



**AIRPORT OPERATIONAL AND SAFETY
REQUIREMENTS**

FOR CHANGI & SELETAR AIRPORTS

Compiled by

Standards and Safety Unit
Engineering & Development Cluster

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CONTENTS

SECTION A	AIRPORT SECURITY REQUIREMENTS
SECTION B	AIRPORT FIRE SAFETY REQUIREMENTS
SECTION C	AIRPORT SAFETY REQUIREMENTS
SECTION D	OBSTRUCTION CONTROL REQUIREMENTS
SECTION E	WILDLIFE CONTROL REQUIREMENTS
SECTION F	OTHER HAZARDS CONTROL REQUIREMENTS
SECTION G	AIR TRAFFIC CONTROL OPERATIONS REQUIREMENTS
SECTION H	AIRSIDE REGULATIONS
SECTION I	COMPLIANCE WITH OTHER STATUTORY REQUIREMENTS
SECTION J	HAZARD IDENTIFICATION AND RISK ASSESSMENT
Attachment A1	OBSTRUCTION CONTROL REQUIREMENT AT RUNWAY END AREA IN SINGAPORE CHANGI AIRPORT
Attachment A2	AIRPORT COORDINATE SYSTEM AND LOCATION OF AIRCRAFT MOVEMENT AREAS IN SINGAPORE CHANGI AIRPORT
Attachment A3	OBSTRUCTION CONTROL REQUIREMENT AT RUNWAY END AREA IN SINGAPORE SELETAR AIRPORT
Attachment A4	LOCATION OF AIRCRAFT MOVEMENT AREAS IN SINGAPORE SELETAR AIRPORT
Attachment A5	DAILY FOD CHECKLIST
Attachment A6	OUT OF BOUND AREA DURING AIRPORT LOW VISIBILITY OPERATION IN SINGAPORE CHANGI AIRPORT
Attachment A7-1	STANDARD TEMPLATE FOR RFI FOR CHANGI AIRPORT
Attachment A7-1A	STANDARD TEMPLATE FOR RFI FOR SELETAR AIRPORT
Attachment A7-2	CHECKLIST FOR CARRYING OUT TRIAL HOLE WORKS IN CHANGI/SELETAR AIRPORT

Attachment A7-3	CHECKLIST FOR CARRYING OUT EXCAVATION AND PILING WORKS IN CHANGI/SELETAR AIRPORT
FORM A	REQUEST FOR INFORMATION ON UNDERGROUND SERVICES FOR TRIAL HOLE / EXCAVATION / PILING WORKS
FORM B	APPLICATION FOR PERMIT TO CARRY OUT TRIAL HOLE WORKS
FORM C	APPLICATION FOR PERMIT TO CARRY OUT EARTHWORKS
Attachment A8-1	LOCALISER CRITICAL AND SENSITIVE AREAS IN SINGAPORE CHANGI AIRPORT
Attachment A8-2	GLIDE PATH CRITICAL AND SENSITIVE AREAS IN SINGAPORE CHANGI AIRPORT
Attachment A9-1	LOCALISER CRITICAL AND SENSITIVE AREAS IN SINGAPORE SELETAR AIRPORT
Attachment A9-2	GLIDE PATH CRITICAL AND SENSITIVE AREAS IN SINGAPORE SELETAR AIRPORT
Attachment A10	GRADED RUNWAY STRIPS AND RUNWAY END SAFETY AREAS IN SINGAPORE CHANGI AIRPORT
Attachment A11	GRADED RUNWAY STRIPS AND RUNWAY END SAFETY AREAS IN SINGAPORE SELETAR AIRPORT)
Attachment A12	EXAMPLES OF THE OBSTACLE LIGHTS AND CHEQUERED FLAGS FOR REFERENCE)
Attachment A13	TYPICAL MARKINGS AND LIGHTINGS
Attachment A14	CROSS MARKERS FOR A CLOSED RUNWAY, TAXIWAY OR PORTION THEREOF
Attachment A15	RISK ASSESSMENT FORM
Attachment A16	REQUIREMENTS FOR CONSTRUCTION WORKS IN THE AIRSIDE (CHANGI AIRPORT)
Attachment A17	APPLICATION FOR PERMIT TO CARRY OUT WORKS ON INNER FENCING OF SINGAPORE CHANGI AIRPORT
Attachment A18	SELETAR AIRPORT AIRSIDE SAFETY NOTICE (10/2018)

Attachment A19	WORKPLACE SAFETY AND HEALTH (WSH) REQUIREMENTS FOR CONTRACTORS)
Attachment A20	IN-HOUSE SAFETY RULES FOR CONTRACTORS
Attachment A21	CHECKLIST FOR UNDERGROUND SEWERAGE & SANITARY SERVICE DIVERSION WORKS IN CHANGI/SELETAR AIRPORT
Attachment A22	CHECKLIST FOR UNDERGROUND WATER SERVICE DIVERSION WORKS IN CHANGI/SELETAR AIRPORT
Attachment A23	CHECKLIST FOR UNDERGROUND GAS SUPPLY SERVICE DIVERSION WORKS IN CHANGI/SELETAR AIRPORT
Attachment A24	TERMS AND CONDITION OF WORKS IN LANDSIDE
Attachment A25-1	CHECKLIST FOR WORK PARTY'S SAFETY REPRESENTATIVE CARRYING OUT DAILY INSPECTION IN CHANGI / SELETAR AIRPORT
Attachment A25-2	CHECKLIST FOR CAG APPOINTED SAFETY REPRESENTATIVE / RTO CARRYING OUT DAILY INSPECTION IN CHANGI / SELETAR AIRPORT
Attachment A26	HORTICULTURE OUTDOOR REQUIREMENT AT AIRSIDE
Attachment A27	SKYTRAIN PERMIT-TO WORK (PTW) APPLICATION REQUIREMENTS
Appendix A	HEIGHT LIMIT FOR ROADS IN CHANGI AIRPORT (VERSION 05 / 2021)

Note: The Contractor is required to confirm that they have read, understood and will comply with the AOS requirements including all attachments, annexes and appendix A by signing on the acknowledgement sheet found in Attachment A20.

FOREWORD

This set of Airport Operational and Safety (AOS) requirements is compiled and published by the Standards and Safety Unit of Changi Airport Group (Singapore) Pte Ltd (CAG) Engineering & Development Cluster, with inputs from CAG Airport Emergency Service Division, Airport Operations Planning & Airside Division (Airside Management & Airside Operations Team), Aerodrome Safety Unit and Aviation Security Unit. It also contains the requirements forwarded by the Air Traffic Services Division of the Civil Aviation Authority of Singapore (CAAS), Changi Airbase and Airport Police Division.

The requirements and specifications stipulated in this set of AOS requirements are intended for reference and compliance by Developers, Consultants, Project and Maintenance Contractors/Sub-Contractors and all parties working in the airport, who shall be referred to as “Work Party” or “Work Parties” in this document. These Work Parties are required to obtain an updated copy of the AOS requirements from the CAG Superintending Officer (S.O.), Project Officer or Coordinating Officer overseeing their works. A set of the AOS requirements is also normally found in the contract documents for project works within the airport. All Work Parties are to ensure that their management team and all their site workers read and understand the latest AOS requirements thoroughly and comply with them strictly when carrying out works within the airport premises. Compliance with all the AOS requirements shall constitute part of the Work Party’s lease agreement and/or contractual obligations.

This set of AOS requirements is owned by CAG and will be updated/revised and re-published by CAG from time to time. Any suggestions for improvement, proposed correction of errors, or request for an updated copy can be directed to:

**The Safety Manager
Engineering & Development Cluster
Changi Airport Group (Singapore) Pte Ltd
PO Box 168, Singapore Changi Airport
Singapore 918146**

SECTION A - AIRPORT SECURITY REQUIREMENTS

1 WORKERS IN THE AIRPORT

All workers working in the airport shall be subject to security clearance and approval of Changi Airport Group (Singapore) Pte Ltd (herein referred to as the “CAG”) and the Airport Police Division of the Singapore Police Force (SPF) whose decision on this shall be final and binding. Workers found objectionable to CAG or the Airport Police shall not be permitted to work in the airport.

2 SECURITY CLEARANCE FOR WORKERS

2.1 Prior to the commencement of the work, the Work Party shall submit the particulars of all the personnel he intends to deploy for the work in the Airport for the Seasonal Airport Pass application. The applications must be submitted via the online Airport Pass Application System at <https://www.changiairport.com/corporate/e-services/airport-pass-application.html>. Work Party shall be given access to the System by the respective CAG Project Officer. For Seletar Airport, the applications must be submitted via email. Work Party can obtain the application form and submission procedures from Seletar Airport’s website at <https://www.seletarairport.com/permits-passes.html>. The Work Party shall allow at least 14 working days for the background screening and security clearance. The particulars of the workers required for the application shall include, but not be limited to the following:

- a) Full Name
- b) NRIC No. /Passport and Work Permit Nos.
- c) Nationality
- d) Date of Birth
- e) Residential Address
- f) Appointment
- g) Nature of Duties

2.2 The Work Party shall ensure that all his workers involved in executing the works hold valid Work Permits. He shall also submit the particulars of all his workers for record and declare to the Superintending Officer (S.O.), Project Officer and/or Coordinating Officer that all his workers hold valid Work Permits to carry out the works. All the cost for application and making of the Airport Passes (including photograph taking) shall be borne by the Work Party concerned.

2.3 Workers shall be required to surrender their Changi Airport passes to the Airport Pass Office (located at Terminal 2 Basement) and Seletar Airport Passes to the Seletar Airport Pass Office (located at Seletar Airport) upon the expiry of the Airport Pass, or when they have no more association with the work in the airport.

2.4 Any person found using the Airport Pass for unauthorised purposes will be arrested and prosecuted by the Airport Police. The Work Party management shall ensure that all his workers and sub-contractor workers comply with this requirement strictly at all times.

3 PHOTOGRAPH TAKING AND VIDEO FILMING

No photograph taking or video filming shall be allowed in the airport without the prior approval of CAG. Personnel who are caught with unauthorised photographing or video filming activities in the airport will be arrested and prosecuted accordingly. All parties who wish to carry out filming or photography at Changi Airport will need to apply for a filming/photography permit from Changi Airport Group (CAG) at <https://www.changiairport.com/corporate/e-services/filming-and-photography.html>

4 SITE ENTRY AND SECURITY PASSES

- 4.1 The Airport Passes issued are not transferable.
- 4.2 The Airport Passes are to be worn conspicuously on the upper part of the body at all times whilst within the restricted area.
- 4.3 All Airport Pass holders shall obey the directions given by the Auxiliary Police Officer or any authorised officer of CAG.
- 4.4 For any loss of the Airport Pass, a Police report shall be made immediately at Airport Police Division or any Neighbourhood Police Posts. A levy fee will be charged for a replacement other than normal fair, wear, and tear.
- 4.5 The Airport Passes issued shall remain the property of the issuing authority (i.e. CAG) and may be withdrawn at any time by the issuing authority without assigning any reason.
- 4.6 Only approved list of persons cleared by CAG and/or the Airport Police and vehicles issued with valid Temporary Airfield Vehicle Entry Permit issued under the CAAS (Changi Airport) By-Laws 2009/CAAS (Seletar Airport) By-Laws 2009 by CAG Airside Management's Airside Driving Centre are allowed entry into the airport via the designated entry gates. All persons/vehicles holding such pass/permit shall ensure that the validity date for the pass/permit has not expired.

5 WORKS INVOLVING SECURITY GATE, FENCE OR RELATED FACILITIES

- 5.1 For any works on the inner perimeter fencing of the Changi Airport, the Work Party shall fill up Form (Attachment A17) and submit it to CAG for approval before the work can commence. The Work Party shall liaise directly with the Perimeter Intrusion Detection System (PIDS) contractor for the removal and reinstatement of the PIDS sensor cables at the affected sections of the fencing, and in some cases, the work may also involve removal of the lead-in cable. The Work Party shall work out payment arrangements with the PIDS contractor based on the Schedule of Rate of the PIDS contract with CAG. The details of the PIDS contractor are as follows:

Company: ST Engineering Electronics Ltd
 Address: 24 Ang Mo Kio Street 65,
 Singapore 569061

Attention: Mr Teo Seow Khye
Office: 6521 7833
Email: teo.seowkhye@stengg.com

- 5.2 For works involving the design and construction of new facilities or alteration (either permanent or temporary) of the existing airport security fence or facilities, or affecting the boundary of the airfield or restricted premises in the passenger terminal buildings, proper security and fencing measures shall be taken to ensure that there is no entry by unauthorised persons or vehicles or intrusions by wildlife (e.g. dogs and cats) into the airport restricted areas and/or aircraft movement areas at any time due to such changes. When erection of security fence, door, gate or barrier is required, the new security fence, door, gate or barrier shall be completed and accepted by CAG and the Airport Police before the works affecting the existing security fence, door, gate or barrier of the airport is allowed to commence.

6 SECURITY

The Work Party shall ensure that no work is carried out or structures built adjacent to the security fencing or gates, which may jeopardize the security of the airport, without prior permission of CAG and the Airport Police.

SECTION B – AIRPORT FIRE SAFETY REQUIREMENTS**1 GENERAL**

The Work Party shall comply with all fire safety requirements, safety instructions, permit to work system and hot work procedures stipulated in the CAG Fire Safety Manual and also the regulations and fire safety practices of the Singapore Civil Defence Force (SCDF). CAG Airport Emergency Service (AES) provides fire safety consultation on airport fire safety requirements on Mondays to Fridays from 1030 hrs to 1130 hrs and 1530 hrs to 1630 hrs at Changi Airport Terminal 2-

2 FIRE SAFETY MANUAL

For details on airport fire safety requirements, reference may be made to the latest Fire Safety Manual available online from the CAG website at <https://www.changiairport.com/corporate/e-services/documents.html>.

3 FIRE PROTECTION SYSTEM

All addition and alteration work, renovations, construction or installation works shall comply with SCDF regulations and CAG renovation guidelines and shall in no way affect the functioning or efficiency of existing fire protection systems and means of fire escape on CAG's property at all times.

4 ACCESS FOR CAG AES FIRE VEHICLES

4.1 Unimpeded access for CAG Airport Emergency Service (AES) vehicles responding to aircraft emergencies shall be maintained at all times and all existing gates and access roads shall not be obstructed. There shall be at least two separate accesses for CAG AES vehicles into the site.

4.2 In particular, all service roads leading directly from the Fire Station to aircraft movement areas shall be out of bound to all vehicles and personnel, except the CAG AES teams or airport authorised personnel during an airport emergency.

5 STORAGE OF FLAMMABLE MATERIALS

No storage of flammable liquids, i.e. diesel/petrol for vehicle/machinery/plant or other hazardous substances shall be allowed at the site. Fuel shall only be brought to site as and when refuelling is necessary. Prior written approval of CAG must be obtained and subject to strict compliance with all conditions set by the relevant authorities.

6 EXISTING FIRE HYDRANT SYSTEM

Works affecting the airport fire hydrant system shall be reported to CAG and no fire hydrant shall be rendered inoperative without the concurrence of CAG AES Division.

7 USE OF COMMUNICATION EQUIPMENT ON THE AIRSIDE

Communication equipment used during aircraft refuelling operations within 3 metres (10 feet) of the fuelling equipment or the fill or vent points of aircraft fuel systems shall be intrinsically safe in accordance with UL913, Standard for Intrinsically Safe Apparatus and Associated for Use in Class I, II and III Division 1, Hazardous (classified) Locations.

8 OTHER ACTIVITIES INVOLVING BURNING AND OPEN FLAME

There shall be NO burning of candles, joss sticks, joss papers, oil lamps, etc. within the airport premises, particularly in the airside and within buildings. Any burning of these items outside the airport premises shall require approval of CAG AES Division.

9 HOT WORKS, ISOLATION OF FIRE ALARM SYSTEM AND DRAINING OF SPRINKLER SYSTEM

9.1 The prior approval of CAG AES Division shall be obtained for all hot works that generate heat or sparks through submitting a request for approval of hot works. The approval will be granted subject to the condition that all fire safety requirements are met. Prior approval shall also be required when works are being carried out to isolate the fire alarm system and draining of the sprinkler system.

9.2 The “Hot Work Permit” shall be applied online via <https://onecalendar.changiairport.com>. This shall be done at least 3 working days before the work is expected to commence. When the work needs to be carried out urgently, CAG AES Division HQ [Tel No.: 6541 2535 (Changi)/6481 3377 (Seletar) during office hours] or Fire Station 1 [Tel: 6541 2526 (Changi)/6481 3377 (Seletar) during non-office hours] shall be notified and approval sought.

9.3 All hot works on site shall be supervised by a person who has attended the "Fire Patroller Course" conducted by recognised local training institution i.e. SAA or SCDF. Other local training institutions may be considered only if the contractor shows evidence that the training syllabus are consistent with CAG's fire safety requirements. The course fee will be at the prevailing rate set by the institute. A qualified fire patroller equipped with appropriate fire extinguisher must be present at site whenever welding/hot works is in progress. One fire extinguisher of the appropriate type shall be placed on site to cover a protection zone within a radius of 15 metres from each hot work area. The Work Party shall ensure that each and every area where hot works are carried out is supervised by a qualified fire patroller. Each qualified fire patroller is only allowed to provide fire coverage for a work radius of up to 15 metres. The Work Party shall take into account of this requirement in his tender submission.

9.4 The “Isolation of Fire Alarm System/Draining of Sprinkler System” shall be applied via <https://onecalendar.changiairport.com>. This shall be done at least 3 working days before the work is expected to commence. When the work needs to be carried out urgently, CAG AES Division HQ [Tel No.: 6541 2535 (Changi)/6481 3377 (Seletar) during office hours] or Fire Station 1 [Tel: 6541 2526 (Changi)/6481 3377 (Seletar) during non-office hours] shall be notified and approval sought. The requested works

shall be carried out during normal office hours and where applicable be approved by the Work Party's Qualified Person. Any isolation, draining or recharging to the affected sprinkler system must be carried out by CAG Term Maintenance Contractor (TMC). The Work Party shall engage the CAG TMC for such requests and any fees chargeable by the TMC are to be borne by the Work Party. The sprinkler system must be promptly charged up and normalised by 1800 hrs for Mondays to Fridays to reinstate its full function. Isolation of the system on Weekends and Public Holidays is not allowed unless with CAG AES Division's approval. A joint physical site check must be carried out with CAG TMC to ensure that the requested fire alarm zone to be isolated is correct before recording the zone label in "PART 2" of the application. Approval will not be given if the joint verification inspection is not carried out. The Work Party supervisor-in-charge is required to be present during the draining and charging of the requested zone. The sprinkler works contractor is required to label the Alarm Control Valve (ACV) number on all the new sprinkler pipes which they have installed. The applicant shall ensure that all affected parties are duly informed of the application status and the intention to carry out the works beforehand. All sprinkler installation works shall only be carried out by Qualified Persons. The Work Party supervisor-in-charge shall contact Changi Airport Fire Station 1 (Tel No.: 6541 2526) for notification prior to the start and after the completion of the above-mentioned works. The Work Party shall also make arrangements for the TMC to be on site on standby to react promptly to any situation where there is water discharge due to incorrect isolation of the sprinkler system so as to minimise disruption to operations.

- 9.5 Where hot works that could produce fumes are carried out in the vicinity of air-conditioning return air diffusers/ducts, the Work Party shall take appropriate measures to prevent the burning smell from being propagated into the air-conditioning return air system (e.g. installing temporary ioniser deodorants near the return air system).

10 SAFETY REQUIREMENTS FOR HOT WORKS ON THE APRON

- 10.1 There shall be NO aircraft or any part of it allowed within 75 metres of any hot works in the apron areas. However, if the hot works is supervised by qualified Safety Officer (registered with Ministry of Manpower), the safety distance can be reduced to 50 metres.
- 10.2 The Work Party Safety Officer must be competent in supervising hot works and monitoring ambient fuel vapours using a flammable gas detector with alarm. He must attend a briefing conducted by CAG AES Division on airside fire safety requirements.
- 10.3 All hot works must stop immediately when there are refuelling or defueling activities carried out for aircraft at the adjacent bays.
- 10.4 Other AES requirements for specific work activities, such as application for hot works permit, engagement of fire patroller and fire vehicle standby (required for all hot works in the airside and chargeable for non-CAG projects), shall also be complied with.

10.5 Smoking is strictly prohibited on the airside of the airport. “No Smoking” signs shall be adequately and prominently displayed at the Work Party’s work site.

11 AES SERVICE CHARGE

11.1 To prevent abuse of AES resources, CAG AES Division may levy a service charge on the Work Party for any of the following services:

- a) Removal of fuel hazards;
- b) Refuelling/defuelling standby;
- c) Explosives escort;
- d) Hot works standby;
- e) First Aid Fire Appliances (FAFA) training;
- f) False fire alarm activation turnout;
- g) Vehicle escort; and
- h) Fire patroller duties.

11.2 The schedule of rates is as follows:

<u>Service</u>	<u>Charge</u>
a) Fire vehicle	\$350 per vehicle per hour or part thereof*
b) Sea rescue craft	\$870 per vessel per hour or part thereof*
c) Fire officer	\$50 per officer per hour or part thereof*
d) Firefighter	\$25 per firefighter per hour or part thereof*

* excludes 7% Goods and Services Tax (GST)

SECTION C - AIRPORT SAFETY REQUIREMENTS**1 GENERAL**

- 1.1 In general, no activity shall be allowed to take place within the aircraft movement areas unless the areas are closed to aircraft operation and permission is obtained from CAG for works to be carried out. Approval will have to be sought from CAG should there be an absolute need for closure of any aircraft movement areas to carry out the works. All works carried out in the airside shall comply with the latest requirements as stipulated in Attachment A16 (for Changi Airport) and Attachment A18 (for Seletar Airport).
- 1.2 For the purpose of this section of the Airport Operational and Safety requirements, the following areas are defined as aircraft movement areas in the airport.

At Changi Airport**a) Runway**

All areas within 140 metres from the centre line of Runway 1, Runway 2 and Runway 3 as well as the areas defined at the ends of runway (see Attachment A1 for reference).

b) Code F Taxiways

- N2 behind bays 502 to 514 bound within 57.5 metres from the centre line of code F taxiway.
- All other areas bound within 51 metres from the centre line of all Code F taxiways.

c) Code E Taxiways

All areas bound within 43.5 metres from the centre line of the following Code E only taxiways:

- Taxiways U8, U9 and U4
- Taxiway Q (between taxiways V and P7)
- Taxiways S2 and S3

d) Code F Taxilanes

- N1 (which is extending from N2 behind bays 515 to 517) bound within 50.5 metres from the centre line of Code F taxilane.
- N4 bound within 50.5 metres from the centre line of Code F taxilane.

- All other areas bound within 47.5 metres from the centre line of all Code F taxilanes.

e) Code E Taxilanes

All areas bound within 40 metres from the centre line of the following Code E only taxilanes:

- Taxilane P7 (behind aircraft stands E20 to E24)
- Taxilane R7 (behind aircraft stands F50 to F54)
- Taxilane V11 (behind aircraft stands A18 to A21)
- Taxilane S4 (behind aircraft stands 461 to 469)
- Taxilane Q1 (behind aircraft stand C16 to taxiway P)
- Taxilane Q2 (behind aircraft stand D30 to C15/D34)
- Taxilane Q3 (behind aircraft stand D35 to taxiway P)

f) Code C Taxilanes

All areas bound within 22.5 metres from the centre line of the following Code C only taxilanes:

- Taxilane L5

g) Aircraft Parking Apron

All operational aircraft parking apron, (see Attachment A6 for reference).

