

**TENDER FOR THE PROVISION TO REPLACE STAIRCASE PRESSURIZATION FANS AND CARPARK VENTILATION FANS WITH NEW CO SENSORS AND VSD FOR TOURISM COURT, SINGAPORE TOURISM BOARD**

ITT No: STB/AM/21-22/T32

For Enquiries: Rebecca Low, Manager, Asset Management Department, DID: 68313993

Email: Rebecca\_LOW@stb.gov.sg

**SECTION 2: SCOPE OF WORK AND TECHNICAL REQUIREMENTS**

**1 PURPOSE**

1.1 The purpose of these Scope of work and Technical Requirements is to assist the Contractor to better understand the operational requirements of the Contract.

1.2 The specifications are categorized as follows,

Category 1--- General Requirement

Category 2--- Staircase Pressurization Fans and Static Pressure Sensors

Category 3 --- Carpark Ventilation Fans and New CO sensors and VSD

Category 4 --- Testing, Commissioning & Hand Over

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**CATEGORY 1: GENERAL REQUIREMENT**

**1. General**

- 1.1 This Contract shall be governed by the terms and conditions set out in the PSSCOC. In the event of any inconsistency between the PSSCOC and the Requirement Specifications, unless otherwise stipulated by the Board, the PSSCOC shall prevail.
- 1.2 The Scope of Works of this contract shall comprise of the supply of all materials, equipment and labour for the satisfactory execution of the Works listed in accordance with these Scope of work and Technical Requirements of this Contract and to the entire satisfaction of Singapore Tourism Board (“STB”).
- 1.3 The Works shall include the replacement of staircase pressurization fans, static pressure sensors interfaced to existing Building Management System (BMS) and Fire Alarm System (FAS) in the Fire Command Centre (FCC) and carpark ventilation fans and supply of new Carbon Monoxide (CO) sensors and Variable Speed Drive (VSD) without linking to existing BMS, connecting to existing electrical switchboard and associated works at STB. It shall be carried out in a manner so as the normal operation of the existing air conditioning system will not be affected. The works shall not have any negative impacts on the existing chiller plant system efficiency. The Contractor shall be responsible for the proper co-ordination with other relevant vendors.
- 1.4 The Contractor shall ensure surplus manpower to complete the installation and modification works on time. The Contractor shall note majority of the works at night outside normal working hours, on Sundays and public holidays.
- 1.5 The Contractor is advised to visit the site to ascertain and get familiar with the route for delivery of equipment, extent of builders' works, and modification works to the existing services etc. No claim for ignorance of site conditions will be entertained.

**2. Description of System**

**2.1 Existing Equipment**

Refer to **06\_Existing Drawing and Equipment Schedule** and **Annex B\_Price Schedule** for more details. Please note that the below shall include all associated works. The Contractor shall check on site and inform of any discrepancies found prior to the submission of tender. Else, no claim for any discrepancies shall be entertained by the Board unless otherwise stated.

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<u>Scope of works</u>	<u>Staircase</u>	<u>Level</u>	<u>Existing Equipment</u>	<u>Existing MSSB (New equipment to link to existing MSSB)</u>	<u>Remarks</u>
Replace existing Staircase Pressurization Fans and VSDs	1	Level 11	SPF-11A and SPF-11-1B	MSSB 11-1E	1 to 1 replacement
		B2	SAF-B2-5	MSSB-B2-1E	1 to 1 replacement
	2	Lower roof	SPF-RF-1	MSSB RF-1E	1 to 1 replacement
		B2	SAF-B2-4	MSSB-B2-1E	1 to 1 replacement
	3	Level 11	SPF-11-2A and SPF-11-2B	MSSB 11-1E	1 to 1 replacement
		B1	SAF-B1-3	MSSB-B1-1E	1 to 1 replacement
Replace existing Static Pressure Sensors	1, 2 and 3	L9	Total 3 (1 at each staircase)	-	1 to 1 replacement
	1, 2 and 3	L4	Total 3 (1 at each staircase)	-	1 to 1 replacement
Replace existing Carpark Ventilation Fans	-	B1	SAF-B1-1, SAF-B1-2, EAF-B1-1 and EAF-B1-2	MSSB B1-1E	1 to 1 replacement
	-	B2	SAF-B2-1, SAF-B2-2, EAF-B2-1 and EAF-B1-2	MSSB B2-1E	1 to 1 replacement
	-	B3	SAF-B3-1, SAF-B3-2, EAF-B3-1 and EAF-B3-2	MSSB B3-1E	1 to 1 replacement
Supply and install new Carbon Monoxide Sensors	-	B1, B2, B3	Estimated Nos.: 18	-	New item
Supply and install new Variable Speed Drives	-	B1, B2, B3	Estimated Nos.: 12	-	New item

