Alpha
Consulting Engineers Pte Ltd

PROJECT QUALITY PLAN

HDB AT BEDOK NORTH N5C19

For

HOUSING & DEVELOPMENT BOARD

Copy No.	1

Prepared By: Yip Yoke Fun

Authorised By: Loh Fook Yuen

Date: 24 January 2022

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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	6230	24 January 2022

1.2 Revision Record

Revision	Date of Issue	Section Reference	Page(s)	Remarks
0	23 December 2016	1 to 11	29	+ 1 page (Section 4.1 – Overall Programme) + 1 page (Section 9.1 – Sustainable Design Features/Criteria)
1	5 July 2017	1 to 11	29	+ 1 page (Section 4.1 – Overall Programme) + 1 page (Section 9.1 – Sustainable Design Features/Criteria)
2	16 October 2017	1 to 11	29	+ 15 pages (Section 4.1 – Overall Programme) + 1 page (Section 9.1 – Sustainable Design Features/Criteria)
3	2 May 2019	1 to 11	29	+ 15 pages (Section 4.1 – Overall Programme) + 1 page (Section 9.1 – Sustainable Design Features/Criteria)
4	29 October2019	1 to 11	29	+ 16 pages (Section 4.1 – Overall Programme) + 1 page (Section 9.1 – Sustainable Design Features/Criteria)
5	17 December 2020	1 to 11	29	+ 16 pages (Section 4.1 – Overall Programme) + 1 page (Section 9.1 – Sustainable Design Features/Criteria)
6	24 January 2022	1 to 11	29	+ 1 page (Section 4.1 – Handover Schedule) + 1 page (Section 9.1 – Sustainable Design Features/Criteria)

SECTION 2

PROJECT INFORMATION

2.1 Project Description

Type of Development	Residential

Statistics of Development	
Site Area, m²	7,343
Nett Floor Area, m²	-
Gross Floor Area, m²	19,150.67
Covered Carpark, m²	-
No. of Covered Carpark Lots	63
No. of Apartments/Houses	215
No. of Beds (for Hospitals)	-
No. of Guestroom (for Hotels)	-
No. of Blocks / No. of Storeys	2 Blocks/16 storeys
Green Mark Category	Gold
No. of Phases	2

2.2 Project Cost

M&E Services Cost Plan (S$ x 1M)										
Services	EI	ACVI	LEI	FFAI	PSI	SPFI				
Estimate	1.55	-	0.45	0.3	1.55	-				
Awarded	1.249	-	-	0.307	1.08	-				

Total Project Construction Cost (S$ x1M)			
	Site Clearance	Piling Works	Main Contract
Estimate	-	-	26.36
Awarded	-	-	21.668

