

AIRSIDE WORKS PROCEDURE MANUAL

FOR CHANGI AIRPORT

Compiled by

Standards and Health Unit
Engineering & Development Cluster

Version 28/2023

24 August 2023

CONTENTS

PROCEDURE

1	CLOSURE OF RUNWAY FOR TWO (2) HOURS OR LESS TO CARRY OUT WORK	AWP/5
2	CLOSING OF RUNWAY FOR MORE THAN TWO (2) HOURS TO CARRY OUT WORK	AWP/7
3	PROCEDURE FOR DRIVERS ACCESSING VICINITY OF RUNWAY 3	AWP/11
4	CLOSING OF TAXIWAY/TAXILANE FOR THREE (3) DAYS OR LESS	AWP/12
5	CLOSING OF TAXIWAY/TAXILANE FOR MORE THAN THREE (3) DAYS	AWP/14
6	CLOSING OF AIRCRAFT STAND TO CARRY OUT APRON PAVEMENT MAINTENANCE/PROJECT WORK	AWP/16
7	CONDUCTING RUNWAY SCHEDULED INSPECTION	AWP/18
8	CONDUCTING TAXIWAY/TAXILANE DAILY INSPECTION AND GENERAL MAINTENANCE CHECK	AWP/21
9	CONDUCTING AIRCRAFT STAND DAILY INSPECTION AND GENERAL MAINTENANCE CHECK	AWP/22
10	NORMAL OPENING OF RUNWAY/TAXIWAY/TAXILANE CLOSURE	AWP/23
11	EMERGENCY OPENING OF RUNWAY/TAXIWAY/TAXILANE CLOSURE	AWP/24
12	NORMAL OPENING OF AIRCRAFT STAND CLOSURE	AWP/25
13	EMERGENCY OPENING OF AIRCRAFT STAND CLOSURE	AWP/26
14	RESPONSE TO WILDLIFE STRIKE REPORT AND WILDLIFE CARCASS FOD FOUND IN THE AIRCRAFT MANOEUVRING AREA	AWP/27
15	RESPONSE TO HANDLE FOD FOUND IN THE AIRCRAFT MANOEUVRING AREA	AWP/29

16	RESPONSE TO LOCAL ACTION	AWP/33
17	RESPONSE TO CATEGORY II ILS OPERATION	AWP/36
18	RESPONSE TO LEAKAGE INCIDENT ON RUNWAY /TAXIWAY /TAXILANE /AIRCRAFT STAND	AWP/38
19	APPLYING RUNWAY /TAXIWAY /TAXILANE /AIRCRAFT STAND CLOSURE TO CARRY OUT MAINTENANCE/PROJECT WORK	AWP/40
20	APPLYING EMERGENCY RUNWAY/TAXIWAY/TAXILANE CLOSURE TO CARRY OUT REPAIR WORK	AWP/45
21	PREPARING AND DISSEMINATING AIP AMENDMENT/AIP SUPPLEMENT	AWP/47
22	RESPONSE BY PROJECT CONTRACTOR TO UNDERGROUND SERVICE DAMAGE BY PROJECT CONTRACTOR DURING EXCAVATION WORK	AWP/48
23	PROCEDURE FOR CANCELLING RUNWAY/TAXIWAY/TAXILANE/AIRCRAFT STAND CLOSURE OUTSIDE CAG NORMAL WORKING HOURS	AWP/49
24	PROCESS FLOW ON UPDATING OF AERODROME MANUAL, AIRPORT OPERATIONAL AND SAFETY(AOS), AIRSIDE WORKS PROCEDURE (AWP)	AWP/50
25	RESPONSE TO CRASH ON LAND WITHIN CHANGI AIRPORT WITHIN AES TURN-OUT AREA (RUNWAY 1, 2 or 3)	AWP/53
26	RESPONSE TO DISABLED AIRCRAFT RECOVERY AT RUNWAY 3 AND ASSOCIATED TAXIWAYS	AWP/54
27	PROCESS FLOW ON COMMISSIONING AND HANDING OVER UPON COMPLETION OF PROJECT AT MOVEMENT AREA	AWP/55
28	PROCESS FLOW ON DESIGN CHECK TO ENSURE COMPLIANCE TO CAAS AIR NAVIGATION REGULATION 139, AERODROME SPECIFICATIONS AND ADVISORY CIRCULARS	AWP/63

- 29 SAFETY BRIEFING WORKFLOW FOR AIRSIDE SAFETY AWP/66 INDUCTION BRIEFING (ASIB) & AIRPORT OPERATIONAL SAFETY REQUIREMENTS(AOS)
- 30 SAFETY INSPECTION FRAMEWORK (DEVELOPMENT / AWP/67 PROJECT)

PROCEDURE 1: CLOSURE OF RUNWAY FOR TWO (2) HOURS OR LESS TO CARRY OUT WORK

For any ad-hoc closure of runway for two (2) hours or less, Airside Safety Inspection Teams/Airfield Lighting Shift Team to inform CAG REP Officer for co-ordination. (For closure of runway for two (2) hours or more, refer to Procedure 2)

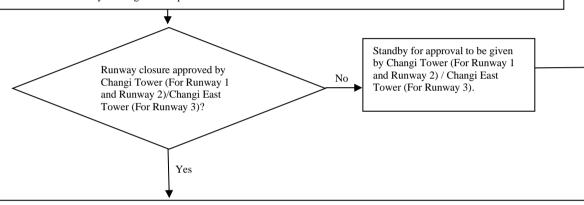
CAG REP Officer to call Changi Tower (For Runway 1 and Runway 2) (at 6541-2416) or Changi East Tower (For Runway 3) (at 6592-2295) prior to closure to arrange for closure window.

CAG REP Officer shall:

- Inform Airside Safety Inspection Teams/Airfield Lighting Shift Team, sweeper or external contractors (if any) on the closure time and time to RV at REP Hut
- Issue number tags to all vehicles & machinery and record all entry using Form A & C
- Obtain permission from Changi Tower (For Runway 1 and Runway 2) through 121.9MHz (Runway 1) or Changi East Tower (For Runway 3) through 119.675MHz (Runway 3) to close runway.

Airside Safety Inspection Teams/Airfield Lighting Shift Team shall:

• Conduct REP safety briefing to work parties if there are external contractors.

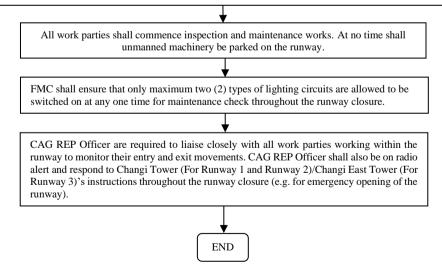


CAG REP Officer shall:

- Perform readback of permission received to Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3). Ensure traffic lights have been turned from red to green (to remind ATC if needed) before lifting drop arm barrier.
- Ensure that all vehicles & machinery entering the runway display number tags, have yellow flashing lights switched on & have the latest aerodrome chart.
- To lower the arm barrier after all vehicles and work parties have entered the closed runway.

Airside Safety Inspection Teams/Airfield Lighting Shift Team shall:

Request FMC to switch off all the runway lights and to allow only maximum two (2) types of lighting circuits to be switched on at any one time
for maintenance check.



Additional Note:

- (a) CAG REP Officer, Airside Safety Inspection Teams/Airfield Lighting Shift Team shall:
 - Check the two (2) yellow flashing lights on their rovers are serviceable before the start of runway closure.
 - Check the serviceability of the radio set by establishing a comms check with Changi Apron at least once a day at the start of the shift.
 - Check the serviceability of the transponder by observing that the green LED is blinking (2 times per sec).
 - Refer to "CAT1 Airside Driving Theory Handbook" for further details.
- (b) In the event that Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3) needs to re-open the closed runway, CAG REP Officer shall ensure that all personnel, vehicles and machinery, etc. are evacuated from the runway within the time specified below upon notification by Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3). All workers need to sign out and vehicle/machinery tags need to be accounted for. If the runway cannot be re-opened within the stipulated period, CAG REP Officer shall inform Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3) in advance. Airside Safety Inspection Teams/Airfield Lighting Shift Team shall inform FMC who will in turn inform the CAG Team Leader in-charge of aircraft pavement and AFL. REP Officer shall jointly with ASIT/ASLT carry out the FINAL inspection to ensure all workers, vehicles, machines and equipment have vacated the runway.

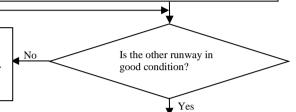
Closure time	Estimated lead time for
	evacuation
Less than or equal to 30 minutes (i.e. time-limited works)	5 minutes
More than 30 minutes	30 minutes

(c) Ad-hoc closure refers to closures which are not part of the scheduled daily inspections that are reflected in the AIP/AIP Sup.

PROCEDURE 2: CLOSING OF RUNWAY FOR MORE THAN TWO (2) HOURS TO CARRY OUT WORK

Before the start of the planned runway closure period, the Airside Safety Inspection Teams (ASITs)/Airfield Lighting Shift Team shall contact Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3) through radio set (121.9 MHz/119.675 MHz) to get approval to carry out inspection of the other runway, i.e. runway not intended to be closed for more than 2 hours. This is to ensure that the other runway is in fully serviceable condition before the planned runway closure of more than 2 hours is carried out. Please also refer to Procedure 7 when inspecting the other runway.

ASIT shall_request Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3)'s permission to mobilise necessary resources to rectify the defect found on the other runway before continuing with the original planned runway closure. ASIT shall inform CAG REP officer (on standby at REP post) should there be any delay to scheduled runway closure.

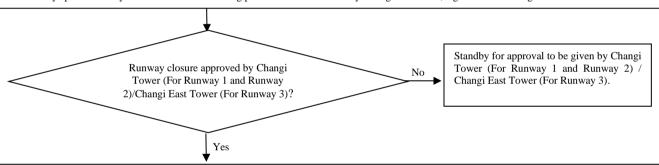


CAG REP Officer shall:

- Inform Airside Safety Inspection Teams/Airfield Lighting Shift Team, sweeper or external contractors (if any) on the closure time and time to RV at REP Hut
- Issue number tags to all vehicles & machinery and record all entry using Form A & C
- Update movement chart on the work areas and contact numbers of work supervisors;
- Obtain permission from Changi Tower (For Runway 1 and Runway 2) through 121.9MHz (Runway 1) or Changi East Tower (For Runway 3) through 119.675MHz (Runway 3) to close runway.

Airside Safety Inspection Teams/Airfield Lighting Shift Team shall:

- Conduct REP safety briefing to work parties if there are external contractors.
- Brief on any special activity or event that will be taking place on the closed runway during the closure, e.g. aircraft crossing.



Runway Closure

CAG REP Officer & REP Support Officer shall:

- Perform readback of permission received to Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3). Ensure traffic lights have been turned from red to green (to remind ATC if needed) before lifting drop arm barrier
- Complete relevant checklist(s) for runway closure, in accordance to CAG Airside Operations Control's SOP;
- · Ensure that all vehicles & machinery entering the runway display number tags, have latest aerodrome chart and yellow flashing lights switched on.
- Record the time at which vehicles/machinery enter the runway;
- Check that the number of workers entering with each vehicle tallies with the records;
- Regulate the vehicular movement into the runway and ensuring that escort vehicle not escorting more than 2 vehicles;
- Lower the drop arm barrier after the last vehicle had entered the runway.

Airside Safety Inspection Teams/Airfield Lighting Shift Team shall:

 Request FMC to switch off all the runway lights and to allow only maximum two (2) types of lighting circuits to be switched on at any one time for maintenance check.

Advanced party (including ASITs), Airfield Lighting Shift Team and all work parties shall enter the runway through REP:

(i) Advance Party would proceed to set up the following closure markers as per Annex 1 and inform CAG REP Officer when closure markers are properly deployed:

- Lighted and white cross markers at each end of the runway and properly weighted down;
- Lighted obstruction marker boards across taxiways as shown in Annex 1; and
- Reflective cones across all other taxiways connecting to closed runway.
- (ii) All work parties shall enter the REP to their designated work site.





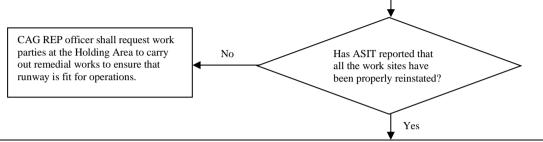
Runway Opening

CAG REP Officer & REP Support Officer shall:

- Alert all work parties to start packing up 1 hour before scheduled runway opening time
- Check records of movements into/out of closed runway on Form A & C are accounted for after all work parties vacated runway
- Ensure all vehicles & machinery tags returned and tallied.
- · Lift the drop arm barrier for vehicles & machinery to vacate

Airside Safety Inspection Teams/Airfield Lighting Shift Team shall:

· Carry out inspection on work sites.



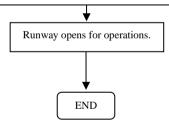
Advanced party (including ASITs) shall

- Retrieve all obstruction markers and cones placed across connecting taxiways, lighted and white cross markers at the runway.
- Account for all obstruction markers and cones retrieved.

CAG REP Officer shall jointly with ASIT/ASLT carry out the FINAL inspection to ensure all workers, vehicles, machines and equipment have vacated the runway.

CAG REP officer shall:

- Inform Changi Tower (For Runway 1 and Runway 2) through 121.9MHz or Changi East Tower (For Runway 3) through 119.675MHz that closed runway is safe for aircraft operations.
- · Ensure traffic lights have been turned from green to red (to remind ATC if needed) and drop arm barrier lowered



Additional Notes:

- (a) Where runway closure period is more than three (3) days or where a section of the runway is closed for more than 3 days, closed runway markings (white cross complying with CAAS Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars) shall be placed at not more than 300 m intervals along the runway or closed runway section.
- (b) In the event that Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) needs to reopen the closed runway, the CAG REP Officer, Airside Safety Inspection Teams(ASIT)/Airfield Lighting Shift Team(ALST) shall ensure that all personnel, vehicles and machinery, etc. be evacuated from the runway within 30 minutes upon notification by Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3).
- (c) NOTAM shall be issued for cancellation of the inspection and maintenance closures of the other runway when one runway is closed for maintenance or project works for more than 2 hours or where there are conflicts in closure timings resulting in closing of both runways at the same time.
- (d) All forms need to be filled in and submitted to CAG REP officer before being allowed to enter runway. These forms can be obtained from CAG REP officer.
- (e) All personnel involved in the runway maintenance closure shall refer to any risk assessments conducted and/or proposals for any interim deviation from this procedure.