At Seletar Airport

a) Runway

All areas within 75 metres from the centre line of the runway as well as the areas defined at the ends of runway (see Attachment A3 for reference).

b) Taxiway

All areas bound within 35 metres from the centre line of all the operational taxiways.

c) Aircraft Parking Apron

All operational aircraft parking apron (see Attachment A4 for reference).

Note: The above information for Changi or Seletar Airport may change due to work in progress. The Work Party shall check with the Superintending Officer (S.O.), Project Officer and/or Coordinating Officer for the latest information.

- 1.3 For works on/affecting any airside facilities (e.g. runways, taxiways, taxilanes, aircraft parking apron, active airside roadways etc.), the Work Party shall submit his work proposal and detailed daily programme (including drawings, sketches, etc.) for that portion of the works to the S.O., Project Officer and/or Coordinating Officer for approval, prior to commencement of works.
- 1.4 For works affecting / impacting any aircraft manoeuvring areas. The Work Parties shall submit Standard Operating Procedures (SOPs) to the Project Officer / Maintenance Officer. Works will only be allowed to commence after the Project Officer / Maintenance Officer, from the respective agencies / organisation who had engaged the Work Parties, is satisfied that the SOPs comply with CAG's requirements and procedures, as well as the MOAS.
- 1.5 The Work Party shall conduct daily toolbox meeting in accordance with the following items:
 - a) Conduct in languages that can be understood by the foreign workers.
 - b) Illustrations with pictures on the "Dos and Don'ts"
 - c) Pose questions to the workers to reinforce their understanding of the briefings
 - d) Briefing on the work area layouts and Out of Bound areas
 - e) Risk mitigation stated in RA
 - f) Changes to work activity / process
 - g) All work party shall be reminded on the importance of regular checks on toolbox meeting records, checklists and site reports. Information included in these records shall be accurate and only works and checks conducted shall be recorded.
- 1.6 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.
- 1.7 All work parties shall ensure that drivers, both permanent or ad-hoc, have attended a toolbox meeting before entering the airside. The toolbox briefing shall cover information designated access route, recent vehicular infringements in the airside and also key activities which may affect the safety of anyone entering the work area.

2 BARRICADES, SIGNS, AND HAZARD LIGHTINGS

- 2.1 The project title of works shall be displayed on the hoardings of worksites. In the absence of hoarding, a pegged down signboard shall be used and placed at a strategic location. The name of the Work Party's company and associated work title shall also be displayed on all site offices and at designated access points.

2.2 The Work Party shall provide, erect and maintain all necessary barricades, signs, signals and lights for the protection of his work and for the safety of the public activities in the vicinity of his work areas.

2.3 Works on Active Roadway or Works Affecting the Active Roadway

2.3.1 For open trenches or pit works or any other works (e.g. superstructure works, foundation works, pavement re-surfacing, underground services works) to be carried out on the active roadway pavement, subject to the approval of CAG, these works shall be planned in such a manner that only one lane of the affected roadway shall be closed at any one time. Approved impact-resistant barricades e.g. water-filled plastic barrier shall be used to fence up the work area to prevent vehicle from running into it. Traffic marshalling service (either manual or via approved traffic signalling equipment etc.) shall also be provided for the affected section of roadway to regulate the traffic during the roadway closure period. Approved impact-resistant barricades (e.g., water-filled plastic barrier) shall be used to separate the work area from traffic. Alternatives may be proposed to overcome site or operational constraints, subjected to the approval of CAG.

2.3.2 When work affecting the active roadway or requiring the section of the roadway is closed for more than 15 metres long stretch, a comprehensive, round-the-clock traffic marshalling service (either manual or via approved traffic signalling equipment etc.) shall be provided at the affected section of roadway throughout the roadway closure period.

2.3.3 For trench or pit works to be carried out on the roadway in front the aircraft parking stand, it shall be planned in such a way that at any one time, a minimum continuous 30 metres length of unobstructed, full-width roadway pavement is maintained to allow the ground servicing vehicles to access to the parking stand to service the aircraft. When the nature of work requires a number of trial holes or trenches to be made and to remain on the active roadway pavement over a period of time, proper fencing or barricades shall be provided at these trenches and holes to prevent the traffic from running into it during the works. During no-work or off-work hours, such trench and hole shall be properly barricaded all round and be illuminated with amber flashing lights spaced at 1.5 metres along its boundary and at its corners. These work areas shall also be temporarily covered up with properly designed and secured steel plates if the affected roadway is to be re-opened temporarily for traffic use.

2.3.4 Prior to the commencement of the works, the Work Party shall submit a detailed proposal on how he plans to carry out the works, including all the necessary safety and traffic marshalling measures, to the S.O., Project Officer and/or Coordinating Officer for evaluation and approval.

2.4 Works and Equipment on Non-pavement Area

Open trenches, pits and large excavations on non-pavement area shall generally be fenced up with appropriate barricades approved by CAG and shall be illuminated with amber flashing lights spaced at 1.5 metres along its boundary and at its corners at all times.

- 2.5 Obstruction lighting comprising illuminated red stationary lamp shall comply with paragraph 7.4 of Section D. It shall be placed at the extremities and the highest point of all stationary plant and equipment and their designated parking zones. Approved red and white obstruction barricades shall be used to demarcate areas of equipment and plant storage with amber flicker lamps placed at a maximum spacing of 1.5 metres along its boundary and at its corners at all times.
- 2.6 The Work Party's vehicles/plant/machineries/equipment travelling in the airfield shall have appropriate markings approved by CAG or shall display approved markings/signs/flags/flashing lights at all times.

3 INSPECTION AT THE END OF EACH DAY'S WORK

- 3.1 Prior to the end of each day's work and before dusk on days when there are work activities on site, the Work Party's representative shall inspect his worksite in the vicinity of the aircraft movement areas or in areas that could affect the operation of the aircraft movement areas nearby to ensure that checks are conducted using checklist for work parties' representative carrying out daily inspection in CHANGI / SELETAR AIRPORT (Attachment A25-1). The work parties shall ensure that no Foreign Objects or potential Foreign Object Debris (FOD) would be encountered by aircraft operation and all other safety and operational requirements of the aircraft movement areas (e.g. covering up of open trench, proper operation of obstruction lighting, etc.) are met. The "Daily FOD Checklist" (Attachment A5) and "Checklist for work parties' representative carrying out daily inspection in CHANGI / SELETAR AIRPORT" (Attachment A25-1) shall be submitted to the S.O., Project Officer and/or Coordinating Officer for reference and records of checks carried out shall be kept.

Project officer or CAG's appointed site representative (i.e. RTO) shall use the checklist for CAG Project Officer / RTO to carry out weekly inspection in CHANGI / SELETAR AIRPORT (Attachment A25-2) at his work site daily on days when there are work activities.

- 3.2 The Work Party shall also carry out daily inspection and maintenance for all the signs and markers, markings and lights displayed at his work site, within the closed aircraft movement areas and his storage areas and make arrangements to ensure that all these lights, signs and markings are constantly maintained in good operating condition.

4 LIGHTING AND MARKINGS FOR CLOSED AIRCRAFT MOVEMENT AREAS

- 4.1 In general, approved airfield warning signs, markers and lights shall be displayed at the closed aircraft movement areas and aircraft parking stands or part thereof to warn pilots, ground handlers and other users operating near the area. Prior to the commencement of work and after having been instructed by the S.O., Project Officer and/or Coordinating Officer to proceed, the Work Party shall ensure that sufficient quantity of approved closure warning signs, markers and illuminated unserviceability lights are placed at the strategic locations along the boundary of the closed aircraft movement areas and also at the locations directed by the S.O., Project Officer and/or Coordinating Officer so as to warn the aircraft operating in the vicinity of the closure

of the aircraft movement areas or parts thereof. The Work Party shall ensure that all these warning signs, markers and illuminated unserviceability lights are properly secured so that they are not dislodged by strong winds, jet blast or other environmental conditions.

- 4.2 At the end of each closure period all warning signs, markers and illuminated unserviceability lights shall be removed from the aircraft movement areas and stored within the Work Party's designated storage area.
- 4.3 The unserviceability lights shall consist of a 50-50 mix of types that can be operated on two different sources (e.g. Battery powered, solar powered, generator powered, conventional electrical supply, etc.). Electrical supply source for the unserviceability lights may be tapped from existing street lighting OG Box in the vicinity of the lights. The Work Party shall provide all necessary cables and connections to the power source. The Work Party shall engage a qualified electrician to carry out checking to ensure that the existing street lighting supply is able to support the unserviceability lights' power demand. The Work Party may also propose to use appropriate generators sets to power the lights reliably. The cables shall be adequately protected, pegged down and marked such that the cables would not be damaged. The unserviceability lights shall have photocell sensors so that they can be turned on automatically during hours of darkness or bad weather.
- 4.4 All warning signs, markers and lights for closed aircraft movement areas shall be inspected daily and their status shall be recorded for submission to CAG. If any of the light or marker board is found faulty or is damaged, the Work Party shall take immediate action to restore or replace it. Battery operated unserviceability lights shall be checked daily to ensure that the effective intensity does not drop below the minimum acceptable intensity.
- 4.5 The Work Party shall refer to Section D, paragraphs 7 to 13 for more specific requirements on obstruction markings and lighting in the airfield.

5 OBSTRUCTION MARKING AND LIGHTING OF WORKING AREAS UNSERVICEABLE AREAS AND AREAS CLOSED TO AIRCRAFT MOVEMENTS

5.1 General

- 5.1.1 All obstruction marking and lighting of working areas, unserviceable or closed aircraft movement areas shall comply with all the requirements as specified hereunder and in accordance with the operational practices CAG deems adequate and appropriate.
- 5.1.2 The Work Party shall consult CAG S.O., Project Officer and/or Coordinating Officer for the relevant requirements with regards to obstruction marking and lighting of working areas, unserviceable areas and areas closed to aircraft movements.

5.2 Marking of the Portion of Runway or Taxiway Closed to Aircraft

- 5.2.1 A closed marker shall be displayed on the runway or portion of the runway which is closed to aircraft for more than 2 hours.
- 5.2.2 Where runway closure period is more than 3 days, or where a section of the runway is closed for more than 3 days, a runway closed marker shall be placed at each end of the closed area and additional markers shall be placed along the runway centre line so that the maximum interval between markers does not exceed 300 metres.
- 5.2.3 Where runway closure period is 2 hours or less, a set of lighted red/white obstruction marker board shall be placed at the holding position located at each of the two entry taxiways located at each end of the closed runway.
- 5.2.4 Unless otherwise shown on the drawings, the runway and taxiway closed marker shall be of the form of a cross with the minimum dimensions shown in Attachment A14 and shall be of a single contrasting colour yellow (for taxiway) and white (for runway). (A marking utilising material other than paint on the surface may be suitable for temporary closure.)
- 5.2.5 In addition, the marker shall also be heavy enough so that it would not be displaced or lifted by the direct aircraft jet engine blast or by strong winds.
- 5.2.6 Airfield lights on or certain section/length of airfield light leading to the closed portion of runway, taxiway and aircraft parking stands shall be effectively covered up by the Work Party concerned in a manner acceptable to CAG, including demarcating and switching off / blocking the affected Airfield Lighting (AFL) circuits of the closed area on the Advance Surface Movement Ground and Control System (ASMGCS) and Airfield Lighting Control System (ALCS) graphic interface at the control tower (please refer to Section C (Clause 13.9)).
- 5.2.7 Where taxiway closure period is more than 3 days, or where a section of the taxiway is closed for more than 3 days, a taxiway closed marker shall be painted at each end of the closed area. At the end of the taxiway closure period, the closed marker shall be totally removed by milling and patching of at least 50 mm in depth at straight portions of the taxiway, or at least 75 mm in depth in areas which are subjected to traction forces exerted by wheels of turning aircraft.

5.3 Lighting of the Portion of Runway or Taxiway Closed to Aircraft

- 5.3.1 Unserviceability lights shall be placed across the entire entrance and exit to the closed area at intervals not exceeding 3 metres. The unserviceability lights shall consist of a 50 - 50 mix of types that can be operated on two different sources (e.g. battery powered, solar powered, generator powered, conventional electrical supply, etc.).
- 5.3.2 An unserviceability light shall consist of a red fixed light and shall not cause glare and confusion to the pilots or traffic controllers.

- 5.3.3 The following light characteristics shall be complied with:
- a) Light shall be seen in all directions;
 - b) Red colour;
 - c) Minimum of 10 candelas effective intensity;
 - d) Weather-proof; and
 - e) The unserviceability lights shall be lit between the hours half an hour before official sunset time until half an hour after official sunrise, and during periods of poor visibility e.g. heavy rain.
- 5.4 Marking and Lighting of Work Sites and Unserviceable Areas
- 5.4.1 Unserviceability markers and lights shall be displayed whenever any portion of a taxiway, apron or holding bay is unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely. Unserviceability markers and lights are used for such purposes as warning pilots of a hole in a taxiway or apron pavement or outlining a portion of pavement, such as on an apron, that is under repair. (Note: Such measures are not suitable for use when a portion of a runway becomes unserviceable, or on a taxiway when a major portion of the width becomes unserviceable. In such instances, the runway or taxiway is normally closed.)
- 5.4.2 Unserviceability markers and lights shall be placed at 3 metres intervals so as to delineate the unserviceable area. Gaps between unserviceability markers shall not be greater than 3 metres.
- 5.4.3 Unserviceability lights shall comply with the requirements specified in paragraph 12 above.
- 5.4.4 Unserviceability markers shall consist of conspicuous upstanding marker board. An unserviceability marker board shall be at least 0.5 metre in height, 3.0 metres in length with alternate red and white vertical stripes (see Attachment A13).
- 5.4.5 Markers shall be light-weight and frangible mounted. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft. (Note: Anchors or chains, to prevent markers which have broken from their mounting from blowing away are to be used where necessary.)
- 5.4.6 All the markers and lights shall be adequately designed such that they shall be able to withstand a direct aircraft jet engine blast at velocity of 216 km/h without toppling or displacement. All the marker boards shall be properly weighed down to ensure that they will not be displaced by jet blast or strong wind. Non-frangible materials, such as concrete slabs, shall not be used to weigh down the marker boards. The Work Party shall ensure that materials used to weigh down the marker boards, such as sandbags, will not contribute to FOD.

- 5.4.7 Each marker board shall have at least two serviceable lights mounted at the highest point. The intervals between obstacle/warning lights shall not exceed 3 metres.
- 5.4.8 The exact location of the unserviceability markers and lights shall be subject to the approval of CAG.
- 5.4.9 All lamps used to light up the construction site shall be shielded to shine downward onto the ground. In no circumstances shall any light be allowed to point in the direction of north or south or towards the Changi/Changi East/Seletar Tower.

6 INTRUSIONS INTO AIRCRAFT MOVEMENT AREAS

- 6.1 The Work Party's attention is drawn to the fact that the aircraft movement areas are in operation all the times and no workmen or machinery shall be allowed into the active aircraft movement areas. Trespassers to such areas will be prosecuted. In this connection, the Work Party working in the airfield shall be required to clearly mark out (e.g. use of physical demarcation) the boundary of his work site and confine all his workers and activities strictly within these designated work areas. All his workers and machineries movements beyond these designated areas shall be directed and escorted by CAG's authorised personnel or supervisors.
- 6.2 Under no circumstances shall the Work Party use the runway to gain access to his work areas. The crossing of taxiway (either active or closed) to gain access to work areas shall strictly be done at designated and approved locations only.
- 6.3 Access and egress for works on the runway shall only be through designated runway entry point (REP). Work parties shall strictly adhere to prevailing runway maintenance closure rules found in the Airside Works Procedure Manual (AWPM) and Airside Operations SOP.
- 6.4 All work parties shall observe the "never cross red" rule (i.e. red stop bar lights at runway holding positions, flashing-red lights at road holding positions or red traffic lights at applicable road holding positions) regardless of the status of the runway.
- 6.5 All work parties shall ensure that all personnel, equipment, vehicles and/or machineries are accounted for when entering and vacating the runway.
- 6.6 All CAT 1 vehicles entering the aircraft manoeuvring areas shall also fit with Runway Incursion Prevention Pre-Warning Location Equipment (RIPPLE).

7 INTERFERENCES TO AIRCRAFT, VEHICULAR TRAFFIC, ETC.

- 7.1 At all times, the movement and deployment of the Work Party's plant and equipment in the airport shall comply with the Airport Operational and Safety requirements stipulated herein and shall also be subject to the conditions imposed from time to time, by CAG who have jurisdiction over the matter.
- 7.2 The Work Party shall be responsible for ensuring that the movement of plant, equipment and materials, and his employees, do not at any time interfere with airport operations regardless of whether the plant are in operation or unused/parked. In the

event that the Work Party's plant obstructs the movement of aircraft or other vehicular traffic, etc., CAG reserves the right to instruct the Work Party to shift the plant, equipment, etc. and the Work Party shall immediately comply with such instruction, failing which CAG reserves the right to engage a third party to do the same at the Work Party's expense.

8 INSPECTIONS PRIOR TO OPENING FOR AIRCRAFT OPERATIONS

- 8.1 At the end of each closure period of aircraft movement areas for works, the Work Party shall carry out thorough inspection and preparation on the affected aircraft movement areas to see that all the Airport Operational and Safety requirements are met and fully complied with before handling over the area for aircraft operation.
- 8.2 The opening of aircraft movement areas for aircraft operations shall be subject to the approval of the S.O., Project Officer and/or Coordinating Officer representing CAG.

9 OPENING OF SECTION OF AIRPORT TO AIRCRAFT TRAFFIC

When in the opinion of CAG any runway, taxiway, aircraft parking apron, roadway or any structure is in satisfactory condition, it may be opened to traffic with the permission of CAG. The opening of any runway, taxiway, aircraft parking apron, roadway shall not be considered as a waiver of any of the provisions of these specifications or the Work Party's obligations. Pending final completion and acceptance of the work, all necessary repairs and renewals on any section of the taxiway, runway, roadway so opened, due to defective material of work, or natural causes other than ordinary wear and tear, or other works of the Work Party, shall be performed by and at the expense of the Work Party.

10 MOTORISED VEHICLES

- 10.1 Any vehicle intending to enter the operational aircraft manoeuvring areas must obtain clearance from the Changi/Changi East/Seletar Tower. All drivers are to adhere to the standard phraseology for driving into manoeuvring area. If the vehicle is not radio-equipped, it shall be escorted by an authorised radio-equipped vehicle driven by an authorised person.
- 10.2 Escort a maximum of two (2) vehicles at any one time.

11 RESPONSES TO AIRPORT EMERGENCY

- 11.1 The Work Party shall be required to respond to any airport emergency call activated by CAG related to his work at all times.
- 11.2 Upon receipt of such instruction, he shall immediately mobilise his resources to the site to carry out the works required by CAG to reinstate the operational status of the airport.
- 11.3 In connection to this, he is required to submit a list of related contact persons to CAG.

11.4 In the event of an aircraft emergency requiring the re-opening of the runway, all the work activities (including construction and maintenance works) within the runway strips and operational surface shall be ceased and the Work Party shall be required to remove all plant, equipment, materials and evacuate all workers from these areas and tidy up the site to meet the requirements as stipulated in Section D in order to open the runway for operations within 30 minutes of notification by CAG. The Work Party shall liaise closely with and respond to the S.O., Project Officer and/or Coordinating Officer's needs for such emergencies.

12 AIRPORT OPERATION UNDER LOW VISIBILITY CONDITION

12.1 In the event that low visibility aircraft operating conditions are initiated by CAG due to poor weather conditions, all the works within all aircraft movement areas and other out-of-bound areas in the airfield (see Attachment A8-1) shall cease immediately and the Work Party shall be required to remove all his plants, equipment, materials and personnel out of these areas until such time this restriction is lifted.

12.2 During this period, all the vehicles at the site shall display appropriate obstruction lights when moving from place to place and shall also exercise extreme care when entering the runway, crossing any active taxiway/taxilane and when travelling within the active aircraft parking apron areas.

12.3 The Work Party shall request from CAG a copy of the Category II Low Visibility Operational Procedure Manual and disseminate to all his workers the requirements and restrictions for works under such weather conditions.

13 MODIFICATION AND ALTERATION TO EXISTING RUNWAYS, TAXIWAYS, TAXILANES, AND AIRCRAFT PARKING STANDS

13.1 When alteration or modification works (e.g. airfield lights diversion, airfield signs relocation, pavement marking alteration, pavement re-surfacing, etc.) to the existing operational facilities (i.e. runways, taxiways, taxilanes, aircraft parking stands) are called for in the Work Party's scope of work, these works shall only be carried out in close coordination with the aerodrome operational requirements, which could require the works to be carried out during the restricted night working hours if so requested by CAG. The Work Party shall request from the S.O., Project Officer and/or Coordinating Officer the restricted night working hours during which works can be carried out.

13.2 All the alteration/modification works affecting the operation of the runway, taxiway, taxilane or aircraft parking stand shall be completed within the stipulated working hours granted by CAG and have the work-area reinstated and handed back to CAG for aircraft operation punctually by the end of the restricted working hours. Any damages to existing services caused by the alteration/modification works shall also be rectified by the Work Party.

13.3 When a runway is shortened for construction, the Work Party shall provide the following measures:

- a) repaint runway designation markings, runway centre line markings, threshold markings and touchdown markings and remove existing markings not appropriate for the shortened runway;
- b) blacken existing taxiway markings, including taxiway centre line and side stripe markings, leading into the closed section of the runway;
- c) change runway light configuration for the shortened runway;
- d) isolate all necessary runway lights in the closed area;
- e) install temporary runway end and threshold lights provided with a permanent power supply at the shortened runway end;
- f) install runway guidance sign on shortened runway showing revised runway distance available, e.g. TORA distance;
- g) mask out all necessary runway guidance signs at closed runway area;
- h) mask out and isolate the circuits of all taxiway lights and taxiway guidance signs leading into the closed section of the runway including demarcating and switching off / blocking the affected Airfield Lighting (AFL) circuits of the closed area on the Advance Surface Movement Guidance and Control System (ASMGCS) and Airfield Lighting Control System (ALCS) graphic interface at the control tower (please refer to Section C (Clause 13.9)).
- i) any other measures requested by CAAS Air Traffic Control, or the CAG S.O., Project Officer and/or Coordinating Officer.

13.4 When a taxiway or taxilane is closed continuously (more than 3 days, and less than 3 months) for construction, the Work Party shall provide the following measures:

- a) paint taxiway side stripe markings (double yellow lines 15 cm wide and 15 cm apart) across all entrances leading into the closed taxiway or taxilane;
- b) blacken existing taxiway markings, including taxiway centre line and side stripe markings, leading into the closed taxiway or taxilane;
- c) install blue reflective taxiway edge markers across all entrances leading into the closed taxiway or taxilane and alongside all straight taxiway or taxilane segments where the side of the taxiway or taxilane abuts a large span of paved area that is not used, at a maximum separation of 60 metres or lesser as directed by CAG; and
- d) mask out and isolate the circuits of all taxiway lights and taxiway guidance signs leading into the closed taxiway or taxilane including demarcating and switching off / blocking the affected Airfield Lighting (AFL) circuits of the closed area on the Advance Surface Movement Guidance and Control System (ASMGCS) and Airfield Lighting Control System (ALCS) graphic interface at the control tower (please refer to Section C (Clause 13.9)).