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

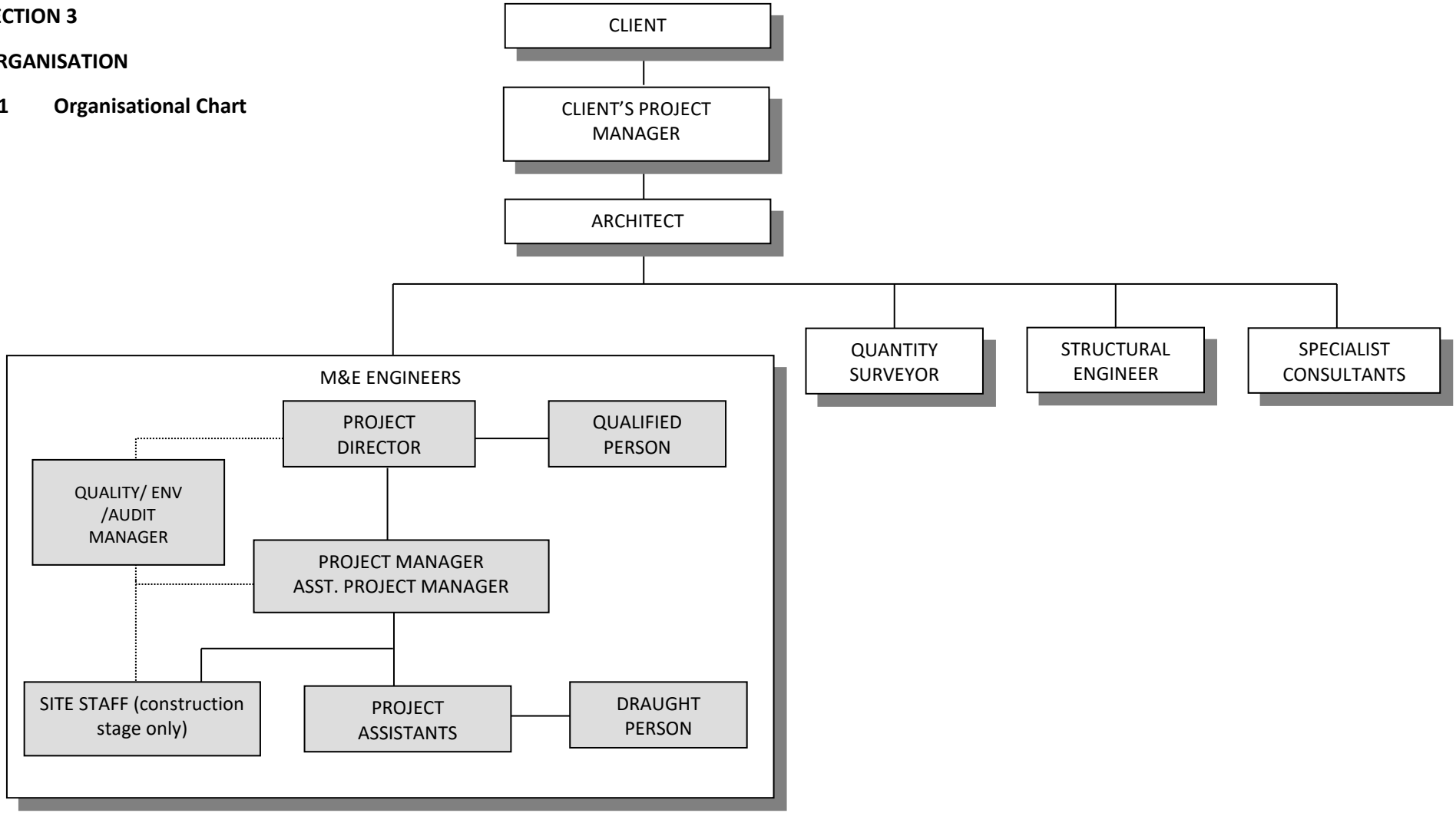
EJECTOR & DIVERTER		SUMP PUMP		FUEL OIL TANK		LIFT & ESCALATOR		PRESSURE VESSEL		HOISTS		FOAM	

(✓*where applicable*)

SECTION 3

ORGANISATION

3.1 Organisational Chart



SECTION 3

ORGANISATION

3.2 ACEPL's Project Team Member

TITLE		NAME
Project Director		Choong Choon Guan (CCG)
Qualified Person	Mechanical	Choong Choon Guan (CCG)
	Electrical	Loh Fook Yuen (LFY)
Project Manager		Yip Yoke Fun (YYF)
Assistant Project Manager		-
Project Assistant (Mech)		-
Project Assistant (Elect)		Lim Sheng Benedict (LSH)
Draughtsperson		Common Pool
Resident Engineer (M&E)		-
Assistant Resident Engineer (M&E)		-
Clerk-of-Work (M&E)		-