Annex 1

CLOSING OF RUNWAY 1 FOR MORE THAN TWO (2) HOURS TO CARRY OUT MAINTENANCE WORK

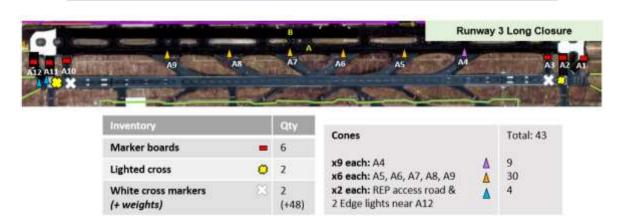


CLOSING OF RUNWAY 2 FOR MORE THAN TWO (2) HOURS TO CARRY OUT MAINTENANCE WORK*



Legend	Qty	Legend	Qty
Marker boards	10 sets	Cones	Total: 32
Lighted cross	2	6 each @ T4, T5, T6, T7, T8 2 each @ REP access road \	30 2
White cross markers (+ weights)	2 (+48)		

CLOSING OF RUNWAY 3 FOR MORE THAN TWO (2) HOURS TO CARRY OUT MAINTENANCE WORK

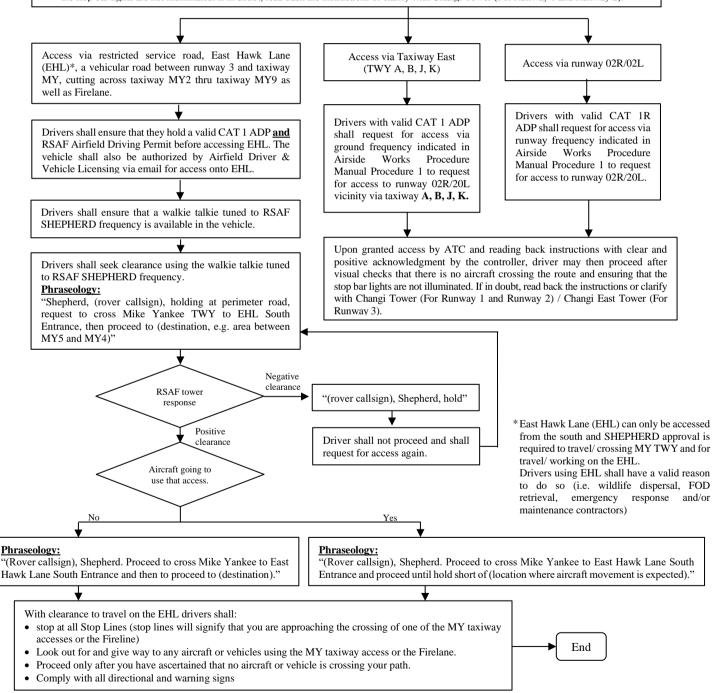


^{*}Tentative closure plan for closing of runway 2 for more than 2 hours. Parties conducting the closure is to check with AOC for updates.

PROCEDURE 3: PROCEDURE FOR DRIVERS ACCESSING VICINITY OF RUNWAY 3

The CAT 1 / CAT 1(R) drivers accessing runway 3 vicinity shall:

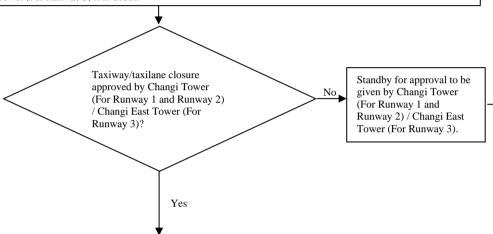
- check that the two (2) yellow flashing lights on their rovers are serviceable before entering the runway 3 vicinity.
- check the serviceability of the radio set by establishing a comms check with Changi Apron at least once a day at the start of the shift.
- check the serviceability of the transponder by observing that the green LED is blinking (2 times per sec).
- contact Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3) through radio set on the frequency listed in Airside
 Works Procedure Manual Procedure 1, before the planned runway access. Please refer to the document on "CAT1 Airside Driving Theory
 Handbook" Standard Phraseology for further details.
- shall ensure that RT set had been tuned and RT set shall be clearly labelled to indicate Ground Frequency and Runway Frequency.
- only enter the runway upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3) and the stop bar lights are not illuminated. If in doubt, read back the instructions or clarify with Changi Tower (For Runway 1 and Runway 2).



PROCEDURE 4: CLOSING OF TAXIWAY/TAXILANE FOR THREE (3) DAYS OR LESS

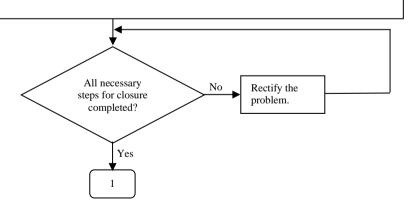
The Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer shall

- check that the two (2) yellow flashing lights on their rovers are serviceable before entering any apron or taxiway/taxilane
 en-route to the closed taxiway/taxilane.
- check the serviceability of the radio set by establishing a comms check with Changi Apron at least once a day at the start
 of the shift.
- check the serviceability of the transponder by observing that the green LED is blinking (2 times per sec).
- contact Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) through radio set (121.9 MHz / 119.675 MHz) before the start of the planned taxiway/taxilane closure period to get approval to close the taxiway/taxilane. Please refer to the document on "CAT1 Airside Driving Theory Handbook" Standard Phraseology for further details.
- only enter the Taxiway/taxilane upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) and to read back the instructions and to clarify with Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) if in doubt.



The Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer shall:

- demarcate the closure area by deploying obstruction marker boards with lights meeting CAAS Air Navigation
 Regulation 139, Aerodrome Specifications and Advisory Circulars across the taxiway/taxilane centre lines leading to
 the closed area. These lighted marker boards shall be placed at least 51 metres^ away from the operational taxiway
 centre line and before the stopbar intended to hold aircraft going towards the operational taxiway, without infringing
 into any neighbouring operational taxiway/taxilane/strip; and
- request FMC or Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) to switch off the taxiway lights leading into and within the closed taxiway/taxilane;



^ The minimum clearance from taxiway may be less than 51 metres based on the separation distances stated in paragraph 1.2 of Section C of CAG AOS requirements.



All work parties shall commence maintenance/project works.

- escort not more than 2 other vehicles (including heavy machineries and premix trucks) to the closed taxiway/taxilane after getting clearance from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3), where needed;
- ensure that the active taxiways/taxilanes used by the construction vehicles en-route to the closed taxiways/taxilanes are kept clean at all times:
- ensure no movement of heavy machineries, premix trucks and vehicles between 2 parked aircraft.
- carry out inspection of the lights mounted on the obstruction marker boards at the end of the workday before sunset or before sunset for work timing after 1900 hrs and record the status in an appropriate checklist. Where lights are found to be blown or unserviceable, they shall be replaced immediately.

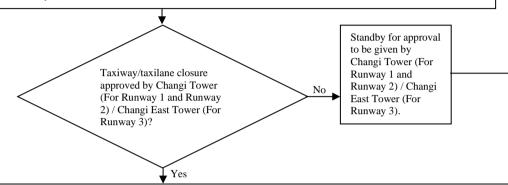
The Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer are required to liaise closely with all contractors working within the taxiway/taxilane to monitor their access and progress of work. The team shall also be on radio alert and respond to Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3)'s instructions throughout the taxiway/taxilane closure (e.g. for emergency opening of the taxiway/taxilane). At no time shall unmanned machinery be parked on the taxiway/taxilane.



PROCEDURE 5: CLOSING OF TAXIWAY/TAXILANE FOR MORE THAN THREE (3) DAYS

The Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer shall

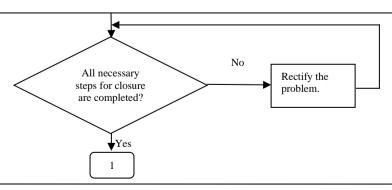
- check that the two (2) yellow flashing lights on their rovers are serviceable before entering any apron or taxiway/taxilane enroute to the closed taxiway/taxilane.
- check the serviceability of the radio set by establishing a comms check with Changi Apron at least once a day at the start of the shift.
- check the serviceability of the transponder by observing that the green LED is blinking (2 times per sec).
- contact Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3) through radio set (121.9 MHz/119.675 MHz) before the start of the planned taxiway/taxilane closure period to get approval to close the taxiway/taxilane. Please refer to the document on "CAT1 Airside Driving Theory Handbook" Standard Phraseology for further details.
- only enter the Taxiway/taxilane upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2)/Changi East
 Tower (For Runway 3) and to read back the instructions and to clarify with Changi Tower (For Runway 1 and Runway 2)/Changi
 East Tower (For Runway 3) if in doubt.



The Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer shall:

request FMC or Changi Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3) to switch off the taxiway lights leading into and within the closed taxiway/taxilane:

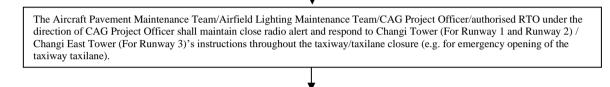
- ensure that a yellow cross meeting CAAS Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars is placed at the
 beginning and end of the closed/unfinished taxiway/taxilane. The yellow cross shall either be painted on the taxiway/taxilane pavement or made of
 reflective material which is properly pasted onto the taxiway/taxilane pavement to prevent it being blown away;
- ensure that obstruction marker boards with lights meeting CAAS Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars attached are placed at 3 metres interval across the entry to the closed/unfinished taxiway/taxilane and weighted down. These lighted marker boards shall be placed at least 51 metres^ away from the operational taxiway centre line and before the stopbar intended to hold aircraft going towards the operational taxiway, without infringing into any neighbouring operational taxiway/taxilane/strip. The obstruction marker boards shall be placed after the yellow crosses on the side of the closed/unfinished taxiway/taxilane. The lights shall consist of a 50-50 mix of types that can be runs on two different powerful sources (e.g. conventional electrical, generator, solar or battery operated);
- · ensure that taxiway side strip markings are painted across the entrance to the closed/unfinished taxiway/taxilane;
- lead in lines should be blacken for closure more than 3 days, but less than 3 months;
- guidance sign should be masked for closure more than 3 days;
- for prolonged closure > 3 months, taxiway and/or aircraft stand markings shall be grinded off;
- ensure that blue retro-reflective markers are installed at 60 metres interval or lesser as directed by CAG across the entrance to the closed/unfinished taxiway/taxilane;
- ensure that all taxiway/taxilane centre line and edge light circuits leading into and within the closed taxiway/taxilane are isolated and FMC and CAG
 Officer-in-charge of Airfield Lighting Control System (ALCS) are kept informed of the isolated circuits through an official memo;
- shall inform CAAS ATE/FMC to demarcate the closed area and isolate the taxiway lights leading into and within the closed taxiway/taxilane on Advance Surface Movement Guidance Control System (A-SMGCS) graphic interface and Airfield Lighting Control System (ALCS) graphic interface.





All work parties shall commence maintenance/project works.

- escort not more than 2 other vehicles (including heavy machineries and premix trucks) to the closed taxiway/taxilane after getting clearance from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3), when needed;
- ensure that the active taxiways/taxilanes used by the construction vehicles en-route to the closed taxiways/taxilanes are kept clean at all times;
- ensure no movement of heavy machineries, premix trucks and vehicles between 2 parked aircraft.
- carry out inspection of the condition of the yellow crosses and lights mounted on the obstruction marker boards at the end or before sunset of each workday and record the status in an appropriate checklist. Where lights are found to be blown or unserviceable, they shall be replaced immediately.



END

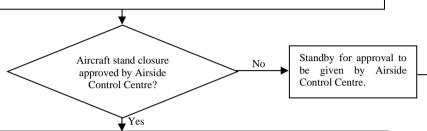
^ The minimum clearance from taxiway may be less than 51 metres based on the separation distances stated in paragraph 1.2 of Section C of CAG AOS requirements.

PROCEDURE 6: CLOSING OF AIRCRAFT STAND TO CARRY OUT APRON PAVEMENT MAINTENANCE/PROJECT WORK

The Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer shall

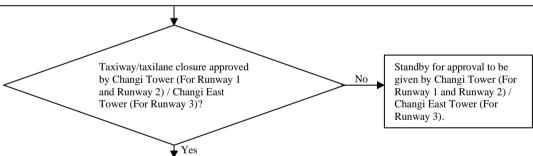
- contact Airside Control Centre (6541 2148/6541 2258) through handphone 30 minutes before the start of the planned aircraft stand closure period to get approval to close the aircraft stand to carry out maintenance/project work.
- check that the two (2) yellow flashing lights on their rovers are serviceable before entering any apron or taxiway/taxilane en-route to
 the closed aircraft stand.
- check the serviceability of the transponder by observing that the green LED is blinking (2 times per sec).

*CAG Project / Maintenance officer is to ensure that CAFHI had been consulted prior to commencement of any works within the aircraft stand



If apron taxiway/taxilane behind the closed aircraft stand is affected by the work, permission shall also be sought from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) to close the associated apron taxiway/taxilane. Before entering any taxiway/taxilane, the Aircraft Pavement Maintenance Team/ Airfield Lighting Maintenance Team/ CAG Project Officer/authorised RTO shall

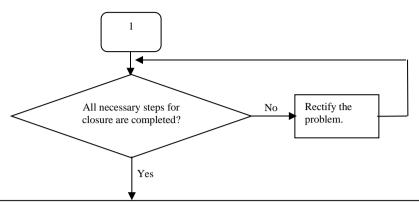
- check the serviceability of the radio set by establishing a comms check with Changi Apron at least once a day at the start of the shift.
- contact Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) through radio set (121.9 MHz / 119.675 MHz) before the start of the planned taxiway/taxilane closure period to get approval to close the taxiway/taxilane. Please refer to the document on "CAT1 Airside Driving Theory Handbook" Standard Phraseology for further details.
- only enter the Taxiway/taxilane upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) and to read back the instructions and to clarify with Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) if in doubt.



The Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer shall:

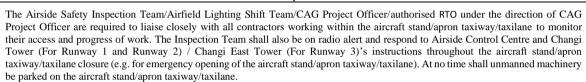
- follow Procedure 4 or 5 for closure of taxiway/taxilane.
- demarcate the closed aircraft stand by deploying obstruction marker boards\(^\) with lights meeting CAAS Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars across the aircraft stand lead-in lines.





All work parties shall commence maintenance/project works.

- escort not more than 2 other vehicles (including heavy machineries and premix trucks) to the closed aircraft stand after getting clearance from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) where needed (if crossing of taxiway is required). As far as possible, the access of these heavy machineries and premix trucks to the closed aircraft stand shall be via apron service roadway.
- · No movement of heavy machineries, premix trucks and vehicles shall be allowed between 2 parked aircraft.
- carry out inspection of the lights mounted on the obstruction marker boards at the end or before sunset of each workday and record the status in an appropriate checklist. Where lights are found to be blown or unserviceable, they shall be replaced immediately.





^ Aircraft stand closure for 3 days or less, a single marker board with red obstacle lights on each end shall be placed at the aircraft stand centre line during works to denote stand closed for works (e.g. maintenance works).

PROCEDURE 7: CONDUCTING RUNWAY SCHEDULED INSPECTIONS

Scheduled Runway Inspection

For 5- & 10-min durations

For 30- & 60-min
Refer to Procedure 1 "CLOSURE OF

Refer to Procedure 1 "CLOSURE OF RUNWAY FOR TWO (2) HOURS OR LESS TO CARRY OUT WORK"

<u>During Runway Inspection</u> Duties of Rover 34 & 35:

- Rover 34 shall inspect FOD &
 Pavement defects from entry
 point by driving along either
 eastern or western side of
 Runway till the other end of
 Runway. It then returns back
 on the other side of Runway to
 conduct similar check till it
 reaches the entry point (making
 one complete circle
 inspection).
- Rover 34 shall inspect FOD & Pavement defects for all Runway Entry Taxiways & Rapid Exit Taxiways
- Rover 35 shall request FMC to switch off all the runway lights (including the Runway Entry Taxiway & Rapid Exit Taxiway lights) and to allow only maximum two (2) types of lighting circuits to be switched on at any one time for maintenance checks.

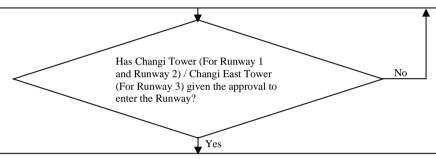
Upon completion of inspection:

 For 30- and 60-min inspection, all rovers shall vacate the runway from the REP

Refer to Procedure 1 "CLOSURE OF RUNWAY FOR TWO (2) HOURS OR LESS TO CARRY Rover 34 as the lead Rover shall contact and check with Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) the estimated time for scheduled runway inspection. Rover 34 shall relay the message to Rover 35 unless changes made to the call-signs of these rovers were informed otherwise to ATC and Airside Operations Control. At the given estimated time, Rovers 34 and 35* shall proceed to the designated Runway Holding Position which is normally on the opposite side of the prevailing landing direction (unless otherwise instructed by ATC). *OJT staff are not allowed to replace qualified staff for these inspections.