- 13.5 When an aircraft parking stand is closed continuously (more than 3 days, and less than 3 months) for construction, the Work Party shall blacken existing lead-in line that leading into the closed aircraft parking stand, including demarcating and switching off / blocking the affected Airfield Lighting (AFL) circuits of the closed area on the Advance Surface Movement Guidance and Control System (ASMGCS) and Airfield Lighting Control System (ALCS) graphic interface at the control tower (please refer to Section C (Clause 13.9)).
- 13.6 When a taxiway or taxilane, or an aircraft parking stand is closed continuously (more than 3 months) for construction, the work party shall grind off the existing taxiway / taxilane markings and/or existing lead-in line that leading into the closed aircraft parking stand, including demarcating and switching off / blocking the affected Airfield Lighting (AFL) circuits of the closed area on the Advance Surface Movement Guidance and Control System (ASMGCS) and Airfield Lighting Control System (ALCS) graphic interface at the control tower (please refer to Section C (Clause 13.9)).
- 13.7 The above works are in addition to any closure markers, markings or obstruction lights that are required to be placed to demarcate the closed taxiway / taxilane / aircraft parking stand areas.
- 13.8 Work Parties shall note and take reference from Section G (Clause 2.2) for more information on the procedures required to modify the Advance Surface Movement Guidance and Control System (ASMGCS) graphic interface and Airfield Lighting Control System (ALCS) for any addition/decommission of runway, taxiway, aircraft parking stands and any other areas where lighting services are provided.
- 13.9 Work Parties shall note that for any closure of runway, taxiway, aircraft parking stands and any other areas which have airfield lighting services, there is a need to work with CAAS ATE/ FMC to demarcate and switch off/ block the affected airfield lighting (AFL) circuits of the closed area on the Advance Surface Movement Guidance and Control System (ASMGCS) graphic interface and Airfield Lighting Control System (ALCS) graphic interface.
- 13.9.1 Based on the duration of closure, work parties (CAG project officer/ appointed contractors or Approved personnel by Airside Ops and CAAS ATE) shall take note of the following procedure:
- a) Duration three (3) days or less.
 - i. Before the closure:

Work parties to request for approval from Changi Tower / Changi East Tower to close the proposed closure area. Changi Tower / Changi East Tower will inform FMC to switch / block off the affected Airfield Lighting (AFL) circuits.
 - ii. On the day of opening:

Work parties to inform tower that the closed area has been re-opened. Changi Tower/ Changi East Tower will inform FMC to switch on / unblock the affected Airfield Lighting (AFL) circuits.

b) Duration more than three (3) days.

i. Before the closure:

Work parties to inform FMC/CAAS and ASMGCS/CAG ALCS team via email of the closure area and duration, including the affected AFL circuit names to be temporarily blocked from the ASMGCS/ALCS control (“off and block”)

The email attachment to FMC should include the approved closure programme by Airside Ops and CAAS ATE, as well as the AFL circuit names / Constant Current Regulators (CCRs) to be blocked.

ii. On the day of closure:

Work parties to request for approval from Changi Tower / Changi East Tower to close the proposed closure area. Changi Tower / Changi East Tower will inform FMC to switch / block off the affected AFL circuits.

iii. On the day of opening:

Work parties to inform tower that the closed area has been reopened. Changi Tower / Changi East Tower will inform FMC to switch on / unblock the affected AFL circuits.

13.9.2 For any queries on the above procedures, please contact the following personnel:

Team: FMC

Email: fmccag.support@changiairport.com

Phone Number: 64961302 or 64961303

System: Airfield Lighting Control Monitoring System (ALCMS)

Location: Seletar Airport

Attention: Richard Chia

Email: Richard.chia@changiairport.com

System: Airfield Lighting Control Monitoring System (ALCMS)

Location: Changi Airport

Attention: Teo Wei Yi/ Andy Chin

Email: teoweiyi@changiairport.com/ andy.chin@changiairport.com

System: Advanced Surface Movement Guidance and Control System (ASMGCS)

Location: Changi Airport

Attention: Toh Seow Teng/ Kevin Kong

Email: Toh_Seow_Teng@caas.gov.sg/ Kevin_Kong@caas.gov.sg

13.10 The work party shall allow for all necessary provision in their scope of work to comply with the above requirements.

14 JET BLAST HAZARDS DURING AIRCRAFT MANOEUVRING

- 14.1 Jet blast hazards due to aircraft manoeuvring can be expected at the following locations in the airfield:
- a) on or next to the runway, particularly near to the take-off end;
 - b) in the vicinity of apron taxiways and taxilanes, adjacent to and behind the aircraft parking stands; and
 - c) in the vicinity of taxiway junctions.
- 14.2 All lightweight or wind attracting objects shall be kept away from the above areas whenever possible. All plant/equipment when deployed at these areas shall be checked against stability under jet blast and measures shall be taken to ensure the stability of the plant/equipment when necessary and their suitability for deployment. All the airfield closure signs and markers placed in the above areas shall be properly strengthened and secured against jet blasts from the manoeuvring aircraft. The Work Party shall propose his method of strengthening or securing the signs/markers for CAG's approval.
- 14.3 All personnel working within the jet blast hazard area shall temporarily evacuate the site during the times when aircraft is manoeuvring at these areas. Personnel working on or next to the runway, particularly near to the take-off end, shall keep clear at least 750 metres away behind an aircraft taking off. Personnel working behind the aircraft parking stands shall temporarily move away a distance at least 80 metres behind the aircraft during aircraft power-in operation and shall keep clear 250 metres away behind the aircraft during its breakaway operation.

15 LIGHTNING WARNING SYSTEM

- 15.1 Where works are involved in the open or aircraft movement areas, the Work Party shall be required to check weather forecast for thunderstorms/lightning from any of the following channel:
- NEA Website at www.nea.gov.sg
 - NEA's Application such as "myENV" & "Lightning@SG"
 - Weather Forecast Hotline at 65427788
- The Work Party shall allow for such costs under this work scope.
- 15.2 Upon receiving the information on weather forecast, it is the sole responsibility of the Work Party to decide whether to proceed with the works with proper mitigating measures or stop works to protect the personnel and equipment from lightning hazard.
- 15.3 No extension of time due to stoppages of works and loss and expense in compliance with the above Clause will be entertained.

16 DETECTION AND PROTECTION OF CABLES

16.1 Overlaid Cables

- a) Overlaid cables shall be protected, firmly secured to the ground and make visible by securing them at about 300 mm above ground or placed under marker boards (i.e. at taxiways, apron access areas, etc.).
- b) These cables shall be transferred to permanent installation whenever possible.
- c) All unused cables shall be removed from the airfield immediately.
- d) Work Parties shall remove unwanted or unused cables promptly.

16.2 Underground Cables

The Work Party shall locate and trace all underground services, both charted ones shown in as-built services layout drawings and uncharted ones, before commencement of any ground works such as excavation, underground services diversion work and piling in the airport premises. The Work Party shall comply with all the requirements stipulated in the checklist for carrying out trial holes, excavation, underground services diversion work and piling works in Changi/Seletar Airport (Attachment A7-1, A7-2, A21, A22 and A23). The Work Party is required to seek written approval from CAG and/or relevant local authorities/agencies/service providers before any trial hole, trenching, excavation or piling works are carried out. The checklist and application forms are available from the CAG website at <https://www.changiairport.com/corporate/e-services/documents.html> under Engineering and Development tab.

- (a) For trial holes, subject officer should, to the best of his ability, obtain information on the depth of the underground services so as not to damage them during the course of work. When digging a trial hole, there must be 100% standing supervision for each excavation, with the presence of LCDW and competent standing supervisor.
- (b) Prior to commencement of any earthwork, Licensed cable detection worker (LCDW) shall be engaged to perform underground services detection so that the risk of damage to underground services can be reduced. LCDW and competent earthwork supervisor shall provide 100% standing supervisor when conducting trial hole works. This is to ensure that trial holes are carried out till all possible underground service cables are found.

There may be instances where different entities may engage the same term contractors to help service their systems, as such, It is the duty of the work party to ensure that the correct stakeholders are consulted during the request for information stage to confirm the presence of underground services.

Due to the uniqueness of some systems that exist only in the airport environment, below guidance material is provided for reference. CAG shall not be responsible if the LCDW had misjudge the detection mode. LCDW shall exercise their professional

knowledge and judgement to ensure that the right cable detection method is employed. LCDW shall inform and/or advise the earth works contractor, who engaged him, of the location of the cables detected / not detected within the worksite. This shall be clearly marked out in the cable detection report and included in the legend.

Type of underground services	Recommended Detection Mode
CAFHI e-stop Cable (110V DC signal)	Power Mode with direct cramping detection. Active and Passive detection Work party to exercise caution as cable runs on DC signal and may not be clearly identified. When in doubt, CAFHI shall be consulted and a site meeting should be arranged to locate such cables.
Fuel Hydrant / Fire Hydrant / Drainage Sub-soil, Potable and NEWater Pipes	Radio Mode (Metal detection)
Airfield Lighting (AFL) Cable	Power Mode or Power and Radio Mode. Active and Passive detection (*required to Master ON – energize the AFL circuit)
Structured Cabling / IT services, E&D & ATE Fibre Optics	Ground Probing Radar (GPR) *Note: Only able to detect up to depth of 2 - 3m. Work party to exercise caution as fibre optic cables may not be clearly indicated during the scan.
High Tension (HT) Cable	Power Mode. Passive and/or active detection (when necessary, such as cable on soak cannot be passively detected and cable known to be passing through the area cannot be detected in passive mode)
Low Tension (LT) Cable	Power Mode. Active and Passive detection

LCDW shall indicate the detection method used in the cable detection report. He/she shall locate and confirmed the location of the underground services prior any earthworks.

Work party shall stop all works and information CAG officer should they come across any unknown underground services. In the absence of any information, underground services discovered shall be deemed to be live and shall not be removed without prior approval of the service owner.

- 16.2.1 When performing cable detection, the LCDW shall request to “**Master on**” circuits within the vicinity of the area where earthworks is to be conducted. Where “**Master On**” is not possible, the LCDW will have to perform cable detection once in the **day** and once **after sunset**. This is to ensure that services which are not turned on during the daytime are included in the detection.

It is the responsibility of the work party conducting the earthwork to ensure that all relevant stakeholders are consulted, and information gathered are as comprehensive as possible.

Where necessary, additional trial holes shall be conducted along the route of cables to confirm the absence of services.

Important Notes:

- No cutting of any unknown cables without LCDW confirmation that they are “dead” or “abandon” cables.
- “Master On” all related AFL circuits including those blocked circuits leading into the closure areas, taxiway edge light circuits and taxiway stop bar light circuits when carrying out underground services detection, verification and confirmation of the AFL primary cables.
- Underground services diversion shall be carried out if the services are causing obstruction to the project works.
- To “**Master On**” ALL the AFL circuits again after any works involved with the AFL primary cables which might be affected during the work to ensure and confirm that there are no circuit faults (i.e., opened circuits, earth fault, etc) received by FMC via Honeywell ALCS system or operational airfield lighting circuits failure on site before night falls.

16.3 Detection and Diversion of Underground M&E Services

16.3.1 Underground M&E Services Diversion

The Work Party shall engage a qualified registered and competent contractor(s) of the relevant trade(s) and work head(s) to execute a thorough & complete service(s) protection and/or diversion work(s) at the subject site.

The following checklists shall serve as a guide for the proper and complete execution of the underground M&E services diversion works to be carried out by the appointed contractor(s)

(a) Sewerage & Sanitary Service Diversion Works

Checklist for Underground Sewerage & Sanitary Service Diversion Works (Attachment A21)

(b) Water Supply Service Diversion Works

Checklist for Underground Water Service Diversion Works (Attachment A22)

(c) Gas Supply Service Diversion Works

Checklist for Underground Gas Supply Service Diversion Works (Attachment A23)

17 SAFETY EQUIPMENT

- 17.1 All personnel performing work in the airside shall be equipped with appropriate personal protective/safety equipment such as safety vests, safety helmet and safety boots. Every person entering or performing work within the runway, taxiway, apron, including the aircraft stands and compass swing area, shall wear a high visibility safety vest at all times.
- 17.2 All Personnel shall also be equipped with proper tools/PPE in handling carcasses.

18 AIRSIDE SAFETY INDUCTION BRIEFING (CHANGI AIRPORT & SELETAR AIRPORT) / AIRPORT OPERATIONAL AND SAFETY BRIEFING (CHANGI AIRPORT & SELETAR AIRPORT)

- 18.1 All contractors (applicable for seasonal pass holder) shall attend an Airside Safety Induction Briefing (Changi Airport & Seletar Airport) before they are being deployed for duties.
- 18.2 Airside Safety Induction Briefing (for Changi Airport) will be conducted based on available sessions found on the ASIB portal at <https://www.changiairport.com/corporate/our-expertise/airport-operations/airside-safety-induction-briefing.html#A3>
A step-by-step user registration guide is available on the portal. An auto-generated confirmation email will be sent to the participant upon successful registration. The venue will be advised in the confirmation email.
- 18.3 Airside Safety Induction Briefing (for Seletar Airport) will be conducted on every Wednesday (except on public holidays) from 0930 hrs to 1030 hrs at the Meeting Room at Seletar Airport Passenger Terminal Building, 21 Seletar Aerospace Road 1. Registration and viewing of available slots for the ASIB sessions can be made via <https://outlook.office365.com/owa/calendar/AirsideSafetyInductionBriefing@changiairport.com/bookings/> by providing the staff's full name and organization name

Full Name	NRIC / FIN No.	Organisation	Renewal / New Application

- 18.4 All contractor supervisors and above shall attend the Airport Operational and Safety (AOS) briefing and test conducted by respective CAG Division's SSU.
- 18.5 All contractor supervisors shall conduct the Airport Operational and Safety (AOS) briefing once before project commencement and a refresher training once every year subsequently to all staff.

19 GEOGRAPHICAL SURVEY

- 19.1 The geographical coordinates of each threshold, appropriate taxiway centre line & each aircraft stand shall be measured in degrees, minutes, seconds and hundredths of seconds (reference to CAAS Manual of Aerodrome Standards, Chapter 6, 6.2.5.2 to 6.2.5.4).

- 19.2 The geographical survey and submission of survey reports shall comply with the quality requirements specified in the ICAO WGS-84 Manual (Doc 9674) format complying to the requirements in ICAO Annex 14 Vol.1 Appendix 5, Table A5-1.

20 DRIVING TO AIRPORT/HEIGHT LIMIT FOR HEAVY VEHICLES

- 20.1 The Work Party shall ensure that all drivers (from the Work Party or its sub-contractors) coming to the airport are properly briefed of the approved designated driving routes to the work site at the airport and physically taken through this route at least twice (once in the day and once after sunset) before driving any construction equipment or making actual delivery to site.
- 20.2 Contractors shall consult Project/Maintenance Officer for the height limit of route and obtain a set “HEIGHT LIMIT FOR ROADS IN CHANGI AIRPORT “ document for references (see Appendix A) and conduct a safety assessment before bringing in vehicle/ equipment to the airport premises.
- 20.3 Contractors shall issue travel route map to their drivers covering the access from outside Airport to airside on the access route map with the following marked:
- (i) Landmarks where the drivers are to take note to guide him/her to the worksite;
 - (ii) Contact details of CAG project officers in case the driver is lost within the airport road network;
 - (iii) Accident hot spots where the project officer would like the drivers to take note; and,
 - (iv) Translated to the language understood by the driver.
- 20.4 The work party shall have a plan in place to address the possibility of drivers losing their way when driving to or within the airport roadways. General rule to stop at a safe location to seek assistance in wayfinding shall be observed.

21 IN HOUSE RULES AND REGULATION

- 21.1 All Contractors shall ensure compliance with the Workplace Safety & Health (WSH) Requirements (see Attachment A19) and In-House Safety Rules (see Attachment A20).

22 HAZARD REPORTING

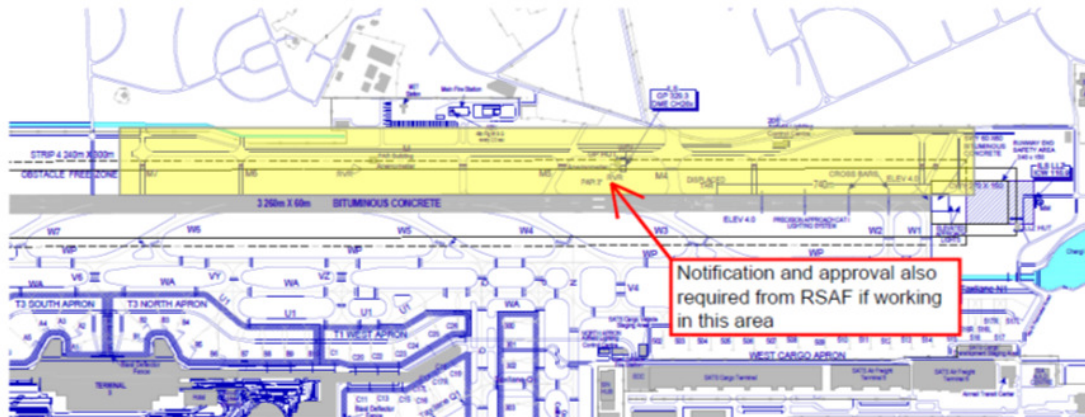
- 22.1 There are several channels available to facilitate hazard reporting for airport community:
- (a) On-line: Changi Airport website:
<https://www.changiairport.com/corporate/e-services.html>
 - (b) E-mail: safety@changiairport.com;
 - (c) Phone (hazards requiring immediate attention);
24-hour hotline numbers:

Changi Airport
 Fault Management Centre – 6541 2424

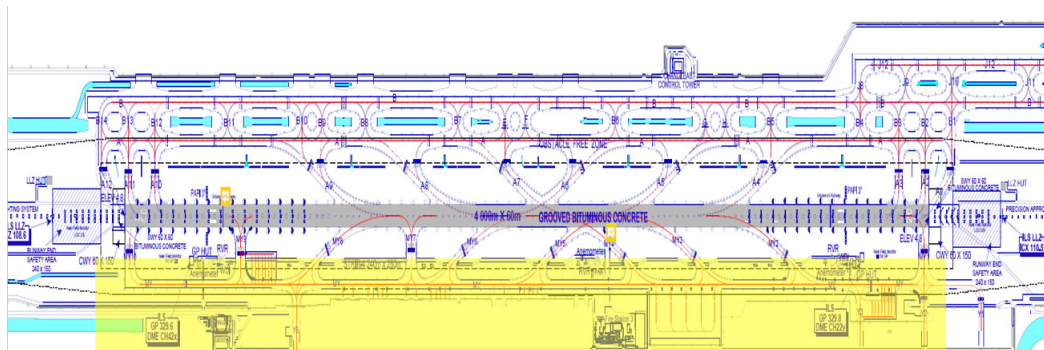
Seletar Airport
 Seletar Airport Operations – 6481 5077
 (d) CAG: iFeedback on CAG In.Touch
 Airport Community: iFeedback on SWEET Application.

23 CARRYING OUT ACTIVITIES OR WORKS IN/NEAR RSAF AREA

Runway 1 Area



Runway 3 Area



23.1 If there are any works to be carried out and is within the highlighted area shown above (West of Runway 02L/20R or East of Runway 02R/20L), the Project/Maintenance Team shall take additional steps to inform Changi Air Base (CAB) of the upcoming works and ensure approval is sought prior to work commencement.

The personnel from RSAF to be notified are as follows:

No	Name	Role	Email Contact
1	CAB Duty Officer	24hrs Duty Officer	Cab_duty@defence.gov.sg
2	CAF Airfield Lighting Team	In charge of AFL for RSAF	CAB_AOF@defence.gov.sg

The cab duty phone (24 hr hotline) is 65864033 / 34.

- 23.2 All movements within the **yellow highlighted military area** above are subjected to CAB's approval. The maintenance/project contractor shall communicate with CAB ATC Tower via RSAF approved walkie talkie and ensure the supervisor has CAB airfield driving permit before entering/exiting the area.
- 23.3 For the CAB airfield driving permit, CAB will be conducting lessons and certification on a monthly basis. To enrol for the lessons, please ensure you have gotten CAG approval before contacting Mr Phair (Phair.Xiu.Jun@defence.gov.sg).
- 23.4 For the walkie talkie, project/maintenance contractor can either:
1. Purchase their own walkie talkie and engage CAB appointed contractor NCS to input the frequency or;
 2. Purchase the walkie talkie from CAB appointed contractor NCS.
- For more info, please contact Mr Phair (Phair.Xiu.Jun@defence.gov.sg).
- 23.5 All work parties are reminded that there shall be strictly no photo-taking of military facilities allowed from the airfield.

24 WORK ACTIVITIES INVOLVING ROADWAY LANE CLOSURE IN LANDSIDE / AIRSIDE

- 24.1 When Lane closure at landside is necessary, the Work Party shall comply with the "Terms and condition of works in landside" (see attached Attachment A24) and complete the "Road work Permit and submit to the divisions stated in the Distribution List five (5) working days before the commencement of work. The Work Party shall only commence the planned work after receiving the approval from all divisions on the Distribution List.
- 24.2 When Lane closure at Airside is necessary, the Work Party shall seek approval from CAG Airside Operations." (See attached Attachment A16)

25 ELECTRICAL SAFETY

- 25.1 The Work Party shall ensure that sufficient safety measures are put in place when working with energized equipment or when installing and/or modifying equipment that was connected, is connected or shall be connected to a live power source. The Work Party shall ensure that all staff and workers involved in the work activity shall be briefed on associated risk assessments and safe work procedures related to the scope of work.
- 25.2 All circuits, DBs, PDPs and any electrical distribution system must be isolated and checked by an authorized competent person to be safe to work on before works can commence.
- 25.3 The Work Party shall ensure all electrical works must be undertaken or carried out by a licensed electrical worker of the appropriate class as per the guidance set out by the Energy Market Authority.

- 25.4 It shall be the responsibilities of the Work Party to ensure that its workers are sufficiently protected throughout the entire duration of work. In doing so, Work Party must put in place a lock-out, tag-out system to minimise the possibility of accidental turn-on of the incoming power supply. On top of that, workers working on the electrical system shall be provided with necessary and appropriate form of personal protective equipment to mitigate the severity of any incident / accident that may occur during electrical works. This may include, but not limited to the use of grounding bracelets, goggles, face masks, rubber mats, etc. All metallic tools (i.e. aluminium ladder, screw drivers, pliers) should be avoided within the vicinity of the work area. The use of such tools are only permitted when sufficient form of insulation is provided for exposed metallic surfaces to reduce the likelihood of such tools causing electrical shorts or arcing.
- 25.5 The Work Party shall also ensure that circuit diagrams and schematics are available and incorporated into the emergency response plan to facilitate prompt and immediate response to any electrical incidents that may arise during the course of work.
- 25.6 For electrical installations taking electricity supply from the CAG's substations, advice on circuit protection requirements must be sought from CAG LEW responsible for the respective licenced electrical installation.
- 25.7 The Work Party shall:
- (i) Update the respective existing electrical drawings for any new installation/modification to the existing system with an endorsement of the Licence Electrical Worker (LEW).
 - (ii) Submit Certification of Compliance (COC) of the new equipment/system installed to CAG LEW prior to the power turn-on to the new equipment/system.
 - (iii) Submit the approved Method of Statement and Risk Assessment prior to the commencement of the work.
 - (iv) Inform Fault Management Centre (FMC) before work commencing and after work completion.
- 25.8 The work party shall be responsible for provision of barricades and warning signs for other live switchboards within the same switchroom, that are not intended for works.
- 25.9 Lockout and Tagout (LOTO) procedure shall be strictly enforced when a HT panel is de-energised and isolated (compliance with SS571 standards) for the control of energy sources which could cause injury to persons. It applies, but is not limited to, activities such as erecting, installing, constructing, repairing, adjusting, inspecting, modifying, unjamming, setting up, troubleshooting, testing, cleaning, dismantling, servicing, and maintaining machines, equipment or processes. This procedure is to ensure proper isolation from LIVE electrical supply with safety padlocking and caution notices to warn personnel at work.

