Design Features) + 1 pg (Section 9.3 – Site Emergency Preparedness)
2	12 October 2017	1 to 11	30	+ 9 pg (Section 4.1 – Overall Programme) + 1 pg (Section 9.1 – Sustainable Design Features) + 1 pg (Section 9.3 – Site Emergency Preparedness)
3	26 April 2019	1 to 11	30	+ 1 pg (Section 9.1 – Sustainable Design Features) + 1 pg (Section 9.3 – Site Emergency Preparedness)
4	29 October 2019	1 to 11	30	+ 1 pg (Section 9.1 – Sustainable Design Features)

SECTION 2

PROJECT INFORMATION

2.1 Project Description

Type of Development	Residential

Statistics of Development	
Site Area, m²	24,964.3
Nett Floor Area, m²	-
Gross Floor Area, m²	52,426
Covered Carpark, m²	21,400
No. of Covered Carpark Lots	687
No. of Apartments/Houses	663
No. of Beds (for Hospitals)	NA
No. of Guestroom (for Hotels)	NA
No. of Blocks / No. of Storeys	4 Blocks/24 Storeys
Green Mark Category	Gold Plus
No. of Phases	1

2.2 Project Cost

M&E Services Cost Plan (S$ x 1M)										
Services	EI	ACVI	LEI	FFAI	PSI	SPFI				
Estimate	12	12	3.6	1.6	9.4	1.4				
Awarded	9.07	8.09	3.24	1.29	8.06	0.90				

Total Project Construction Cost (S$ x1M)			
	Site Clearance	Piling Works	Main Contract
Estimate	-	-	-
Awarded	-	-	181.50

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

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

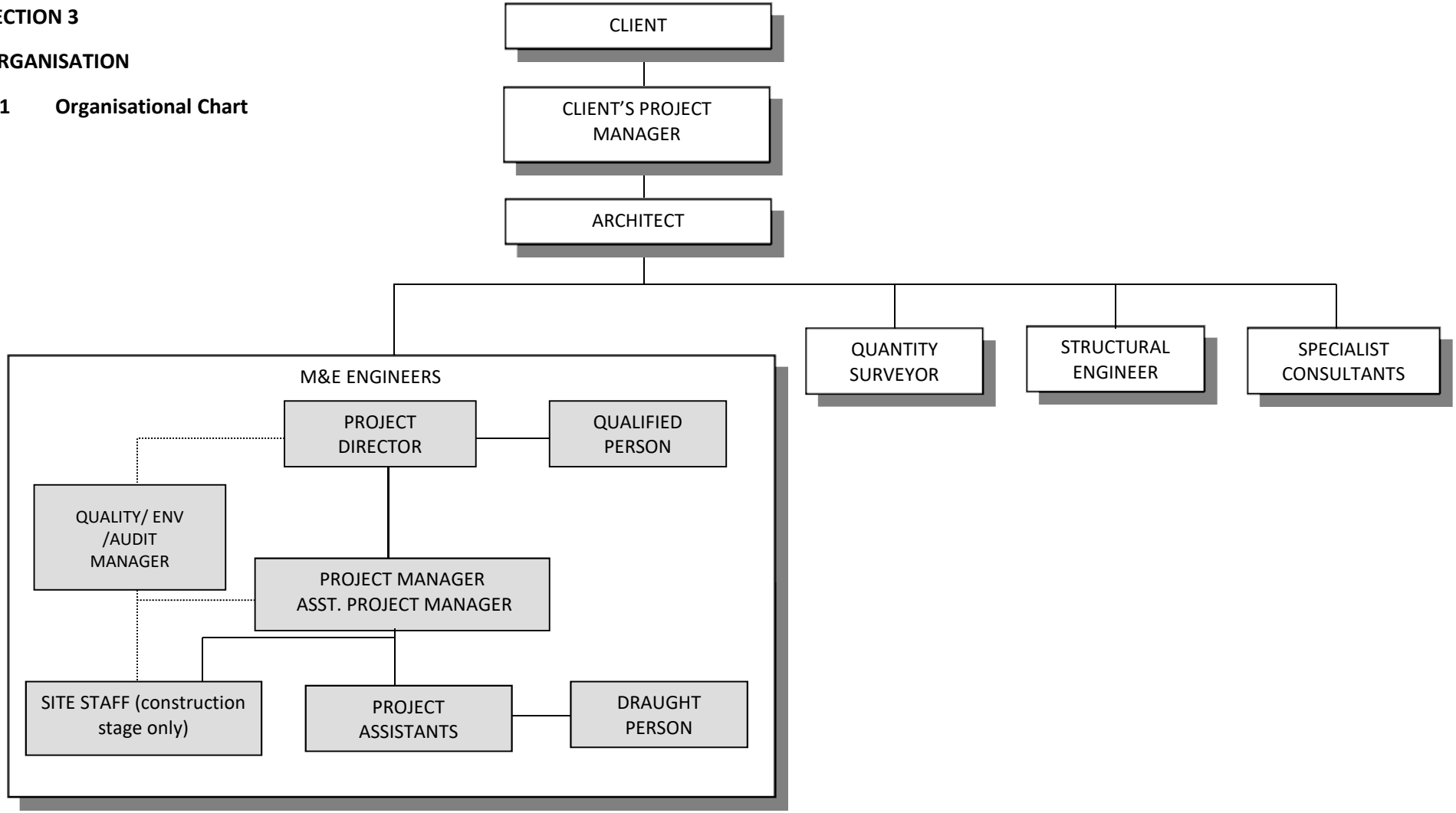
EJECTOR & DIVERTER	✓	SUMP PUMP	✓	FUEL OIL TANK		LIFT & ESCALATOR	✓	PRESSURE VESSEL	✓	HOISTS		FOAM	