### 3. Scope of Works

3.1 The works stated hereunder shall be read together with **the Annex B – Price Schedule, 02 Requirement Specifications, 06 Existing Drawings and Equipment Schedule and all other documents that is part of this contract**. The scope of works in this Contract shall include but not limited to the following:

- a) Dismantle and disposal of existing staircase pressurization fans and static pressure sensors, carpark ventilation fans, associated equipment, accessories, etc. Pre-con photographic survey shall be done prior to any works commencement. A detailed survey report, Method of Statement (MOS), shall be submitted for the Board's approval.
- b) Supply, replacement, install, testing and commissioning the following:
  - i. Staircase pressurization fans and static pressure sensors, staircase grilles, associated accessories and other affected ducts and any other works, interfacing to existing Building Management System (BMS) and Fire Protection System (FPS).

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- ii. Carpark ventilation fans come with new Carbon Monoxide (CO) sensors and Variable Speed Drive (VSD) with PLC display, associated accessories, affected ducts and any other works, without linking to existing BMS.
- c) All necessary preliminaries work including labour and transportation for disposal of existing equipment, pre-condition photographic survey before work at site, hoisting and scaffold works, administration works (i.e., insurance, security deposit), getting approval for all required drawings and calculation with endorsement of Qualified Persons, submission of MOS, catalogues and specifications of equipment, and any other required works or requested by the Board.
- d) Work shall also include other means to facilitate the installation, not limited to scaffold, staging, etc. (complete with necessary PE endorsement and in accordance with the relevant authority requirements), of the new equipment, ductworks and accessories. There shall not be any interruption to the existing staircase pressurization system and/ or carpark ventilation system to comply to Fire Code or other relevant regulations.
- e) Management of STB appointed BMS and Fire Alarm and Protection System Contractors in interfacing of existing BMS and Fire Alarm and Protection system with the new fans and sensors, including all necessary ancillaries and accessories associated works
- f) Interfacing, testing and commissioning of the full integrated staircase pressurization system, and carpark ventilation system to the existing BMS and Fire Alarm and Protection Systems. The testing and commissioning shall comply to all relevant regulatory requirement and codes (E.g., Fire Code, SS553, etc.)
- g) Provide calibration, testing and compliance certification report for and sticker indication on the newly installed equipment.
- h) Conduct Testing and Commissioning of the equipment/devices. A representative of the Board shall be present at the commencement and end of the test. The Contractor shall submit a copy of testing and commissioning document with the endorsement by the representative for record purposes. The Contractor shall at his own expenses rectify all non-conformance or failure. The Contractor shall work with the Board's Facility Management Company (FMC) for all required testing and commissioning at no cost to the Board.
- i) Engagement of Qualified Persons ("QP") or Professional Engineer ("PE") services for all necessary design calculation and drawings endorsement including submission to authorities when required.
- j) Include relevant endorsed design calculations by tenderer's engaged mechanical P.E, inclusive of submission (as necessary) to relevant authorities for approval and any other services deemed required under this contract.
- k) Provide the necessary site protection and hoarding works as and when required during the duration of the project so as not to expose or obstruct the daily operation.
- l) Carry out preventive maintenance and servicing of the new equipment during the 12-months Defect Liability Period from certification of substantial completion.
  - i. During the DLP, the contractor shall rectify at its own cost on any works is found to be malfunction, defective, faulty, non-compliance, and any irregularity found on the devices and BMS,
  - ii. In the event there is malfunction, defect, fault, non-compliance and any irregularity found on the devices and BMS, the contractor shall respond the Call-out Time within 24 hours. The Call-out Time is the period of time commencing when a fault condition has been reported to the contractor till the time of qualified personnel arrives at site to proceed with rectification works.