3.3 Client/Client's Representatives

Client:- Housing & Development Board

Address:- HDB Hub
480 Lorong 6, Toa Payoh
Singapore 310480

Tel:- 6490 2043

Fax:- 6490 2030

Client's Representatives:-

Name of Company	Contact Person	Contact
Housing & Development Board	Name: Mr Koh Chen Wei, Albert Position: Senior Architect	Tel: 6490 2166 Fax: - Handphone: 9117 4081 Email: Albert_CW_KOH@hdb.gov.sg
Housing & Development Board	Name: Ms Tiew Siew Sien Position: Senior Engineer	Tel: 6490 3223 Fax: - Handphone: 8322 0972 Email: tiew_siew_sien@hdb.gov.sg
	Name: Position:	Tel: Fax: Handphone: Email:
	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 LAUD Architects Pte Ltd	Name: Ms Bow Pisamai Position: Architect	Tel: 6259 2122 Fax: 6259 1151 Handphone: 9325 7073 Email: bedok_n5c19@laudarchitects.com
Quantity Surveyor Arcadis Singapore Pte Ltd	Name: Ms Odessa Position: Quantity Surveyor	Tel: 6239 8269 Fax: 6224 7089 Handphone: Email: 6734@arcadis.sg
Structural Engineer KTP Consultants Pte Ltd	Name: Mr Yao Hong Bing Position: Director	Tel: 6412 0363 Fax: 6273 8454 Handphone: 9366 2863 Email: 16.00059_BdkN5C19@ktp.com.sg
Interior Designer	Name: Position:	Tel: Fax: Handphone: Email:
Lighting Consultant	Name: Position:	Tel: Fax: Handphone: Email:
Acoustic Consultant	Name: Position:	Tel: Fax: Handphone: Email:
Landscape Consultant LanArch Studio Pte Ltd	Name: Mr Joaquin Rodriguez Position: Landscape Architect	Tel: 6782 1629 Fax: Handphone: Email: joaquin@lanarchstudio.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 China Construction Realty Co Pte Ltd		Name: Mr Liew Yoke Ming Position: Project Director	Tel: 6227 4537 Fax:6227 5073 Handphone: 9783 5565 Email: BDKN5C19@chinaconstruction.com.sg
Air Conditioning & Ventilation Installation Sub-Contractor		Name: Position:	Tel: Fax: Handphone: Email:
Plumbing & Sanitary Installation Sub-Contractor Khoon Engineering Contractor Pte Ltd	DSC	Name: Mr Sathis Position: Project Manager	Tel: 6570 8770 Fax:6570 6573 Handphone: – Email: sathis@khoon.com.sg
Electrical Installation Sub-Contractor Khoon Engineering Contractor Pte Ltd	DSC	Name: Mr Sathis Position: Project Manager	Tel: 6570 8770 Fax:6570 6573 Handphone: – Email: sathis@khoon.com.sg
Lift & Escalator Installation Sub-Contractor Chevalier Singapore Holdings Pte Ltd	NSC	Name: Mr Eric Mong Position: Executive Manager	Tel:6510 7247 Fax:67472 988 Handphone: – Email: mongkt@chevalier.com.sg
Fire Fighting & Alarm Installation Sub-Contractor Khoon Engineering Contractor Pte Ltd	DSC	Name: Mr Sathis Position: Project Manager	Tel: 6570 8770 Fax:6570 6573 Handphone: – Email: sathis@khoon.com.sg
Swimming Pool Filtration Plant Installation Sub-Contractor		Name: Position:	Tel: Fax: Handphone: Email:
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 Lau Siang Loon/Mr Abbas Mohd Supian	6378 8631
(b) Diversion	-	-
SP Services: (a) Customer Supply	-	-
(b) Installation	-	-
(c) Meter Section	-	-
(d) Road Lighting	-	-
TFCC: (a) SCV	-	-
(b) SingTel	Ms Felicia Tey	9721 6095
(c) IDA	-	-
BCA: (a) Building Plan	-	-
(b) Green Mark	-	-
FSSD: (a) Building Plan	Mr Lim Boon Hsing	6848 1466
(b) M&E Plan	Ms Ang Ai Hua Nancy	6848 1729
PUB (Water Supply) Network Dept: (a) Water Conservation	-	-
(b) Plumbing Plan	Mr Ng Kok Peng/Mr Chia Choon Kwang	6380 9843/9828 2203
(c) Diversion	-	-
(d) NEWater	-	-
PUB Water Reclamation (Network) Dept: (a) Building Plan/CBPU	Mr Fadhilatul Ariffin/Ms Nur Sakinah	6571 4075/6571 4080
(b) M&E Plan	Mr Melvin Ng	6571 4003
(c) Diversion	-	-
City Gas Pte Ltd:		
(a) Planning/Submission	Mr Jackson Houng	9694 9383
(b) Installation/Inspection	Mr Misnal Bin Pagi	9686 4513
PowerGas Pte Ltd (a) Diversion	-	-
NEA (Pollution Control) (a) Planning/Submission	-	-
(b) Inspection	-	-