At Runway Holding Position (RHP), the Airside Safety Inspection Teams ASIT (Rover 34) /Airfield Lighting Shift Team ALST (Rover 35) shall:

- Identify callsign to ATC & report current position to ATC via 121.9 MHz (for Runway 1) or 119.675 MHz (for Runway 3), describe intended location and purpose. (Refer to Annex 2)
 - While preparing to enter runway, ensure position allow vehicle to face aircraft landing/take-off direction
 - At RHP, drivers must stop before the solid double yellow lines and wait for permission from ATC to enter the runway.
- ii. Obtain instruction from ATC to monitor appropriate runway frequency.
- iii. Tune to 'Singapore Tower' frequency to listen out ONLY. Wait for Singapore Tower to initiate contact.



ATC upon giving clearance, shall simultaneously turn off the red stopbar lights.

Rover 34 & Rover 35 to perform readback of permission received. (**Refer to Annex 2**) Ensure positive clearance received from ATC, red stopbar lights have been turned off & no landing aircraft seen before entering the runway.

- NEVER CROSS ILLUMINATED RED STOPBAR LIGHTS Even if permission has been given to enter. If the Red Stopbar Lights are still illuminated, inform ATC and request for the lights to be turned off before proceeding.
- Red stop bar lights are unidirectional (i.e. you will see the row of red lights as you approach the runway. When you vacate the runway, you will not see these row of red lights).

During Runway Inspection

Duties of Rover 34 & 35:

- Rover 34 shall inspect FOD & Pavement defects from the entry point by driving along along the centre line of Runway before vacating the closed Runway.
- Rover 34 shall carry out one round of inspection of Runway Entry Taxiways & Rapid Exit Taxiway for FOD and pavement over defect during the 5- & 10-mins inspection.)
- Rover 35 shall request Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) to
 switch on all the runway lights and inspect all airfield lightings (circuit level) by driving along the center of
 Runway from one end of the runway to the other.
- Rover 35 shall carry out one round of inspection of airfield lights at all Runway Entry Taxiways & Rapid Exit Taxiways during the 5- & 10-mins inspection

Upon completion of inspection:

- For 5- & 10-mins inspection, Rovers 34 and 35 shall vacate Runway & they shall individually inform Changi
 Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) that they have already vacated the
 Runway.¹
- Once confirmed that all rovers have vacated the runway, Rover 34 (or the Lead Rover) shall then inform Changi
 Tower (For Runway 1 and Runway 2)/Changi East Tower (For Runway 3) that inspection has completed, and he
 has vacated the Runway.¹



ANNEX 2:
RT script for vehicles entering via runway holding position (RHP) for runway inspection:

RT script for vehicles entering via runway holding position (RHP) for runway inspection:				
ENTERING RUNWAY FOR RUNWAY INSPECTION				
Frequency	RT Script			
121.9 MHz (CHANGI	ROVER	CHANGI TOWER (FOR RUNWAY 1 AND RUNWAY 2) / CHANGI EAST TOWER (FOR RUNWAY 3), <rover callsign=""></rover>		
TOWER (FOR RUNWAY 1	ATC	<rover callsign="">, CHANGI TOWER (FOR RUNWAY 1 AND RUNWAY 2) / CHANGI EAST TOWER (FOR RUNWAY 3)</rover>		
AND RUNWAY 2) GROUND UTILITY	ROVER	CHANGI TOWER (FOR RUNWAY 1 AND RUNWAY 2) / CHANGI EAST TOWER (FOR RUNWAY 3), <rover callsign="">AT <runway holding="" point="">, STANDING BY FOR RUNWAY <designator> INSPECTION</designator></runway></rover>		
FREQUENCY) 119.675 MHz	ATC	<pre><rover callsign="">, MONITOR SINGAPORE TOWER ON <runway frequency=""></runway></rover></pre>		
(CHANGI EAST TOWER (FOR RUNWAY 3) GROUND UTILITY FREQUENCY)	ROVER	CHANGI TOWER (FOR RUNWAY 1 AND RUNWAY 2) / CHANGI EAST TOWER (FOR RUNWAY 3), <rover callsign="">, MONITOR SINGAPORE TOWER ON <runway frequency=""></runway></rover>		
	ENTERIN	NG RUNWAY		
	ATC	<rover callsign="">, SINGAPORE TOWER ENTER RUNWAY <designator> via <runway holding="" point=""></runway></designator></rover>		
118.6 MHz (RUNWAY 1) 118.25MHz	ROVER	<pre><rover callsign="">, ENTER RUNWAY <designator> via <runway holding="" point=""> [In vehicle:</runway></designator></rover></pre>		
(RUNWAY 2)	VACATIN	NG RUNWAY		
131.4MHz (RUNWAY 3)	ROVER	SINGAPORE TOWER, < ROVER CALLSIGN>		
(KUNWAI 3)	ATC	<rover callsign="">, SINGAPORE</rover>		
	ROVER	SINGAPORE TOWER, <rover callsign="">, VACATED RUNWAY < DESIGNATOR> via <*RUNWAY HOLDING POINT> *Rover to inform ATC which RET was taken to exit from the runway.</rover>		
	ATC	<rover callsign="">, ROGER</rover>		

Additional Note:

- 1. All rovers entering maneuvering shall:
 - check that the two (2) yellow flashing lights on their rovers are serviceable before entering the runway. For night inspection, the spotlights and headlights shall also be switched on before commencing the inspection.
 - check the serviceability of the radio set by establishing a comms check with Changi Apron at least once a day at the start of
 the shift.
 - check the serviceability of the transponder by observing that the green LED is blinking (2 times per sec).
 - contact Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) through radio set on the
 frequency listed in Airside Works Procedure Manual Procedure 1, individually before the scheduled runway inspection
 timeslot to get approval to enter the runway for inspection. Please refer to the document on "CAT1 Airside Driving Theory
 Handbook" Standard Phraseology for further details.
 - only enter the Runway upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2) / Changi East
 Tower (For Runway 3) and the stop bar lights are not illuminated. If in doubt, read back the instructions or clarify with
 Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3).

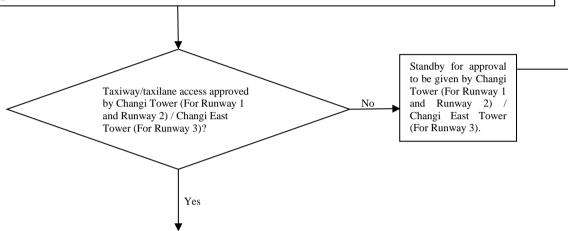
Rover 34 shall:

- (a) keep records of FOD, pavement defect(s) and any abnormalities found, all rovers entering the runway including details such as rover call signs, nature and location of work, person-in-charge, handphone number, manpower strength, estimated time of completion of work etc; runway closing and opening times for inspection; weather condition, surface condition and landing direction in the Runway Daily Inspection Report.
- (b) arrange with pavement repair team to repair any pothole(s) found during runway inspection.
- (c) activate CAG Airside Operations Control's through FMC for carrying out friction test if fuel or hydraulic leakage is detected on the runway.
- Depending on the extent of the leakage, the ASIT shall make an assessment on the risk to re-open the runway without first conducting a friction test. An example of risk which can be mitigated without first conducting a friction test is when a spillage is localized in an area and has been thoroughly cleaned up. If in doubt, the ASIT shall still take the safer approach to activate CAG Airside Operations Control to conduct a friction test before re-opening the runway. For aircraft accident, a friction test shall be carried out. If after conducting the friction test and the result shows that the friction level along any 100m section is measured to be 0.34 or less at test speed of 95km/h or to be at 0.50 or less at test speed of 65km/h, the ASIT shall notify the Airside Duty Manager and inform Team Leader of E&D Airfield Systems, Pavement Section to take immediate action to arrange for the removal of rubber deposits.
- 3. Rover 34 shall report any FOD or pavement defect(s) found, and record in the Runway Daily Inspection Report.
- Rover 35 shall record unserviceable airfield lightings and arrange to replace those unserviceable lightings during the
 maintenance closure.
- 5. Inform CAG of any rovers who have requested to enter the runway without giving notification to Rover 34 in advance.
- 6. For the 5- and 10-mins inspections, apart from Rovers 34 and 35, no other rovers/vehicles are allowed to enter the runway.
- For the 30- and 60-mins inspection, all vehicles entering closed runway shall inform CAG REP Officer of the works that they intend to carry out and the location of the work.
- 8. Please refer to AIP Singapore / AIP Sup, WSSS Section AD 2.12 and/or NOTAMs for details on the runway inspection timing.
- 9. ATC shall be consulted for interim arrangements that may deviate from the AIP, AIP Sup and NOTAMs or this procedure.

PROCEDURE 8: CONDUCTING TAXIWAY/TAXILANE DAILY INSPECTION AND GENERAL MAINTENANCE CHECK

The Airside Safety Inspection Teams and Airfield Lighting Shift Team shall

- check that the two (2) yellow flashing lights on their rovers are serviceable before entering the Taxiway/taxilane. For night inspection, the spotlights and headlights shall also be switched on before commencing the inspection.
- check the serviceability of the radio set by establishing a comms check with Changi Apron at least once a day at the start of the shift.
- check the serviceability of the transponder by observing that the green LED is blinking (2 times per sec).
- contact Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) through radio set (121.9 MHz / 119.675 MHz) to get approval to enter the taxiway/taxilane for inspection. Please refer to the document on "CAT1 Airside Driving Theory Handbook" Standard Phraseology for further details.
- only enter the Taxiway/taxilane upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) and to read back the instructions and to clarify with Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) if in doubt.



The Airside Safety Inspection Teams shall:

check the taxiway/taxilane for FOD and conduct taxiway/taxilane pavement inspection.

Safety: The Inspection Team shall look out and give way to aircraft (by keeping at least 51m away from the taxiing centre line) when carrying out the inspection.

The Airfield Lighting Shift Team shall:

- request FMC or Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) to switch on all the taxiway lights
 for inspection (applicable only in the day). Stop bar lights shall only be switched on when the inspection team is in the immediate vicinity
 of these lights and shall be switched off immediately after checking so that it will not interfere with live taxiing operations;
- conduct taxiway lighting inspection; and
- conduct taxiway guidance sign inspection (applicable only for night inspection).

Safety: The Shift Team shall always look out and give way to aircraft when carrying out the inspection.

Inform Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) when the inspection is completed and after having cleared from all operational taxiways/taxilanes.

Additional Note:

- (a) All blown taxiway guidance sign tubes shall be replaced immediately when spotted.
- (b) All FOD, fuel/hydraulic spillage, unserviceable obstruction lights, pavement/marking defects, obstructions infringing the taxiway strip shall be recorded in the Taxiway Daily Inspection Report.

PROCEDURE 9: CONDUCTING AIRCRAFT STAND DAILY INSPECTION AND GENERAL MAINTENANCE CHECK

The Airside Safety Inspection Teams shall:

- check that the two (2) yellow flashing lights on their rovers are serviceable before entering any aircraft stand.
- check the serviceability of the transponder by observing that the green LED is blinking. (2 times per sec)
- check the serviceability of the radio set by establishing a comms check with Changi Apron if access to aircraft stand via taxiway/taxilane is needed
- contact Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) through radio set (121.9 MHz / 119.675 MHz) to seek approval if access to aircraft stand via taxiway/taxilane is needed. Please refer to the document on "CAT1 Airside Driving Theory Handbook" Standard Phraseology for further details.
- only enter the taxiway/taxilane upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) and to read back the instructions and to clarify with Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) if in doubt.
- check the aircraft stand for FOD; and
- conduct rigid pavement inspection, including the condition of non roc drain gratings.

Safety: 1) The Inspection Team shall always look out and give way to aircraft taxiing and pushing back when carrying out the inspection.

- 2) The inspection team shall not travel in between two aircrafts all times.
- 3) Wherever possible, the inspection team shall avoid the use of secondary road.



PROCEDURE 10: NORMAL OPENING OF RUNWAY/TAXIWAY/TAXILANE CLOSURE

The Airside Safety Inspection Teams/Airfield Lighting Shift Team/authorised RTO under the direction of CAG Project Officer/CAG REP Officer shall ensure that all the work parties target to finish their work and clear from the runway/taxiway/taxilane at least 30min before the end of the planned runway/taxiway/taxilane closure period.

The Airfield Lighting Shift Team/authorised RTO under the direction of CAG Project Officer/CAG REP Officer shall carry out inspection of runway lighting (including rapid exit taxiway and exit taxiway lights)/taxiway lightings 30 minutes before the end of the planned runway/taxiway/taxilane closure period.

At the end of the published runway/taxiway/taxilane closure period, the Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer/CAG REP Officer shall: conduct a thorough FOD, pavement and runway/taxiway/taxilane lighting inspection to ensure that the runway is safe for operations. check that all the work parties and vehicles which have entered the runway/taxiway/taxilane are cleared from the site; and assemble at designated holding area account for manpower strength of all work parties check that all the closed runway/taxiway/taxilane markings, obstruction marker boards and lights are removed from the site Mobilise Airfield Lighting Shift Team /Aircraft Pavement Is runway/taxiway Are all runway/ Maintenance /taxilane cleared of taxiway/ taxilane Team/Project No all vehicles, lightings operational Contractor to machinery, and pavement in check and rectify personnel and FOD? good condition? the fault. Inform Changi Tower (For Runway 1 and Runway 2) / Yes Yes

For Runway/Taxiway/Taxilane:

Contact Changi Tower (For Runway 1 and Runway 2) (121.9MHz) or Changi East Tower (For Runway 3) (119.675MHz) through radio set. The phraseology to be used shall be "Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3), I have checked that all work parties, machines and equipment have vacated from the runway/taxiway/taxilane and the area is free of FOD and the pavement and airfield lightings are in good and serviceable condition.".

For Runway:

Work parties to report to CAG REP Officer to sign-out from REP & return all vehicles/machinery tags. Refer to Procedure 2 for procedure on Runway re-opening.



Changi East Tower (For Runway 3) how

long is needed to restore the lights.

Inform FMC to contact CAG

Officer in-

charge.

PROCEDURE 11: EMERGENCY OPENING OF RUNWAY/TAXIWAY/TAXILANE CLOSURE

Changi Tower (For Runway 1 and Runway 2) contacts_the CAG REP Officer, the Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer /authorised RTO under the direction of CAG Project Officer to request for emergency opening of the closed runway/taxiway/taxiway/taxiane.

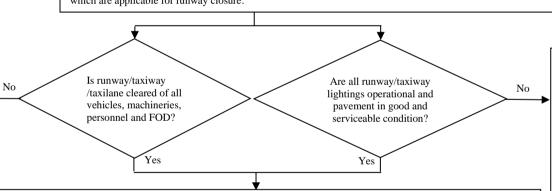
The CAG REP Officer, Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer /authorised RTO under the direction of CAG Project Officer shall immediately inform all parties on the runway/taxiway/taxilane to prepare the runway/taxiway/taxilane for emergency opening within the time stipulated below as informed by Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3). If the runway/taxiway/taxilane cannot be re-opened within the stipulated period, the Airside Safety Inspection Teams/Airfield Lighting Shift Team shall inform Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3), CAG REP Officer in advance and the CAG Team Leader in-charge of aircraft pavement and AFL.

Closure time	Evacuation time
Less than or Equal to 30 minutes (i.e. time-limited works)	5 minutes
More than 30 minutes	30 minutes

The Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer/CAG REP Officer shall:

- notify CAG REP Officer (for runway only).
- check that all openings on pavement and trenches are covered up;
- check that all the work parties and vehicles which have entered the runway/taxiway/taxilane are cleared from the site;
 and assemble at designated holding area
- check that all loose excavation on turf areas within the runway/taxiway strip is properly compacted;
- check that all the closed runway/taxiway/taxilane markings obstruction marker boards and lights, are removed from the site;
- conduct a thorough FOD, pavement and runway/taxiway/taxilane lightings inspection to ensure that the runway/taxiway/taxilane is safe for operations.
- account for manpower strength of all parties.