(✓*where applicable*)

SECTION 3

ORGANISATION

3.1 Organisational Chart



SECTION 3

ORGANISATION

3.2 ACEPL's Project Team Member

TITLE		NAME
Project Director		Loh Fook Yuen (LFY)
Qualified Person	Mechanical	Tay Wen Chung (TWC)
	Electrical	Loh Fook Yuen (LFY)
Project Manager		Yip Yoke Fun (YYF)
Assistant Project Manager		-
Project Assistant (Mech)		-
Project Assistant (Elect)		Thin Thin Tun (TTT)
Draughtsperson		Common Pool
Resident Engineer (M&E)		-
Assistant Resident Engineer (M&E)		-
Clerk-of-Work (M&E)		-

3.3 Client/Client's Representatives

Client:- Secure Venture Development (Alexandra) Pte Ltd

Address:- 101 Thomson Road #33-00
United Square
Singapore 307951

Tel:- 6255 0233

Fax:- 6252 9822

Client:- Unison Construction Pte Ltd

Address:- 180 Paya Lebar Road
#03-05 Yi Guang Building
Singapore 409032

Tel:- 68463584

Fax:- 68423787

Client's Representatives:-

Name of Company	Contact Person	Contact
Secure Venture Development (Alexandra) Pte Ltd	Name: Ms See Wai Ming Position: Senior Project Manager	DID: 6358 1720 Fax: 6252 9822 Handphone: 9003 9695 Email: see.waiming@uol.com.sg
Kheng Leong Co Pte Ltd	Name: Ms Ng Khee Ye Position: Project Manager	Tel: 6603 9309 Fax: - Handphone: 9099 2274 Email: ngky@khengleong.com.sg
Unison Construction Pte Ltd	Name: Mr Ang Bee Soon Position: Senior Project Manager	Tel: 64715596 Fax: 64741324 Handphone: 97317180 Email: bsang@unisoncon.sg
	Name: Position:	Tel: Fax: Handphone: Email:
	Name: Position:	Tel: Fax: Handphone: Email:

3.4 **Other Consultants** (Local)

