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## **A. REQUIREMENTS AND SPECIFICATIONS FOR PREVENTIVE MAINTENANCE**

### **1. OBJECTIVES OF PREVENTIVE MAINTENANCE**

#### **1.1. General Description**

1.1.1. It is envisioned that the Contractor will provide all the necessary manpower, tools and materials to perform all PM and repair works in AFT1-5 (including eCommerce Airhub) for a contract period of 5 years with an Option to extend for 2 years more, at the sole discretion of SAS.

1.1.2. Although the works will be performed during normal office hours, the Contractor will be required to work on weekends, public holidays as well as normal office hours if required by SAS.

1.1.3. The Contractor is expected to be able to rely on the support from its workshops/factory whenever the need arises.

#### **1.2. Objectives**

1.2.1. The Contractor is expected to achieve the following:

- a) High equipment serviceability rate.
- b) Reduce spare parts usage.
- c) Maintain the equipment at a presentable state.
- d) Complete all minor repair and major repair of critical equipment within 24 hours and major repairs of non-critical equipment within 36 hours.

### **2. SCOPE OF WORK**

The Contractor is required to carry out preventive maintenance of the MHS and MSS equipment as per the equipment schedule.

To carry out repairs as required. The equipment shall include PLCs and replacement of preloaded ICS and MSS client terminals.

The Contractor allocated manpower arrangement shall be decided by SAS. SAS shall be able to allocate the preventive maintenance team to carry out urgent repairs, instead of preventive maintenance, if necessary.

SATS is ISO and OSHA certified. The Contractor needs to follow all ISO 14001, 9001, OSHA requirements and keep relevant records for inspection.

**3. TOOLS & SPARE PARTS**

- 3.1. The tools needed to carry out all jobs are to be provided by the Contractor. Borrowing of specialized tools from SAS Maintenance can be arranged but this is subjected to availability. This cannot be used as an excuse for delay in the works that the Contractor is required to carry out.
- 3.2. SAS shall purchase and issue spare parts to the Contractor.
- 3.3. SAS shall first consider purchasing & using spares supplied by the Tenderer at the sole discretion of SAS.
- 3.4. The Contractor shall work closely with SAS and advise SAS' store personnel on components that they are expected to use. Shortage of spare parts cannot be used as an excuse for non-availability of the machines. This will only be waived if the failure cannot be predicted during PM.
- 3.5. All part replaced must be original parts from the original manufacturer. This will only be waived with approval from SAS.

**4. MONTHLY STATISTICAL & MANAGEMENT REPORT**

- 4.1. The Contractor must provide a monthly statistical report by the 10<sup>th</sup> day of each month, providing detail summary of the events & work done during the previous month. Sample is shown in Appendix D.
- 4.2. Detail information on the spare usage & manhours incurred for all the equipment in AFT1-5 must be readily accessible. Upon request, the Contractor must be able to extract the information from a computerized database.
- 4.3. The Contractor must also provide a detail PM schedule for the next month. The report must also include the major components that will be changed. This will enable the store to purchase the spare parts in time for the change.
- 4.4. The Contractor is expected to investigate and produce investigation report for any breakdowns that occurs and submit to SAS within 24hrs upon SAS request.
- 4.5. The Contractor shall provide a regular Billing Report and Service LOG in the format set by SAS procurement (SPS) to record every invoice charged under this contract. The required Billing Report shall be provided as a supporting document with every Invoice submitted to SAS Finance.
- 4.6. The Contractor shall keep an Issue Log to identify, categorize and report all service delays or operational issues or supply disruptions or warranty claims, and any other matters which may have been raised by SAS representatives/supervisors.