SECTION 4

PROGRAMME

4.1 Overall Programme – Refer to Attached Handover Schedule

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																									

BEDOK N5C19 Handover Schedule & Status

15/7/2020

Phase		3		4		5	
S/N	Inspection Items	BLK547C (Semi-basement Carpark)		BLK547A		BLK547B	
		Schedule	Actual	Schedule	Actual	Schedule	Actual
1	**Costing Form**	**17/9/2020**		**13/10/2020**		**31/10/2020**	
2	Lock-up (for resi- bldg only)	NA		12/10/2020		30/10/2020	
3	SPA (for resi- bldg only)	NA		28/9/2020		16/10/2020	
4	2nd BIT / BO Inspection	11/9/2020		14/9/2020		2/10/2020	
5	**1st BIT / BO Inspection**	**28/8/2020**		**31/8/2020**		**18/9/2020**	
6	**TOP Inspection**	**26/8/2020**		**26/8/2020**		**26/8/2020**	
7	BCA HHS Shelter inspection	NA		24/8/2020		24/8/2020	
8	RI (Archi) Inspection	21/8/2020		21/8/2020		21/8/2020	
9	RI (M&E) Inspection	21/8/2020		21/8/2020		21/8/2020	
10	HDB HHS Shelter inspection	NA	NA	27/3/2020	30/3/2020	27/3/2020	1/4/2020
11	Critical Functional Test (HDB)	NA	NA	6/3/2020	5/3/2020	24/3/2020	26/3/2020
12	Window Water Tightness Test (HDB)	NA	NA	7/2/2020	16/1/2020	20/2/2020	19/2/2020
13	Water Turn On	20/2/2020	24/3/2020	20/2/2020	24/3/2020	20/2/2020	24/3/2020
14	HDB Unit Testing	NA	NA	20/2/2020	25/2/2020	15/6/2020	
15	HDB MSB Testing	6/2/2020	6/2/2020	6/2/2020	6/2/2020	6/2/2020	6/2/2020
16	Power Turn On	19/12/2019	19/12/2020	19/12/2019	19/12/2019	19/12/2019	19/12/2019

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	Jun 16	1/6/16	-	-	-	-	-	-	03/11/16
Power Supply Substation	SP PowerGrid Ltd	Dec 16	7/11/16	15/11/16	12/12/16	25/1/17	15/2/17			23/2/17
LT Cable Reticulation	SP PowerGrid Pte Ltd	Feb 17	14/03/17	22/03/17	17/04/17					21/4/17
Metering Layout	SP Services Ltd	-								
Sanitary Installation	PUB Water Reclamation (Network) Dept	Nov 17	20/4/18							23/4/18
Overall Plumbing Installation	PUB (Water Supply) Network Dept	Oct 16	24/10/16							22/12/16
Domestic Water Supply		Jun 17	12/06/17	4/07/17	19/07/17					22/9/17
Overall Gas Installation	City Gas Pte Ltd	July 17	13/2/17							14/3/17
Gas Supply Installation		May 18	22/5/18	7/6/18	18/6/18					2/7/18
Air Conditioning & Ventilation Inst.	FSSD	-								
Fire Fighting & Alarm Installation	FSSD	June 18	14/5/19							22/5/19
Telephone Installation	TFCC	Feb 17	23/12/16							16/01/17
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	March 20	17/3/20	26/3/20	3/4/20					14/4/20
Air Conditioning & Ventilation Inst.	FSSD									
Fire Fighting & Alarm Installation	FSSD	Feb 21	15/4/21	20/4/21	23/4/21					28/4/21
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	

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 APPLICABLE

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

*Note: Applicable only, if the client engaged a Project Manager.