Function / Name of Company	Contact Person	Contact
Architect Architects 61 Pte Ltd	Name: Mr Chan Mun Kit Position: Deputy CEO	Tel: 6393 6876 Fax: 6732 5439 Handphone: - Email: rs508_pcc@a61.com.sg
Quantity Surveyor Arcadis Singapore Pte Ltd	Name: Mr Eric Pau Position: Senior Director	Tel: 6239 8234 Fax: 6224 7089 Handphone: - Email: 6516@arcadis.sg
Structural Engineer TEP Consultants Pte Ltd	Name: Mr Pok Ming Wee Position: Director	Tel: 6339 7277 Fax: 6338 8362 Handphone: 9754 3727 Email: t778_princecharles@tepc.com.sg
Interior Designer Index Design Pte Ltd	Name: Ms Sylvian Cheng Position: ID Architect	Tel: 6220 1002 Fax: 6334 7262 Handphone:9320 2955 Email: sylvian@index.com.sg
Lighting Consultant -	Name: - Position: -	Tel: - Fax: - Handphone: - Email: -
Acoustic Consultant -	Name: - Position: -	Tel: - Fax: - Handphone: - Email: -
Landscape Architect STX Landscape Architects	Name: Mr Deric Seow Position: Associate	Tel: 6327 4452 Fax: 6327 8042 Handphone: - Email: dericseow@stxla.com
_____	Name: Position:	Tel: Fax: Handphone: Email:

3.4 Other Consultants (Overseas) - **NOT APPLICABLE**

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 Company	Contract *	Contact Person	Contact
Main Contractor Unison Construction Pte Ltd	DC	Name: Mr Ang Bee Soon Position: Senior Project Manager	Tel: 6471 5596 Fax: 6474 1324 Handphone: 9731 7180 Email: bsang@unisoncon.sg
Air Conditioning & Ventilation Installation Sub-Contractor Kembla Air-Con (S) Pte Ltd	DSC	Name: Mr Neo C S Position: General Manager	Tel: 6747 3600 Fax: 6747 2989 Handphone: 9780 7101 Email: neo@kemblaaircon.com.sg
Plumbing & Sanitary Installation Sub-Contractor Markpoint Engineering Pte Ltd	DSC	Name: Mr Galvin Ang Position: Managing Director	Tel: 6456 8012 Fax: 6454 8012 Handphone: 9455 8012 Email: markpoint@markpoint.com.sg
Electrical Installation Sub-Contractor Powen Electrical Engineering Pte Ltd	DSC	Name: Mr Ong Pang Hwee Position: Project Engineer	Tel:6468 6868 Fax: 67630 1908 Handphone: 9820 5478 Email: panghwee@powen.com.sg
Lift & Escalator Installation Sub-Contractor Kone Pte Ltd	DSC	Name: Mr Khoo Rui Xiang Position:	Tel: 6424 8996 Fax:- Handphone: 8685 8614 Email: ruixiang.khoo@kone.com
Fire Fighting & Alarm Installation Sub-Contractor Sprinkler Engineering Pte Ltd	DSC	Name: Mr Tan Tiong Hin Position: General Manager	Tel: 6453 1488 Fax: 6453 7655 Handphone: 9780 0452 Email: sprinkler@singnet.com.sg
Swimming Pool Filtration Plant Installation Sub-Contractor Venus Enterprises Pte Ltd	DSC	Name: Mr Noel Choo Position: General Manager	Tel: 6272 9185 Fax: 6272 1091 Handphone: 9672 4420 Email: noelchoo@venus.com.sg
Carpark System Installation Sub-Contractor		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 Goh Li Qing	6378 8679
(b) Diversion	Mr Lau Zhi Wei	6240 9107
SP Services:		
(a) Customer Supply	Mr Chen Shu Kai	6378 8637
(b) Installation		
(c) Meter Section		
(d) Road Lighting		
TFCC:		
(a) SCV	Ms Wang Wei Biao	8332 5125
(b) SingTel	Mr Jamal Aziz	9633 1398
(c) IDA	Ms Kelly Kong	6211 3893
BCA:		
(a) Building Plan	Mr Teo Orh Hai	6804 4382
(b) Green Mark	Ms Denise Kwok	6804 4679
FSSD:		
(a) Building Plan	Mr Tan Yi Yong	6848 1729
(b) M&E Plan	Mr Tan Chiew Sia/Mr Daven Tan	6848 1414/6848 1408
PUB (Water Supply) Network Dept:		
(a) Water Conservation		
(b) Plumbing Plan	Mr Ow Zhao Hui/Ms Norain Binte Dalail	6731 3934/6731 3762
(c) Diversion	Mr Ramlan Sanjar	9067 1890
(d) NEWater		
PUB Water Reclamation (Network) Dept:		
(a) Building Plan/CBPU	Mr David Lim B H/Mr Lim Hoe Soon	6731 9629/6731 3512
(b) M&E Plan	Mr Melvin Ng	6571 4003
(c) Diversion		
City Gas Pte Ltd:		
(a) Planning/Submission	Mr Liew Khee Boon	6578 7603
(b) Installation/Inspection	Mr Lim Teck Seng	9007 5727
PowerGas Pte Ltd		
(a) Diversion	Mr Ahmad Baihaqi Bin Sa'dollah	6916 6639
NEA (Pollution Control)		
(a) Planning/Submission		
(b) Inspection		