All work parties' supervisors shall wait at the holding area until clearance is given by the Airside Safety Inspection Teams which are applicable for runway closure.



For Runway/Taxiway/Taxilane:

Contact Changi Tower (For Runway 1 and Runway 2) (121.9MHz) or Changi East Tower (For Runway 3) (119.675MHz) through radio set. The phraseology to be used shall be "Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3), I have checked that all work parties, machines and equipment have vacated from the runway/taxiway/taxilane and the area is free of FOD and the pavement and airfield lightings are in good and serviceable condition."

For Runway:

Work parties to report to CAG REP Officer to sign-out from REP & return all vehicles/machinery tags. Refer to Procedure 2 for procedure on Runway re-opening.

END

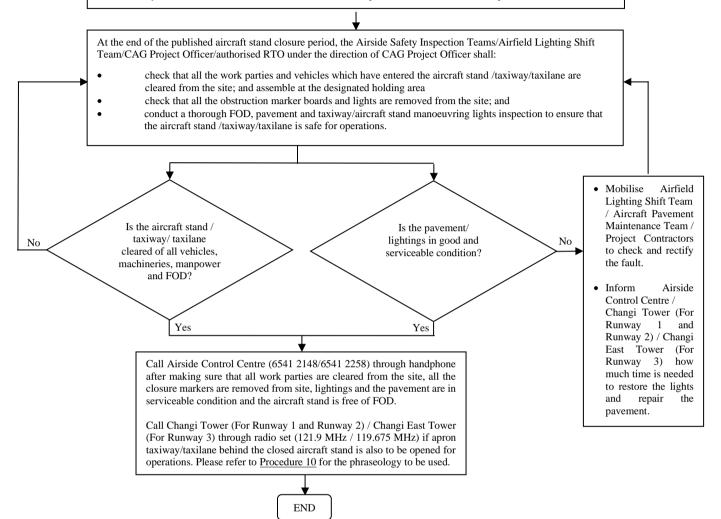
- Mobilise Airfield Lighting Shift Team/Aircraft
 Pavement Maintenance Team/Project contractors to check and rectify the fault.
- Inform Changi Tower (For RWY 1 and 2) and Changi East Tower (For RWY 3) how much time is needed to restore the lights and repair the pavement.
- Inform FMC to contact CAG Officer-incharge.

Additional Note:

Unless approved by Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3), all communications between the Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer/CAG REP Officer and all work parties shall continue to be via handphones. To facilitate the opening of runway within the specified evacuation time, CAG REP Officer may seek the approval from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) to use radio set (121.9 MHz / 119.675 MHz) in addition to using handphones for communications. This procedure shall be read in tandem with Airside Operations Control SOP for emergency opening of runway. This procedure shall be read in tandem with Airside Operations Control SOP for emergency opening of runway.

PROCEDURE 12: NORMAL OPENING OF AIRCRAFT STAND CLOSURE

The Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer shall ensure that all the work parties target to finish their work and clear from the aircraft stand/taxiway/taxilane at least 15 minutes before the end of the planned aircraft stand closure period.



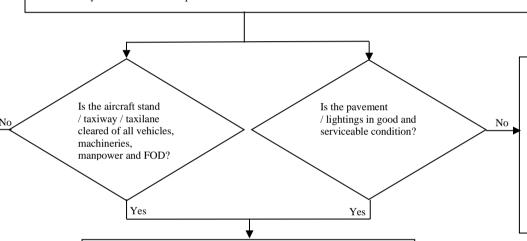
PROCEDURE 13: EMERGENCY OPENING OF AIRCRAFT STAND CLOSURE

Airside Control Centre contacts the Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer to request for emergency opening of aircraft stand.

The Airfield Safety Inspection Team/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer shall immediately inform all parties on the closed aircraft stand to prepare the stand for emergency opening

The Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Project Officer/authorised RTO under the direction of CAG Project Officer shall:

- notify the CAG Project/Maintenance-in-charge.
- check that all openings on pavement and trenches are covered up;
- check that all the work parties and vehicles which have entered the aircraft stand/taxiway/taxilane are cleared from the site; and assemble at designated holding area
- check that all the obstruction marker boards and lights are removed from the site; and
- conduct a thorough FOD, pavement and taxiway/aircraft stand manoeuvring lights inspection to ensure that the aircraft stand /taxiway/taxilane is safe for operations.



 Mobilise Airfield Lighting Shift Team / Aircraft Pavement Maintenance Team / Project Contractors to check and rectify the fault.

• Inform Airside Control Centre/Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) how much time is needed to restore the lights and repair the pavement.

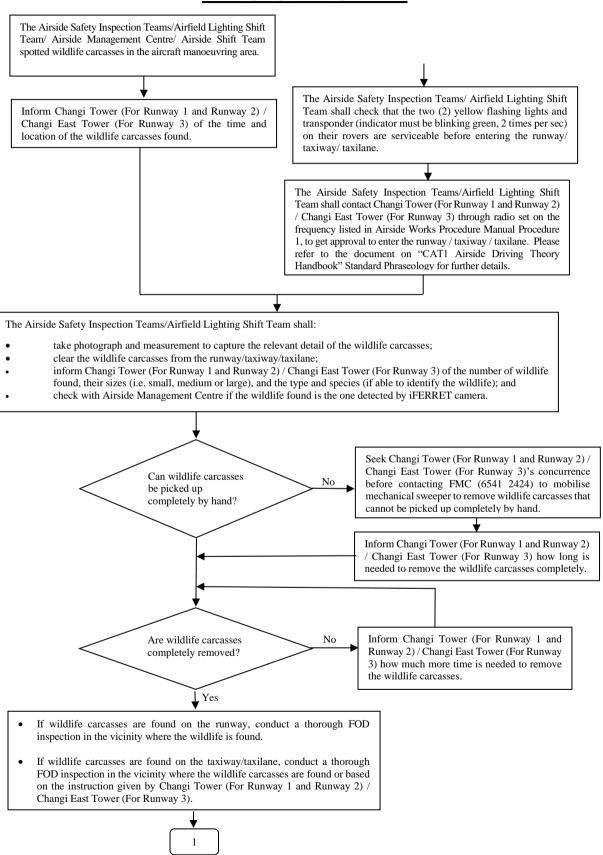
Call Airside Control Centre (6541 2148/6541 2258) through handphone after making sure that all work parties have been notified and are cleared from the site, all the closure markers are removed from site and the aircraft stand is free of FOD and

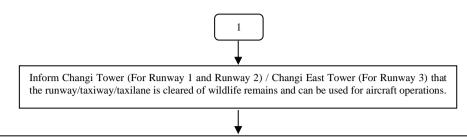
the lightings and pavement are in serviceable condition.

Call Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) through radio set (121.9 MHz / 119.675 MHz) if apron taxiway/taxilane behind the closed aircraft stand is also to be opened for operations. Please refer to $\underline{\text{Procedure }11}$ for the phraseology to be used.



PROCEDURE 14: RESPONSE TO WILDLIFE STRIKE REPORT AND WILDLIFE CARCASS FOD FOUND IN THE AIRCRAFT MANOEUVRING AREA





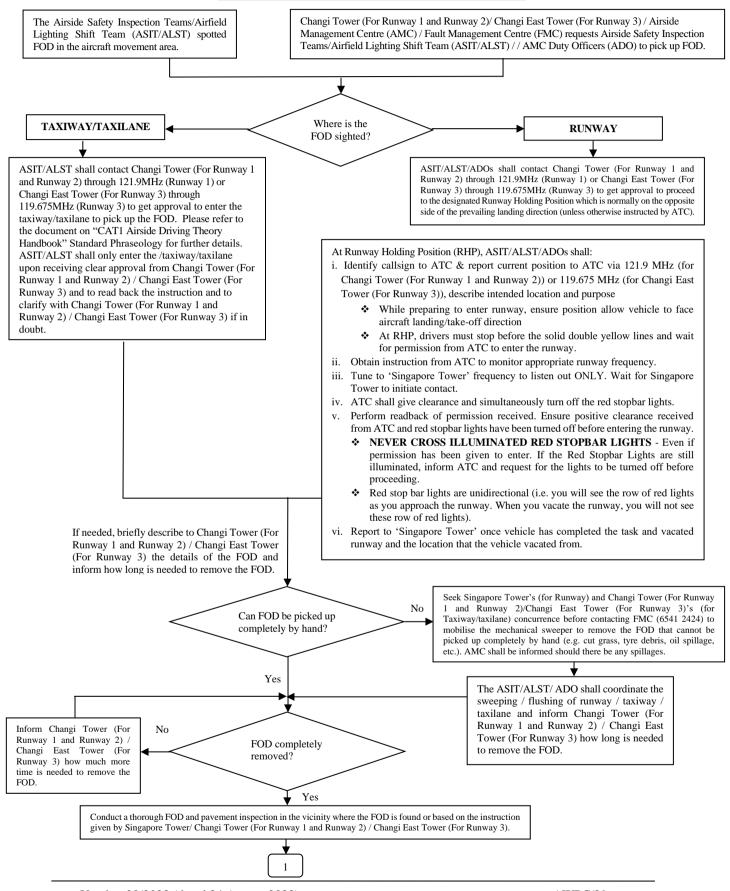
Location where the wildlife carcasses are found shall also be marked on a plan. Only bird carcasses are required to hand over to Airside Management Centre. The rest of the wildlife carcasses can be disposed. The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall also ensure that the Airside Management Centre staff acknowledge receipt of the bird carcasses.

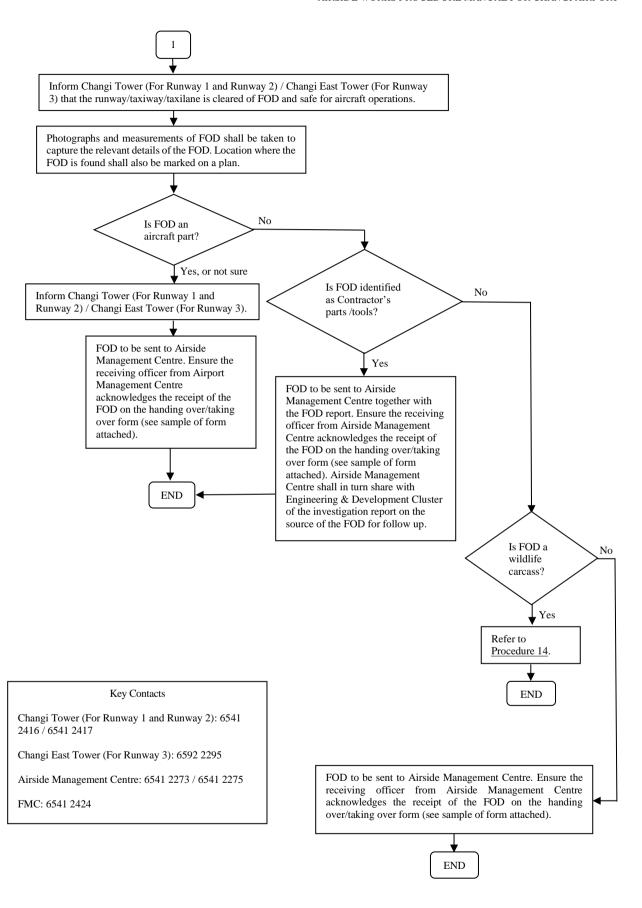


Additional Note:

- (a) All Personnel shall also be equipped with proper tools/PPE in handling and storing carcasses.
- (b) The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall stop and look in both directions to make sure that there is no approaching aircraft in flight when at the junction of a taxiway/roadway leading to a runway. If need to, the vehicle shall be positioned at an angle that allows maximum visibility of both ends.
- (c) The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall park the vehicle facing the landing end of the runway when picking up wildlife carcasses.

PROCEDURE 15: RESPONSE TO HANDLE FOD FOUND IN THE AIRCRAFT MANOEUVRING AREA





Additional Note:

- (a) The ASIT / ALST / ADO shall stop and look in both directions to make sure that there is no approaching aircraft in flight when at the junction of a taxiway/roadway leading to a runway. If need to, the vehicle shall be positioned at an angle that allows maximum visibility of both ends."
- (b) The ASIT / ALST / ADO shall park the vehicle facing the landing end of the runway when picking up FOD.
- (c) All rovers entering maneuvering area shall:
 - check that the two (2) yellow flashing lights on their rovers are serviceable before entering the runway. For
 night inspection, the spotlights and headlights shall also be switched on before commencing the inspection.
 - check the serviceability of the radio set by establishing a comms check with Changi Apron at least once a day
 at the start of the shift.
 - check the serviceability of the transponder by observing that the green LED is blinking (2 times per sec).
 - contact Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) through radio set
 on the frequency listed in Airside Works Procedure Manual Procedure 1, individually before the scheduled
 runway inspection timeslot to get approval to enter the runway for inspection. Please refer to the document on
 "CAT1 Airside Driving Theory Handbook" Standard Phraseology for further details.
 - only enter the Runway upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2) /
 Changi East Tower (For Runway 3) and the stop bar lights are not illuminated. If in doubt, read back the
 instructions or clarify with Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway
 3).

HANDING OVER / TAKING OVER FORM

S/No.	Description		
I certify that the above items have been received by me.		I witness that the above items have been handed over to the recipient.	
Name		Name	
Designation		Designation	
Organisation		Organisation	
Signature		Signature	

PROCEDURE 16: RESPONSE TO LOCAL ACTION

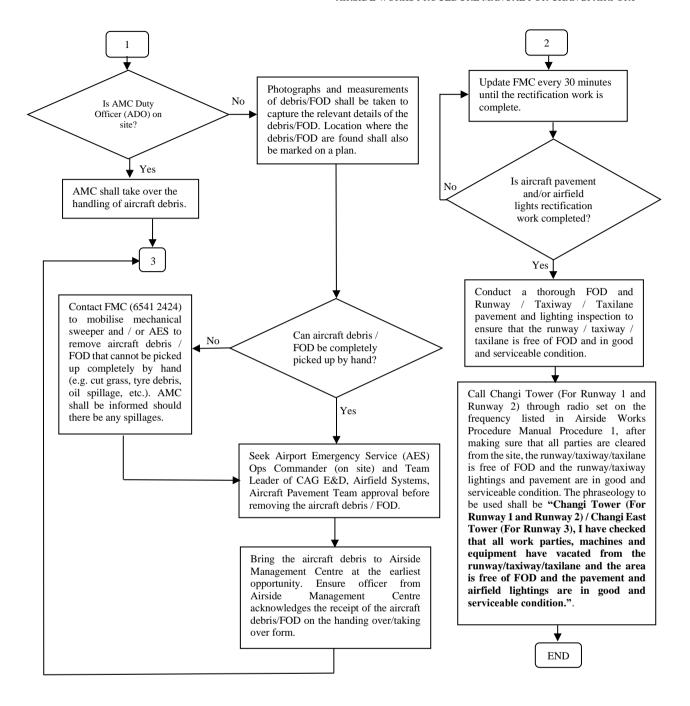
The Airside Safety Inspection Teams/Airfield Lighting Shift Team receives local action notification from Fault Management Centre (FMC) or Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3).