**APPENDIX A****EQUIPMENT LIST****AFT 5**

<b>S/N</b>	<b>DESCRIPTION</b>	<b>B. LEVEL</b>
1	Export workstation finger sub-system BUA1A	A
2	Export workstation finger sub-system BUA2A	A
3	Export workstation finger sub-system BUA3A	A
4	Export airside hoist system and bridge queue MCP 4	A to F
5	Export workstation finger sub-system BUA4A	A
6	Export workstation finger sub-system BUA5A	A
7	Export workstation finger sub-system BUA6A	A
8	Export airside hoist system and bridge decks MCP 10	A to F
9	Refrigerated Coldrooms, powered decks airside RQL	A to C
10	Export workstation finger sub-system	D
11	Export workstation finger sub-system	D
12	Export workstation finger sub-system	D
13	Export workstation finger sub-system	D
14	Export workstation finger sub-system	D
15	Export workstation finger sub-system	D
16	Stationary equipment stacker system	A to D
17	Stationary equipment stacker system	A to D
18	Stationary equipment stacker system	A to D
19	Export minishipment south	A to D
20	Export minishipment north	A to D
21	Elevating transfer vehicle, south	A to F
22	Elevating transfer vehicle, centre	A to F
23	Elevating transfer vehicle, north	A to F
24	Turntable transfer vehicle, south airside	A
25	Turntable transfer vehicle, centre airside	A
26	Turntable transfer vehicle, north airside	A
27	Bridge vehicle	D
28	Bridge vehicle	F
29	Queues lanes	A to F
30	Mobile platform	
31	Truckdock leveler functional check	

**AFT 2 (Coolport), 3 & 4**

S/N	DESCRIPTION	LEVEL
1	BV 2-BRIDGE VEHICLE	AFT 3
2	ETV 4-ELEVATING TV	AFT 3
3	ETV 5-ELEVATING TV	AFT 3
4	TD F-TRUCK-DOCK AND SCISSOR LIFT	AFT 3
5	TV 4-TRANSFER VEH.	AFT 3
6	TV 5-TRANSFER VEH.	AFT 3
7	WS 3A-WORKSTATION	AFT 3
8	WS 3B-WORKSTATION	AFT 3
9	WS 3C-WORKSTATION	AFT 3
10	WS 3D - WORKSTATION	AFT 3
11	WS 3E – WORKSTATION	AFT 3
12	WS 3F-WORKSTATION	AFT 3
13	WS 3G-WORKSTATION	AFT 3
14	Q LANE AND ROLLER DECKS	AFT 3
15	ETV 6-ELEVATING TV	AFT 4
16	TV 6-TRANSFER VEH.	AFT 4
17	WS 4A-WORKSTATION	AFT 4
18	WS 4B-WORKSTATION	AFT 4
19	WS 4C-WORKSTATION	AFT 4
20	Q LANE AND ROLLER DECKS	AFT 4
21	MINISHIPMENT CAROUSEL	AFT 4
21	ETV 2 – ELEVATING TV	AFT 2
22	ETV 3 – ELEVATING TV	AFT 2
23	TV 2 – TRANSFER VEH.	AFT 2
23	TV 3 – TRANSFER VEH.	AFT 2
24	WS 2D – WORKSTATION	AFT 2
25	WS 2E - WORKSTATION	AFT 2
26	WS 2F – WORKSTATION	AFT 2
27	WS 2G – WORKSTATION	AFT 2
28	DOLLY LINE TV	AFT 2
29	LANDSIDE TRUCKDOCK SYSTEM AND SCISSOR LIFT	AFT 2
30	Q LANE AND ROLLER DECKS	AFT 2
31	ETV 1 – ELEVATING TV	AFT 1
32	TV 1 – TRANSFER VEHICLE	AFT 1
33	Q LANE AND ROLLER DECKS	AFT 1
34	ECC CONVEYOR BELT AND LANE	ECC
35	DOLLY LINE TV	AFT 3
36	LANDSIDE TRUCKDOCK SYSTEM	AFT 3
37	STRONGROOM ROLLERS	STRONGROOM
38	TRUCKDOCK LEVELLERS	ALL
39	STORAGE DECKS	ALL