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- iii. During the rectification, the allowable Down Time is not more than 3 days. The allowable Down Time shall commence from the time when a fault condition has been reported to the contractor till fully rectified or restore the system to its normal functioning condition.
- iv. The following penalties shall be imposed on the Contractor in the event of non-compliance of services:

s/n	Description	S\$
1	Failure to respond the Call-out Time within 24 hours	50 per hour
2	Failure to rectify or restore the system to its normal functions within the allowable Down Time of 3 days.	50 per day
3	Recurrence of malfunction, faults, defects, non-compliance and any irregularity found on the devices and BMS within 5 days from the day rectified.	per occurrence

- v. The Board may consider waiving the penalties to be imposed on the Contractor if the Contractor is able to substantiate with reasonable reasons complete with supporting documents.
- m) All costs arising from the project including peripherals but not limited to any ancillary works, professional and consultation fees, submissions to relevant authorities, all purchase of drawings from authorities if required, cost associated with compliance to relevant authorities' policies, guidelines, and COVID-19 advisories (e.g., BCA safe management measures for workers), are deemed to be part of and priced into this contract and there shall be no additional costs imposed to STB
- n) The Contractor shall ensure there is no disruption to existing staircase pressurization system and carpark ventilation system (no breach of Fire Safety or any other relevant Acts and Codes) and no disruption to "Live" Building Operation at any point in time and all cost to mitigate these risks shall be included or indicated clearly in the **Annex B- Price Schedule**, under "**Any other items**" which forms part of the Contract Sum.

**4. Other Requirements**

- 4.1 The Contractor is advised to fully acquaint himself with the site condition to ensure that his proposal shall include all the necessary co-ordination, modification and interfacing such that when completed, the works shall operate as an integral whole of the air-conditioning system to provide a reliable and efficient operation.
- 4.2 All electrical installation shall be carried out using materials approved by the Board / its appointed representative and workmanship in accordance with the requirements of the latest Singapore Standards.
- 4.3 The Contractor shall include in the tender price all costs and expenses which may entail the provision of such tools, instruments and ancillary items for the complete testing of the air-conditioning and mechanical ventilation systems

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**5. Contractor to provide everything necessary**

- 5.1 The Contractor shall provide everything necessary for the proper execution of the Works according to the true intent and meaning of the Drawings and Specifications taken together whether the same may or may not be particularly shown or described provided that the same is reasonably to be inferred there from and if the Contractor finds any discrepancy therein he shall immediately and in writing refer the same to the person who shall decide which shall be followed. Figured dimensions shall be taken in preference to the scale mentioned on or attached to any drawings.

**6. Equipment Performance**

- 6.1 All equipment, when installed and operated in accordance with this specification, shall have performance and capacities not less than the minimum requirements indicated in the drawings and the Schedule of Technical Compliance/Data.

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**CATEGORY 2: STAIRCASE PRESSURIZATION FANS AND STATIC PRESSURE SENSORS**

**1. Scope of works**

Contractor shall:

- 1.1 Replace and supply, install and testing & commissioning of the existing Staircase pressurization fans, standby fans, and static pressure sensors, staircase grilles, associated accessories, affected duct opening, and any other works required, interfacing to existing Building Management System (BMS) and Fire Protection System (FPS). (**Refer to 06\_Existing Drawings and Equipment Schedule for more details**).
- 1.2 The Contractor shall include endorsement of qualified persons (e.g., Mechanical PE, LEW, etc.) for all required as-built drawings and calculations for the new equipment system including all required submissions to authorities and updated existing single line diagram, BMS if any.

**2. Existing Building Licensed Electrical Worker (LEW)**

- 2.1 In the event the Contractor needs to engage the existing Building LEW, the contact is as follows:

**Name of company:** ON Engineers Pte Ltd

**Address of company:** 14 Gul Ave Singapore 629657

**Contact person:** Mr Dony Lukman

**Email address:** dony.lukman@onengineers.com

**3. Interface to existing Building Management System (BMS)**

- 3.1 Contractor shall, at his own expense, liaise, coordinate, implement and engage with BMS vendor for interfacing with existing BMS including programming, testings & commissioning and all other necessary parts and/or equipment are deemed included as part of this contract. This is applicable only for the Staircase pressurization fans. The contact for the existing BMS vendor is as follows:

**Name of company:** BMS Engineering & Trading Pte Ltd

**Address of company:** Block 984D, Buangkok Link, #04-29, Singapore 537982.

**Contact person:** Mr. HT Choo – 9665 2212 or 6744 8717

**Email address:** htchoo@bmsengrg.com.sg

**4. Interface to existing Fire Alarm/ Protection System (FAP/ FPS)**

- 4.1 Contractor shall, at his own expense, liaise, coordinate, implement and engage with the existing FAP/ FPS vendor for interfacing with existing FAP/ FPS including programming, testings & commissioning and all other necessary parts and/or equipment are deemed included as part of this contract. The contact for the **existing FAP/ FPS vendor** is as follows:

**Name of company:** Quickstart Technology Pte Ltd

**Address of company:** 21 Joo Koon Cres Singapore 629026.

**Contact person and email:**

1. Mr KK Foo: [kkfoo@quickstarttech.com.sg](mailto:kkfoo@quickstarttech.com.sg)

2. Ms Shirley Yeo: [shirley\\_yeo@quickstarttech.com.sg](mailto:shirley_yeo@quickstarttech.com.sg)

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**CATEGORY 3: CARPARK VENTILATION FANS AND NEW CO SENSORS AND VSD**

**1. Scope of works**

Contractor shall:

- 1.1 Replace and supply, install and testing & commissioning of the existing Carpark ventilation fans come with new Carbon Monoxide (CO) sensors and Variable Speed Drive (VSD) with PLC display, associated accessories, affected duct opening, and any other works required, without linking to existing BMS (**Refer to 06\_Existing Drawings and Equipment Schedule for more details**).
- 1.2 Quantity of new CO sensors and VSD can be found in the Price Schedule.
- 1.3 The new CO sensors and VSD shall automatically activate the new carpark ventilation fans when the CO level in the carpark exceeds the acceptable range according to regulatory requirements as prescribed in relevant Codes and Acts. The quantity of the new CO sensors and VSD shall also comply to relevant Codes and Acts.
- 1.4 The new CO sensors and VSD are not required to be linked to existing BMS. However, the equipment is expected to come with PLC display to facilitate readings of data from the equipment as and when required.

**2. Interface to existing Fire Alarm/ Protection System (FAP/ FPS)**

- 2.1 The Contractor shall ensure that the new carpark ventilation fan system and CO sensors and VSD operates upon activate of the building fire alarm/ protection system accordingly to statutory regulations, code of practices and standards (e.g., Fire Code, SS553, etc.).
- 2.2 Contractor shall, at his own expense, liaise, coordinate, implement and engage with the existing FAP/ FPS vendor for interfacing with existing FAP/ FPS including programming, testing & commissioning and all other necessary parts and/or equipment are deemed included as part of this contract. The contact for the **existing FAP/ FPS vendor** is as follows:

**Name of company:** Quickstart Technology Pte Ltd

**Address of company:** 21 Joo Koon Cres Singapore 629026.

**Contact person and email:**

1. Mr KK Foo: [kkfoo@quickstarttech.com.sg](mailto:kkfoo@quickstarttech.com.sg)
2. Ms Shirley Yeo: [shirley\\_yeo@quickstarttech.com.sg](mailto:shirley_yeo@quickstarttech.com.sg)



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**CATEGORY 4: TESTING, COMMISSIONING & HAND OVER**

**1. General**

- 1.1 The Contractor shall carry out all testing and commissioning necessary for the safe, reliable and satisfactory operation of the system and equipment installed. The Works shall be commissioned and tested in accordance with manufacturer's instruction, the appropriate testing and commissioning codes, local Government requirements, applicable insurance company's and this Specification.
- 1.2 The Contractor shall furnish the following information for each system or process to the Board for review at least one month prior to testing or commissioning of system
  - a) Test details and procedures, and the relevant data report forms to the Consulting Engineer for approval.
  - b) Type, manufacture and operating instructions of instruments to be used.
  - c) Calibration methods, accuracy and tolerances of instruments.
  - d) Complete schedule and programme of all testing and commissioning activities.
- 1.3 The Contractor shall provide all instruments and labour necessary to carry out all tests and commissioning. The Contractor shall employ thoroughly competent and experienced personnel for the tests and commissioning
- 1.4 All instruments used shall have been calibrated and certified by the instrument manufacturers or an approved calibration agency within six months prior to the start of testing and commissioning.
- 1.5 Should any system or equipment failed to perform to the standards in this Specification, the Contractor shall adjust, modify and if necessary, replace the equipment without further payment in order that the required performances be obtained. Any damage or deterioration caused to the building or other services consequent on such modifications shall be made good and all cost borne by the Contractor.
- 1.6 The Contractor shall notify the Board in writing of his programme to test and commission equipment and systems at least seven (7) working days before actual execution. A schedule indicating the dates and types of testing shall be submitted.
- 1.7 The Contractor shall prepare and provide printed testing and commissioning record forms of approved format. The Contractor shall submit two (2) copies of a written report on the results of tests, etc. within seven (7) working days of completion of such tests, irrespective of the test results.