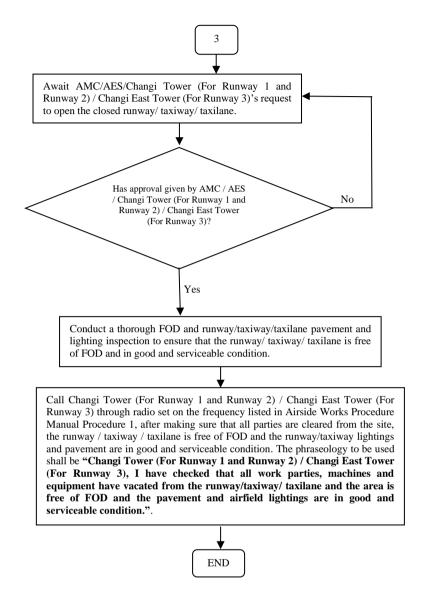
The Airside Safety Inspection Teams/ Airfield Lighting Shift Team shall check that the two (2) yellow flashing lights and transponder (indicator must be blinking green, 2 times per sec) on their rovers are serviceable before entering the

transponder (indicator must be blinking green, 2 times per sec) on their rovers are serviceable before entering the runway/taxiway/taxilane. The ASIT/ASLT shall also check the serviceability of the radio set by establishing a comms check with Changi ACC at least once a day at the start of the shift.

The Airside Safety Inspection Teams/ Airfield Lighting Shift Team shall contact Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) through radio set (121.9 MHz / 119.675 MHz) to get approval to enter the runway/taxiway/taxilane. Please refer to the document on "CAT1 Airside Driving Theory Handbook" Standard Phraseology for further details. The ASIT/ALST shall only enter the runway/taxiway/taxilane upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) and to read back the instructions and to clarify with Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) if in doubt.

The Airside Safety Inspection Team/Airfield Lighting Shift Team shall proceed to the site of incident. Conduct a thorough FOD and runway/taxiway/taxilane Any sight of Any signs of pavement lighting and aircraft debris No No damage to aircraft inspection to ensure that the /FOD? pavement and/or runway/ taxiway/ taxilane is airfield lightings? free of FOD and in good and serviceable condition. Yes Call Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) through radio Mobilise materials (i.e. premix, set on the frequency listed in Airside Works airfield lights), machinery Procedure Manual Procedure 1, after making sure additional staff to carry out the repair that all parties are cleared from the site, the work if necessary. runway/taxiway/taxilane is free of FOD and the runway/taxiway/taxilane lightings and pavement are in good and serviceable condition. The phraseology to be used shall be "Changi Tower (For Runway 1 and Runway 2) / Changi East Seek Airport Emergency Service (AES) Ops Commander (on site) and Team Tower (For Runway 3), I have checked that all Yes work parties, machines and equipment have Leader of CAG E&D, Airfield Systems, vacated from the runway/taxiway/taxilane and Aircraft Pavement Team approval before the area is free of FOD and the pavement and carrying out rectification work. airfield lightings are in good and serviceable condition." END





Additional Note:

The Airside Safety Inspection Teams shall activate the CAG Airside Operations Control to conduct friction test under the following scenarios:

- i) Aircraft veered off /overshot the runway,
- ii) Fuel or hydraulic leakage is detected on the runway,
- iii) Aircraft skidding on the runway.

Depending on the extent of the leakage, the ASIT shall make an assessment on the risk to re-open the runway without first conducting a friction test. An example of risk which can be mitigated without first conducting a friction test is when a spillage is localized in an area and has been thoroughly cleaned up. If in doubt, the ASIT shall still take the safer approach to activate CAG Airside Operations Control to conduct a friction test before reopening of the runway. For aircraft accident a friction shall be carried out. If after conducting the friction test and the result shows that the friction level along any 100m section is measured to be 0.34 or less at test speed of 95km/h or to be at 0.50 or less at test speed of 65km/h, the ASIT shall notify the Airside Duty Manager and inform the Team Leader of CAG E&D, Airfield Systems, Aircraft Pavement Team to take immediate action to arrange for the removal of rubber deposits.

PROCEDURE 17: RESPONSE TO CATEGORY II ILS OPERATION

The Airside Safety Inspection Teams/Airfield Lighting Shift Team receives CAT II ILS operation notification from Fault Management Centre (FMC) or Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3).



The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall check that the two (2) yellow flashing lights and transponder (indicator must be blinking green, 2 times per sec) on their rovers are serviceable before entering the runway/taxiway/taxilane.



The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall contact Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) through radio set on the frequency listed in Airside Works Procedure Manual Procedure 1, to check which is the landing runway and get approval to enter that runway to carry out the inspection first, followed by the take-off runway. Please refer to the document on "CAT1 Airside Driving Theory Handbook" Standard Phraseology for further details. The ASIT/ALST shall only enter the runway upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) and the stop bar lights are not illuminated. If in doubt, read back the instructions or clarify with Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3).



The Airside Safety Inspection Teams and/or Airfield Lighting Shift Team shall proceed to check the pavement, approach and runway lights for the landing runway first before carrying out the same for the take-off runway. The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall be given 20 to 30 minutes to complete inspection on one runway. The pavement and lighting inspections for all runways shall be completed within 1 hour upon FMC/Changi Tower (For Runway 1 and Runway 2) notification. The following approach and runway lights shall be checked for its serviceability and the status recorded in the Airfield Lighting Inspection Checklist:

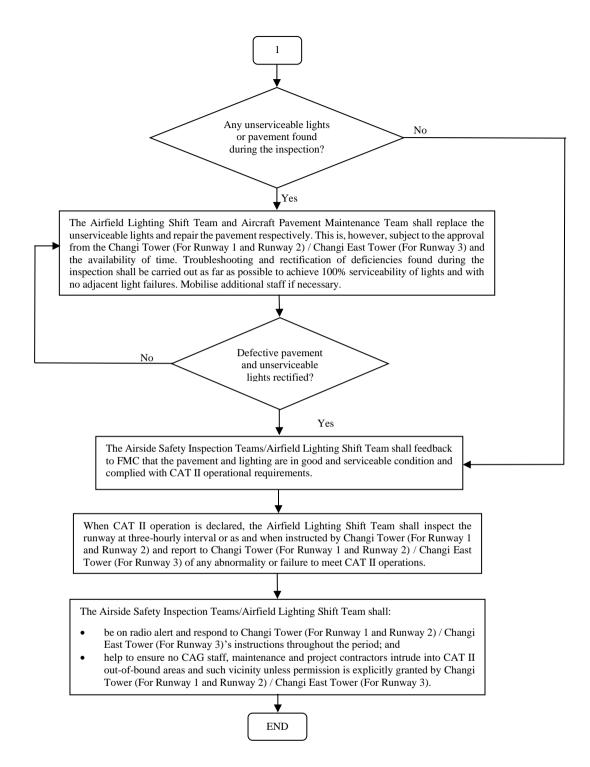
- · approach lights;
- threshold lights;
- touchdown zone lights;
- runway centre line lights;
- runway end lights;
- runway edge lights; and
- Precision Approach Path Indicator (PAPI) lights.

Following which, the Airside Safety Inspection Teams and/or Airfield Lighting Shift Team shall check for the serviceability of all the standby generator sets by asking Changi Tower (For Runway 1 and Runway 2) Watch Manager to switch on from Changi Tower (For Runway 1 and Runway 2).



The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall feedback to FMC on the condition of pavement, the standby generator sets, and the number of unserviceable lights based on the list above.



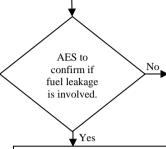


PROCEDURE 18: RESPONSE TO LEAKAGE INCIDENT ON RUNWAY/TAXIWAY/TAXILANE/AIRCRAFT STAND / ROADWAY

For Runway/Taxiway/Taxilane: Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) receives notification of aircraft hydraulic or fuel leakage and activates Airside Management Centre (AMC), AES, FMC and/or Airside Safety Inspection Teams/Airfield Lighting Shift Team to check the site.

For Aircraft Stand/Roadway: FMC receives notification of hydraulic spillage and activates Airside Management Centre (AMC) and the cleaning contractor.

- a) FMC shall contact Airside Safety Inspection Teams/ Airfield Lighting Shift Team through walkie-talkie /handphone if the hydraulic leakage is at aircraft stand.
- b) Where aircraft pavement/airfield lighting are damaged, FMC shall also inform relevant CAG Engineering & Development Cluster Team Leaders and maintenance contractor (see attached contact list).
- c) Airside Management Centre shall compile incident report capturing location of incident and chronology of events.
- d) The particulars of the responsible party (e.g. flight no./ callsign, aircraft registration no., aircraft type, etc.), where traceable, shall also be included.
- e) Airside Management Centre shall endorse the incident report prepared and forward copies to the following parties for follow-up action:
 - Team Leaders of Engineering & Development Cluster / Airfield Systems, Aircraft Pavement Team and Airfield Lighting Team
 - ii) CAG Chief Legal Officer.
- The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall arrange to carry out repairs or replacement.
- g) The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall also inform Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) to close the affected area for repairs / replacement or for the cleaning contractor /AES to proceed with cleaning works. *
- h) The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall take photos of the incident on site where necessary for proper record.
- The Airside Safety Inspection Teams/Airfield Lighting Shift Team shall update FMC/Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) regularly.
- j) When repairs/cleaning works have been completed, the Airside Safety Inspection Teams/Airfield Lighting Shift Team shall carry out a FOD, pavement and lighting inspection before declaring the area open for operations.
- k) The Airside Safety Inspection Teams/Airfield Lighting Shift shall also update FMC upon completion of the repair works.
- Standard phraseology shall be used when communicating with Changi Tower (For Runway 1 and Runway 2):
 - i) For access into taxiway, use the word "REQUEST PERMISSION TO PROCEED TO TAXIWAY".
 - ii) For access into runway, use the word "REQUEST PERMISSION TO ENTER RUNWAY".
 - iii) Once out from runways and taxiways, use the word "<u>VACATED</u> FROM RUNWAY OR TAXIWAY"
- m) All Rovers and Runway Sweepers shall only enter the taxiway and runway upon receiving clear approval from Changi Tower (For Runway 1 and Runway 2), read back the instructions and to clarify with Changi Tower (For Runway 1 and Runway 2) if in doubt.



a) AES updates, Changi Tower (For Runway 1 and Runway 2) who shall close

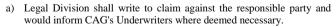
 AES shall follow up with necessary action to contain and remove the fuel leak.

the affected area.

 c) Changi Tower (For Runway 1 and Runway 2) shall be informed by AES when the site is ready for operations. AES updates Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) of the extent of hydraulic leakage. Changi Tower (For

Runway 1 and Runway 2) / Changi East Tower (For Runway 3) shall inform FMC to activate AMC, Airside Safety Inspection Teams / Airfield Lighting Shift Team the cleaning contractors. The affected area shall be closed where necessary.

- The cleaning contractor shall inform Airside Safety Inspection Teams/ Airfield Lighting Shift Team and FMC of progress of cleaning works on site.
- c) FMC shall provide regular updates of site status and inform Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3) when cleaning works have completed.
- The cleaning contractor shall inform FMC of progress of cleaning works on site.
- b) Upon works completion, inspection to be carried out with AMC officer.
 - a) The Airside Management and Team Leaders of Airfield Systems of Engineering & Development Cluster in-charge of the respective areas of maintenance shall feedback to Legal Division on any claims arising from the hydraulic leakage incident.
 - b) These should, as far as possible, be substantiated with works order (capturing labour and materials expended) issued to contractors for the cleaning or repair job carried out and be submitted within one week of receiving the incident report.



 Legal Division shall inform Finance Division to bill the responsible party in order to recover the repair/ cleaning costs incurred.



* For temporary closure purposes, the Airside Safety Inspection Teams/Airfield Lighting Shift Team shall carry a minimum of 4 sets of heavy-duty, rubber type cones, chequered flags and red fixed lights to demarcate the closed area.

Additional Note: If there is hydraulic fluid leakage on the runway, friction test is required to be carried out.

Depending on the extent of the leakage, the ASIT shall make an assessment on the risk to re-open the runway without first conducting a friction test. An example of risk which can be mitigated without first conducting a friction test is when a spillage is localized in area and has been thoroughly cleaned up. If in doubt, the ASIT should still take the safer approach to activate CAG Airside Operations Control to site to determine the need to conduct a friction test before re-opening of the runway. For aircraft accident a friction test shall be carried out. If after conducting the friction test and the result shows that the friction level along any 100m section is measured to be 0.34 or less at test speed of 95km/h or to be at 0.50 or less at test speed of 65km/h, the ASIT shall notify the Airside Duty Manager and inform the Team Leader of CAG E&D Airfield Systems, Aircraft Pavement Team to take immediate action to arrange for the removal of rubber deposits.

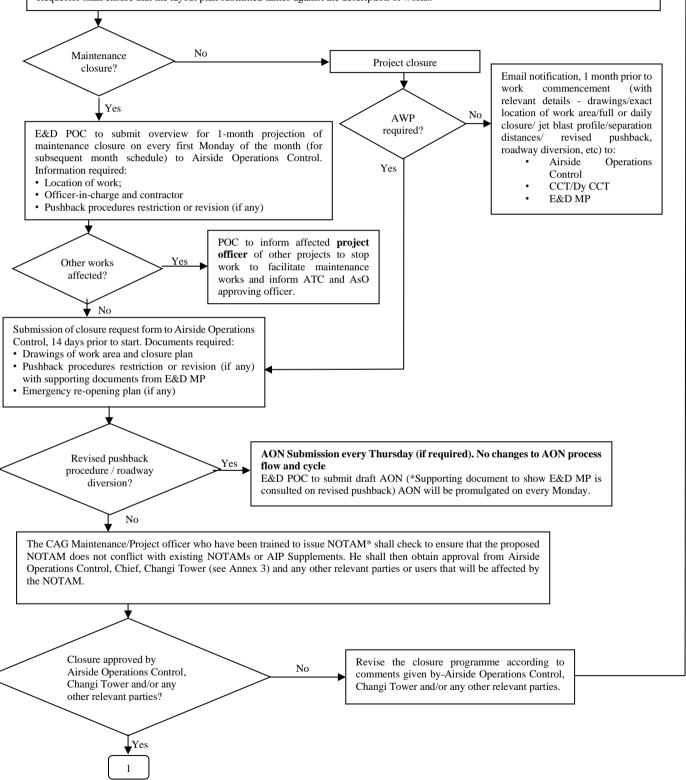
LIST OF CONTACT PERSONS FOR AIRCRAFT HYDRAULIC LEAKAGE INCIDENT ON RUNWAY/TAXIWAY/TAXILANE/AIRCRAFT STAND

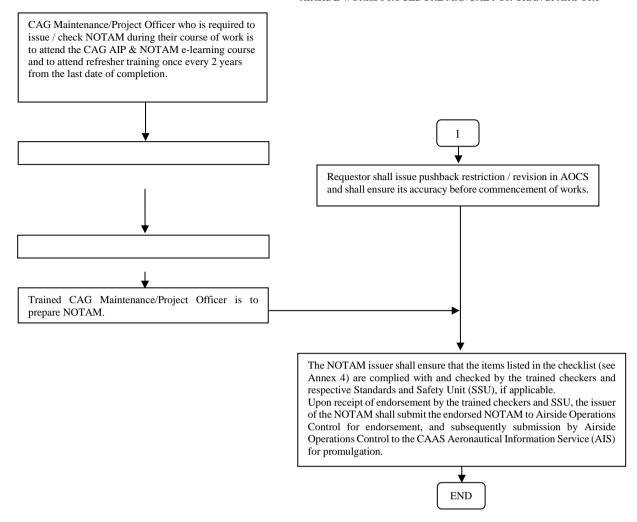
Chang	zi Tower	
1	Duty Tower Watch Manager	Tel: 6541 2416/2417
Airpo	rt Emergency Service (AES)	
2	Station 1 Watch Tower	Tel: 6541 2526
3	Station 2 Watch Tower	Tel: 6541 2544
4	Station 3	Tel: 6541 2531
FMC		
5	Duty Supervisor	Tel: 6541 2424
Airsid	e Operations Control	
6	Airside Control Centre (ACC)	Tel: 8533 4558 / 6541 2151
7	Airside Management Centre (AMC)	Tel: 6541 2273 / 2275
CAG	Engineering & Development Cluster	
8	Team Leader, Airfield Systems, Aircraft Pavement Team	HP: 8191 9223
9	Team Leader, Airfield Lighting Team	HP: 9457 7373
Chye '	Thiam Maintenance Pte Ltd	
10	Contractor's Manager	HP: 9299 7687

PROCEDURE 19: APPLYING RUNWAY/TAXIWAY/TAXILANE/ AIRCRAFT STAND CLOSURE TO CARRY OUT MAINTENANCE/PROJECT WORK

The requestor shall submit runway/taxiway/taxiway/taxilane/aircraft stand closure programme to the CAG Maintenance/Project Officer for approval. CAG Maintenance/Project Officer who have been trained to issue NOTAM shall go through the CAM) Part 4.1 on Aerodrome Reporting before preparing the NOTAM.