- 25.10 All airport stakeholders are required to provide the as-built drawings indicating the provisions of secondary power supply and inform CAG of any new installation or replacement of the following equipment:
- a) The signalling lamp and the minimum lighting necessary to enable air traffic service personnel to carry out their duties;
 - b) All obstacle lights which, in the opinion of the Aerodrome and ANS Regulation Division, are essential to ensure the safe operation of aircraft;
 - c) Approach, Runway and Taxiway lighting;
 - d) Meteorological equipment;
 - e) Essential security lighting;
 - f) Essential Equipment and facilities for the aerodrome responding emergency agencies;
 - g) Floodlighting on a designated isolated aircraft parking position;
 - h) Illumination of apron areas over which passengers may walk.

SECTION D - OBSTRUCTION CONTROL REQUIREMENTS**I) WORK ACTIVITIES NEAR RUNWAY & TAXIWAY****1 GENERAL**

All the Standards and Recommended Practices stipulated in the Civil Aviation Authority of Singapore (CAAS) Manual of Aerodrome Standards (MOAS) (where applicable) and in the International Civil Aviation Organisation (ICAO) Annex 14 Volume I and Volume II (where applicable) are to be complied with.

2 MAXIMUM HEIGHT OF OBJECTS

- 2.1 All above ground objects (such as mobile machineries, tall construction machineries/plant, temporary structures, stockpile, etc.) present on the airfield are subject to height control. The maximum height of all these objects shall not infringe into the obstacle limitation surfaces, Tower and radar line of sight and any other navigational instrument paths as CAG and/or CAAS may declare from time to time.
- 2.2 If there are special circumstances where it is absolutely necessary to carry out activity or to place objects in the airfield infringing the runway operational surfaces or affect line of sight or navigation equipment performance, ample advance notice and good justification must be given, subject to CAG' and CAAS' approval.
- 2.3 To ensure the active runway operational surfaces are not infringed, no above ground object or work activity at the site shall be allowed to take place higher than the Height Limit (expressed in above ground level), as stipulated in the following table, at all times when the runway concerned is in operation.

At Changi Airport

CHANGI AIRPORT RUNWAY 1, 2 & 3	
Perpendicular distance of object or activity from centre line of runway, D (m)	Permissible maximum height (expressed in above ground level)
$D < 140$ m	No object allowed above ground level
$140 \text{ m} \leq D < 455$ m	$\frac{(D-140)}{7}$ m
$D \geq 455$ m	45 m

If temporary mobile construction at distances less than specified in the table, approval from CAAS ANS Policy shall be sought.

At Seletar Airport (Current till further notice)

SELETAR AIRPORT RUNWAY	
Perpendicular distance of object or activity from centre line of runway, D (m)	Permissible maximum height (expressed in above ground level)
$D < 75$ m	No object allowed above ground level
$75 \text{ m} \leq D < 390$ m	$\frac{(D-75)}{7}$ m
$D \geq 390$ m	45 m

Note: The above table for Seletar Airport will change to the following after the runway is equipped with Instrument Landing System. The Work Party shall check with the Superintending Officer (S.O.), Project Officer and/or Coordinating Officer for the effective date.

At Seletar Airport (after runway is equipped with Instrument Landing System)

SELETAR AIRPORT RUNWAY	
Perpendicular distance of object or activity from centre line of runway, D (m)	Permissible maximum height (expressed in above ground level)
$D < 140$ m	No object allowed above ground level
$140 \text{ m} \leq D < 455$ m	$\frac{(D-140)}{7}$ m
$D \geq 455$ m	45 m

2.4 The Work Party shall submit to CAAS Air Navigation Services (ANS) Policy & Planning Division for height clearance, a list of mobile machineries, tall construction machineries/plant, temporary structures, stockpile, etc to be brought onto the airfield, at least 7 days prior to their deployment. In the submission, the following information shall be provided:

- a) type and height (in metres above mean sea level, AMSL) of equipment, plant, structures, stockpiles, etc. with extensible arms both in extended and retracted positions;
- b) proposed location of deployment (with site plan);
- c) expected duration and daily working hours; and

d) contact number of Work Party.

- 2.5 The CAG S.O., Project Officer and/or Coordinating Officer shall ensure that prior approval be obtained from CAAS Air Navigation Services (ANS) Policy & Planning Division before allowing such mobile machineries, tall construction machineries/plant, temporary structures or stockpile, etc to be deployed on site.

3 HEIGHT CONTROL

- 3.1 Work sites near the airport are subject to height restriction imposed by CAG and/or CAAS Air Navigation Services (ANS) Policy & Planning Division. The Work Party shall seek the approval of CAAS Air Navigation Services (ANS) Policy & Planning Division before deploying tall equipment and ensure that the height restrictions stipulated are strictly complied with.

- 3.2 The height restrictions imposed by CAG and/or CAAS Air Navigation Services(ANS) Policy & Planning Division also apply to temporary structures and construction machineries such as cranes, piling rigs, etc. with extensible arms both in extended and retracted positions. The Work Party shall apply to CAAS Air Navigation Services (ANS) Policy & Planning Division for height clearance of construction machineries at least 7 days prior to the deployment of the equipment. The Work Party shall apply using the standard application form which can be downloaded from CAAS website at <https://www.caas.gov.sg/e-services-forms/e-services/application-for-obstacle-clearance>. The following information shall be provided:

- a) Type and height (in metres above mean sea level, AMSL) of equipment and plant to be used with extensible arms both in extended and retracted positions;
- b) Proposed work sites (please provide a site plan);
- c) Expected duration and daily hours of working;
- d) Name and contact numbers (office number, mobile number and pager number) of the Work Party; and
- e) Name of client.

4 MINIMUM CLEARANCE FROM RUNWAY

- 4.1 No object shall penetrate the Approach, Take-off Climb and Transitional Surfaces of the operational runway, or be within the various safety areas i.e. runway strip, clearway, stopway, runway end safety area as declared for the operation of the airport by CAG and/or CAAS (see Attachments A1 and A3 for Changi Airport and Seletar Airport respectively).

Note: The obstruction control requirement at runway end area in Seletar Airport will change after the runway is equipped with Instrument Landing System. The Work Party shall check with the Superintending Officer (S.O.), Project Officer and/or

Coordinating Officer for the latest permissible maximum height (shown in Attachment A3).

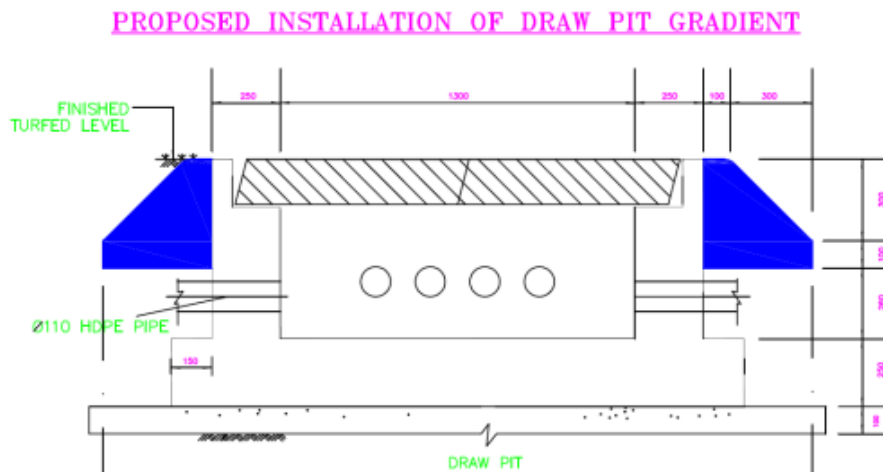
- 4.2 No above ground object or work activity shall be allowed within the runway strips (i.e. 140 metres and 75 metres from the centre line of the runway for Changi Airport and Seletar Airport respectively) when the runway is in operation, unless otherwise approved by CAAS/CAG.

Note: The width of the runway strip in Seletar Airport will change after the runway is equipped with Instrument Landing System. The Work Party shall check with the Superintending Officer (S.O.), Project Officer and/or Coordinating Officer for the latest requirement.

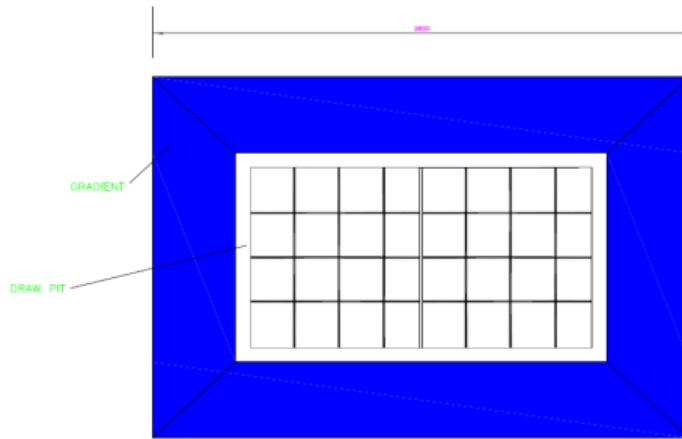
- 4.3 All machineries/plants or tall objects, shall be parked or placed as far away as possible from the runway. The height control requirements specified in paragraph 3 above shall be fully complied with.
- 4.4 Vehicles, construction equipment and workers shall keep out of the Instrument Landing System (ILS) critical and sensitive areas at both ends of the runways at Changi Airport (see Attachments A8-1 and A8-2) and at Seletar Airport at all times, unless otherwise approved by CAAS/CAG (see Attachments A9-1 and A9-2).

Note: Seletar Airport’s runway would be equipped with Instrument Landing System from upon further notice. Work party shall check with the respective Superintending Officer (S.O.), Project Officer and/or Coordinating Officer for the effective date.

- 4.5 Within the graded runway strip and runway end safety area (See Attachment A10 and A11), measures should be taken to prevent an aeroplane wheel, when sinking into the ground, from striking a hard-vertical face. In the case of concrete foundations for runway light fittings or any other objects which the object surface must also be flush with the surface, the vertical face can be eliminated by chamfering from the top of the foundations/objects to not less than 30 cm below the strip surface level and with a slope of 30 – 45 degrees.



Picture 1 - Typical Installation with a slope of 45° (Side View)



Picture 2 - Typical Installation with a slope of 45° (Top View)

Other objects, the functions of which do not require them to be at surface level, should be buried to a depth of not less than 30 cm.

- 4.6 All taxiways leading into the runway at Changi Airport and Seletar Airport including Runway Entry Points (REPs), other than REP 3 are equipped with Microwave Barrier Detectors (MBDs). MBDs are installed at the runway-holding positions / road holding positions to detect unauthorised entry of aircraft or vehicles into the runway.

No machineries/plants or objects are allowed to be parked or placed in front of the MBDs. The area to be kept clear at all times shown in the diagrams below.

Diagram 1: For single sided MBD

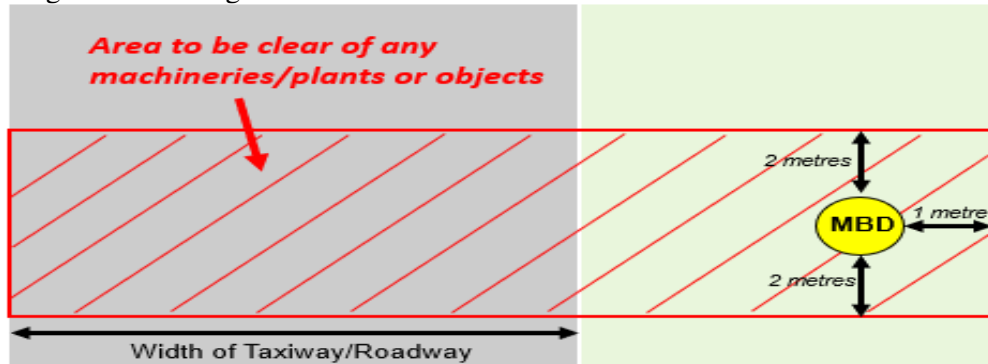
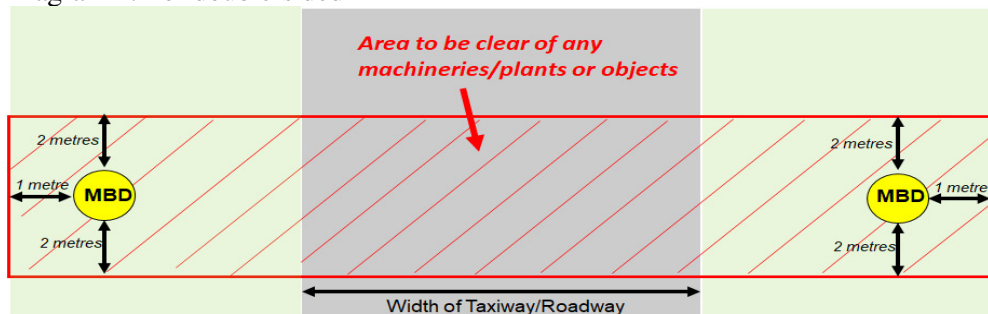


Diagram 2: For double-sided MBD



4.7 Excavation, Open Trench and Pits

Excavations, trenches, pits or holes are not permitted to be left uncovered and back-fill of these areas are not to be left uncompacted within graded runway/taxiway strips and runway end safety areas when the runway is in operation (see Attachments A10 and A11 for Changi Airport and Seletar Airport respectively).

5 MINIMUM CLEARANCE FROM TAXIWAY

5.1 All work activities and obstructions such as construction equipment, personnel, FOD, etc. must be kept at least 51 metres (Changi)/35 metres (Seletar) from the centre line of the taxiway when the taxiway is in operation. The minimum clearance from taxiway for Changi Airport may be less than 51 metres based on the separation distances stated in paragraph 1.2 of Section C or as published by CAG from time to time. The minimum clearance from taxiway for Changi or Seletar Airport may change due to work in progress. The Work Party shall check with the S.O., Project Officer and/or Coordinating Officer for the latest information.

5.2 All machineries/plants or tall objects (objects having a height to smaller base width ratio of more than 1) shall be parked or placed as far away as possible from the taxiway when not in deployment or unattended.

5.3 Under no circumstances shall any non-operating or unattended machinery/plant or tall objects be placed nearer than the distance, T, from the centre line of the operational taxiway:

T = total height of the object/machinery/plant + 51 metres (Changi)

T = total height of the object/machinery/plant + 35 metres (Seletar)

Note: The above information for Changi or Seletar Airport may change due to work in progress. The Work Party shall check with the S.O., Project Officer and/or Coordinating Officer for the latest information.

5.4 Excavation, Open Trench and Pits

Excavations, trenches, pits and holes are not permitted to be left uncovered and back-fill be left uncompacted within 30 metres (Changi)/13 metres (Seletar) from the operational taxiway centre line. If they are carried out within these areas when the taxiway is closed, they must then be backfilled and compacted before the taxiway is re-opened for operations. Outside these areas, uncovered or uncompacted excavations shall be minimised. The above information for Changi or Seletar Airport may change due to work in progress. The Work Party shall check with the S.O., Project Officer and/or Coordinating Officer for the latest information.

6 OTHER AREAS

6.1 Vehicles, construction equipment and workers shall not be near the runway and taxiways unless necessary for working purposes.

- 6.2 When not in use, vehicles, machineries, plant, equipment and materials shall be placed within the designated areas assigned by CAG and they shall be as far away from the aircraft movement areas as possible.
- 6.3 Working areas, parking areas, storage areas and access routes to and from these areas shall be clearly designated and approved by CAG.

II) **OBSTRUCTION MARKING AND LIGHTING OF MOBILE OBJECTS (PLANT, MACHINERIES, EQUIPMENT, VEHICLES, ETC.)**

7 **GENERAL**

- 7.1 The marking and/or lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of the obstacles.
- 7.2 Vehicles, construction equipment, etc. on or near the movement area (i.e. runways, taxiways, taxilanes and aprons) of an airport are obstacles and shall be marked and, if they are used at night or in conditions of low visibility, lighted, in accordance with the specification given herein and in the manner CAG deems acceptable.
- 7.3 The markings and lighting of obstacles in accordance with the CAAS Manual of Aerodrome Standards Chapter 10. Marking and lighting standards for vehicles (e.g. pickups, trucks and trailers) are as follows:
- a) The low-intensity obstacle lights displayed on vehicles shall be flashing yellow.
 - b) The flash frequency shall be between 60 and 90 per minute.
 - c) The effective-intensity of the flash shall not be less than 40 candelas of yellow light. Maximum not more than 400 candelas.
 - d) Flags used to mark mobile vehicles shall not be less than 0.9 metre square.
 - e) Flags used to mark mobile vehicles shall consist of a chequered pattern, each square having sides of not less than 0.3 metre. The colours of the pattern shall contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red and white shall be used.
 - f) Examples of the obstacle lights and chequered flags are attached for your easy reference (see Attachment A12).
 - g) The Work Party shall ensure the quality of the chequered flag are in good and clean condition.
- 7.4 The markings and lighting of obstacles in accordance with the CAAS Manual of Aerodrome Standards Chapter 10 for cranes, piling, rigs, excavators, silos, etc. are as follows:
- a) Omni and fixed red light

- i) Cranes/piling rigs/excavators (< 45 m above the surrounding ground) (Low intensity, type A (Minimum 10 candelas) or B (Minimum 32 candelas), fixed red).
 - ii) Cranes/piling rigs (> 45 m, < 150 m above the surrounding ground) (Medium intensity, type B, flashing, 20-60 fpm, 2000 ± 25% candelas)
- b) Flags of size not less than 0.9 metre square shall consist of a chequered pattern, each square having sides of not less than 0.3 metre. The colours of the pattern shall contrast each with the other and with the background against which they will be seen. Orange and white alternatively red and white shall be used.

8 MARKING OF MOBILE OBJECTS

- 8.1 All mobile objects issued with Airfield Vehicle Permit shall be painted in a single conspicuous colour except for tall construction equipment. Vehicles that require to enter the aircraft manoeuvring areas shall be painted yellow, while other vehicles moving outside the aircraft manoeuvring areas shall be painted white. For concrete trucks, lorry cranes, tipper lorries & trailers which are not feasible to be painted with a single conspicuous colour, shall display a chequered flag at its highest point.
- 8.2 All mobile objects with Temporary Entry Permit shall display flags not less than 0.9 metre square of chequered pattern of orange and white colours, each square having sides of not less than 0.3 metre at its highest point while travelling in the airfield (see Attachment A12).

9 LIGHTING OF MOBILE OBJECTS

- 9.1 All CAT 1 vehicles & mobile equipment operating in taxiways and runway shall be equipped with dual low-intensity flashing yellow obstacle light type C and shall be installed longitudinally on top of the vehicles & mobile equipment.
- 9.2 With effect from 1 November 2014, all other vehicles and mobile equipment operating in the aircraft parking stands and airside roadway are required to have one low-intensity flashing yellow obstacle light type C, installed at its highest point and shall switch on the lights at all times when vehicles and equipment are operating in the airside, except for Airport Emergency Services (AES) and Airport Police Division (APD) vehicles.
- 9.3 A copy of the documentation proof certifying that the flashing yellow obstacle light installed on each vehicle complies with the required specifications will be required to support the application or renewal of the Airside Vehicle Permit (AVP), as well as Temporary Entry Permit (TEP).
- 9.4 Tall objects (e.g. cranes and piling rigs) shall be lighted up with conspicuous steady red omni-directional obstacle lights at the top and extremities. Any equipment parked on closed aircraft movement areas (when there are no work activities in the closed areas) shall also be marked with chequered flags and lighted (i.e. red fixed obstacle light at the highest point at night or during poor visibility condition) when not in use.

- 9.5 The obstacle light on vehicles & mobile equipment shall comply with CAAS Manual of Aerodrome Standards Chapter 10, Table 10-3 Characteristics of obstacle lights.
- 9.6 The driver of the vehicle shall switch on hazard lights, head lights, spot lights & directional arrows when the vehicle is stationary on runway while carrying out work at night. Where long vehicle is concerned, additional flashing yellow obstacle light shall also be installed at the rear of the vehicle so that the entire vehicle is conspicuously lighted

SECTION E – WILDLIFE CONTROL REQUIREMENTS

- 1 **MEASURES TO MINIMISE WILDLIFE HAZARD**
- 1.1 Work Parties shall take appropriate measures to avoid attracting birds, dogs, cats and other wildlife to the airport. In addition, Work Parties shall conduct daily checks to ensure that their workers adhere to these measures.
- 1.2 Work Parties shall avoid damaging turf in the course of their activities as ponding could lead to the growth of insects and other invertebrates which in turn attract birds. All excavated areas shall be covered up with approved materials and methods.
- 1.3 Work Parties shall minimise the presence of stockpiles or poles or wires and other such items which could act as perches for birds at worksites. Appropriate mitigation measures must be taken if birds are found to be attracted to these areas.
- 1.4 Work Parties shall ensure that there is no overgrown grass and minimize water ponding within the work sites.
- 1.5 Work parties shall ensure that there are no gaps or holes in the hoardings and any damage to the hoardings must be repaired immediately with stopgap measures to block up the holes. This is to prevent dogs, cats and other stray animals from entering the airfield. Checks on the base of the hoardings, gates and fences shall also be carried out daily to ensure no disturbance to the ground that could lead to wildlife trespassing.
- 1.6 No person shall consume any food or beverage in the movement area except in the offices located on the apron or on board an aircraft. There shall be proper management of food waste to reduce attractants for wildlife. No person shall feed any bird or animal within the airside.
- 1.7 Work Parties shall be required to catch any dogs, cats or other animals found within their worksites. If the dogs, cats or other animals escape into the airfield, Work Parties shall report such incidents to CAG Airside Operations immediately at Tel: 6541 2275/3 (Changi Airside Management Centre)/6481 5077 (Seletar Airport Operations Unit) or contact the Changi/Changi East/Seletar Tower directly.

SECTION F - OTHER HAZARDS CONTROL REQUIREMENTS**1 FOREIGN OBJECTS/DEBRIS/DUST (FOD)**

- 1.1 There must not be any foreign objects debris (such as stones, earth lumps, nails, construction waste, cut grass, mud stain, etc.) left behind on the aircraft pavements (such as runways, taxiways, taxilanes and aircraft parking aprons, etc.) as well as in their vicinity as these objects could be ingested by the aircraft engines and may subsequently endanger the safety of the aircraft during operation. The Work Party shall ensure that all the foreign objects on the aircraft pavements and their vicinity are cleaned up and cleared away before the pavements are opened for operation. The Work Party shall be required to ensure that all his vehicles, machineries or equipment are in proper serviceable condition and are cleaned and free from foreign objects or debris before they travel on the aircraft pavement.
- 1.2 There must also be strict supervision to ensure that workers do not litter the work site, as the litter could be blown onto the runways, taxiways, taxilanes or aircraft parking apron.
- 1.3 Measures must be taken to ensure that objects such as markers and dust from construction areas, piles of material/debris, etc. are not blown onto the runways, taxiways, taxilanes or aircraft parking apron.
- 1.4 Every person on the premises of the airside shall obey the lawful directions given by an authorised person to remove any material, handling or transporting equipment, refuse or litter. No person shall leave or deposit any foreign matter or thing in the movement area that is likely to be hazardous to the operation of any aircraft.

2 GLARES FROM LIGHTS AND REFLECTIVE PANELS

- 2.1 In general, all lights for illumination of work sites shall be shielded and directed to shine towards the ground. Should pilots or air traffic controllers complain of glare after the installation of the lights, these lights shall be modified or removed accordingly.
- 2.2 Lightings installed at developments similarly shall not cause glare and confusion to aircraft pilots or to air traffic controllers. Should pilots or air traffic controllers subsequently complain of glare or confusion, the lights shall be modified or removed accordingly.