**2. Testing**

- 2.1 After all equipment has been delivered and installed at site, a complete system operability test shall be carried out to verify the integrity of the entire system.

**2.1.1 Site Test**

- a) The systems will be inspected and tested during and after installation on site as set out below and approved for compliance with the provisions for the appropriate specifications and for performances, workmanship, materials dimensions and ratings as tendered.
- b) The systems shall be tested to operate accordingly with the existing BMS and FAP/FAS system.

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- c) All tests shall be witnessed by the Board or his appointed representative(s). Notice of minimum seven (7) working days shall be given prior to any test.
- d) Should any test failed or if not satisfactory, the test shall be repeated to the satisfaction of the Board at no extra cost.

2.1.2 Preparatory Check

- a) The Contractor shall ensure that all equipment included under this contract is thoroughly cleaned, lubricated and checked for serviceability immediately before setting to work. All debris, from building or M&E works shall be removed prior to commissioning.
- b) All automatic controls and safety devices shall be inspected and checked for serviceability and functionality before the working fluid or electricity is applied to the system.

**3. Commissioning**

3.1 General

- 3.1.1 After testing and balancing is completed, each complete installation shall be commissioned. Particular attention shall be paid to:
  - (a) The maintenance of cleanliness of all equipment during construction and ensuring that equipment is cleaned as part of commissioning.
  - (b) The protection of particularly sensitive and fragile items, from the activities of other trades during construction and from dirt and malfunctioning during testing and balancing.
  - (c) The protection of electrical equipment from damp during construction, testing and balancing.

3.2 Cleaning

- 3.2.1 Equipment and staircase grilles shall be thoroughly cleaned of all debris and blown free of all foreign matter and dust.
- 3.2.2 Equipment shall be wiped clean, with all traces of oil, dust, dirt or paint spots removed. Bearings shall be properly lubricated with oil or grease as recommended by the Manufacturer. Belts shall be tightened to proper tension. All control valves and other miscellaneous equipment requiring adjustment, shall each be adjusted to the settings indicated or required.

3.3 Performance Tests

- 3.3.1 After cleaning, testing and balancing and installing of new equipment, as specified hereinafter, have been completed, the system shall be tested as a whole to see that all items perform as an integral part of the system, and that all field devices such as static pressure sensors and CO sensors are working accurately.
- 3.3.2 Corrections and adjustments shall be made as necessary to provide the conditions specified in the Specifications

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3.4 Control Settings

- 3.4.1 The actual on-site setting of all automatic controls shall be done in accordance with a printed tabulated list indicating type, location, setting and function.

3.5 Test Data

- 3.5.1 The Contractor shall provide the Superintending Officer with written schedules of readings taken during the testing operation indicating the actual required readings, the first reading taken, and the final reading.

3.6 Control Systems

- 3.6.1 Generally, the Contractor shall adopt the commissioning procedure set out in the relevant codes.

- 3.6.2 The Contractor shall test and ensure all field devices installed (e.g., Static pressure and CO sensors, etc.) are calibrated and condition set properly.

- 3.6.3 The Contractor shall submit to the Superintending Officer a list indicating setting of all automatic controls including pressure controls and other similar items to be tested. The test shall be done in accordance the submitted list which shall include type, location, setting and function of each part of the control.

- 3.6.4 Particular attention shall be paid to the following features:

- a) Satisfactory operation of any automatic or manually operated sequences to be used in the event of fire.
- b) Safety in the event of failure and of sudden resumption of electricity supply.
- c) Satisfactory operation of safety interlocks designed for the protection of the personnel, such as those associated with remote electrically operated plant.

- 3.6.5 The following items shall be checked and/or tested and recorded on the site test certificate:

- a) Desired set value of all control devices.
- b) Satisfactory operation of equipment protection devices.
- c) Satisfactory operation of all sequencing operations and alternate working selections and automatic or manual changeover of duplicate plant.