A layout plan using the aerodrome chart in the AIP, clearly showing the proposed areas to be closed is to be attached with the closure programme. Requestor shall ensure that the layout plan submitted tallies against the description of works.





Additional Notes:

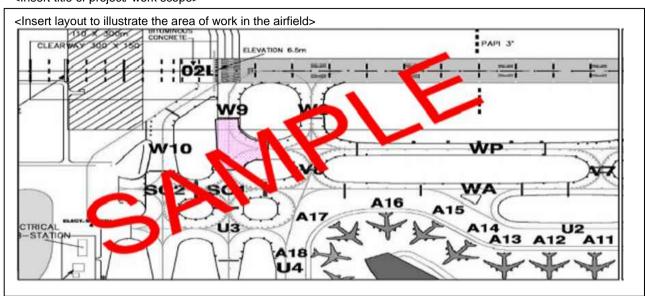
- (a) Approval from Changi Tower (For Runway 1 and Runway 2) is not required for closure of aircraft stand (i.e. provided that no runway/taxiway/taxilane is required).
- (b) Application for stand closure is via online gate closure portal <u>at least 10 working days</u> before the proposed date of closure. Submission not fulfilling the required lead time requirement via the portal will be evaluated on a case-by-case basis.

Annex 3

Twy Closure Approval No:

CLOSURE PROGRAMME

<Insert title of project/ work scope>



For clarification, please call handphone:		
CAG (Project officer):	Contractor:	/ Rover

LEGEND	CLOSU	RE LOCATION	DATE	TIME (L/T)	REMARKS (FULL/DAILY)
Requested B	By:	Supported By:		Approved By:	
(Compa	any)	CAG Engi	neering &	(Runway & Taxiway/Ta	axilane Only)
		Relevan	t Group	Chief Changi Tower(WEST)	SVP, Airside Operations Control
(Nam	e)	(Nai	me)	(Name)	(Name)
(Signature	& Date)	(Signatur	e & Date)	(Signature & Date)	(Signature & Date)

Colour code : Taxiway/taxilane closure : Work area

: Stand Closure - (no aircraft parking)

: Stand restriction - (for layover only/no movements/no engine run)

: Advisory Note - aircraft pushback restrictions

NOTE: The description of work under closure location and the inserted layout (use AIP Aerodrome chart) must tally, and NOTAM accordingly

	nex 4 Reference:		AIRSIDE	E WORKS PROCEDURE MANUA.	L FOR CHAN	NGI AIRPORT
СНЕ	ECKLIST FOR NOT	AM / AIP SUPPLEMENT / A CIRCULAR P			CAL INFO	RMATION
Pro	ject Title:					
Rec	questing Section:		Work	Location:		
		Refore	e Promi	ulgation		
S/No		Item		ingunon —		Please Circle /
						Respond
1	Supplement / AIP A	whether the aeronautical data and mendment / Aeronautical Informations (eg. runway closure, longer	mation (Circular impacts safety and effi	iciency of	Yes / No / N.A.
2	Have mitigation me NOTAM / AIP Sup	easures for the impact on safety plement / AIP Amendment / Aen the form of a risk assessment?	eronautio			Yes / No / N.A.
3	obstacle lights, etc. Amendment / Aeror	nat the necessary safety provision in will be in place on site to support the support of the su	support	the NOTAM / AIP Supplement	ent / AIP	Yes / No / N.A.
4	the proposed change / Aeronautical Infor		e NOTA	M / AIP Supplement / AIP An	nendment	Yes / No / N.A.
5	/ AIP Amendment / activities is correct	nat the aeronautical data and information Circ Aeronautical Information Circ and not in conflict with any of to mautical Information Circulars?	cular in a the exist	association with the proposed	changes /	Yes / No
6	AIP Supplement / A	hat the phrasing of the aeronaut IP Amendment / Aeronautical I	Informat			Yes / No
	-	assigned to check the site when AIP Amendment is effected	the			
	Number	AIF Amendment is effected				
Issue	r of NOTAM/AIP Supp	lement/AIP Amendment:	(Checker of NOTAM/AIP Supple	ment/AIP A	mendment:
Name	e / Designation	Signature / Date		Name / Designation	Signature	e / Date
	ked by SSU:	Signature / Date				
		After Pr that the promulgated NOTAN ation Circular is correct?			ment /	Yes
		ne NOTAM / AIP Supplement / mber and attached it with this C				Yes ef No:
your a	nswer to any of the ab	ove items is "No", please give the	the reaso	n(s) below: -	•	
Issue	r of NOTAM/AIP Supp	lement/AIP Amendment:	C	hecker of NOTAM/AIP Supplen	nent/AIP An	nendment:
Name	e / Designation	Signature / Date		Name / Designation	Signature	e / Date

Note:

- 1. For content of NOTAM which takes effect less than 1 day, the issuer of NOTAM shall inform Airside Safety Inspection Team (Changi) / Aircraft Pavement & Airfield Lighting Inspection Teams (Seletar) via phone and fax immediately after the NOTAM is promulgated.
- 2. Only those officers have been trained can issue NOTAM.
- 3. The checker of NOTAM/AIP Supplement/AIP Amendment shall be officers who have undergone training.
- 4. The checker of the NOTAM/AIP Supplement/AIP Amendment cannot be the issuer of the same NOTAM/AIP Supplement/AIP Amendment.
- 5. NOTAM / AIP Supplement / AIP Amendment Promulgation Form must be attached to this checklist.
- NOTAM / AIP Supplement / AIP Amendment Promulgation Form shall be checked by the respective SSU before submission.
- 7. Project officers shall consult Airside Operations Control, prepare AIP and all the necessary supporting documents, and submit to Airside Operations Control within the publication timeline as stipulated in Changi Aerodrome Manual. Airside Operations Control shall be responsible for the final submission to CAAS, AIS.
- 8. For NOTAM promulgation only Maintenance works carried out by Team Leaders of E&D Airfield Systems, Pavement section and AFL section need not be endorsed by SSU. However, the issuer has to complete the checklist before sending the NOTAM to CAAS AIS and ASIT (Changi) / Aircraft Pavement & Airfield Lighting Inspection Teams (Seletar).

PROCEDURE 20: APPLYING EMERGENCY RUNWAY/TAXIWAY/TAXILANE CLOSURE TO CARRY OUT REPAIR WORK

The Airside Safety Inspection Teams (ASIT) /Airfield Lighting Shift Team (ALST)/CAG Officer/authorised RTO under the direction of CAG Project Officer spotted a defect on the runway/taxiway/taxilane during their inspection, which could pose a danger to aircraft operations.

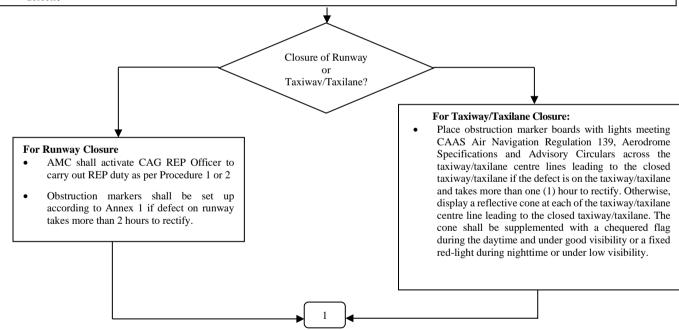
The following defects are defects which warrant immediate closure of runway/taxiway/taxilane. This list shall serve as a guide to the Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Officer/authorised RTO under the direction of CAG Project Officer but shall not be taken as exhaustive. For defects which are not listed below, the Airside Safety Inspection Teams/Airfield Lighting Shift Team/CAG Officer/authorised RTO under the direction of CAG Project Officer shall assess whether to invoke this procedure based on their judgmental assessment and experience:

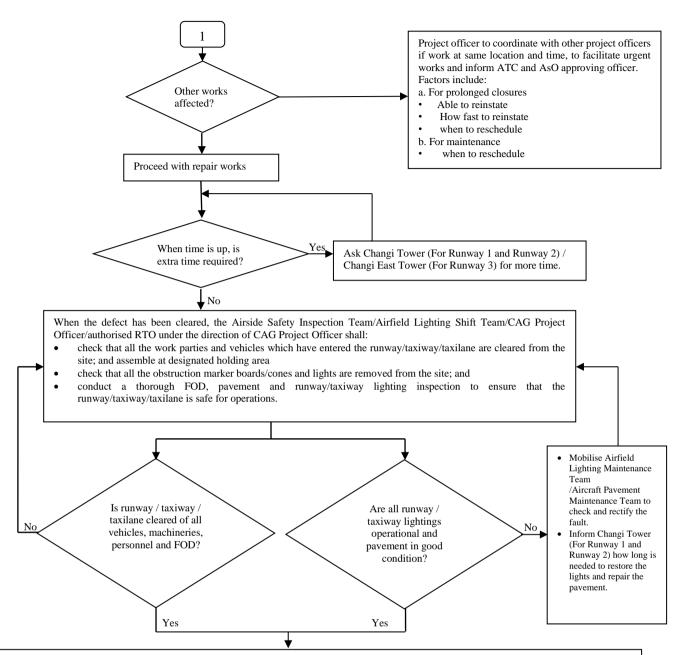
- (i) Surface flooding at runway/taxiway/taxilane
- (ii) Pothole of size greater than 15 cm in diameter at runway / taxiway*
- (iii) Outage of both sets of Precision Approach Path Indicator (PAPI) lights on the landing direction.
- (iv) Unserviceable light adjacent to another unserviceable light during CAT II ILS operation / outage of one complete circuit of runway lights;
- (v) Deep erosion of runway/ taxiway / taxilane strip surface;
- (vi) Obstacles on the runway/taxiway or runway/taxiway strip or infringing the associated approach/take-off surfaces;
- (vii) Rubber tyre debris or other large quantity of debris scattered on the runway/taxiway /taxilane surface;
- (viii) Excessive bird activities on a runway or within the approach/take-off areas;
- (ix) Fuel/Hydraulic Fluid leakage or spillage on runway/taxiway/ taxilane;
- (x) Friction level that drops below 0.34 (95km/h) or 0.50 (65km/h) on any 100m section of the runway.

 \downarrow

The ASIT/ALST/CAG Officer/authorised RTO under the direction of CAG Project Officer shall:

- Inform Changi Tower (For Runway 1 and Runway 2) and AMC that the runway/taxiway/taxilane is not safe for aircraft operations and how long is needed to rectify the defects;
- If NOTAM action is needed, CAG Project Officer shall submit draft & NOTAM proposal to CAG Airside Operations Control for promulgation.
- To seek approvals from Changi Tower (For Runway 1 and Runway 2) to close taxiway/taxilane, and from AMC to close runway for critical pavement defects:



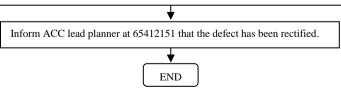


For Runway/Taxiway/Taxilane:

Contact Changi Tower (For Runway 1 and Runway 2) (121.9MHz) or Changi East Tower (For Runway 3) (119.675MHz) through radio set. The phraseology to be used shall be "Changi Tower (For Runway 1 and Runway 2) / Changi East Tower (For Runway 3), I have checked that all work parties, machines and equipment have vacated from the runway/taxiway/taxilane and the area is free of FOD and the pavement and airfield lightings are in good and serviceable condition."

For Runway:

Work parties to report to CAG REP Officer to sign-out from REP & return all vehicles/machinery tags. Refer to Procedure 2 for procedure on Runway re-opening.

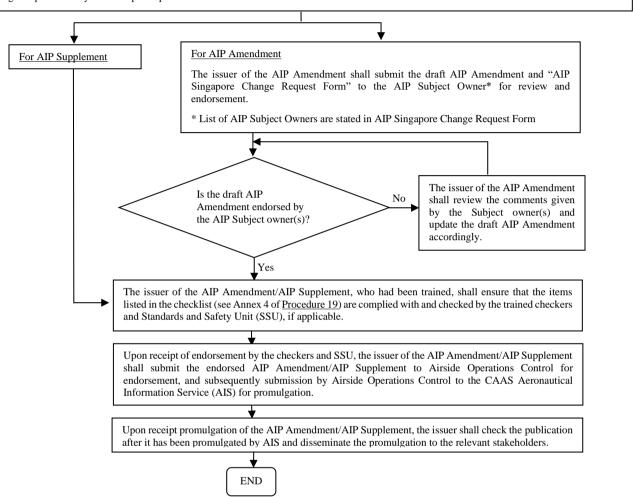


The defined criteria that warrant immediate closure of the runway is:

A pothole on the runway of size greater than 150mm in diameter and 75mm in depth, enlarging and with the potential of generating FOD would warrant immediate closure of runway.

PROCEDURE 21: PREPARING AND DISSEMINATING AIP AMENDMENT/AIP SUPPLEMENT

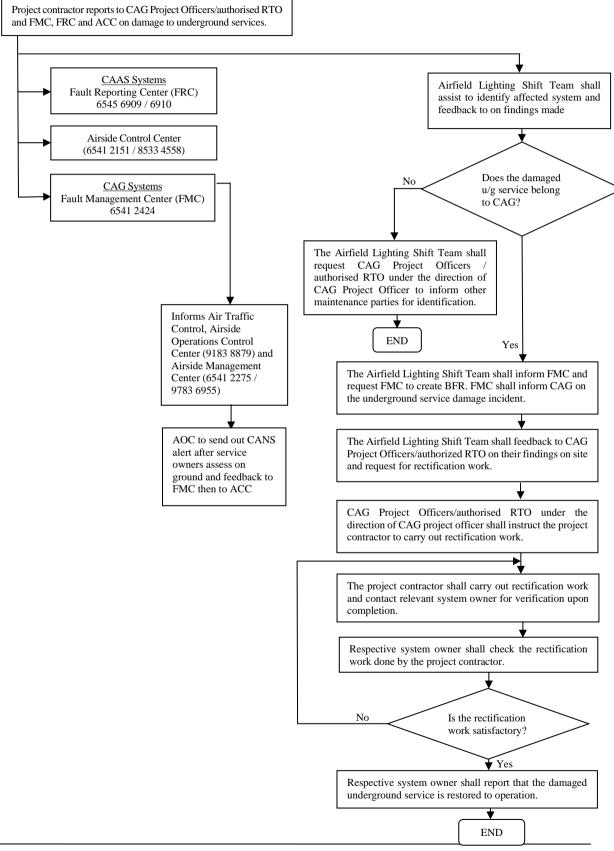
CAG Maintenance/Project Officer who have been trained to issue AIP amendment / AIP Supplement* shall go through the <u>Changi Aerodrome Manual (CAM) Part 4.1 on Aerodrome Reporting</u> before preparing a draft AIP Amendment / AIP Supplement and carry out a risk assessment on the impact of the proposed changes / activities, e.g. construction work to airside facilities, if applicable. Reference should be made to the AIP guide published by CAG Airport Operations Control Division.