3 INTERFERENCE TO NAVIGATION AIDS/AIRPORT EQUIPMENT

- 3.1 There shall not be large metallic cladding/metallic structures which can cause radio signal reflection or blockage against line-of-sight operations to systems such as Instrument Landing System (ILS) and radars installed in the airport. Installation of such metallic cladding/metallic structures is strictly subject to written approval from CAAS Aeronautical Telecommunications & Engineering (ATE) Division.
- 3.2 Vehicles, construction equipment and workers shall keep out of the ILS critical and sensitive areas along the runways.

- 3.3 Metal cladding and materials of high reflectivity to radar signal of frequencies 1 GHz to 3 GHz shall not be used for wall and roof facing our radars. However, if such metal cladding or materials are to be used, a suitable consultant would have to be engaged to advise on how radar signal reflections from the buildings could be minimised to a level similar to that of the same building with its walls and roof using conventional building materials, e.g. concrete.
- 3.4 Arc welding shall be avoided as it could interfere with the navigation aids. CAAS ATE Division shall be kept informed of any arc welding carried out during the work.
- 3.5 Radio equipment to be used must be of the type which will not cause interference to airport telecommunications and navigational aid equipment. The procedures for application of mobile radio sets are as follows:
- a) The Work Party is to write to the Engineer (Communications), (Tel: 6541 2790/Fax: 6542 2447) furnishing the following details:
 - i) Reason for the need of mobile radio set, supporting letter or document from the airport employer, project title and reference number and duration;
 - ii) Vehicle(s) licence plate number; and
 - iii) Areas where sets would be used.
 - b) If acceptable, CAAS ATE Division will approve the use of mobile radio sets.
 - c) With CAAS' approval letter, the Work Party is to approach the officer-in-charge from NCS Communications Engineering Pte Ltd, (Tel: 6541 1677) for rental of mobile radio set. The contact details of NCS Communications Engineering Pte Ltd :
- NCS Communications Engineering Pte Ltd
Aeradio Service Division
Changi Airport
P.O. Box 2838
Singapore 918199
Fax: 65457126
- 3.6 Prior arrangements must be made between CAG and CAAS ATE Division for any maintenance work e.g. grass cutting and excavation work, carried out in the vicinity of navigational aids and other ATE facilities within the airside. Such arrangements may include for works to be carried out during planned shutdown of the aids/facilities, e.g. HF Transmitting Antennae.
- 3.7 All vehicles which need to enter the aircraft manoeuvring areas at Changi Airport (i.e. runways, taxiways and taxilanes) are required to be equipped with Automatic Dependent Surveillance – Broadcast (ADS-B) transponders utilising 1090 MHz Extended Squitter. Such transponders shall comply with the prevailing standards of aircraft avionics for ADS-B OUT (air-to-ground). The purpose of having the

ADS-B transponders is to enhance aerodrome safety by facilitating Air Traffic Control (ATC) in tracking vehicular movements in the aircraft manoeuvring areas. For more information and technical details, please contact Engineer (Surveillance) of CAAS ATE Division (Tel: 65756773).

- 3.8 All the cost associated with equipping the Work Party's vehicles with radio equipment or ADS-B transponders are to be borne by the Work Party.

4 PROTECTION OF TELECOMMUNICATIONS SERVICES
(Applicable where works cut across Telecom's Underground Services)

- 4.1 The Work Party shall arrange with NCS Communications Engineering Pte Ltd to make available sufficient special comms cable and ACR (Approach Control Radar) cables where applicable for emergency repairs as their severance will disrupt the aircraft operations. Such spare cables must be stored at suitable locations, with the aim of reaching the proposed work sites in the shortest possible time in the event of cable cut.

- 4.2 Where the works would be carried out over ACR cables, NCS Communications Engineering Pte Ltd (CAAS' contractor) shall be engaged for on-site standby to repair the cables in the event of their severance. Please liaise with NCS Communications Engineering Pte Ltd for further details. For the Nav aids, ATC radio and comms cables, prior arrangement shall be made for engagement of SingTel's repair team when its services are needed. Please liaise with SingTel Network Services Outside Plant Planning, (Tel: 6848 5854/Fax: 6848 4110) for further details.

- 4.3 The depth of existing ducts shall be ascertained by manual trial hole excavation prior to overcrossing the ducts. Only manual excavation is to be carried out within 4 meters of such crossing.

- 4.4 If the proposed works were to overcross the comms cable ducts, slabs shall be provided to protect the comms cable ducts before heavy machinery could go over them during the works as such ducts are not supported by piles.

- 4.5 If the proposed works were to overcross the comms cable ducts, the method of support and protection shall be submitted to NCS Communications Engineering Pte Ltd, Line Plant Operations Division for approval. NCS Communications Engineering Pte Ltd, Line Plant Operations Division must be informed of the dismantling of supports and the backfilling procedure of the comms cable ducts.

- 4.6 A comprehensive work schedule shall be submitted to CAAS and SingTel through CAG. In addition, CAG, CAAS and SingTel shall be kept informed in advance of all works approaching existing CAG's or CAAS' comm plants/ducts.

- 4.7 Any severance of existing CAG's or CAAS' comm plants/ducts shall be attended to immediately with the aim of restoring normal services in the shortest possible time. The Work Parties responsible for the works shall inform CAG, CAAS and SingTel immediately of such severance.

- 4.8 All construction works within the existing services shall be carried out under the standing supervision and direction of the services detection worker and the Work Party supervisor, in a manner similar to that of making the trial hole or inspection pit.
- 4.9 The Work Party shall submit service detection report and surveyed services drawings endorsed by the services detection worker to CAG and CAAS. The surveyed services drawings shall include but not limited to the following:
- a) the location and depth of the services observed, to be expressed in Airport Coordinates and in elevation with respect to mean sea level (MSL) respectively; and
 - b) the cross section and description of the services.
- 4.10 The Work Party shall note the consequences of damaging SingTel's cables. Under Section 29 of the Telecommunications Act 1999, any person who fails to give 7 days notification to SingTel prior to commencement of earthworks is liable on conviction to a fine not exceeding \$100,000 or to imprisonment for a term not exceeding 3 years or both. Under Section 49 of the same Act, any person who in the course of carrying out earthworks, damages any SingTel's cable is liable on conviction to a fine not exceeding \$1 million or to imprisonment for a term not exceeding 5 years or to both.

5 PROTECTION OF AIRCRAFT PAVEMENTS

- 5.1 The Work Party shall take all necessary measures to prevent his vehicles, machineries or plant from damaging the aircraft pavements during the work and shall be responsible to make good all the damaged pavements at his own expense to the satisfaction of CAG.
- 5.2 No tracked vehicles, plant or machineries shall be allowed to travel on the aircraft pavements unless such vehicles, plant or machineries are prevented from getting direct contact with the pavements surface by approved plywood or timber plank packing.
- 5.3 In no circumstances shall any diesel or fuel leaking vehicle be allowed to work in the airfield. Diesel or fuel leaking plant and machineries shall also, as far as possible, be discouraged for work in the airfield and shall not be brought to site without CAG's approval.
- 5.4 Unless otherwise decided by CAG, all the plant and machineries found leaking with fuel or diesel during the work shall be immediately stopped and removed from site and replaced at Work Party's own expense.

SECTION G - AIR TRAFFIC CONTROL OPERATIONS REQUIREMENTS**1 AIR TRAFFIC CONTROL OPERATIONS**

- 1.1 The Work Party shall be required to implement the following co-ordination procedures with Air Traffic Control (ATC) during his works within the aircraft movement areas:
- a) The Work Party shall ensure the provision of a Co-ordinator (e.g. site engineer or approved certified safety officer) stationed full-time at site during the works who must be contactable and be able to respond immediately and communicate at all times with the Changi/Changi East/Seletar Tower Duty Watch Manager in case of emergency or irregularities. The Work Party's Co-ordinator's mobile phone number shall be provided to the Changi/Changi East/Seletar Tower.
 - b) Unless otherwise decided by CAG, the Work Party shall provide at least 2 radio-equipped vehicles at site at all time (including night works) during his works within the aircraft movement areas (either operational or closed) or when there is a need to manoeuvre in the aircraft movement areas. Both radio-equipped vehicles shall have good conditioned and reliable radio sets turned-on at all time to enable effective and instant communication with the Changi/Changi East/Seletar Tower.
 - c) In case of obstructions or hazards to aircraft operations, or any incidence during the works that may endanger the operation of aircraft within the aircraft movement areas, the Co-ordinator shall immediately alert the Changi/Changi East/Seletar Tower Duty Watch Manager through the radio set on 121.9 MHz (Changi)/119.675 MHz (Changi East)/122.9 MHz (Seletar) or Tel No 6541 2416 (Changi) or 6481 2893 (Seletar) [to be used only when a radio set is not available] for Changi and Seletar Airport respectively.
 - d) In the event of an aircraft emergency requiring opening of runways or taxiways, the Changi/Changi East/Seletar Tower Duty Watch Manager will alert the Co-ordinator through radio-set and he shall evacuate all construction personnel and equipment from the work areas within the runway/taxiway strip and operational surfaces to pre-designated holding areas. Runway must be ready for operation (i.e. cleared of all obstructions) within 30 minutes upon notification by the Changi/Changi East/Seletar Tower Duty Watch Manager.
 - e) Notification procedure for works or movement of equipment/vehicles that require Changi/Changi East/Seletar Tower Duty Watch Manager's clearances.
- 1.2 The Work Party shall provide proper supervision of his workers movement and clearly mark out the work areas to ensure that vehicles, personnel, equipment, works, etc. are confined to the designated work areas and that there is no unauthorised entry into aircraft movement areas, such as runways, taxiways, taxilanes, aprons, runway safety areas, navigational aids sensitive areas, etc.
- 1.3 Vehicles, construction equipment and workers shall only use the approved designated routes to gain access to work areas.

- 1.4 Access routes to the work areas shall as far as possible be routed clear of taxiways (either operational or closed). Where crossing of operational taxiway/taxilane is necessary during his works and approved by CAG, the Work Party shall obtain clearance from the Changi/Changi East/Seletar Tower before each crossing is made and be responsible to engage approved safety supervisor stationed at the designated crossing point to manage and regulate his vehicular crossing activities. Priority shall be given to the taxiing aircraft on the taxiway during his vehicular crossing activities. No crossing of the taxiway shall be permitted whenever the Changi/Changi East/Seletar Tower so directs. Crossing is also not permitted in front of the path of a taxiing aircraft. He shall also be required to station two workers full-time at his designated taxiway/taxilane crossings to maintain the cleanliness of the taxiway/taxilane pavement and ensure it is free from FOD at all time during his vehicular usage.
- 1.5 All vehicles which are required to enter and manoeuvre in the aircraft movement areas (i.e. runways, taxiways, taxilanes and aprons) shall be equipped with radio sets on 121.9 MHz (Changi West)/ 119.675 MHz (Changi East)/122.9 MHz (Seletar) frequency which must be manned at all times such that there will be a constant communications link between the Changi/Changi East/Seletar Tower and the vehicle/equipment in the aircraft movement areas.
- 1.6 Where entry into a particular movement area is approved by CAG, ATC clearance shall be obtained before mobilising any vehicle, personnel or construction equipment into that particular area. In this case, radio communications between the Changi/Changi East/Seletar Tower and the Work Party's work supervisor shall be continuously maintained at an approved radio frequency. The Work Party shall also confirm with the CAG Superintending Officer (S.O.), Project Officer or Coordinating Officer on a daily basis regarding the closure of the airfield facility before entering the area concerned to start work each day.
- 1.7 At the end of each work period or period of runway closure, the Co-ordinator shall conduct runway/taxiway inspection to see that it is free from FOD and debris hazards. FOD and hazards found shall be immediately removed before the runway/taxiway is handed back to CAG for aircraft operation.

2 CONTROL OF AIRFIELD LIGHTS FROM THE CHANGI/CHANGI EAST/SELETAR TOWER

- 2.1 Work parties shall note and take reference to Section C (Clause 13.9) for more information on the procedures required to demarcate and switch off / block the affected airfield lighting (AFL) circuits of the closed area on the CAAS Advanced Surface Movement Guidance and Control System (ASMGCS) and CAG Airfield Lighting Control System (ALCS) graphic interface, for any closure of runway, taxiway, aircraft parking stands and any other areas where airfield lighting services are provided.
- 2.2 Modification of ASMGCS and ALCS at Changi Airport or ALCMS at Seletar Airport shall be required for the following airside works involving AFL services:

1. addition / decommissioning / replacement of infrastructure with AFL services on the runway, taxiway and aircraft parking stands;
2. addition / deletion/ modification of AFL services and circuits in the airfield;
3. changes in taxiway naming; or
4. any other works which involves AFL services.

Work parties shall bear the cost of the required modification works to ASMGCS, ALCS and ALCMS. Work parties shall check with CAAS ASMGCS team for any modification cost to ASMGCS.

2.2.1 The modification works carried out by the Work Parties to ASMGCS/ ALCS/ ALCMS shall include but not limited to the following activities:

- a) Inform and get approval from ASMGCS/ ALCS/ ALCMS system owners.
- b) Liaise directly with ASMGCS/ ALCS/ ALCMS specialised contractors to carry out the following works:
 - i. Any new software and/ or hardware installation/ modification works;
 - ii. All necessary surveys, pre-testing, deployment, testing and commissioning works in accordance with MOAS;
 - iii. Updating of ASMGCS/ ALCS/ ALCMS operational and maintenance manuals and training materials.
- c) Coordinate and perform thorough software testing together with CAAS ATS, system owners and operation parties on the various systems' offline Testing and Validation System (TVS).
- d) Deployment of the necessary software and/ or hardware including testing and commissioning activities.
- e) Ensure all necessary documents (e.g., signed reports and updated OMM documents) to be submitted to system owners.

The general requirements above are for reference and is subject to change according to the type of works. Work parties shall clarify with ASMGCS/ ALCS/ ALCMS system owners when in doubt.

2.2.2 For any queries on CAAS ASMGCS and CAG ALCS at Changi Airport and CAG ALCMS at Seletar Airport, please contact the following personnel:

System: Airfield Lighting Control Monitoring System (ALCMS)

Location: Seletar Airport

Attention: Richard Chia

Email: Richard.chia@changiairport.com

System: Airfield Lighting Control System (ALCS)
Location: Changi Airport
Attention: Teo Wei Yi / Andy Chin
Email: teo.wei.yi@changiairport.com / andy.chin@changiairport.com

System: Advanced Surface Movement Guidance and Control System (ASMGCS)
Location: Changi Airport
Attention: Toh Seow Teng / Kevin Kong
Email: Toh_Seow_Teng@caas.gov.sg / Kevin_Kong@caas.gov.sg

- 2.3 The Changi/ Changi East/ Seletar Tower shall at all times continue to have effective remove control to all the active runways and taxiway and apron airfield lights which are not affected by the construction works.
- 2.4 There shall not be any disruption to the ATC operations due to airfield lighting control modification works. In particular, operations on the runways shall not be disrupted.

SECTION H - AIRSIDE REGULATIONS

The contents of this section are subjected to changes. CAG reserves the right to update and/or revise these requirements as and when necessary. The Work Party shall comply with the latest requirements accordingly as instructed and the latest terms and conditions for works in the airside. All drivers are bound by the terms and conditions for operation as specified by the CAG Airside Management in the Airside Driving Theory Handbook (can be purchased from the Changi Airside Driving Centre) for Changi Airport and Seletar Airport Airfield Driving Theory Handbook (ADTH) and Cat 1 Airfield Driving Handbook (Cat 1 ADTH) (obtainable from Seletar Airside Operations Unit) for Seletar Airport.

1 PART 1: PERMITS ISSUED UNDER THE CAAS (CHANGI AIRPORT) BY-LAWS 2009/CAAS (SELETAR AIRPORT) BY-LAWS 2009

1.1 Under the provisions of the CAAS (Changi Airport) By-Laws 2009/CAAS (Seletar Airport) By-Laws 2009, the CAG Airside Management's Airside Driving Centre issues the following permits:

- a) Airfield Vehicle Permit (AVP)
- b) Temporary Entry Permit (TEP) for Vehicles
- c) Airfield Driving Permit (ADP)

1.2 AIRFIELD VEHICLE PERMIT (AVP)

1.2.1 All vehicles, except those under paragraph 1.2.7, operating in the airside shall possess an Airfield Vehicle Permit issued by CAG Airside Management's Airside Driving Centre.

1.2.2 All vehicles must comply with the requirements stipulated in the Third Schedule of the CAAS (Changi Airport) By-Laws 2009/Second Schedule of the CAAS (Seletar Airport) By-Laws 2009 – reproduced in Attachment 1A to Part 1 – prior to the issue of an Airfield Vehicle Permit.

1.2.3 An Airfield Vehicle Permit shall be in force for a period of one year and renewable every year.

1.2.4 An Airfield Vehicle Permit shall be issued to vehicles with valid Land Transport Authority (LTA) Road Tax and Insurance Certificate including usage in the airside covering the period of the Airfield Vehicle Permit.

1.2.5 The fees payable depends on the type of vehicles i.e. Petrol/diesel-driven, Battery-operated, Trailer-mounted.

The rates are prescribed in Part 3 of this section.

1.2.6 CAG Airside Management may impose any condition in the Airfield Vehicle Permit and reserves the right to cancel any vehicle permit without assigning any reason.

1.2.7 Exemption

Airfield Vehicle Permits are not required for the following:

- a) vehicles entering the airside on a Temporary Entry Permit; and
- b) vehicles attending to an emergency.
- c) machineries / equipment which are not roadworthy and are confined to the work area throughout operations and shall be in the form of:
 - i) Supervisor deployed on site to monitor operations and supervisor shall be clearly briefed on his/her roles & responsibilities, ie. He/she must ensure no equipment leave the work area, unless towed by a trailer with valid AVP and driven by valid ADP holder.
 - ii) Equipment operators shall all be briefed clearly that they are only allowed to stay within work area, not allowed to operate equipment outside work area before the start of every shift and during toolbox briefing.

1.2.8 Guidance notes on the application of an Airfield Vehicle Permit are set out at Attachment 1B to Part 1.

1.3 TEMPORARY ENTRY PERMIT (TEP) FOR VEHICLES

1.3.1 Any vehicle intending to enter the airside on ad hoc basis to let down personnel, deliver heavy equipment, construction material, goods or for other approved purposes has to apply for Temporary Entry Permit issued by CAG, Airside Management 's Airside Driving Centre.

1.3.2 The conditions of entry for such vehicles shall:

- a) Be accompanied by a holder of a valid airfield driving permit in that same vehicle or in an escorted vehicle by the holder of a valid airfield driving permit who shall act as a steersman;
- b) Not drive the vehicle into any aircraft hangar;
- c) Ensure the vehicle is of roadworthy condition that is acceptable to CAG. No fuel-leaking vehicle shall be allowed in the airside airport. All vehicles operating in the airside must possess a valid Insurance Certificate covering its usage within the airside;
- d) Display a chequered flag (minimum 0.9 metre by 0.9 metre) by day and a flashing yellow light on top of the vehicle shall be switched on at all times.;
- e) Maintain a safe distance of at least 15 metres from any aircraft refuelling point or aircraft fuel tank vent when there is an aircraft parked at an aircraft stand;
- f) Remove any debris from the airside after completion of each day's work;

- g) Pay cost of repair for any damage caused to CAG or any airport property plus 15% of total repair cost as administrative charge; and
- h) Comply with such other conditions as may be imposed by CAG.

1.3.3 Within a year from the date of application, a vehicle is only allowed to be issued with the Temporary Entry Permit for a maximum period of 60 days per calendar year thereafter no extension will be granted.

1.3.4 The Temporary Entry Permit shall be displayed in a conspicuous place on the front windscreen of the vehicle and shall be produced for inspection upon request by any authorised officer or police officer.

1.3.5 Operators are reminded that the use of the Airfield Vehicle Permit and Temporary Entry Permit are also governed by the Airside Driving Theory Handbook (Changi) and Seletar Airport Airfield Driving Theory Handbook (ADTH) and Cat 1 Airfield Driving Handbook (Cat 1 ADTH) (Seletar) published by CAG and shall be subject to changes and revision by CAG from time to time as necessary.

1.4 AIRFIELD DRIVING PERMIT (ADP)

1.4.1 All drivers of motorised vehicles operating in the aircraft movement (excluding runway and taxiways) areas shall hold at least an Airfield Driving Permit. All drivers of motorised vehicles intending to operate on the runway and taxiways (manoeuvring area) shall possess an Airfield Driving Permit (Category 1). Only a holder of a current Class 3 driving licence issued by the Traffic Police or foreign license equivalent to Class 3 is eligible to apply for an Airfield Driving Permit. Applicant with license other than those issued by Singapore Traffic Police shall check with CAG Airside Driving Centre (ADC) prior to application. Applicant is required to produce the original identity card (NRIC) or work permit (for foreign applicant), state driving license, Airside Rules & regulation Course (ARRC) certificate issued by SATS or DNATA or Company letter head stating applicant is doing self study on the day of booking and on the scheduled test date. All supporting documents that are not in English must be accompanied with an Official Translation, which can be obtained from the country's respective Embassy.

A) ADP

- i) All first time (Changi) Airfield Driving Permit applicants can choose to do self-studying instead of having to attend compulsory classroom-based Airside Rules and Regulation Course (ARRC). All Seletar Airfield Driving Permit applicants have to attend compulsory classroom-based Airside Rules and Regulation Course (ARRC).
- ii) A permit will only be issued after the applicant has passed the Airfield Rules Test (Theory) and Airfield Driving/Safety Compliance Test (Practical) conducted by the CAG Airside Management's Airside Driving Centre (for Changi ADP) and/or by Seletar Airside Driving Centre (for Seletar ADP).

B) ADP (Category 1)

1. Application

- i) Applicant must hold a valid ADP (minimum Class 3).
- ii) Application requires a justification letter to obtain an ADP Category 1 permit. Application from contractors must be supported by relevant CAG Divisions.

2. Familiarisation Trips

Changi ADP (Category 1) applicant is required to attend 10 familiarisation trips on at least 3 different days (inclusive of 2 night trips on different nights but can be on the same day trips) in an authorised vehicle, under the guidance of an ADP Category 1 holder. Each trip made must be recorded in the log sheet and be certified by relevant CAG Division. The supporting documents are to be forwarded to CAG Airside Management's Airside Driving Centre together with the application form for endorsement.

Seletar ADP (Category 1) applicant is required to attend 6 familiarisation trips (inclusive of 4 day and 2 night trips) in an authorised vehicle, under the guidance of an ADP Category 1 holder. Each trip made must be recorded in the log sheet and be certified by relevant CAG Division. The supporting documents are to be forwarded to CAG Seletar Airport Operations for endorsement.

3. Course, Written Test and Test on the Use of Radio Telephony.

Applicant is required to attend a course on radio telephony procedures and the rules and regulations governing the conditions of entry/exit of runway/taxiway.

Applicant is also required to pass a written test and a practical test on the use of Radio Telephony to obtain clearance from duty air traffic controller to make trips to any destination on the runway and taxiway. All such course and tests are conducted by CAG Airside Management's Airside Driving Centre.

Operator of the Radio Telephony set shall adhere to the "Category One Airside Driving Theory Handbook" for Changi Airport and "Driving into manoeuvring Area & Standard Phraseology" for Seletar Airport.

4. Endorsement

The ADP shall be endorsed with the Category 1 status once all the criteria are met which allow the holder to drive into taxiways and runways. Before entering the taxiway and runway areas, approval must be sought from Changi Tower/Seletar Tower.

- 1.4.2 An Airfield Driving Permit authorises the holder to operate any or a combination of the types of vehicles according to the classification of vehicles at paragraph 1.6.