3.7 Electrical Tests

- 3.7.1 The Contractor shall test and ensure that the new equipment installed linked to existing electrical panels shall be in good condition and does not trip the building. The following tests shall also be carried out in full compliance with the Local Codes and Regulation by the Contractor in the presence of the Superintending Officer.

- a) Insulation resistance test of all power, control cables and all motor windings
- b) Test of conductor continuity
- c) Test of Effectiveness of earthing
- d) Operation of thermal overload relays and starters
- e) Operation Sequence Test

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**3.8 Noise and Vibration Level Measurement and Testing**

3.8.1 Noise levels test and measurement (at each octave band mid-frequency from 63Hz to 8,000Hz) and vibration testing shall be carried out to determine if the installed conditions satisfied the Specifications. Such measurement shall not be carried out when weather or other environmental conditions are likely to cause undue influence to the results. The testing shall be carried out to ensure the equipment are operating within satisfactory sound and vibration levels and that there is no transmission of objectionable vibration or through the building structure. Sound levels shall be measured prior to and during the plant operation.

3.8.2 All data relative to the performance tests shall be submitted to the Superintending Officer within 14 days of completion of the tests.

**3.9 Fans**

3.9.1 The Contractor shall test and ensure that the new staircase pressurization fans and carpark ventilation fans including but not limited to the fan speed and air pressure during normal and fire mode, push/pull test of escape doors, variable speed controls, and all other relevant system comply to all statutory regulations, code of practices, standards etc.

**4. Acceptance and Handover**

4.1 All tests shall be carried out in the presence of the Board or his representative. Before the test is carried out, the Contractor shall satisfy himself that the entire system is operating satisfactorily. Any malfunction during the test shall be analyzed and corrections made by the Contractor. The Board shall have the authority to accept satisfactory completion of the test or to request for a repeat of the test.

4.2 Notwithstanding the above, after the successful written clearance from relevant Authorities and the successful completion of the operability test for the entire system, the Board shall operate the entire system under conditions of full operation for a test-run period of four full working week. Any occurrence will be considered as a critical malfunction. The Board may then at this discretion, request the Contractor to repeat the one-week test.

4.3 The Contractor shall also submit to the Board the required sets of Installation Manual, drawings and test reports as a condition to the handing over of the system.

4.4 The system shall be considered successfully handed over only if the Board or his representative is completely satisfied with the system performance during the test period and all above conditions complied with.

4.5 The system shall be considered successfully handed over only if the Board or his representative is completely satisfied with the system performance during the test period and all above conditions complied with. Following are the required documents as minimum:

- a) Fans General Arrangement drawing with operating weight and mounting details
- b) List of Installed Components and parts with manufacturer and parts number
- c) Electrical wiring diagram
- d) Electrical termination details for internal connections
- e) Control diagram with control block diagram
- f) Installation and Operations Manual
- g) All Testing and commissioning reports

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**5. Operation and Maintenance Manual**

Certification of Substantial Completion will be issued after the receipt and acceptance of the above Operating & Maintenance Manual by the Board.

5.1 Upon the completion of the works, the Contractor shall consolidate and submit the following documents to the Board:

- a) Two (2) sets of as built drawings in layout and schematics to show the locations of the new devices and with the endorsement by the Qualified Personnel including all letter of submission approval or notice from authorities (e.g. SCDF, BCA, etc.) (Hard copy in A1 size and soft copy in AutoCAD version)
- b) Two (2) sets of warranties for the equipment
- c) Two (2) sets Work done report
- d) Two (2) sets of binded Operation and Maintenance Manual (OMM) consisting of the following documents:
  - i. Content list and project details
  - ii. Description of the as-installed system;
  - iii. List of vendors including names, addresses and telephone numbers;
  - iv. Schedule of the as-installed equipment;
  - v. Contact list for maintenance and breakdown services;
  - vi. Operating instructions for all equipment;
  - vii. Manufacturer's pamphlets for all equipment including head/flow curves for all pumps with impeller size marked;
  - viii. Compilation of all systems pre-commissioning checklist Testing and commissioning data and results;
  - ix. List of spares recommended;
  - x. proper records of approved detailed system as-built drawings
  - xi. proper handing/taking over documentation between "project and operational" staff
  - xii. Schedule of recommended maintenance
  - xiii. any other information requested by the Board.
- e) Two (2) sets of soft copy for the above stored in Thumb drives.