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
HDB Guide Drawings & Specification	Softcopy saved in the server

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
Emergency Voice Communication System	NA
Air Conditioning & Ventilation Installation	NA
Lift & Escalator Installation	SS 550 : 2009
Sprinkler System	SS CP 52 : 2004
Dry 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 608 : 2015
Boiler and Steam Supply System	NA
Mechanical Smoke Control System	NA

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 Pre-Consultation and Waiver

S/N	Description	Date of Application	Date of Approval	Remarks
1	*Clause 3.2.5(b), 6.4.1(c) & 4.2.2(d)(iii) in Fire Code of Practice for non-provision of compartment wall, sprinkler system & FAP which require waiver. Consultation Ref No.- Waiver Ref. No. WVR/03056/16	4 Oct 2016	6 Oct 2016	
2	*Clause 1.1.23 Appendix 20 & 1.1.24 Appendix 21 in Fire Code of Practice for PWD which require waiver. Consultation Ref No.- Waiver Ref. No. WVR/03846/16	7 Dec 2016	19 Dec 2016	
3	*Clause 6.3A & 6.4.3(b) in Fire Code of Practice for Fire Alarm System & Sprinkler Control Valve which require waiver. Consultation Ref No. Waiver Ref. No. WVR/01206/17	4 May 2017	24 May 2017	
4	*Clause 1.4.4.1(a) & (b) in CP10 for using wireless transmission for primary & back-up line which require waiver. Consultation Ref No. Waiver Ref. No. WVR/03083/18	30 Nov 2018	19 Dec 2018	

*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	
Elevate	8.22	Peters Research	Lift Traffic Analysis	✓

(✓*where applicable*)

SECTION 9

ENVIRONMENTAL CONSIDERATIONS

9.1 Sustainable Design Features/Criteria

Item	Remarks
Green Mark criteria	Gold
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

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	✓

ECO-INITIATIVES & ECO-FEATURES

Compulsory Eco-Initiatives & Eco-Features for New Public Housing Developments

1. To obtain Green Mark Gold or higher without additional Eco-Features other than those listed below.

2. LED lighting with motion sensor lighting control at staircases.

3. Re-generative lifts for all residential blocks.

4. Centralised Chute for Recyclables (CCR) for all residential blocks.

5. Covered bicycle parking lots based on:

   1 bicycle parking lot: 6 dwelling units
   Provide bicycle wheel guides at all external staircases

6. To use dual bicycle rack system.

7. Eco-pedestals to all Bath/WC of flats.

8. Optional: ABC Water features as promoted by PUB.

9. Use of sustainable products recognised by BCA for Green Mark scoring.

10. Use of recycled products recognised by BCA for Green Mark scoring.

11. Provide compost bins where community gardens are provided.

12. Green features guide for residents based on BCA Green Mark requirements.

The total incremental cost of the Eco-Features is to be within 1% of the project cost budget.

The total incremental cost of the use of sustainable products and recycled products is to be within 0.1% of the project cost budget.

The tender-cost breakdown for the eco-features is to be included in the tender documents.
This is to allow HDB to monitor the eco-features cost data across projects.

PROJECT LAUNCH

Bedok N5 C19 is to be **ready for launch by Nov 2016 and tender by Dec 2016**.
Notwithstanding this, the actual project launch and tender may take place at a later date.

SECTION 9

ENVIRONMENTAL CONSIDERATIONS

9.4 Reporting of Environmental Non conformances – NOT APPLICABLE

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	-
Tender Documents	-
Tender Report	-
Payment Valuation for QS	A
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 Applicable

SECTION 11

LIST OF SUB-JOB

11.1 List of Sub-Job Numbers – NOT APPLICABLE

Sub Job No	Description	Allocation Details