SECTION 4

PROGRAMME

4.1 Overall Programme – Not Applicable

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																									
8.	Tender Period for Super-Structure																									
9.	Piling Period																									
10.	Sub-Structure Construction Period																									
11.	Super-Structure Construction Period																									
12.	TOP																									
13.	CSC																									

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	16 Sep 2014	16 Sep 2014	-	-	-	-	-	-	24 Sep 2014
Power Supply Substation	SP PowerGrid Ltd	25 May 2015	25 May 2015	25 Jun 2016	17 Sep 2015	23 Oct 2015	28 Feb 2017	30 Mar 2017		30 Mar 2017
Metering Layout	SP Services Ltd	-								
Sanitary Installation	PUB Water Reclamation (Network) Dept	31 May 2016	16 Jan 2017							17 Jan 2017
Domestic Water Supply	PUB (Water Supply) Network Dept	31 Mar 2016	21 Apr 2017	9 Jun 2017	21 Aug 2017					4 Dec 2017
Gas Supply Installation	City Gas Pte Ltd	31 Mar 2016	6 Jun 2016	12 Jul 2016	27 Jul 2016	16 Aug 2016	24 Aug 2016			31 Aug 2016
Air Conditioning & Ventilation Inst.	FSSD	1 Nov 2017	23 Feb 2018							22 March 2018
Fire Fighting & Alarm Installation	FSSD	30 Nov 2017	17 July 2018							4 Sept 2018
Telephone Installation	TFCC	31 Jan 2016	9 Jun 2016							16 Jun 2016
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	SP PowerGrid Ltd									
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	15 May 2019	29 May 2019							6 June 2019
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	✓	- PQP/QSP	✓

Project Files to be initiated by PM as and when required

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

(✓*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	Softcopy saved in the server
Incoming Architectural Sketches/Details	
Incoming Structural Drawings	
M&E Drawings - Electrical Installation - Lift & Escalator Installation - Air Conditioning & Ventilation Installation - Fire Fighting & Alarm Installation - Plumbing & Sanitary Installation - Swimming Pool & Filtration Installation	
Other Drawings - Landscape Drawings - FSSD Approval Building Plan	

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

Item No.	Description*	Required From	Required By	Date Required	Remarks
1	Power Requirement (By email)	KA	ZH	11 Sep 2014	
2	Power Requirement (By email)	KA	TCC	17 Dec 2014	

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

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 - NOT APPLICABLE

ITEM	KEPT BY

8.2 List of Applicable Code of Practice and Regulations

Services	Title of Code of Practice/Standard
Electrical Wiring	SS CP 5 : 1998
Lightning Protection System	SS 555 : 2010
Air Conditioning & Ventilation Installation	SS 553 : 2009
Lift & Escalator Installation	SS 550 : 2009
Sprinkler System	SS CP 52 : 2004
Dry/Wet Riser System	SS 575 : 2012
Automatic Fire Alarm System	SS CP 10 : 2005
Sanitary System	Code of Practice on Sewerage & Sanitary Works
Plumbing System	SS CP 48 : 2005
Town Gas/LPG Supply System	SS CP 51 : 2004