#Mobile platforms to be inspected fortnightly

#Coolport slave dollies to be inspected quarterly

**eCommerce Airhub**

<b>S/N</b>	<b>DESCRIPTION</b>	<b>LEVEL</b>
1	CONVEYORS	AFT 1
2	S-TILTER & CHUTES	AFT 1
3	EARLY BAG SYSTEM (EBS)	AFT 1
4	TRAY	AFT 1
5	ULD SYSTEM	AFT 1
6	AUTOMATED STORAGE AND RETRIEVAL SYSTEM (ASRS)	AFT 1
7	LOAD ASSIST DEVICE (LAD)	AFT 1

**MONTHLY STATISTICAL & MANAGEMENT REPORT**

**1. OVERALL MONTHLY STATISTICAL REPORT**

**1.1. Equipment Serviceability**

Equipment :  
 Serviceability :  
 PM Hours :  
 Remarks :  
 e.g. spare part used etc.

1.2. The above is to be tabulated for all equipment as follows:

<b>Equipment</b>	<b>Serviceability</b>	<b>PM Hours</b>	<b>Remarks</b>

**1.3. Preventive Maintenance Summary**

**1.3.1. PM Hours**

PM hours (office hours) :  
 PM hours (after office hours) :  
 Total PM Hours :

**1.4. Repair**

**1.4.1. Repair Hours**

Repair hours (office hours) :  
 Repair hours (after office hours) :  
 Total Repair Hours :

1.5. Overall Summary.

1.6. Repair jobs completed by equipment type.

<b>Equipment</b>	<b>Repair Hours</b>	<b>Costs</b>	<b>Remarks</b>

1.7. Spare part usage, hazardous waste records.

1.8. Summary of PM carried out for the month by equipment type.

1.9. Daily attendance records.

## **B. REQUIREMENTS AND SPECIFICATIONS FOR FIRST LINE MAINTENANCE**

### **1. GENERAL**

1.1. The first line (breakdown maintenance) of the MHS at AFT2-5 is currently carried out by SAS staff. The first line maintenance of MSS in eCommerce Airhub is carried out by Contractor staff. In the event there is a shortage of manpower for SAS staff and upon SAS request, the Contractor must be able to provide manpower to supplement the support the first line maintenance and repair works in AFT1-5 (including eCommerce Airhub).

### **2. OBJECTIVES OF FIRST LINE MAINTENANCE**

#### **2.1. General Description**

2.1.1. It is expected that the Contractor will provide all the necessary manpower and tools to support the first line (breakdown) maintenance and minor repair works in AFT1-5 (including eCommerce Airhub).

2.1.2. The work is to be done over three shifts, the Contractor will be required to work on weekends and public holidays.

2.1.3. The Contractor is expected to be able to obtain manpower from other areas if the need arises.

#### **2.2. Objectives**

2.2.1. The Contractor is expected to achieve the following:

- a) High equipment serviceability rate.
- b) Reduce spare parts usage.
- c) Complete all minor repair and assist in major repair of all equipment.

### **3. SCOPE OF WORK**

#### **3.1. ATTENDING TO BREAKDOWNS**

3.1.1. The men are expected to attend to breakdowns whenever operation of maintenance staff reports such breakdowns. The Contractor is expected to provide qualified and skilled technicians to perform this work and skilled technician to perform this work.



- 3.1.2. The Contractor shall follow closely the manufacturer's recommendation in the recovery of breakdowns. They shall follow instructions from the duty Technical Officer stationed at the control room.
- 3.1.3. The work would be primarily recovery from breakdowns by resetting, adjustment or moving of ULDs. However, maintenance breakdown support also includes minor repairs and assistance in major repairs where necessary.
- 3.1.4. The Contractor may be required to operate the equipment to retrieve urgent shipments or to hasten the movement of ULDs. These will be part of the contract cost.
- 3.1.5. The Contractor shall ensure that key staff working in the terminal are contactable at all times. They are required to carry walkie talkies (these will be provided by SAS). When requested to attend to breakdowns by SAS staff they should respond with minimum delay. They should be contactable after office hours by pager or handphone for investigation or emergencies.
- 3.1.6. There should be a person responsible for the scheduling and welfare of the men. An engineer or supervisor shall be reachable by handphone in case the men do not turn up for duty.