- 1.4.3 An Airfield Driving Permit shall be in force for a period of one year or for any period as CAG may determine.
- 1.4.4 All fees relevant to the issue of an Airfield Driving Permit are listed out in Part 3 of this section.
- 1.4.5 CAG may cancel or withdraw any driving permit without assigning any reason.
- 1.4.6 Upon termination of employment or cancellation of permit, it is the duty of the employer to surrender the driving permit to CAG Airside Management's Airside Driving Centre.
- 1.4.7 Every driver shall carry his driving permit with him at all times and shall produce it to authorised officers upon request.

1.5 CLASSIFICATION OF VEHICLES

- Class 3A - Motor cars with unladen weight of 2500 kilograms and below with automatic transmission.
- Class 3C - Commercial motor vehicles with unladen weight of 2500 kilograms and below.
- Class 3
 - a) Motor cars with unladen weight of 2500 kilograms and below.
 - b) Motor tractors with unladen weight of 2500 kilograms and below.
- Class 4
 - a) Load/passenger carrying vehicles with unladen weight exceeding 2500 kilograms and not exceeding 7250 kilograms.
 - b) Motor tractors, mobile passenger steps, skyloaders, etc. with unladen weight exceeding 2500 kilograms and not exceeding 7250 kilograms.
- Class 5 - Non-load/passenger carrying vehicles with unladen weight exceeding 7250 kilograms.
- Class A - Passenger Loading Bridges (Aerobridge).
- Class F - Forklifts or fork trucks.

Scooters and motorcycles are not permitted within the aerodrome except in the Changi Airfreight Centre.

2 PART 2: RULES AND REGULATIONS

2.1 General

- a) Every apron user shall conduct oneself in a manner that prevents exposure of oneself or other persons to danger, ensures safe and smooth traffic performance and precludes impairment of flight operations, in particular, of taxiing aircraft.
- b) When driving in the airside areas, drivers must follow the road markings. Vehicles should not use an aircraft parking stand as a short cut or to overtake.
- c) Speed limit to be observed when driving in the airside:
 - i) 5 km/h within 10 metres of a parked aircraft;
 - ii) 10 km/h within the Baggage Handling Area;
 - iii) 15 km/h on roadways fronting baggage handling area;
 - iv) 30 km/h on roadways near aircraft parking stands; and
 - v) 50 km/h on roadways away from aircraft parking aprons along perimeter roads and airside tunnels.
- d) Before starting, the driver shall ensure that his vehicle is in a roadworthy condition and that all requirements under the CAAS (Changi Airport) By-Laws 2009/CAAS (Seletar Airport) By-Laws 2009 have been complied with.
- e) All drivers shall refrain from using handphone or walkie-talkie whilst driving within the airside and shall comply with any direction or instruction given by authorised officers.
- f) Vehicles shall give maximum clearance to aircraft at all times.
- g) Installed seat belts shall be properly fastened.
- h) The driver of a vehicle shall not leave his vehicle unattended in the airside and in the event of a breakdown shall attract attention to his plight.
- i) The driver of a vehicle who desires to enter the aircraft manoeuvring areas shall obtain prior approval from the Changi/Changi East/Seletar Tower Duty Watch Manager over the radio transmitter on VHF 121.9 MHz (Changi)/ 119.675 MHz (Changi East)/122.9 MHz (Seletar) and maintain contactable so as to respond or communicate immediately with Changi/Changi East/Seletar Tower Duty Watch Manager in the event of emergency or irregularities.
- j) Any vehicle which is at the point of entering the aircraft manoeuvring area shall stop at the point of entry and the driver thereof shall first ascertain that there is no aircraft movement before proceeding into the manoeuvring area.

- k) No person shall cross the aircraft movement areas by moving in front of the path of a taxiing aircraft or at the rear of an aircraft being pushed back (with anti-collision lights switched on when about to or in process of push back).
- l) Drivers of vehicles/equipment in the course of their duties or for an adequate period of time before coming on duty shall not consume intoxicating beverages.
- m) Vehicles authorised to display blue flashing emergency light and any other vehicle being led by such vehicles are exempted from the speed limit and may leave the designated traffic lanes if need be. Such vehicles shall however give way to aircraft.
- n) Aircraft shall have right-of-way over all other traffic.
- o) Towed aircraft and guide vehicles escorting aircraft shall have the same right-of-way status as taxiing aircraft over other vehicular traffic.
- p) Vehicles being led by guiding vehicles shall have right-of-way status over other vehicular traffic.
- q) No vehicle or person shall cross the movement area in front of the path of a taxiing aircraft, or an aircraft on tow or pushback. Driver shall remain vigilant to the hazards or jet blasts. A safety distance of 250 metres behind aircraft is recommended.
- r) When driving the vehicle parallel to an aircraft taxiing on the taxiway, keep the vehicle within the red apron boundary line that separates the taxiway from the apron and away from the manoeuvring area.
- s) Vehicles that need to be on the turf area beside the taxiway shall keep at least 51/35 metres (Seletar) from the centre line of all the operational taxiways.

2.2 OPERATING NEAR AN AIRCRAFT

- a) Slow down vehicle when approaching an aircraft which is setting down or taking up passengers. Allow free and uninterrupted passage to every aircraft passenger who is within the airside and every such passenger shall have precedence over all vehicular traffic.
- b) Always approach an aircraft at an angle and keep to the right side of the aircraft in order to avoid a collision in case of brake failure.
- c) Do not draw up or stop the vehicle under the wing, tail or fuselage of an aircraft unless when servicing the aircraft.
- d) Do not reverse towards an aircraft except for the purpose of servicing the aircraft and only when directed to do so by a vehicle marshaller.
- e) Do not approach an aircraft which has its engines running and/or its anti-collision lights switched on.

- f) Do not drive over any hose or bonding cable laid on the ground by fuelling agents during aircraft refuelling.

2.3 SAFETY DISTANCES FROM AIRCRAFT

2.3.1 Stationary aircraft

- a) A safe alert distance of at least 5 metres shall be observed when approaching close to any stationary aircraft.
- b) Keep clear of the aircraft's engines and do not pass within 7.5 metres from the air intake or within 76 metres from the rear of a running jet engine.
- c) Never start the vehicle engine when it is within 15 metres of an aircraft which is being refuelled.
- d) When an aircraft is being refuelled, a safety zone of 2.5 metres radius shall be maintained around the aircraft tank vents by all vehicles.
- e) Vehicles not directly involved in the servicing of aircraft are to maintain a distance of at least 15 metres from parked aircraft.

2.3.2 Moving Aircraft

- a) The “Give Way to Aircraft” sign painted on the roadway warns driver of taxiway crossing ahead and potential aircraft movement. Driver is to stop at the “STOP” marking and visually check that the area is clear of aircraft movement before moving onto the crossing.
- b) Do not cross behind the path of an aircraft taxiing under its own power unless there is a separation of more than 250 metres behind the aircraft.
- c) When driving the vehicle parallel to an aircraft taxiing on the taxiway, keep the vehicle within the red apron boundary line that separates the taxiway from the apron and away from the manoeuvring area.
- d) Vehicles travelling on roadways behind the parking stands shall hold at edge of parking stands and wait for the aircraft (on the apron taxiway to clear or wait until the aircraft has fully pushed back from its parking stand into the apron taxiway) before joining to the roadway to continue their journey.
- e) Tall vehicles travelling along the roadways in front of all contact gates shall stop temporarily whenever an aircraft is approaching the gate. This is to avoid obstructing the Aircraft Docking Guidance System (ADGS) operator’s line of sight to the status of the display panel of the ADGS (mounted on the Terminal building) from the marshaller, positioned at the operator’s control panel.

2.4 PARKING AND STOPPING

- a) All vehicles shall be parked within the area designated by CAG.
- b) If any vehicle is parked at any place in an aerodrome so as to cause danger, obstruction or undue inconvenience to other users of the road or to traffic within the airside, CAG may remove the vehicle and the owner or driver thereof shall pay all the costs incurred.
- c) If any vehicle appears to have been abandoned in a parking place within the airside, CAG may remove the vehicle or prevent the removal of the vehicle from the parking place by fixing an immobilisation device to the vehicle. The owner or driver thereof shall pay all the cost incurred. Any vehicle fixed with an immobilisation device will be detained by CAG until there is payment made on the fees for removal of immobilisation device. The fee for removal of immobilisation devices fixed to any vehicle is \$107.

2.5 TRAVELLING ON AIRSIDE ROADWAYS

2.5.1 No vehicle is allowed to be near aircraft stands unless permission is granted and conditions complied. The Work Party's vehicles shall confine to the designated routes during the project works and avoid the secondary roadways behind aircraft stands where possible. The conditions as stipulated in the Airside Driving Theory Handbook (Changi) and Seletar Airport Airfield Driving Theory Handbook (ADTH) and Cat 1 Airfield Driving Handbook (Cat 1 ADTH) (Seletar) shall apply for all vehicles travelling on roadways in front and behind aircraft stands.

2.5.2 Airside Tunnel Roadways

- a) Vehicles using the airside tunnel roadways must strictly comply with traffic signs and markings.
- b) Vehicles (including loads) exceeding 4.5 metres in height shall not enter the tunnel roadways or other section of airside roads with height restriction or low ceiling areas along the building airside front including those types of vehicles as stipulated in paragraph 2.5.3 (b) and (c) of Section H of the AOS requirements.
- c) All drivers are not to enter the tunnel roadways whenever the Red Light on the gantry at the entrance of the tunnel is activated. Parking and waiting in the tunnel are not permitted.
- d) Any breakdown of vehicles in the tunnel must be reported to CAG Changi Airside Control Centre as soon as possible at Tel: 6541 2257/58. The driver shall take all reasonable precautions to alert other users of his breakdown vehicle by switching on the vehicle hazard lights and place a breakdown sign a distance behind the vehicle where practicable.

2.5.3 Airside Surface Roadways Crossing Taxiways

- a) The airside surface roadways which traverse taxiways are located at the North Cross Taxiway and the South Cross Taxiway. Only authorised vehicles are permitted to cross these surface roadways.

- b) For travelling across North Cross Taxiways – Only tall vehicles above 4 metres in height and other approved types of vehicles (e.g. MDL, JCPL, Catering Hi-lifts, Airtugs, including vehicles carrying explosives or tankers/bowsers carrying flammable liquid) are permitted to travel the surface roadways, R3N and R5N across the North Cross Taxiways.
- c) For travelling across South Cross Taxiways – Only passenger steps and vehicles above 4 metres in height can travel across the airside surface roadways across the South Cross Taxiways subject to the conditions stipulated and shall be escorted by CAG Airside Operations vehicle. All other vehicles shall use the airside underpass roadways.
- d) Vehicles attending to aircraft parked at the North Apron and those who need to carry out works at the North Apron are permitted to travel on R3N and R5N to the North Apron parking stands.

2.6 ACCIDENTS

In the event of an accident in the airside, the person involved shall inform CAG Airside Operations immediately at Tel: 6541 2275/2273 (Changi Airside Management Centre) or 6481 5077 (Seletar Airport Operations). A report of the accident has to be submitted to CAG Changi Airside Management Centre/Seletar Airport Operations within 24 hours of its occurrence.

In case of accidents involving casualties, the person involved shall also contact the Medical Emergency Hotline 6543 2223 directly in Changi and 995 in Seletar.

2.7 VEHICLE BREAKDOWN

In the event of a vehicle breakdown at the airside, the person involved shall:

- a) Inform CAG Airside Management Centre at Tel: 6541 2275/2273 (Changi Airside Management Centre) or 6481 5077 (Seletar Airport Operations);
- b) Try and push the vehicle to the side of the roadway or any area which will not cause obstruction;
- c) Inform the company maintenance section to get it repaired or towed away as soon as possible; and
- d) Do not leave the vehicle unattended.

2.8 HYDRAULIC OIL SPILL

The person causing the spillage shall mop up the affected area with approved absorbent material except sawdust.

In case of heavy oil spillage, the responsible person shall contact the CAG Airside Operations at Tel: 6541 2257/2258 (Changi Airside Control Centre) or 6481 5077 (Seletar Airside Operations Unit) for necessary assistance.

2.9 PENALTY

2.9.1 Action Against Violators Of Traffic Rules

- a) Any person who contravenes the CAAS (Changi Airport) By-Laws 2009/CAAS (Seletar Airport) By-Laws 2009 shall be guilty of an offence and shall be liable on conviction to a fine which may extend to \$2,000, and a police officer may use such force as is reasonable and necessary to arrest and detain the person for the purpose of removing the person from or preventing his entry or re-entry to the airport, or to remove the person from the airport.
- b) CAG Airside Management reserves the right to withdraw permission to enter and drive in the airside as CAG deems fit.
- c) In the case of gross violations the driver's Airfield Driving Permit may be suspended, cancelled or revoked.

2.9.2 Notice of Offence (NOO)

Drivers contravening the CAAS (Changi Airport) By-Laws 2009/CAAS (Seletar Airport) By-Laws 2009 would be issued with Notice of Offence. Vehicle owner and persons issued with the NOO has up to 14 days to settle the compounded amount. Notwithstanding any queries payment shall be made in full by due date.

2.9.3 Suspension or Cancellation of Permits

CAG may suspend or cancel any airfield driving permit (ADP) if:

- i) There has been a contravention of any condition of the permit;
- ii) The person to whom the permit has been issued is not competent to drive the relevant vehicle;
- iii) It would not be in the interest of public safety for him to hold a driving permit.

3 PART 3: APRON FEES

3.1 AIRFIELD VEHICLE PERMIT (AVP) FEE

Vehicles that operate within the Movement Area shall possess an Airfield Vehicle Permit. The fees are as follows:

- a) Diesel/petrol vehicles - 8 cents per cc per annum (any odd cents round off to the next dollar);
- b) Battery Operated Vehicles - \$110/- per annum;
- c) Trailer-Mounted Equipment - \$25/- per annum;

A fee of \$5/- will be levied for a duplicate permit. All Airfield Vehicle Permit and duplicate permit are subjected to 7% Goods and Services Tax (GST).

3.2 AIRSIDE DRIVER TRAINING

Before applying for a Changi / Seletar ADP, airside drivers will have to:

i) Attend and complete the Airside Rules and Regulation Course (ARRC) conducted by authorised training centres (Changi Airport) / Seletar Airport Operations (Seletar Airport); or

ii) Study the contents of the Airside Driving Theory Handbook (Changi) and /or Seletar Airport Airfield Driving Theory Handbook (ADTH) and Cat 1 Airfield Driving Handbook (Cat 1 ADTH) (Seletar) himself.

Existing ADP holders should attend the ARRC refresher training conducted by authorised training centres (Changi Airport) / Seletar Airport Operations (Seletar Airport), every two years. It is mandatory for all drivers to undergo refresher training courses and obtain the necessary certification before renewing their ADP. The authorised training centres accredited by CAG are SATS, DNATA and SIAEC.

3.3 AIRFIELD RULES AND DRIVING TESTS FEE

Prior to the issue of an Airfield Driving Permit, the applicant will need to pass an Airfield Rules Test (Theory) and Airfield Driving Safety Compliance Test (Practical). The fee per test is \$5/- and \$12/- respectively. Both services are subject to 7% GST.

3.4 AIRFIELD DRIVING PERMIT (ADP) FEE

A permit will only be issued after the applicant has successfully passed a test based on the terms and conditions as specified by the CAG Airside Management's Airside Driving Centre. The fee for an Airfield Driving Permit is \$10/- per annum and this service is subject to 7% GST.

ATTACHMENT 1A TO PART 1

REQUIREMENTS FOR VEHICLES OPERATING WITHIN AIRSIDE

Petrol engine

1. The petrol engine of the vehicle shall be effectively flame-proofed as follows:
 - (a) the mixture adjustment for the induction system shall be such that exhaust pipe explosions cannot occur when the throttle is suddenly closed;
 - (b) the carburettor air intake shall be fitted with a flame trap or arrestor (a standard automotive type oil bath air cleaner complies with this requirement). Alternative types of flame traps or air filters must be approved by the airport licensee;
 - (c) the gasket between the induction manifold and the cylinder block shall be such as to ensure an efficient gas-tight seal.

Exhaust system

- 2.—(1) The exhaust system of the vehicle shall comply with the following requirements:

Exhaust manifold

- (a) the exhaust manifold and the section of the exhaust pipe adjacent to the manifold shall be shrouded with a metal cover to prevent petrol, oil or other combustible material from coming into contact with the hot metal. If the manifold cannot be effectively protected in such a manner a drip tray shall be provided under the carburettor with drain pipe to direct waste petrol away from the manifold and exhaust pipe.

Tail pipe spark arrestor

- (b) the tail pipe of the exhaust system shall be fitted with an approved type of spark arrestor. Because of the rapid ease with which screen type arrestors can collect carbon, they must be serviced regularly to ensure that they remain in an efficient condition.

- (2) The entire exhaust system from the exhaust manifold to the tail pipe should be checked regularly to ensure that there are no gas leaks.

Fuel system

3. The fuel system of the vehicle including the petrol tank, pipelines, fuel pump, fuel filters, carburettors, etc., shall be free of leaks. Any leakage shall be immediately rectified.

Electrical system

4. The electrical system of the vehicle shall comply with the following requirements:

Spark plugs

- (a) Spark plugs shall be of the KLG (K. LEE — Guinness) type MF50 or equivalent.

Distributor

- (b) The distributor cover shall be free of cracks or mechanical defects and shall fit tightly on the housing.

High tension cables

- (c) All high tension cables shall be fastened by means of screwed connection or equivalent.

Voltage regulator and cut-out

- (d) The voltage regulator and cut-out shall be enclosed by a close-fitting cover.

Fuses

- (e) Fuses shall be of the glass enclosed type and protected from breakage by a cover.

Battery

- (f) The battery shall be suitably covered to avoid accidental shorting of the cells and shall be provided with adequate means of natural ventilation.

Switches

- (g) All switches shall be of the enclosed type.

Generator and starter motor

- (h) Openings in the casing of the generator and starter motor shall be covered by a fine wire screen having not less than 30 wire meshes of a size not less than 30 S.W.G.

Spark suppression

- (i) Spark suppression shall be used where possible to reduce the intensity of sparking at switch and relay contacts and at the commutators of generators and starter motors.

Diesel engine

- 5. The diesel engine of the vehicle shall comply with the following requirements:
 - (a) flame proofing of the exhaust and ignition system of diesel engines is not required;
 - (b) the fuel system of the engine shall be free of leaks. Any leakage shall be immediately rectified;
 - (c) the electrical equipment associated with diesel engines shall conform where applicable to the requirements for electrical equipment associated with petrol engines specified in paragraph 4;
 - (d) the air intake to the air blower shall be fitted with a flame trap or arrestor (a standard automotive type oil bath air cleaner complies with this requirement). Alternative types of flame traps or air filters must be approved by the airport licensee.

Markings of vehicles

6. (1) The vehicle shall be painted with a distinguishing roundel comprising a 152-millimetre diameter green circle surrounded by a 25-millimetre white band.
- (2) The roundel shall be painted in clearly discernible positions on the front and rear of each vehicle and in an appropriate position on other items of equipment.

Markings

7. The vehicle shall, unless it is a vehicle owned or operated by the airport licensee and used by its Airport Emergency Service Division or by the Government and used by the Airport Police Division of the Singapore Police Force, be adequately marked as an obstruction as follows:
 - (a) if the vehicle is for driving in the manoeuvring area, the entire body of the vehicle down to the waist and the front portion of the vehicle shall be painted yellow;
 - (b) if the vehicle is for driving in the apron only, the entire body of the vehicle down to the waist and the front portion of the vehicle shall be painted white; and
 - (c) the vertical yellow or white surface shall bear the owner's insignia or logo.

Lights

8. The front and tail lights of the vehicle shall be switched on when the vehicle is used during the hours of darkness and the front lights shall be dipped when approaching oncoming traffic.

Electrical equipment

9. The electrical and ignition equipment of the vehicle shall be suppressed to the satisfaction of the airport licensee.

Fire extinguisher

10. The vehicle shall be equipped with a fire extinguisher (1 kg ABC dry powder or 2 kg Halotron or a suitable alternative as determined by the airport licensee) securely mounted on suitable brackets affixed to a readily accessible position.

Tyres

11. The wheels of the vehicle shall be fitted with rubber tyres.

No smoking sign

12. A vehicle used for the transport of passengers and crew shall display a “NO SMOKING” sign inside the vehicle which is visible to all the occupants of the vehicle. During the hours of darkness, the sign shall be illuminated.

Airport Emergency Service Vehicles

13. Every vehicle belonging to the airport licensee and used by its Airport Emergency Service Division —
 - (a) shall be marked with the distinctive colour of the Airport Emergency Service Division; and
 - (b) shall display an occulting red light when in operation.

Seat belts

14. The vehicle, unless exempted by the airport licensee, shall be installed with seat belts for the driver and the front seat passenger. Every driver and front seat passenger in the vehicle shall fasten their seat belts when the vehicle is in motion.

Speed

15. A vehicle, unless otherwise exempted by the airport licensee, that can travel at a speed in excess of 40 kilometres per hour shall be fitted with a speed warning device. The device shall be set to activate when the vehicle exceeds the speed of 50 kilometres per hour.

ATTACHMENT 1B TO PART 1
GUIDELINES NOTES ON THE APPLICATION OF
AIRFIELD VEHICLE PERMIT

A New Application

Before you complete this form, please write in to CAG with the company’s letterhead indicating the followings:

- Vehicle registration number
- State where will the vehicle be parked when not in use. If parking space is within the airside, please attach a photo of the parking lot.
- Type of vehicle
- Engine CC, as well as combustion type (diesel/petrol)
- A log card of the vehicle must also be attached.
- **A COLOURED PHOTO OF THE VEHICLE (3 VIEWS: FRONT, SIDE AND BACK)**
- If you are engaged by an airport organisation, please attach an endorsement letter by the relevant airport organisation to support your application. The letter should indicate the title of the contract, duration, proposed use of the vehicle and its usage frequency.

Upon receipt of the approval letter, please proceed to ADC with the following documents for payment and to obtain the AVP.

- Vehicle permit application form (This Form)
- Vehicle insurance coverage
- **Vehicle road tax with validity of one month or more (not applicable for RU plate).**
- Airside insurance coverage (Extension Note to insure the vehicle whilst it is driven in the airside)
- Copy of vehicle log card
- A copy of vehicle road tax
- LTA Inspection Certificate issued by the appointed test centres (with certificate of compliance endorsed) for ADC’s retention.
- CAAS Height Restriction Approval letter for lifting cranes
- Documentation proof for obstacle lights.
- A copy of the First Schedule (found in the Tenancy Agreement) if you are parking in the airside when the vehicle or equipment is not in use.

3. The AVP is chargeable at 8 cents per vehicle per cc and is subjected to 7% GST. Applicants will be advised on the fee for the different types of motorised equipment. Payment is by NETS, Cashcard, Flashpay and Cheque only. Cheque must be made payable to Changi Airport Group (S) Pte Ltd. **Fees paid are not refundable. The valid AVP of a vehicle is not transferable to another vehicle.**

4. Vehicle Markings

- Please ensure the following requirements are met:
- For apron use, the **entire body of the vehicle down to the waist and the front portion of the vehicle shall be painted white!** The horizontal surface of the vehicle body to reflect the company’s logo. The dimension of the logo must not be less than **25 x 25cm**.
- A roundel comprising a 152 mm in diameter green circle surrounded by a 25mm white band to be painted or pasted on the front (bonnet passenger side) and rear (boot driver side) of the vehicle.