SECTION 8

DESIGN INPUT & METHODOLOGY

8.3 List of Design Guide or Handbook Used - NOT APPLICABLE

Carrier's Handbook of Air Conditioning System Design

ASHRAE Handbooks

Institute of Plumbing's Plumbing Services Design Guide

8.4 List of Pre-Consultation and Waiver

S/N	Description	Date of Application	Date of Approval	Remarks
1	To waive provision of automatic sprinkler protection system at Sky Lounge as stipulated in Clause 6.4.1(c) Consultation Ref No. - Waiver Ref. No. WVR/00280/15	29 Jan 2015	12 Feb 2015	
2	To paint fire alarm bell white Consultation Ref No. CON/C03674/15 Waiver Ref. No. -	16 Jul 2015	16 Jul 2015	
3	To permit the audible alarm sounder to produce less than the minimum sound level of 65dBA within the apartment units as stipulated in Clause 2.5.3 of CP 10 – Code of Practice for Installation and Servicing of Electrical Fire Alarm Systems. Consultation Ref No. - Waiver Ref. No. WVR/02877/15	6 Oct 2015	8 Oct 2015	
4	To waive provision of hosereel for BBQ pit & BBQ Pavilion as stipulated in Clause 6.2.8(a)(iii) Consultation Ref No.- Waiver Ref. No.WVR/01544/16	25 May 2016	2 Jun 2016	

S/N	Description	Date of Application	Date of Approval	Remarks
5	No requirement for provision of visual alarm at residential & non residential floors (such as car park & clubhouse) Consultation Ref No. - Waiver Ref. No. -	2 Nov 2016	3 Nov 2016	
6	To permit no provision of automatic sprinkler protection system in lieu of automatic fire alarm at double slab/M&E Space located below Sky Terrace as stipulated in Clause 6.4.1(c) Consultation Ref No.- Waiver Ref. No. WVR/00367/17	14 Feb 2017	16 Mar 2017	
7	To permit sprinkler control valve to be located facing the external on the same level as the Guardhouse as stipulated in Clause 6.4.3(b) Consultation Ref No.- Waiver Ref. No. WVR/01239/17	9 May 2017	17 May 2017	

*To fill in actual information

8.5 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	
S13	Non-Conformity & Corrective Action Procedures	✓
S14	Quality & Environmental Management System Audit	✓
S15	Feedback Reporting	✓
S16	Client's Feedback	✓
S17	Management Review	✓
S18	Risk Identification, Assessment & Control	✓

8.6 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	
Dialux	4.11	Freewave	Lighting design	✓
Lift Traffic	7.18	Elevate	Lift traffic calculation	✓
Fault Level Calculation	11.11	ETAP	Calculation of fault level and voltage drop	✓

(✓*where applicable*)

SECTION 9

ENVIRONMENTAL CONSIDERATIONS

9.1 Sustainable Design Features / Criteria

Item	Remarks
Green Mark criteria	Gold Plus RB Version 4.1
Green Design Features	Refer to attached list

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 (Refer to the attached)

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

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

LIST OF GREEN DESIGN FEATURE

1. Inverter and environmentally friendly air conditioner split units with the following COP range as registered with NEA are used in all apartment units and common areas (such as lift lobbies in the basement, gym room, function room, management office, guardhouse & MDF/TER room):

    - COP100% 3.34

    - Weighted COP 3.76

2. Variable frequency variable voltage (VVVF) drive, gearless & regenerative lifts with lights and fans in the lift cars switched off when there is no hall call after a predetermined time delay.

3. T5 lamps are used at car park areas and M&E plantrooms. T5 with integrated motion sensor are used at staircase. Energy efficient LED are used in gym room, function room, management office, guardhouse, landscape, swimming pools and water features.

4. Basement car-parks are provided with 2.5% openings for natural intake and CO sensors to control ductless exhaust system.

5. Automatic flushing cistern for the handicapped toilet. Dual flush cistern for WC and all basin, sink & shower mixer taps in apartment unit toilets and clubhouse changing rooms/toilets are either very good or excellent MWELS certified.

6. Eco-plug is provided to each apartment units.

7. Electric Vehicle Charging Stations are used.

8. Use of Pneumatic Waste Collection

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

* *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 Applicable

SECTION 11

LIST OF SUB-JOB

11.1 List of Sub-Job Numbers - NOT APPLICABLE

Sub Job No	Description	Allocation Details