#### 4. **TOOLS & SPARE PARTS**

- 4.1. The tools needed to carry out all jobs are to be provided by the Contractor for their men. Borrowing of specialized tools from SAS Maintenance can be arranged but this is subjected to availability. This cannot be used as an excuse for delay in the works that the Contractor is required to carry out.
- 4.2. SAS shall supply spares.
- 4.3. The Contractor shall propose a list ranging from *PLC spares, Conveyor consumables, Rollers & bearings, castor wheels, various filters, photo sensors, hall effect sensors, contact switches, lubricants, hydraulic cylinders, roller chains, fasteners, hydraulic oil, gears and power circuit control components* for supply to SAS with fixed unit rates **by calendar year** throughout the contract duration.
- 4.4. SAS shall have to sole discretion whether to exercise these Contractor proposed unit rates above in para 4.3 for the required materials and consumables to maintain the MHS under the scope of this contract.
- 4.5. The proposed list in 4.3 may include unit rates for supply of new items, or alternatively for repair of existing components/items (where repairs are deemed economically viable).

- 4.6. The Contractor shall identify all Spare Parts and materials in 4.3 supplied by the component manufacturer's company name and that component manufacturer's native Part Number, together with its respective *NATO Stock No. Part Number* or international/global ID or any other international equivalent: *such as ASME B18.24-2015 or ATA iSpec 2200 or JASC/ATA 100 code or Global Trade Item Number (GTIN), & the respective UNSPSC code (where available)*, and also utilize common Taxonomy of the item name (with universal nomenclature notation). These Spare part components information shall be listed in an updated excel file report with the specific respective equipment identity No., line item description, quantity supplied, delivery date or usage date, Equipment usage meter (where available), Equipment service life (age) and SAS Purchase order number (where known). The Contractor shall provide this report upon demand, on a regular basis.

## **C. GENERAL REQUIREMENTS**

### **1. COMPANY PROFILE**

- 1.1. Contractor must provide the company profile during the tender submission, stating their expertise and the financial performance of the company over the last 3 years. Expertise on the maintenance of large-scale Material Handling System should also be highlighted.

### **2. TENDERER PROPOSED MANPOWER STRUCTURE**

#### **2.1. Preventive Maintenance:**

Contractor must provide a proposed manpower structure stating the number of staff to be employed. They must at least be categorized into engineers, supervisors, electrical technicians & mechanical technicians. The men provided shall be technically qualified with a minimum of NTC2 or equivalent qualification. They should have working experience on automated systems PLCs and preferably with MHS and MSS experience. The Contractor must also indicate the number of supporting staff that the Contractor can rely upon to support SAS in the event that the site staff is unable to cope with the amount of repair job given. Names & credential of engineers & supervisors to be employed for this contract must be included.

The breakdown of men required for each servicing type shall be quoted and this will be stated in the contract.

#### **2.2. First Line:**

The Contractor is to provide a proposed manpower structure for first line support stating the names and number of men employed for this contract. There may be penalties imposed if the men are redeployed unless due to resignations.

The men provided shall be technically qualified with a minimum of NTC2 or equivalent qualification. They should have working experience on automated systems PLCs and preferably with MHS and MSS experience. They should be conversant with the systems in use for troubleshooting specifically SCADA, and PLC software, the men shall also be familiar with inverter drives and smart sensors so that they would be able to make adjustments on laser scanner systems and inverter drives when the settings are out. They would be expected to be able to change ICS/MSS client PCs preloaded with ICS/MSS software and test that the clients are working properly.

2.3. **Combined Maintenance**

Manpower Requirement for first line maintenance is 2 men per shift.

The Contractor shall quote for the number of men required to support the combined contract. The Contractor may be asked to top up the number of men if SAS determines that the number of men is insufficient, this will be the basis on the number of men required for the contract. The Contractor is allowed to redeploy his men between preventive and first line maintenance. However, at all times the agreed number of men for first line support shall be fixed. The men for preventive maintenance should be supplemented from other sources if there is a shortage. The daily attendance shall be submitted and if there is any shortfall SAS shall be entitled to claim the manhours shortfall through free repair manhours.