Additional Note:

- For newly constructed / rehabilitated aircraft parking stands, early confirmation on the data by the licensed surveyor through email would be established prior to submission of endorsed as-built drawings.
- Project / maintenance officer shall ensure that updates in the AIP and aerodrome manuals are made whenever there are changes to the infrastructure.
- For permanent changes to the information contained in the AIP, or completion of new airfield infrastructure (e.g. new taxiway / new aircraft stand etc.), CAG Maintenance/Project Officer shall inform Master Planning (Airfield Capacity Planning team) to update the changes in the Changi Aerodrome Manual (CAM) and in AIP Singapore accordingly.
- For AIP/AIP supplement promulgation, the form shall only be signed off if a proper safety assessment has been carried out where applicable.
- For permanent changes that are put up using NOTAMs, an additional "AIP Singapore Change Request Form" is needed to submit to AIS for AIP
 amendment.
- For permanent changes that are put up using AIP Supplement, an additional "AIP Singapore Change Request Form" is needed to submit to AIS for AIP amendment.
- For amendment on WSSS AD2.24 Aerodrome Chart AD-2-WSSS-ADC-2, in parallel with the submission to CAAS AIS, the issuer of the AIP amendment shall extend a copy to AES (for their update of the crash map).

PROCEDURE 22: RESPONSE BY PROJECT CONTRACTOR TO <u>UNDERGROUND SERVICE DAMAGE BY PROJECT</u> CONTRACTOR DURING EXCAVATION WORK



PROCEDURE 23: PROCEDURE FOR CANCELLING RUNWAY/TAXIWAY/TAXILANE/AIRCRAFT STAND CLOSURE OUTSIDE CAG NORMAL WORKING HOURS

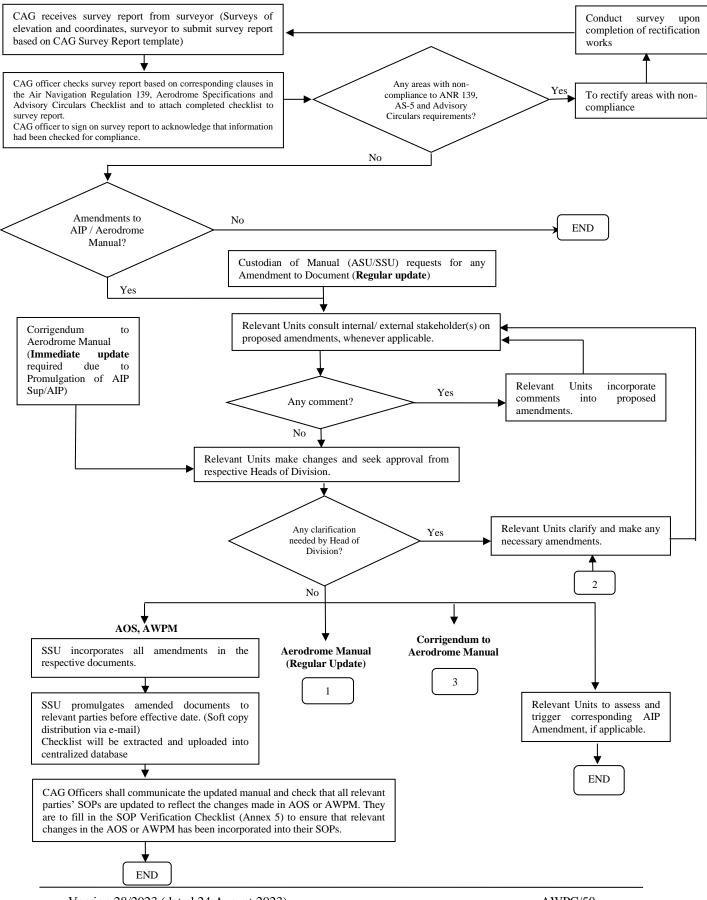
The Maintenance/Project contractor has requested and obtained approval for a runway/taxiway/taxilane/aircraft stand closure through CAG Officer. Due to unforeseen circumstances, the contractor requests to cancel the pre-arranged closure on the day of the closure which happens to be outside CAG normal working hours.

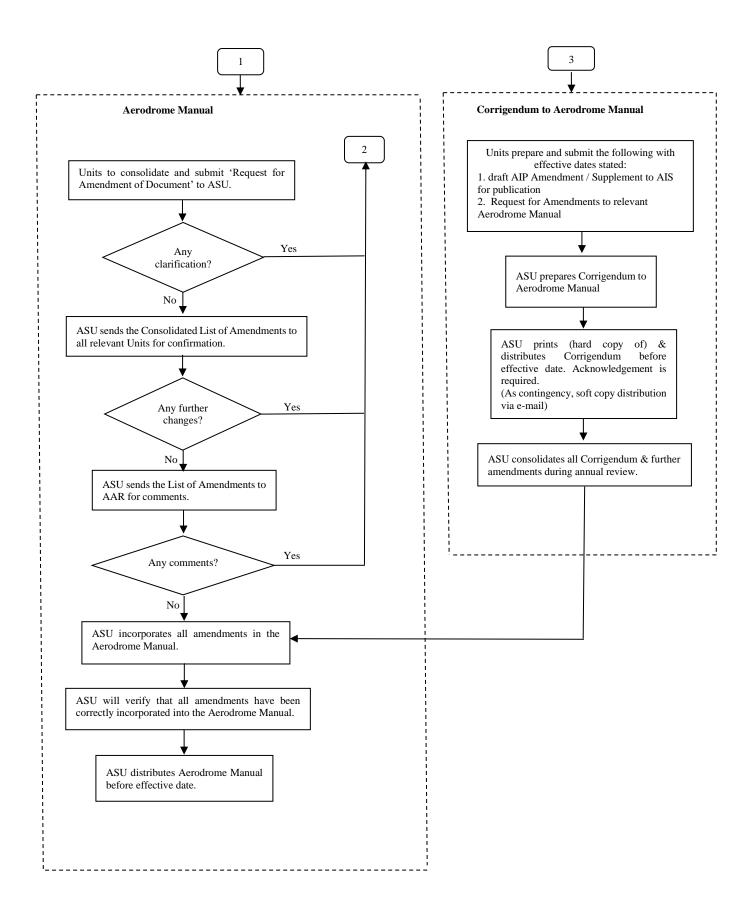
The Maintenance/Project contractor shall inform the respective CAG Officer/authorised RTO under the direction of CAG Project Officer and make known his intent to cancel the pre-arranged closure. CAG Officer/authorised RTO under the direction of CAG Project Officer, upon notification by the contractor, shall convey the message to Changi Tower (For Runway 1 and Runway 2) (6541 2416) / Changi East Tower (For Runway 3) and FMC (6541 2424), giving his full name, area of work to be cancelled (provide NOTAM number if available) and handphone number in the event that clarification needs to be sought. CAG Officer (listed in CAG Authorised name list) shall call and email AIS to issue a NOTAM to cancel the pre-arranged runway/taxiway/taxilane/aircraft stand closure. (use standard email format and indicate the NOTAM number to be cancelled). Standard email format: (AIS contact number: 6595 6056) Caas_ATCSOA@caas.gov.sg Caas_ATCSOB@caas.gov.sg Caas_ATCSOC@caas.gov.sg Caas ATCSOD@caas.gov.sg CAAS-ATSATCSO-WSALL@CAAS.gov.sg Dear AIS officer. As per our tele-conversation. Due to last minute unforeseen circumstances. We would like to cancel the closure on runway/taxiway/taxilane/aircraft stand_ . As such we would like to seek your assistance to issue a NOTAM to cancel existing NOTAM A return reply via this email is appreciated. Regards Upon receiving the request for cancellation, AIS shall reply the email with a new NOTAM number confirming that the original NOTAM has been cancelled. Upon receiving the reply from AIS, CAG Officer/authorised RTO under the direction of CAG Project Officer shall inform Changi Tower (For Runway 1 and Runway 2), the NOTAM issuer and all affect parties. END

Note:

- If the Original NOTAM contains several other dates and which will be cancelled together with the runway/taxiway/taxilane/aircraft stand to be closed, then the issuer of the NOTAM shall re-issue a new NOTAM for the rest of the remaining dates.
- 2) There is no requirement to cancel the NOTAM if the CAG Officer/authorised RTO so decides to re-open the runway/taxiway/taxilane/aircraft stand earlier after it has been closed according to the approved timing.

PROCEDURE 24: PROCESS FLOW ON UPDATING OF AERODROME MANUAL, AIRPORT OPERATIONAL AND SAFETY(AOS), AIRSIDE WORKS PROCEDURE MANUAL (AWPM)





Annex 5

Version 28/2023 (dated 24 August 2023)

SOP Verification Checklist



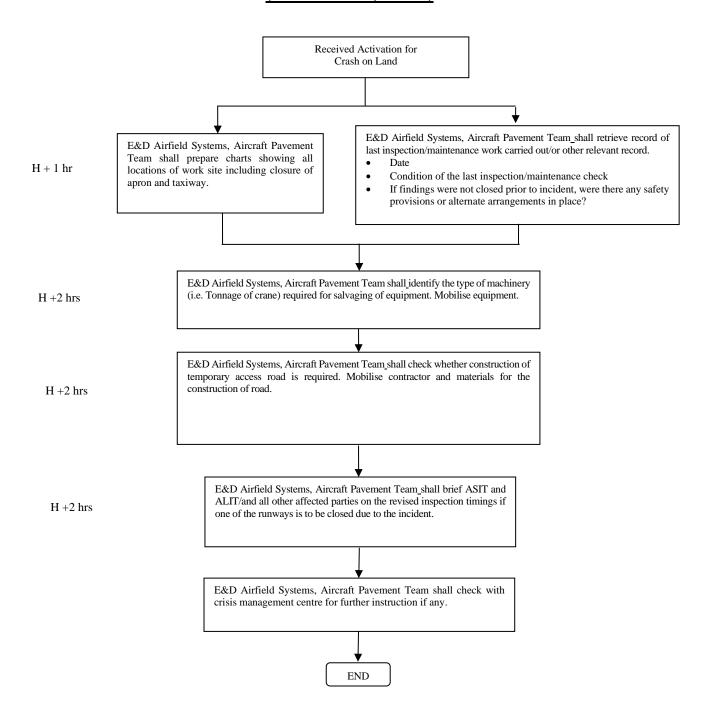
The purpose of this checklist is to ensure that work parties had implemented the latest requirements, where relevant, as stipulated in CAG's procedures such as the Airport Operational and Safety Requirement Manual (AOS) or Airside Works Procedure Manual (AWPM) as and when a new revision to the manual or SOP is promulgated.

CAG project / maintenance officer shall attach excerpts of the affected SOP from work parties for documentation of such changes made.

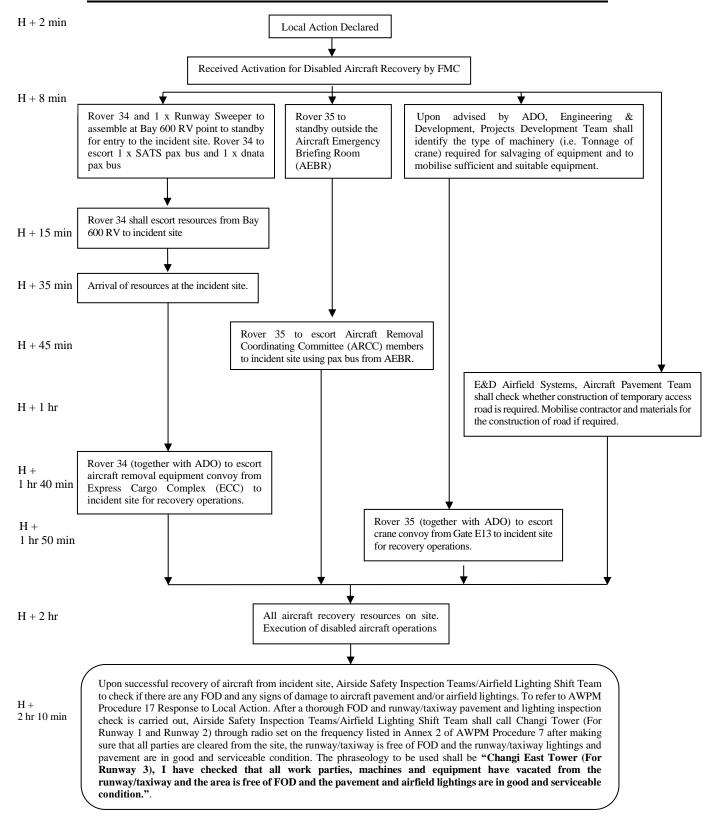
CAG Manual AOS AWPM* Revision Manual Revision Date * Delete where applicable Remarks Reference number in list of Clause reference in Not Not (Reason for not implementing / implemented with reference to work parties' SOP **Implemented** amendment form **CAG Manual Implemented Applicable** and to include work parties' SOP clause reference number) Check by (CAG) Date Scope of Work

AWPC/52

PROCEDURE 25: RESPONSE TO CRASH ON LAND WITHIN CHANGI AIRPORT WITHIN AES TURN-OUT AREA (RUNWAY 1, 2 or 3)



PROCEDURE 26: RESPONSE TO DISABLED AIRCRAFT RECOVERY AT RUNWAY 3 AND ASSOCIATED TAXIWAYS



PROCEDURE 27: PROCESS FLOW ON COMMISSIONING AND HANDING OVER UPON COMPLETION OF PROJECT AT MOVEMENT AREA

Upon completion of any airside project work, the contractor shall conduct inspections, testing & commissioning works with CAG Maintenance/Project officers. The inspections and testing and commissioning works shall be carried out in accordance to the requirements spelt out in the contract specifications and the findings/ results shall be recorded in the inspections, testing and commissioning forms.



Upon certifying that the project has been completed satisfactorily, the CAG Maintenance/Project officer shall inform the respective parties responsible for taking over the new facility for operations and maintenance and arrange for a handing over inspection with the users. CAG maintenance / project officer shall ensure that the new aircraft movement area remains inaccessible to aircraft by marking it as a closed aircraft movement area until the handing and taking over process has completed.



This list below shall serve as a guide for areas to be checked, acknowledged and taken over by respective parties. The project officer shall consult all the respective system owners for their detailed handing/taking over checklist prior to handing over. Civil work*

- Pavement condition
- Quality of dimension airfield marking
- Drainage, turfing
- FOD

Airfield Lighting System*

- Airfield Lighting
- Taxiway guidance signs
- Aircraft Stand Manoeuvring Guidance Light System
- Airfield Lighting Control System

CAFHI*

- Fuel pits available for the intended aircraft types

PLB/ADGS*

- PLB serviceability, including fixed gangway and movable arms
- PLB security doors
- PLB obstacle lights
- ADGS serviceability
- INS sign
- Aircraft stand bay indicator sign

Floodlights*

- Floodlights and lighting levels
- Obstacle lights on high mast
- Earth Receptacle & Lightning Protection

CCTV *

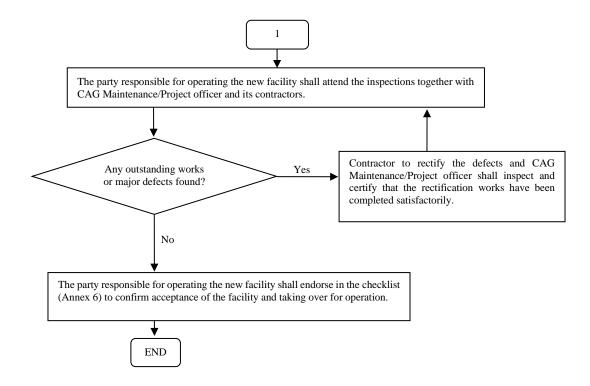
- CCTV on high mast, if any

Master Planning *

- Safety separation distances
- Safety distance to object
- Marking and lighting of obstacles
- Sizing of the ESA and EPS is sufficient for the ground handler
- 2nd layer of checks on as-built drawings, to ensure compliance to Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars upon completion of markings, guidance sign and other visual aids modification or construction.