5. Vehicle Lightings

All airside vehicles must have a low-intensity obstacle lights, Type C displayed on the top of the vehicle and they are to follow the required specifications provided for the obstacle lights. Vehicles associated with emergency or security shall be equipped with flashing-blue lights. All other vehicles shall be equipped with flashing-yellow lights. No other types of obstacle lights are to be used if it is not within the required specifications.

1	2	3	4	5	6	7	8	9	10	11
Light Type	Color	Signal type/ (flash rate)	Peak intensity (cd) at given Background Luminance			Light Distribution Table				
			Day (Above 500 cd/m ²)	Twilight (50-500 cd/m ²)	Night (Below 50 cd/m ²)	Minimum Intensity (a)	Maximum Intensity (a)	Vertical Beam Spread (d)		
								Minimum Beam Spread	Intensity	
Low-intensity Type C (mobile obstacle)	Yellow/ *Blue (for emergency or security vehicle)	Flashing (60-90 fpm)	N/A	40	40	40cd (b)	400cd	12° (c)	20cd	

- (a) 360° horizontal. For flashing lights, the intensity is read into effective intensity, as determined in accordance with Aerodrome Design Manual (Doc 9156), Part 4.
- (b) Between 2 and 10° vertical. Elevation vertical angles are referenced to the horizontal when the light is leveled.
- (c) Peak intensity should be located at approximately 2.5° vertical.
- (d) Beam spread is defined as the angle between the horizontal plane and the directions for which the intensity exceeds that mentioned in the “intensity” column.
- (Extracted from Manual of Aerodrome Standards)*

6. The driver shall ensure that the obstacle light displayed on the top of the vehicle is **switched ON** at all times when operating in the airside.

B Renewal of Airfield Vehicle Permit

For renewal of AVP, applicants only need to produce the documents stated in **Para 2** with payment to Airside Driving Centre.

Attach coloured photo of vehicle (3 views: front, side and back) with the application form.

Attach the latest preventive maintenance checklist or vehicle functionality checklist.

For any queries, please contact Airside Driving Centre at tel: 6541 2847.

Payment is by NETS/Cashcard/Flashpay/Cheque only. Cheque must be made payable to Changi Airport Group (S) Pte Ltd.

ATTACHMENT 1C TO PART 1

**REQUIREMENTS FOR OPERATORS OF
LIFTING MACHINE IN THE AIRSIDE**

LIFTING MACHINE:

CRANE, BOOMLIFT, CHERRY PICKER, HI-LIFT, HOIST, JCPL, LIFT-PLATFORM, MAINTENANCE PLATFORM VEHICLE, FORKLIFT, ETC.

1. Operators of lifting machine/equipment must receive sufficient training in work at the machine. Operators shall observe the safety measure in respect of safe operation of any such machine/equipment.
2. Operators of lifting machine/equipment must be at least 18 years old.
3. Operators must show documentary proof on their certification of training from any of the following organisations: SATS, DNATA, ITE, PSA and SCI.
4. Every lifting machine/equipment shall be properly maintained in order to prevent breakdown which is likely to cause death or bodily injury to any person. These machines shall be thoroughly examined at least once in every 12 months.
5. In respect of the safe operation of such lift machine, the employer shall display on such machine or process on the safety measures to be observed in respect of safe operations. The employer shall display on such machine or at the place nearest to the process a notice written in language understood by the person employed at such machine.
6. The employer shall provide the standard operating procedures (SOP) for recovery of lifting machine/equipment to CAG Airside Operations prior to the commencement of their works.
7. Radio telephony set [121.9MHz (Changi) / 119.675 MHz (Changi East) / 122.9MHz (Seletar)] equipped vehicles shall have their radio call signs painted on top of the vehicles.
8. CAG Airside Management may at any time in his discretion cancel any airfield vehicle permit without assigning any reason under the CAAS (Changi Airport) By-Laws 2009/CAAS (Seletar Airport) By-Laws 2009.

SECTION I – COMPLIANCE WITH OTHER STATUTORY REQUIREMENTS**1 GENERAL**

- 1.1 The Work Party shall comply with CAAS (Changi Airport) By-Laws 2009/CAAS (Seletar Airport) By-Laws 2009 and all other applicable local legislation and statutory requirements related to the carrying out of the works.
- 1.2 The Work Party shall ensure that his workers complete or have completed the necessary training courses (including the refresher courses) required by local legislation and/or CAG before allowing them to perform any work for which the training is required.
- 1.3 The contents of this section highlight some of the requirements stipulated under these statutory requirements. The Work Party shall note that these highlighted items are only a brief representation and not exhaustively mentioned in this section. The Work Party concerned shall be required to find out all other requirements and comply with them fully.

2 WORKPLACE SAFETY AND HEALTH (WSH) ACT

- 2.1 The Work Party shall, as far as reasonably practical, protect the health and safety of his workers and all other users who may be affected by the works.
- 2.2 The Work Party shall comply with the statutory requirements stipulated under the Workplace Safety and Health (WSH) Act. The Work Party shall have in place a proper risk management system for stakeholders to proactively identify potential hazards and take reasonable measures to eliminate or reduce risk at source and instil greater ownership to prevent workplace accidents and injuries through sound safety management processes.
- 2.3 In this respect, the responsibilities of the Work Party shall include but not limited to the following proactive safety measures:
- a) Conduct risk assessments of his work activities, take reasonably practicable steps to eliminate/reduce foreseeable risk and implement safe work procedures;
 - b) Review and revise risk assessments and safety measures regularly to improve safety performance;
 - c) Maintain safe work facilities and arrangements for workers;
 - d) Ensure machinery and equipment in use are kept in safe and proper condition at all times;
 - e) Develop and implement control measures to deal with emergencies in a smooth and effective manner to minimise damage to property or injury to persons; and

- f) Provide workers with proper personnel safety apparels, clear safety instruction, with adequate training and supervision.
- 2.4 The Work Party shall notify and report accidents leading to death/injury of worker, airport staff and/or members of public to CAG and if necessary, the Ministry of Manpower (MOM) and other relevant agencies promptly.
- 2.5 Depending on the nature of work, the Work Party may be required to register parts of the airport as a “factory” with MOM during the contract period. The Work Party shall meet the relevant regulations under the WSH Act and employ one or more full time qualified safety officers as required by the safety regulation for the project.
- 3 BUILDING CONTROL ACT (CHAPTER 29) – BUILDING CONTROL (LICENSING OF BUILDERS) REGULATIONS 2008
- 3.1 The Work Party shall comply with the statutory requirements stipulated under the Building Control Act (Chapter 29) – Building Control (Licensing of Builders) Regulation 2008.
- 3.2 The Work Party shall keep and maintain at the premises of the work site the following documents, books and records for inspection purposes:
- a) An updated register of all the licensed builders (general and specialist) indicating the valid licence numbers, Approved Persons, Technical Controller and expiry of the said licences for the respective builders;
 - b) A copy of the approved manpower programme (if applicable) and approved changes;
 - c) An official site attendance record for all registered construction personnel deployed, in the form and manner as the Commissioner of Building Control may determine;
 - d) A quarterly update of the actual deployment of registered construction personnel on site; and
 - e) A record of all documents accounting for the absence of each registered construction personnel during the scheduled period of his deployment.
- 3.3 The Work Party shall ensure that all his Specialist Builders (whether Nominated, Designated or Domestic and the like) possess the necessary valid builder’s licences in compliance with the Building Control Act on Licensing of Builders and shall ensure the necessary deployment of coretrade manpower and resources to the project.
- 3.4 The Work Party shall not employ any unlicensed builders for the purpose of the Works in contravention of Part VA of the Building Control Act, Chapter 29 on Licensing of Builders. In an event of a suspension of works due to a contravention of Part VA of the Building Control Act, Chapter 29 on Licensing of Builders by the Commissioner of Building Control, the Work Party shall take all necessary

measures to maintain the site and ensure it is safe in accordance with statutory requirements. If the Work Party fails to ensure the proper renewal of his licences (whether Nominated, Designated or Domestic and the like) under Part VA of the Building Control Act, Chapter 29, 30 calendar days before the date of expiry of the said licences, CAG will have the right to suspend the Work Party's Works or portion of the Works without giving any extension of time to the Contract Completion Date. If the Work Party's licences cannot be renewed after revocation or expiry, he shall be obliged to assist in arranging the novation of his Contract and/or the relevant Sub-Contracts to the replacement Work Party to mitigate the loss to CAG. In addition, at CAG's option, CAG may elect to issue a Notice of Termination as though a Termination Certificate had been issued by the Architect immediately upon the expiry of 30 calendar days after the revocation or expiry of the Work Party's licence.

- 3.5 The Work Party shall be liable and shall indemnify CAG against any damage, expense, liability, loss, claims, proceedings and/or penal sanctions whatsoever arising out of or by reason of the commission of any offence under Part VA of the Building Control Act on Licensing of Builders and of any breach or default of the terms and conditions stipulated in paragraph 3.4 of Section I of the AOS requirements.
- 3.6 The Work Party shall submit the manpower programme to the Commissioner of Building Control for approval within 30 days from the date of grant of the permit to carry out structural works for the project and extend a copy to the Architect for record. The manpower programme shall be in such form and manner as determined by the Commissioner of Building Control. The manpower programme shall be reported in every site meeting and the Work Party shall conform and ensure that the manpower programme is strictly adhered to. Where there are any changes to the manpower programme, the Work Party shall submit the updated manpower programme to the Commissioner of Building Control for approval within the stipulated number of days in the Building Control Regulations of the change.

SECTION J – HAZARD IDENTIFICATION AND RISK ASSESSMENT

1 INTRODUCTION AND PURPOSE

- 1.1 This section illustrates the process for hazard identification, risk assessment and safety submission as required of the Work Party carrying out airside and/or development projects at Changi Airport and Seletar Airport.
- 1.2 These procedures apply to all projects that involve physical changes to the airport infrastructure and new systems installed in the airport (e.g. new building developments, airside works and major landside works) which have impact on public safety and changes with significant safety implications. Aviation Safety must be considered for any works performed in the airside in addition to WSH risks. Risk assessment shall be carried out at the beginning of the project.
- 1.3 The objective of this set of procedures is to ensure that the Work Party has adequate knowledge, commitment and resources to manage safety effectively, and that projects are designed and constructed to meet a high level of safety standards.
- 1.4 Safety submissions are required at beginning and throughout the planning and execution phases of a project so that CAG can monitor and track closely the safety measures put in place during the project life cycle.
- 1.5 CAG reserves the right to update and/or revise this set of procedures as and when necessary. The Work Party shall comply with the latest procedures accordingly as instructed.
- 1.6 CAG Project officers shall refer to the CAG SMS Manual, Part 5 for guidance on the Risk Assessment process.

2 RISK ASSESSMENT FORM

- 2.1 A risk assessment form shall be created at the commencement of the project when the Work Party is officially appointed.
- 2.2 The risk assessment form shall be used to identify potential safety hazards that could arise during any phase of the project works and to allow risk analysis to be performed so that all the safety concerns are satisfactorily managed and mitigated.
- 2.3 The risk assessment form is a live document that is passed through each and every phase of a project, from the planning to the implementation and post construction/maintenance stages. The risk assessment form shall be minimally reviewed and updated once every 3 years or earlier, when:
 - (a) There has been an accident, serious incident or incident arising from that activity, or
 - (b) Changes to the work activity/process, including when new technology or infrastructure or new aircraft code is introduced or to a particular infrastructure within the aircraft movement area (i.e., runways, taxiways, aircraft stands); **or**

- (c) Changes to the airside infrastructure, facilities and/or operating methods that may affect the safety of operations; or
- (d) Internal changes such as:
 - i. Construction activities in the airside;
 - ii. New infrastructures or changes to existing operations that can potentially reduce the existing risk tolerability level, e.g., changes in runway inspection timings, reduction in preventive maintenance frequencies;
 - iii. Trial in “live” aircraft movement areas (including trials to evaluate the effectiveness of alternate safety risk controls differing from established safety risk controls).
- (e) External changes such as:
 - i. Environmental changes like low visibility;
 - ii. Air traffic control procedures directly affecting users in the aircraft movement areas like use of stop bar lights to regulate airside vehicle movement, use of single frequency for communication on runway.
 - iii. A new contractor working at or ground handling agent performing services in the airside.

2.4 The risk assessment form shall be prepared in a format as shown in the sample found in the **Attachment A15**. Contractor may propose their preferred RA format subject to CAG acceptance.

3 HAZARD IDENTIFICATION

3.1 The Work Party shall develop a complete description of the project and the environment in which the project is to be operationalized.

3.2 The objective of the hazard identification process is for the Work Party to identify potential safety hazards for airport users and other affected parties so that safety issues are carefully and fully considered prior to actual works being carried out on site. The Work Party shall consider all interfaces between the project and the existing airport system and works proposed or under construction or on adjoining or nearby sites.

3.3 The Work Party’s project manager, safety manager, design engineer, site foremen or any competent staff shall endorse on the risk assessment form.

3.4 Under the ‘Identified Hazards’ column, the Work Party shall be responsible for identifying as comprehensively as possible, all possible risks associated with his system or equipment design, project scheduling or planning, supply, delivery, storage, installation, testing, commissioning, operation relevant to each

phase/portion of the project works, including the post-completion maintenance stages. Such hazards could arise due to design or planning constraints, equipment limitations, unsafe practices, or other external factors.

- 3.5 The location(s) of such hazards, and a full description of the potential safety concerns shall be clearly explained and documented. Where necessary, the Work Party shall illustrate the potential safety concerns using photographs or an appropriately scaled sketches or drawings.

4 RISK ASSESSMENT

- 4.1 For each potential hazard identified, the Work Party shall perform a risk assessment by reviewing the severity of the impact of the hazard in the light of all possible environmental, human, equipment (hardware and software) and their interfacing factors, and by assessing the likelihood of these scenarios. Such risks should include all possible damage to equipment and property, harm to project personnel and general public, as well as plausible impact on airport operations due to first- and third-party equipment malfunction or human error. Each hazard or safety deficiency identified shall be documented together with a detailed description of the unsafe scenario concerned in the risk assessment form.
- 4.2 Each identified hazard or safety deficiency shall be allocated a risk category estimated according to the procedure described in this section.
- 4.3 Risk probability is defined as the likelihood that an unsafe event or condition might occur. The likelihood or accident frequency resulting from the identified hazards or safety deficiencies shall be estimated using Table 1 below.

Table 1: Risk Probability

Probability of Occurrence		
Quantitative definition	Meaning	Value
Frequent	Likely to occur many times (<i>has occurred frequently in the industry</i>).	5
Occasional	Likely to occur sometimes (<i>has occurred infrequently in the industry</i>).	4
Remote	Unlikely, but possible to occur (<i>has occurred rarely in the industry</i>).	3
Improbable	Very unlikely to occur (<i>not known to have occurred in the industry</i>).	2
Extremely Improbable	Almost inconceivable that the event will occur (<i>e.g. information not available in the literature</i>).	1

- 4.4 Risk severity is defined as the potential consequences of an unsafe event or condition, taking as reference the worst foreseeable situation. The severity of accidents resulting from the identified hazards or safety deficiencies shall be estimated using the definitions in Table 2 taking into account a pessimistic but reasonable assessment of their consequences.

Table 2: Risk Severity

Severity of Occurrence		
Aviation definition	Meaning	Value
Catastrophic	<ul style="list-style-type: none"> Results in loss of life or destruction of equipment 	A
Major	<ul style="list-style-type: none"> A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely. Serious injury or life-threatening occupational medical conditions (<i>includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning</i>). Major equipment damage 	B
Hazardous	<ul style="list-style-type: none"> A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of the increase in workload, or as a result of condition impairing their efficiency. Serious incidents. Injury to persons that require medical treatment or ill-health leading to disability (<i>includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders</i>). 	C
Minor	<ul style="list-style-type: none"> Nuisance. Operating limitations. Use of emergency procedures. Minor incidents. Injury or ill-health requiring first-aid only (<i>includes minor cuts and bruises, irritation, ill-health with temporary discomfort</i>). 	D
Negligible	<ul style="list-style-type: none"> Not likely to cause damages, injury or ill-health. 	E

- 4.5 The risk category of the identified hazard or safety deficiency shall be assessed using Table 3 below by cross-referencing estimated risk probability with the risk severity.

Table 3: Risk Assessment Matrix

Risk Probability	Risk Severity				
	Catastrophic A	Major B	Moderate C	Minor D	Negligible E
Frequent 5	5A	5B	5C	5D	5E
Occasional 4	4A	4B	4C	4D	4E
Remote 3	3A	3B	3C	3D	3E
Improbable 2	2A	2B	2C	2D	2E
Extremely Improbable 1	1A	1B	1C	1D	1E

- 4.6 Where necessary, the Work Party may be required to engage the services of a competent party or suitably qualified consultants to perform the risk assessment.
- 4.7 The definitions of the risk tolerability determined from Table 3 are presented in Table 4 below.

Table 4: Risk Tolerability

Risk Category	Region / Risk Index	Criteria
U	Intolerable 5A, 5B, 5C, 4A, 4B, 3A	The risk is unacceptable and operations should not take place until sufficient major risk mitigating measures have been implemented to reduce the risk to an acceptable level.
T	Tolerable 5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D 2A, 2B, 2C 1A, 1B	The risk is of concern and risk mitigating measures should be put in place to reduce the level of risks to as low as reasonably practicable. Where further risk reduction / mitigation is not practicable or viable, the risk may be accepted provided endorsement is given by management.
A	Acceptable 3E, 2D, 2E, 1C, 1D, 1E	The risk is considered acceptable.

5 DEFENCES PROPOSED

- 5.1 Proposals and recommendations for the elimination or reduction of each of the identified hazards or safety deficiencies shall be made in the risk assessment form. These proposals and recommendations shall be explained as detailed as possible to allow an initial and objective assessment of practicability. Annotated photographs or appropriately scaled sketch drawings shall be used to illustrate recommendations wherever possible.

- 5.2 The Work Party shall ensure that these proposals and recommendations are sound and can effectively mitigate, reduce or eliminate the risks identified.
- 5.3 The Work Party shall also consider each hazard or safety deficiency identified in the risk assessment form and recommended suitable means of eliminating it or reducing its associated risks as far as practicable. The Work Party shall record all identified hazards or safety deficiencies and assess whether their associated risk tolerability is acceptable. The Work Party shall also document the risk probability, severity and risk category associated with each hazard or safety deficiency after the implementation of the proposed mitigation measures in the risk assessment form. The Work Party shall prepare detailed proposals to eliminate or mitigate that particular hazard and its consequences. These proposals must then be circulated to the other related stakeholders for their inputs on the effectiveness and practicality. The Work Party shall then follow through to ensure that the level of safety becomes acceptable or, if not possible, tolerable. If the outcome of the assessment for the same consequences is assessed to be unacceptable, then the Work Party shall source for new mitigating solutions or consider abandoning the hazardous work.

6 SAFETY SUBMISSION AND VERIFICATION CHECK

- 6.1 The Work Party shall submit the work method statement and risk assessment to CAG Superintending Officer (S.O.), Project Officer and/or Coordinating Officer for review and acceptance each time the form is updated, or when requested for by CAG.
- 6.2 S.O. may require the Work Party to present the Aerodrome RA and WMS to their respective Safety Working Committee and/or at any other forum where necessary prior to commencement of work or E&D.
- 6.3 The Work Party shall ensure the control measures listed in the submitted Aerodrome RA are completed to the satisfaction of the S.O. team before the commencement of work. S.O. may instruct that additional safety measures be provided by the Work Party if the proposed control measures are found to be insufficient. The Work Party shall comply with such instructions accordingly at no cost to CAG.
- 6.4 Notwithstanding paragraphs 6.2, 6.3 and 6.4 above, the Work Party shall be entirely responsible for its site, system and/or equipment safety, by taking all necessary precautions and appropriate safety measures and by complying with all standing safety requirements stipulated by CAG, CAAS and any other regulatory authorities.

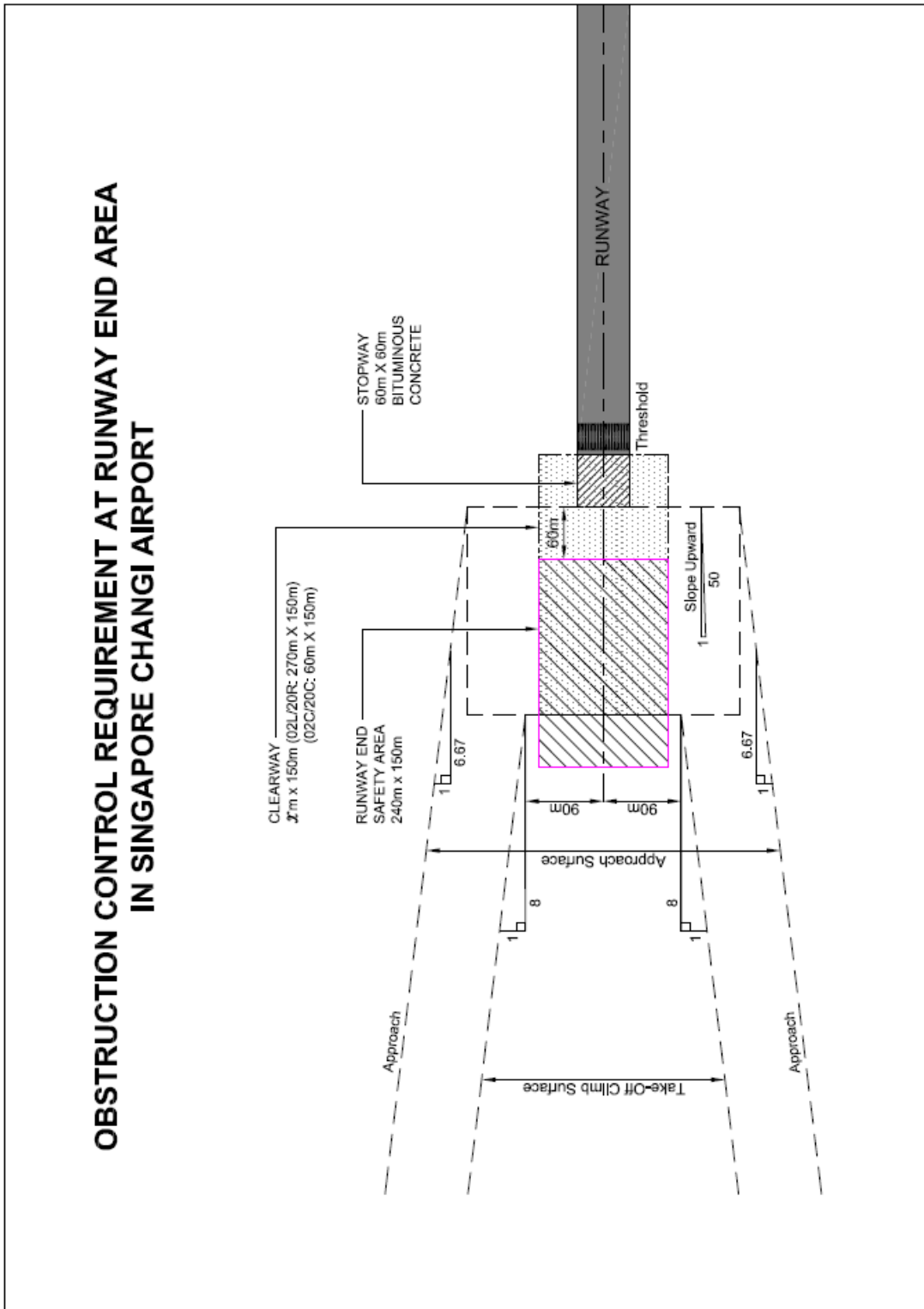
7 NON-COMPLIANCE WITH SAFETY REQUIREMENTS