3. **TENDERER PROPOSED SUB-CONTRACTOR LIST**

3.1. Contractor is expected to provide a list of sub-contractors which will be used to maintain SAS MHS and MSS. The list will include the name of the company as well as the type of jobs that these sub-contractors will be called upon to do. The list of sub-contractors shall be submitted to SAS for approval.

4. **EXPERIENCES**

4.1. Contractor is expected to provide a list of experiences that the company has done for the past 10 years. Tenderer should highlight experiences that are relevant towards the maintenance of SAS Material Handling System and Mail Storage and Sortation system. Tenderer should highlight experiences that are relevant towards the maintenance of PLCs and PCs.

**D. PERFORMANCE, PENALTY AND WARRANTY**

**OVERALL**

**1. SERVICEABILITY RATE**

1.1. The performance on the serviceability of the equipment will be according to the following parameters.

Overall Monthly Serviceability - 99.0%

1.2. The Serviceability Rate is defined as the accumulated time the equipment is working or ready for working divided by total time and expressed in percentage (%). The duration over which this serviceability is measured shall be one calendar month.

1.3. In the event that the Contractor is not able to meet the serviceability rate, the liquidated damages shall be payable as follows:

The Contractor shall maintain the target serviceability level standards

Equipment	Target	Serviceability	Deduction	No. of breakdowns > 1.5hrs (per month)		
				Target	No. of breakdowns	Deduction
ETV	99%	98 to 99%	0.25%	<5	5-10	0.25%
		97 to 98%	0.50%		11-15	0.50%
		96 to 97%	0.75%		16-19	0.75%
		95 to 96%	1.00%		20-24	1.00%
		94 to 95%	1.25%		25-29	1.25%
		93 to 94%	1.50%		30-34	1.50%
BV	99%	98 to 99%	0.25%	<5	5-10	0.25%
		97 to 98%	0.50%		11-15	0.50%
		96 to 97%	0.75%		16-19	0.75%
		95 to 96%	1.00%		20-24	1.00%
		94 to 95%	1.25%		25-29	1.25%
		93 to 94%	1.50%		30-34	1.50%
Airside TV	99%	98 to 99%	0.25%	<5	5-10	0.25%
		97 to 98%	0.50%		11-15	0.50%
		96 to 97%	0.75%		16-19	0.75%
		95 to 96%	1.00%		20-24	1.00%
		94 to 95%	1.25%		25-29	1.25%
		93 to 94%	1.50%		30-34	1.50%
Minishipment	99%	98 to 99%	0.25%	<5	5-10	0.25%
		97 to 98%	0.50%		11-15	0.50%
		96 to 97%	0.75%		16-19	0.75%
		95 to 96%	1.00%		20-24	1.00%
		94 to 95%	1.25%		25-29	1.25%

CT2112Z036 – Maintenance of MHS at AFT1-5 | Schedule 1 – System

		93 to 94%	1.50%		30-34	1.50%
Workstations	99%	98 to 99%	0.25%	<5	5-10	0.25%
		97 to 98%	0.50%		11-15	0.50%
		96 to 97%	0.75%		16-19	0.75%
		95 to 96%	1.00%		20-24	1.00%
		94 to 95%	1.25%		25-29	1.25%
		93 to 94%	1.50%		30-34	1.50%
Hoists	99%	98 to 99%	0.25%	<5	5-10	0.25%
		97 to 98%	0.50%		11-15	0.50%
		96 to 97%	0.75%		16-19	0.75%
		95 to 96%	1.00%		20-24	1.00%
		94 to 95%	1.25%		25-29	1.25%
		93 to 94%	1.50%		30-34	1.50%
Stackers	99%	98 to 99%	0.25%	<5	5-10	0.25%
		97 to 98%	0.50%		11-15	0.50%
		96 to 97%	0.75%		16-19	0.75%
		95 to 96%	1.00%		20-24	1.00%
		94 to 95%	1.25%		25-29	1.25%
		93 to 94%	1.50%		30-34	1.50%
MSS System	99%	98 to 99%	0.25%	<5	5-10	0.25%
		97 to 98%	0.50%		11-15	0.50%
		96 to 97%	0.75%		16-19	0.75%
		95 to 96%	1.00%		20-24	1.00%
		94 to 95%	1.25%		25-29	1.25%
		93 to 94%	1.50%		30-34	1.50%