*if applicable





Annex 6

Checklist for Commissioning of Airside Infrastructure and Works

oject Tit	le:		
	* Runway / Taxiway	:	
	Aircraft Parking Stand	:	
	Other Works	:	



No	Facility / Equipment	Compliance / Functionality Checked	Check Status	Checked By	Signed / Date	Remarks / Comments Addressed
1	<u>Civil Works</u>					
1.1	Condition of Runway / Taxiway pavement		*Acceptable / To Rectify / NA			
1.2	Runway / Taxiway ground markings dimension in accordance to specifications		*Acceptable / To Rectify / NA			
1.3	Condition of Parking Stand pavement		*Acceptable / To Rectify / NA			
1.4	Parking Stand ground markings dimension in accordance to specifications		*Acceptable / To Rectify / NA			
1.5	Stop-line markings dimension in accordance to specifications for each aircraft type		*Acceptable / To Rectify / NA			
1.6	Primary and Secondary Roadway		*Acceptable / To Rectify / NA			
1.7	Roadway ground markings dimension in accordance to specifications		*Acceptable / To Rectify / NA			
1.8	Jet blast deflector		*Acceptable / To Rectify / NA			
1.9	Drains		*Acceptable / To Rectify / NA			

No	Facility / Equipment	Compliance / Functionality Checked	Check Status	Checked By	Signed / Date	Remarks / Comments Addressed
1.10	Turfing		*Acceptable / To Rectify / NA			
2	PLB / ADGS					
2.1	Fixed gangway serviceability		*Acceptable / To Rectify / NA			
2.2	PLB serviceability		*Acceptable / To Rectify / NA			
2.3	PLB security doors		*Acceptable / To Rectify / NA			
2.4	PLB red obstacle lights		*Acceptable / To Rectify / NA			
2.5	PLB safety zone ground markings dimension in accordance to specifications		*Acceptable / To Rectify / NA			
2.6	ADGS display & control panel		*Acceptable / To Rectify / NA			
2.7	INS sign constructed in accordance to specifications		*Acceptable / To Rectify / NA			
2.8	Bay indicator sign constructed in accordance to specifications		*Acceptable / To Rectify / NA			
2.9	Gate Operating System (GOS) updated		*Acceptable / To Rectify / NA			
3	ANCILLARY BUILDING SERVICES AND M&E SYSTEMS					
3.1	Apron Floodlight & lighting levels To attached lux level reading and check against specifications as stipulated in Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars.		*Acceptable / To Rectify / NA			
3.2	Apron floodlight OG box + plinth		*Acceptable / To Rectify / NA			
3.3	Lightning protection shelter		*Acceptable / To Rectify / NA			

No	Facility / Equipment	Compliance / Functionality Checked	Check Status	Checked By	Signed / Date	Remarks / Comments Addressed
3.4	Earth receptacle		*Acceptable / To Rectify / NA			
3.5	OBS lights for jet blast fence		*Acceptable / To Rectify / NA			
4	AFL system / ALCS					
4.1	Runway / Taxiway centerline and edge lights To attached specifications of installation.		*Acceptable / To Rectify / NA			
4.2	Airfield mandatory and information signs constructed in accordance to specifications in terms of dimension and luminance		*Acceptable / To Rectify / NA			
4.3	Airfield Lighting Control System (ALCS) updated		*Acceptable / To Rectify / NA			
4.4	Aircraft Stand Manoeuvering Guidance Light System		*Acceptable / To Rectify / NA			
4.5	Guidance signs are designed and constructed in compliance with Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars / ICAO Annex 14		*Acceptable / To Rectify / NA			
5	<u>CCTV</u>					
5.1	Camera Coverage of Aircraft Parking Stand/Runway/Taxiway		*Acceptable / To Rectify / NA			
6	Fuel hydrant system			ı		
6.1	Underground fuel hydrant pit location		*Acceptable / To Rectify / NA			
6.2	Dimension of markings for hydrant pits in accordance to specifications		*Acceptable / To Rectify / NA			
6.3	Height of protrusion of fuel pit above pavement level		*Acceptable / To Rectify / NA			
6.4	CAFHI infrastructure has been commissioned in line with relevant JIG Standards. CAFHI to send CAG confirmation by the project consultant that the relevant commissioning tests have been conducted and are satisfactory		*Acceptable / To Rectify / NA			

No	Facility / Equipment	Compliance / Functionality Checked	Check Status	Checked By	Signed / Date	Remarks / Comments Addressed
7	Compliance checks					
7.1	Safety separation distances between runway / taxiway		*Acceptable / To Rectify / NA			
7.2	Safety separation distances to object		*Acceptable / To Rectify / NA			
7.3	Marking and lighting of obstacles		*Acceptable / To Rectify / NA			
7.4	Sizing of the ESA/EPA at parking stand		*Acceptable / To Rectify / NA			
7.5	Geographical WGS-84 survey requirements		*Acceptable / To Rectify / NA			
7.6	Markings for ERA, ABL for parking stand		*Acceptable / To Rectify / NA			
7.7	Pavement slope compliance to Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars		*Acceptable / To Rectify / NA			
8	<u>Systems</u>					
8.1	Inclusion of infrastructure in e-inspection (inspection checklist)		*Acceptable / To Rectify / NA			
9	<u>Documentation</u>					
9.1	Issuance of NOTAM		*Acceptable / To Rectify / NA			
9.2	Issuance of AON		*Acceptable / To Rectify / NA			
9.3	Submission of AIS publication (AUP Supp, AIP amdt) Project officer to ensure that information submitted is aligned with updates to the aerodrome manual.		*Acceptable / To Rectify / NA			
9.4	Update to Aerodrome Manual (CAM / SAM) Project officer to ensure that information submitted is aligned with updates to the AIP / AIP Supp.		*Acceptable / To Rectify / NA			
10	Others					

No	Facility / Equipment	Compliance / Functionality Checked	Check Status	Checked By	Signed / Date	Remarks / Comments Addressed
10.1	Operational item (pushback procedure in AOCS)		*Acceptable / To Rectify / NA			
10.2	Operational item (fire extinguisher at parking stand)		*Acceptable / To Rectify / NA			
10.3	Operational item (FOD bin)		*Acceptable / To Rectify / NA			
10.4	Others (to specify:)		*Acceptable / To Rectify / NA			

*Note:

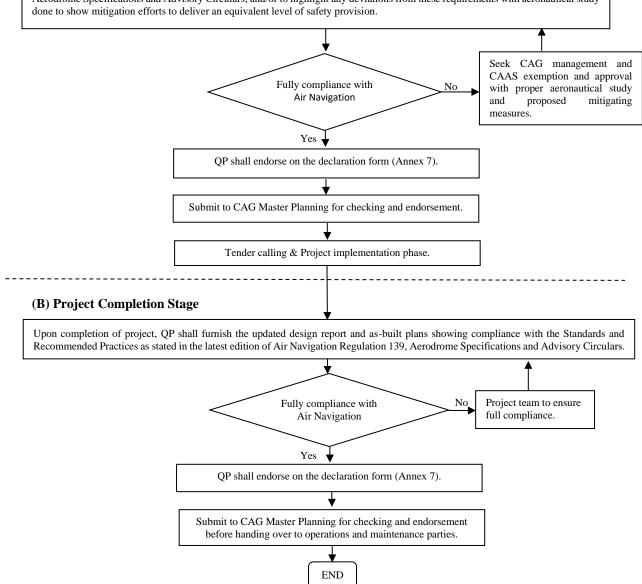
- Handover shall only commence upon approval from CAAS, AAR
- All items checked should be compliant to Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars and critical dimension (i.e. Marking font size, safety distances, e.t.c) shall be recorded.
- As-built drawings to be attached once available and uploaded into internal drawing management system (i.e. Newforma for E&D), after handing-over.
- As-built drawings to be attached once available and uploaded into internal drawing management system (i.e. Newforma for E&D), after handing-over.

Hand Over	Taking Over	Witness By	
(E&D / CE PDCO)	(Operations)		
Section :	Division :	Company	:
Name :	Name :	Name	:
Designation :	Designation :	Designation	:
Signature :	Signature :	Signature	:
Date / Time :	Date / Time :	Date / Time	
	iway / Taxilane / Aircraft Parking Stand / Otl		·1
nfrastructure Type: <u>*Runway/ Tax</u> Hand Over	iway / Taxilane / Aircraft Parking Stand / Otl Taking Over		1
nfrastructure Type: <u>*Runway/ Tax</u>	iway / Taxilane / Aircraft Parking Stand / Otl	hers: (·
Infrastructure Type: *Runway/ Tax Hand Over (E&D / CE PDCO)	iway / Taxilane / Aircraft Parking Stand / Otl Taking Over (E&D Maintenance)	hers: (Witness By	·
Infrastructure Type: *Runway/ Tax Hand Over [E&D / CE PDCO) Section :	iway / Taxilane / Aircraft Parking Stand / Otl Taking Over (E&D Maintenance) Division :	hers: (Witness By Company	: : :
nfrastructure Type: *Runway/ Tax Hand Over E&D / CE PDCO) Section :	iway / Taxilane / Aircraft Parking Stand / Otl Taking Over (E&D Maintenance) Division : Name :	hers: (Witness By Company Name	: : : :

PROCEDURE 28: PROCESS FLOW ON DESIGN CHECK TO ENSURE COMPLIANCE TO CAAS AIR NAVIGATION REGULATION 139, AERODROME SPECIFICATIONS AND ADVISORY CIRCULARS

(A) Before Tender Calling Stage

The design consultant Qualified Person (QP) shall furnish CAG the airfield design report and plans before tender calling to confirm full compliance with the Standards and Recommended Practices as stated in the latest edition of Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars, and/or to highlight any deviations from these requirements with aeronautical study done to show mitigation efforts to deliver an equivalent level of safety provision.



Annex 7

DECLARATION ON COMPLIANCE TO CAAS AIR NAVIGATION REGULATION 139, AERODROME SPECIFICATIONS AND ADVISORY CIRCULARS FOR AIRFIELD DESIGN AT CHANGI AND SELETAR AIRPORTS

Proposed Development / Project	;:	
Location:		
(B) DECLARATION BY DE	SIGN CONSULTANT QUALIFI	ED PERSON
and Recommended Practice 139, Aerodrome Specificat	evelopment: and plan(s) (Tender / As-Built)* cores as stated in the latest edition of the cions and Advisory Circulars (versions and Singapore (CAAS), unless otherwise	e Air Navigation Regulation on:) published by the
Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars Clause	Details of Non-Compliance	Remarks
Note: to submit on a separate po	age if necessary	
DESIGN QUALIFIED PERSON	Ī	
Name:	Designation:	
Signature:	Date:	
Company Stamp:		

(C) CHECK BY CAG'S MASTER PLANNING

This is to certify that the design report and plan(s) submitted by the appointed design consultant have been checked to ensure that:

For the proposed airfield related development: The consultant's submitted design report and plan(s) (Tender /

The consultant's submitted design report and plan(s) (<u>Tender / As-Built</u>)* comply fully with the Standards and Recommended Practices as stated in the latest edition of the Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars (version: ____) published by the Civil Aviation Authority of Singapore (CAAS). The relevant chapter(s) checked are:

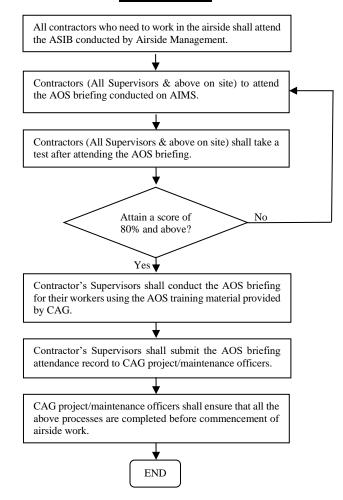
Air Navigation Regulation 139, Aerodrome Specifications and Advisory Circulars Chapter /	Yes	No	N.A	Remarks
Clauses				
Physical Characteristics				
Obstacle Restriction and Removal				
Visual Aids for Navigation				
Visual Aids for Denoting Obstacles				
Visual Aids for Denoting Restricted Use Areas				
Electrical Systems				
Aerodrome Operational Services, Equipment and				
Installations				
Others (please specify:				
)				
Note: to submit on a separate page if necessary				

Additional aeronautical studies done to provide equivalent level of safety for any non-compliances. The following aeronautical studies reports for the non-compliances identified are attached:

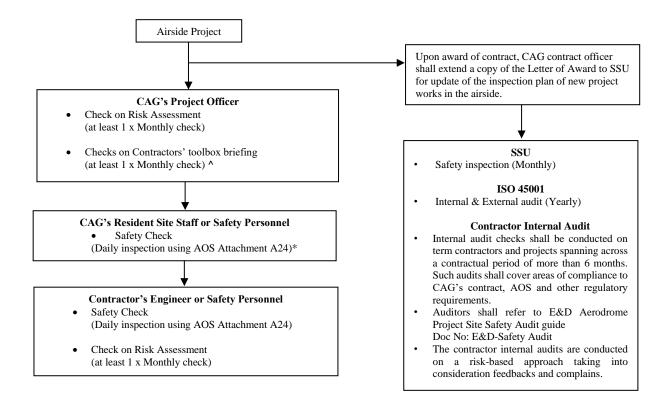
Nos	Air Navigation Regulation 13 Specifications and Advisory Circul	_
HECK	XED BY	
ame: _		Designation:
ignature	e:	Date:
NDOR	SED BY	
lame: _		Designation:
	e:	Date:

* Delete where applicable

PROCEDURE 29: SAFETY BRIEFING WORKFLOW FOR AIRSIDE SAFETY INDUCTION BRIEFING (ASIB) & AIRPORT OPERATIONAL SAFETY REQUIREMENTS (AOS) BRIEFING



PROCEDURE 30: SAFETY INSPECTION FRAMEWORK (DEVELOPMENT / PROJECT)



* On days that the site supervisory personnel are not at work due to public holidays or weekends, the contractor shall assign a person holding a supervisory post or minimally a safety coordinator, to conduct the checks on behalf of the site supervisory personnel. Information of person who has conducted the check on public holidays or weekends shall be indicated on the daily inspection checklist.

To ensure the quality of the checks, photographs of critical check items such as closure markers and markings, obstruction lights and chequered flags shall be taken and forwarded to the site supervisory personnel for verification. Site supervisory personnel shall then attach the photographs and endorse on the checklist on the next working day.

CAG's Project Officer are advised to utilize a copy of the approved risk assessment form to conduct the checks. Mitigation measures checked shall be indicated on the RA with date that it was inspected. Project Officers are also advised to indicate explicitly the checks done or when any mitigation measure has been completed. Where practicable based on progress and scope of work, project officers shall complete checks for every single line item on the RA within a period of 1 year, except for work activities which have not commence. This is to ensure that every line item is checked within a reasonable timeframe. The team lead for the project, shall also conduct checks on the completeness of the RA checks by the project officer once every quarter. CAG's Project Officer can exercise their own discretion when conducting such checks if the records are kept in a manner that provides traceability and ensure completeness of check.

CAG's appointed site representative is to conduct checks on contractor's toolbox briefing at least once a week, signing off on the attendance record only when they are physically present for the briefing session and had verified the accuracy of contents briefed against what is recorded.