The penalty for not meeting the above will be 0.25% of the total contract cost for each percentage point below the serviceability level standard up to a maximum 1.5% of the total contract cost.

1.4. If the serviceability targets are not met for more than three months, it will be grounds for termination of the contract.

2. **PREVENTIVE MAINTENANCE**

2.1. Adherence to PM schedule

If the Contactor fails to start the PM on an equipment on time, SAS will be entitled to claim \$50 for each incident. If the PM is not completed on time SAS will claim \$50 per incident. If any PM is postponed due to Contractor request, it must be completed within one month, subject to availability as confirmed by SAS.

3. **FIRST LINE MAINTENANCE**

3.1. The expected response time to reach site when activated and the Contractors' staff is available and not attending to any breakdowns shall be 10 mins.

If the response time failure per month exceeds more than three times per shift as confirmed and endorsed by the Contractors' supervisor and SAS, a penalty of \$50 will be imposed.

- 3.2. The number for men required per shift shall be 2 men at all times.
- 3.3. The Contractor is required to have sufficient men for first line maintenance support so that the men can be rotated for duty. If any men (as rostered) do not report for work, liquidated damages of \$200 per shift per man will be imposed.
- 3.4. If the Contractors' men are late by more than 1-hour, liquidated damages of \$50 will be imposed.

4. **REPEATED LDS**

If the same LDS are imposed for two months consecutively, the LD quantum will be increased by 25%, and increase by 25% every successive month. The same LD is imposed until the contractor has improved the service level. e.g.

First month		\$50
Second month	1.25x50 =	\$62.5
Third month	1.5x50 =	\$75
etc.		

If the contractor again fails the same SLA the LD quantum will keep on increasing by 25%  
i.e.

First month		\$50
Second month	1.25x50 =	\$62.50
Third month		\$0
Fourth month	1.5x50 =	\$75
etc.		

5. **WARRANTY**

- 5.1. There should not be failure of the equipment within 24 hours after the equipment servicing, unless it is due to a failure of a component which SAS has decided not to change. The Contractor is required to rectify the fault immediately upon notification at no cost to SAS.
- 5.2. If the repair job for the repeated failure is performed by SAS, the Contractor shall reimburse SAS for the cost of labour and materials incurred in rectifying the fault through service credits in the form of free repair manhours. The labour cost shall be based on the Contractors manhour rates.

All repairs and parts supplied by the Contractor if any shall have a 12-month warranty. The warranty shall cover the part itself as well as the workmanship of the repair or replacement if done by the Contractor.

**6. PERFORMANCE REVIEW**

- 6.1. A monthly performance review meeting will be conducted. The Contractor will need to prepare the monthly serviceability report including the breakdown to individual equipment type. They will also need to identify the top ten recurring breakdowns, top ten breakdown which result in long downtime and the top five contributing faults which result in the low serviceability of each equipment type.
- 6.2. Analysis of the reason for the above will be discussed and preventive actions expected.
- 6.3. This shall not replace the daily briefings and ad-hoc meetings that may be arranged. These can be as often as weekly if there are major problems to resolve.



**E. EXIT PLAN**

**1. Introduction**

The exit plan is required to ensure there is a smooth hand over to the next appointed Contractor. A time duration of one month is required to ensure this. The notice starts when the Contractor is notified.

**2. Handover**

The Contractor will prepare a record of transfer which will be used to document each individual item transferred to the client's control. The list should be itemized to record all items.

**3. Training**

Training shall be supplied to the new contractor for a period of one month prior to the start of the new contract with the new contractor. The training shall include work attachment.