CAG reserves the right to take action against the Work Party for non-compliance with any safety requirements. Such actions could include:

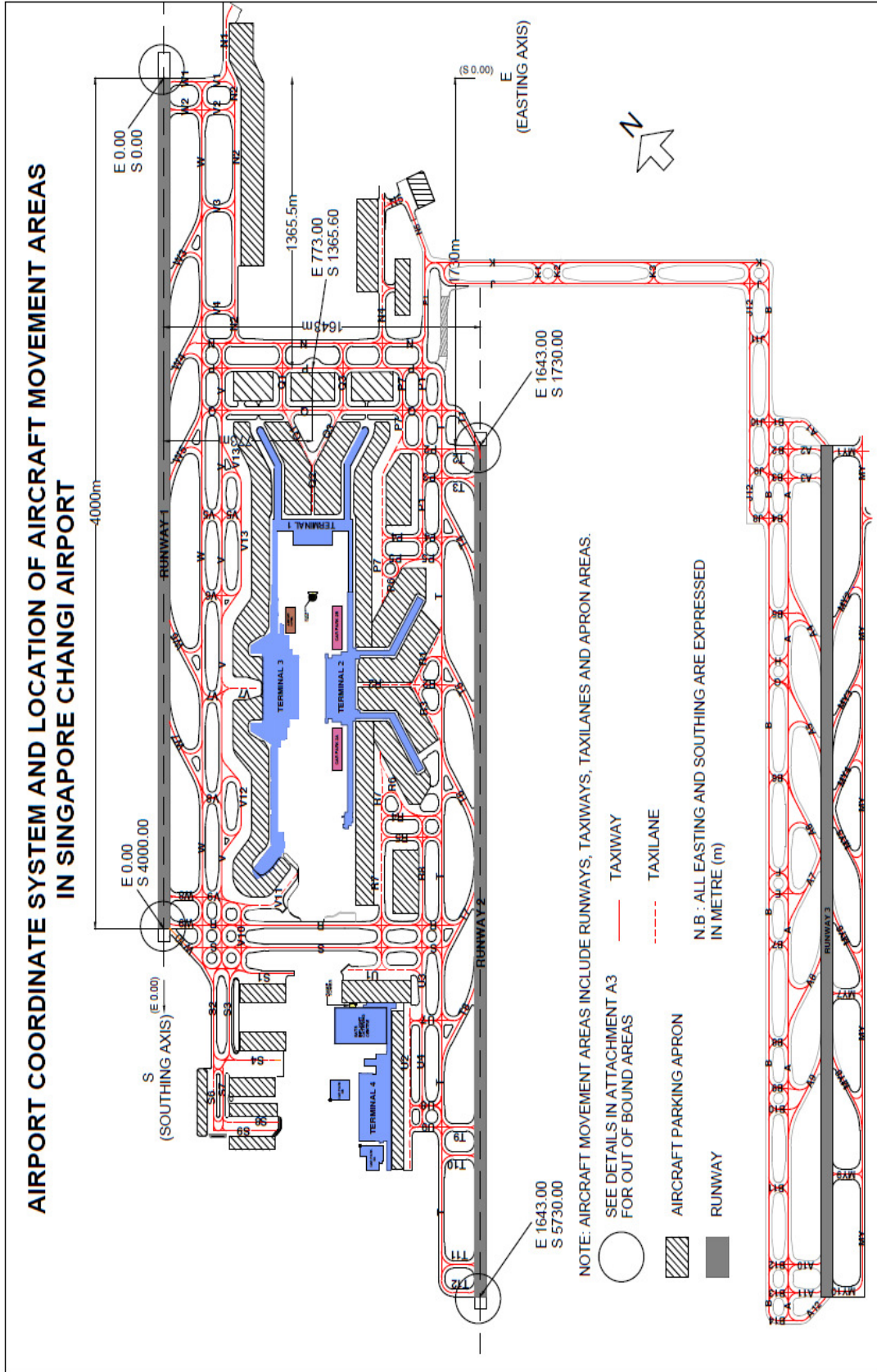
- a) withholding of passes of negligent workers and supervisors temporarily and suspending them from work

- b) removal of passes of negligent workers and supervisors permanently leading to their expulsion from the work site;
- c) removal of the Work Party's Project Manager or Safety Officer if they are deemed not competent for the job or not effective in ensuring that adequate safety measures are taken; and/or
- d) issuance of partial stop work orders to specific areas for serious non-compliance with the Airport Operational and Safety (AOS) requirements.

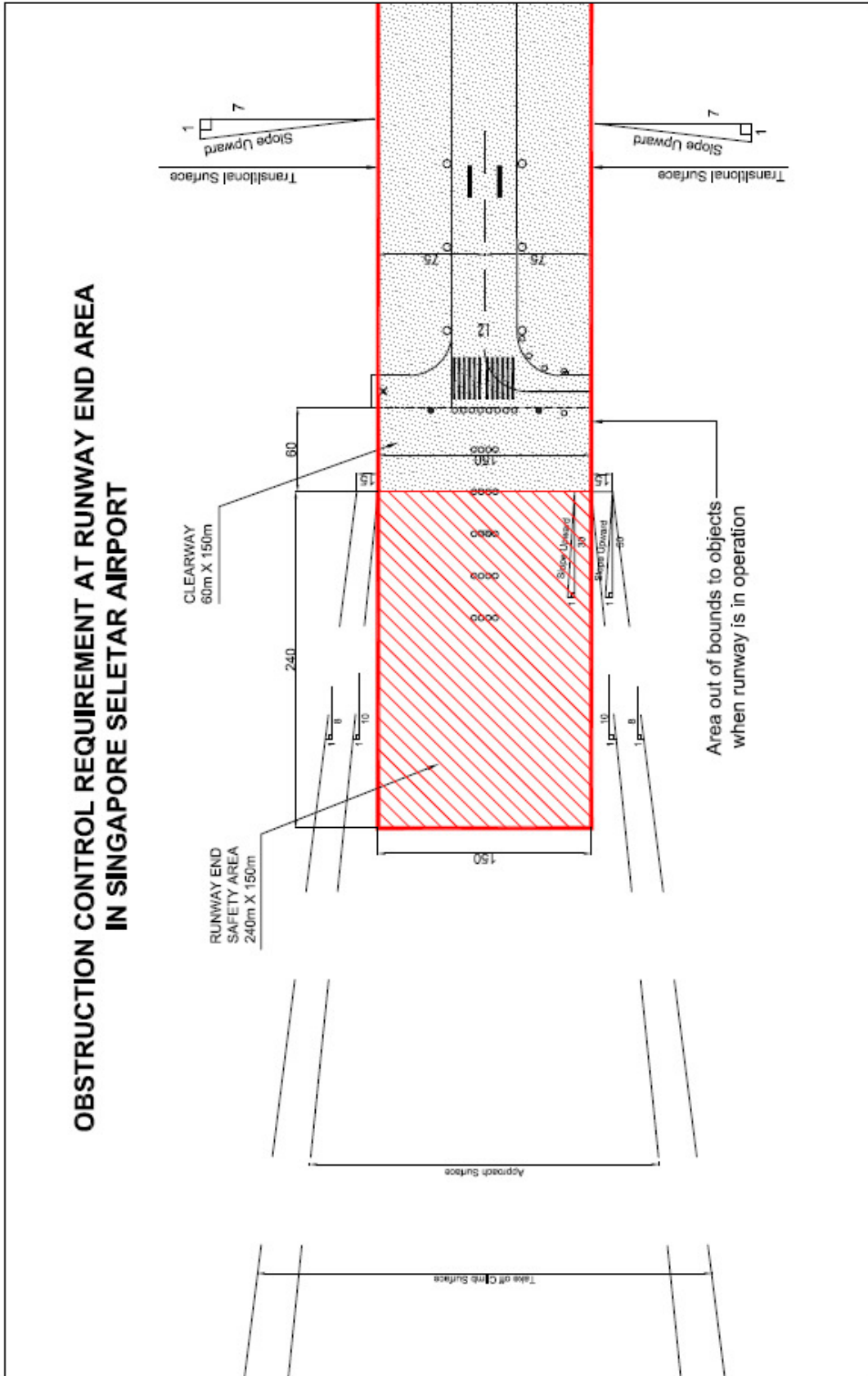
Attachment A1



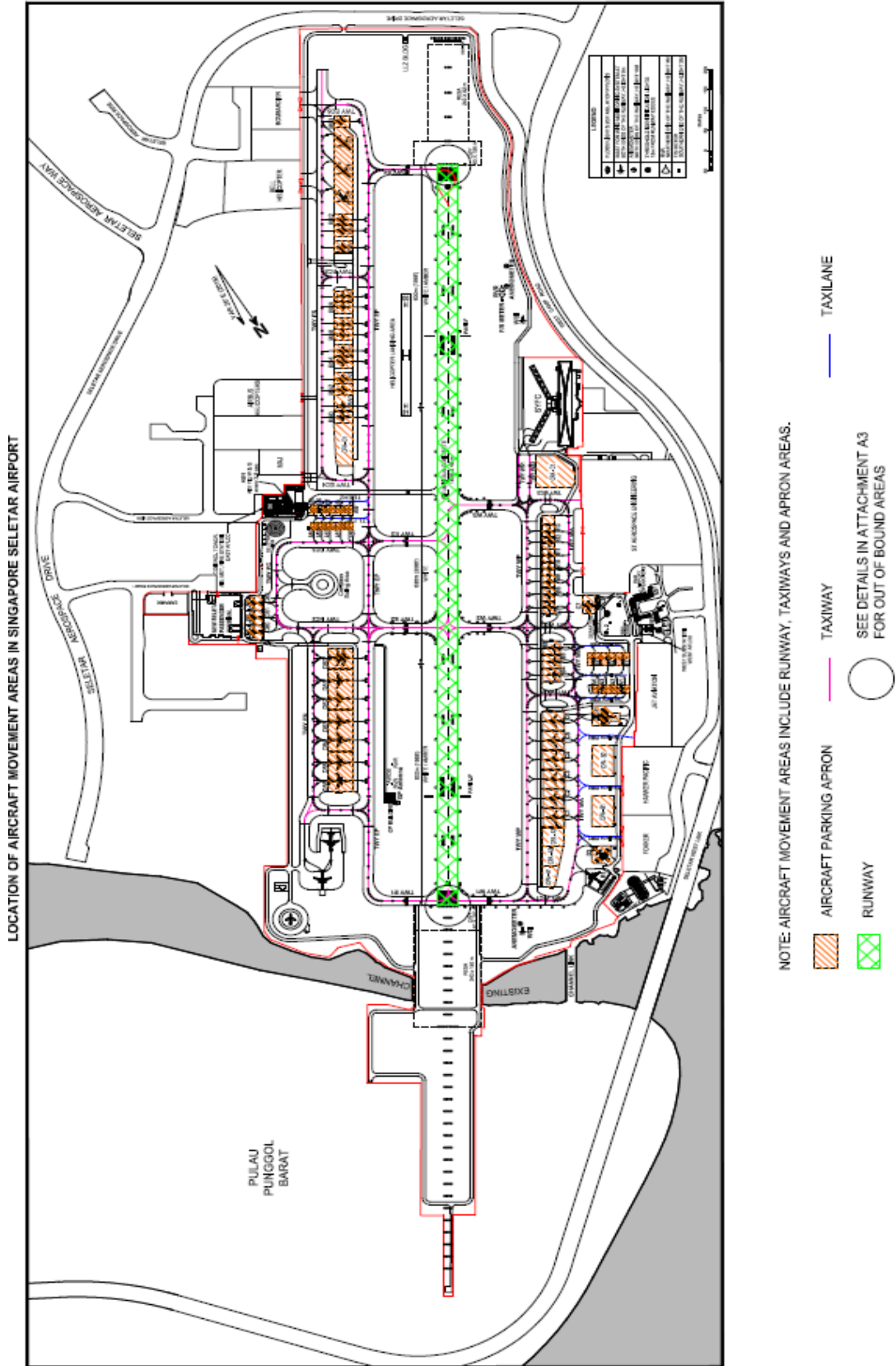
Attachment A2



Attachment A3



Attachment A4



Attachment A5



DAILY FOD CHECKLIST

Date: _____

Time: _____

Location of work area: _____

1) TAXIWAYS

i) Do you have works on the taxiway?

Yes / No (Please circle accordingly)

ii) If yes,

I have inspected the work areas within my project/scope of works (including access route) and its surrounding premises and confirmed that it is free of FOD and other visible equipment/defects/unfinished work, including the items below:

- a) I have removed the closure markers.
- b) I have checked all equipment have been cleared at least 51 metres[^] (Changi)/35 metres* (Seletar) from taxiway centre line.
- c) I have checked that all excavations within 30 metres (Changi)/13 metres* (Seletar) from taxiway centre line have been backfilled.
- d) The taxiways have been swept clean.

2) RUNWAY

a) Are you the last work party to leave runway?

Yes / No (Please circle accordingly)

b) If yes,

- I have inspected the entire runway and ensure that there is no FOD and other visible equipment/defects/unfinished work.

- I have removed the cross markers and marker boards.

- I have checked that all equipment have been cleared at least 150 metres (Changi)/75 metres (Seletar) from the runway centre line.

- I have checked that all excavations within 105 metres (Changi)/75 metres (Seletar) from runway centre line have been backfilled.

3) OBSERVATIONS (IF ANY)

4) COMMENTS (IF ANY)

Inspected by:

CAG Counter-Signing Officer:

(Name & Signature)

(Name & Signature)

Designation: _____

Designation: _____

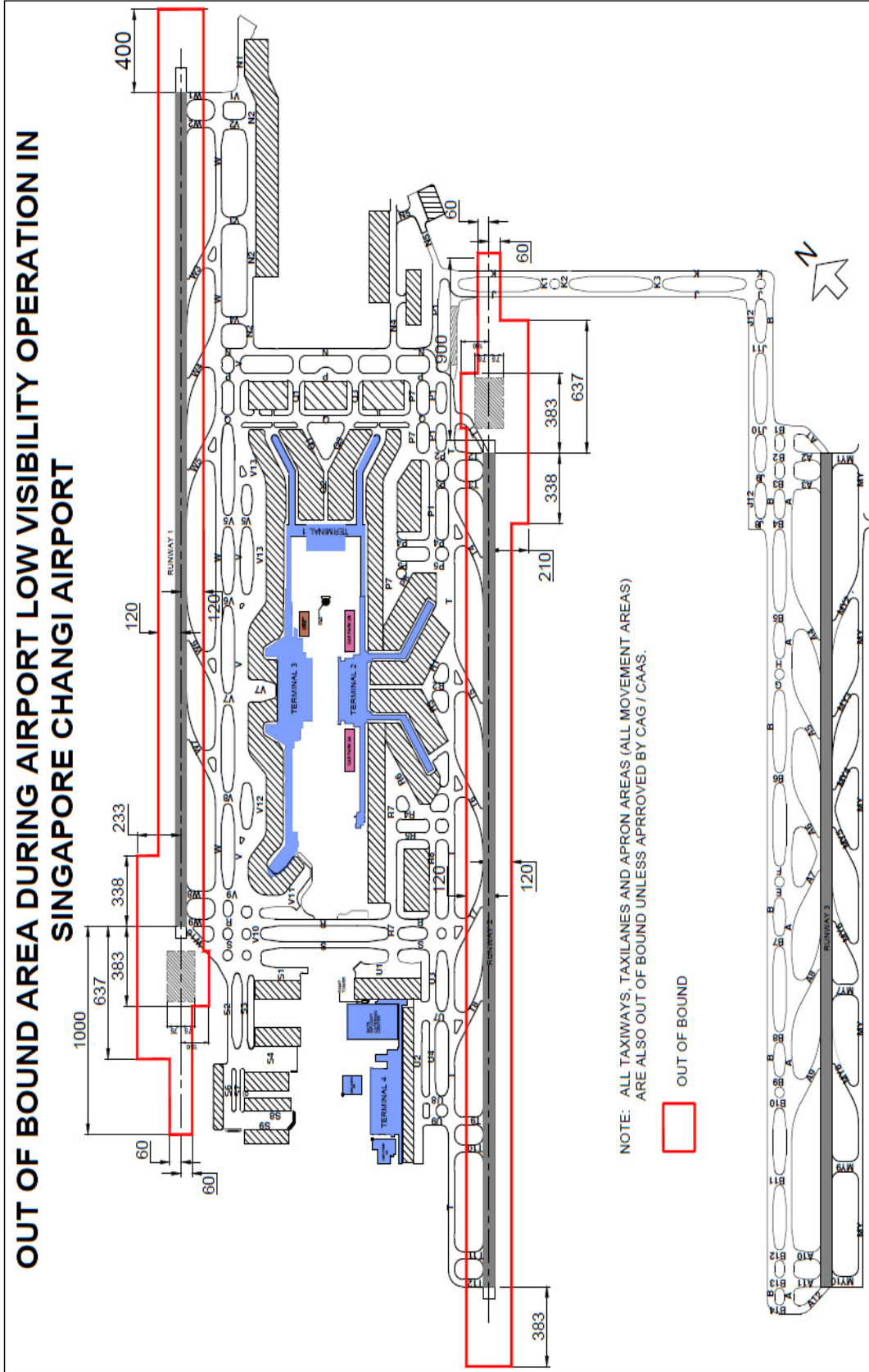
Date: _____

Date: _____

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

* The above information for Seletar Airport may change due to work in progress. The Work Party shall check with the Superintending Officer (S.O.), Project Officer and/or Coordinating Officer for the latest information.

Attachment A6



Attachment A7- 1

Standard Email Template for Request for Information Prior to Commencement of Earthworks for Changi Airport

To:
See Distribution List

Dear Stakeholders for Underground Services within **Singapore Changi Airport**,

The following work party had put up a request for information on underground services for earthworks (Airport Operational and Safety Requirements, Form A). Details of the works are as follows:

Project Title	
Contractor	
Contact Person	
Contact Number	
Consultant	
CAG Officer-in-Charge	
Location of Works <i>(Please attached site layout plan)</i>	
Proposed Date of Commencement	
Proposed Date of Completion	
Request Required	Planning / Earthworks*
Type of Earthwork	Trial Trenching / Excavation / Piling / Boring / Soil Investigation / Sinking of Earth Rod / Others (Please Specify) * _____ _____
Maximum Depth of Earthworks	
Remarks (if any)	

We hereby request for information of any underground services under your purview that could be affected by the above-mentioned works. We will carry out cable detection and trial holes and where necessary, contact your staff to verify the services identified on site.

We will seek your approval before commencing the proposed earthworks.

Your reply with the required information within 2 weeks from the date of this submission would be appreciated.

Regards,
<Applicant's Sign Off>

Attachment A7- 1A

Standard Email Template for Request for Information Prior to Commencement of Earthworks for Seletar Airport

To:
See Distribution List

Dear Stakeholders for Underground Services within **Singapore Seletar Airport**,

The following work party had put up a request for information on underground services for earthworks (Airport Operational and Safety Requirements, Form A). Details of the works are as follows:

Project Title	
Contractor	
Contact Person	
Contact Number	
Consultant	
CAG Officer-in-Charge	
Location of Works <i>(Please attached site layout plan)</i>	
Proposed Date of Commencement	
Proposed Date of Completion	
Request Required	Planning / Earthworks*
Type of Earthwork	Trial Trenching / Excavation / Piling / Boring / Soil Investigation / Sinking of Earth Rod / Others (Please Specify) * _____ _____
Maximum Depth of Earthworks	
Remarks (if any)	

We hereby request for information of any underground services under your purview that could be affected by the above-mentioned works. We will carry out cable detection and trial holes and where necessary, contact your staff to verify the services identified on site.

We will seek your approval before commencing the proposed earthworks.

Your reply with the required information within 2 weeks from the date of this submission would be appreciated.

Regards,
<Applicant's Sign Off>

Attachment A7- 2



CHECKLIST FOR CARRYING OUT TRIAL HOLES
IN CHANGI/SELETAR AIRPORT

Objective:

To locate and trace all underground services, both charted and uncharted, before commencement of ground works to ensure that all activities can proceed safely without damage or downtime to operating services.

Check box when completed.

- | | |
|--|--------------------------|
| <p>1. Before commencement of any trial holes on site, the Work Party shall request for and obtain existing as-built services drawing using the “REQUEST FOR INFORMATION ON UNDERGROUND SERVICES FOR EARTHWORKS” (Form A) and purchase services drawings from relevant agencies.</p> | <input type="checkbox"/> |
| <p>CAG Engineering & Development Cluster, covering:</p> <ul style="list-style-type: none"> • High Tension cables • External Airside and Landside Low Tension cables • Airfield lighting cables • Control cables • Water pipelines • Drainage subsoil pipes • Turf maintenance • CCTV Cables | <input type="checkbox"/> |
| <p>Other CAG Division, covering</p> <ul style="list-style-type: none"> • Horticulture (Irrigation pipes, Landscape Area and / or less than 2m from the tree collar) • Airside Operations (Airside Work Permit & Lane closure at airside) • Roadway Unit (Lane closure at landside) • Corporate IT and Technology (Structured cabling) • Airport Operations Management (LT cable for Airport Operations Systems at landside) | <input type="checkbox"/> |
| <p>Other relevant agencies, including</p> <ul style="list-style-type: none"> • CAAS Aeronautical Telecommunication & Engineering, covering: <ul style="list-style-type: none"> ➢ Communications ➢ Navigation ➢ Surveillance Services • SingTel • StarHub • CAFHI • CityGas / PowerGas • PUB - Sewage pipes • Tenants concerned, where necessary | <input type="checkbox"/> |

2. The Work Party shall submit the method statement for trial holes works to CAG project officer and consultants one week in advance for approval.

3. The Work Party shall carry out services detection on site through engaging the services of a licensed cable detection worker (LCDW). The particulars of the licensed cable detector shall be submitted to the CAG project officer and consultants in charge for endorsement. The CAG project officer and consultants shall make necessary arrangements to ensure that all related electrical services are turned on to facilitate cable detection work. All work party and LCDW in Changi Airport shall ensure that appropriate cable detection method is used for the detection of CAFHI's e-stop cable system. Such cables run on 110V DC signal and are normally buried direct, as such, conventional cable detection method may not be able to pick up the location of these cables. A joint site inspection with relevant CAFHI representative, together with the work party, LCDW and CAG project officer shall be conducted to ensure that presence of CAFHI underground services are accurately identified.

4. After LCDW has completed the detection works, the LCDW will compile a comprehensive services layout report and his recommendation of the proposed trial holes location through the Work Party to CAG project officer and consultants for approval. The LCDW report will recommend suitable measures to be taken to protect all services on site based on sound industrial practice and recommendations by the services' owners. The LCDW report showing exact locations of services found shall be submitted to relevant services' owners for verification.

5. Prior commencement of trial holes work, the Work Party shall submit this **"CHECKLIST FOR CARRYING OUT TRIAL HOLES IN CHANGI/SELETAR AIRPORT"** to consultants and CAG approving officer one week in advance for comments and approval respectively.

6. Prior to commencement of trial holes works, LCDW shall marked out the detected services on the trial holes location using wooden pegs or different spray paints.

7. Prior to commencement of each trial hole works, the Work Party shall notify CAG Project Officer on the commencement and location of the trial holes works. LCDW shall conduct a briefing to all competent supervisors and workers assigned to perform the trial holes works to highlight to them the services layout and possibility that indicators, e.g. cable slabs, markers and sand above existing indicated or non-indicated services or cables may be absent. He shall also determine the depth of services or cables with users and the service detection plan as far as possible.

Check box when completed.

8. The Work Party shall provide trial holes that are manually dug under the full-time 100% standing supervision of the LCDW and Registered Earthwork Supervisor to expose, identify and confirm the services detected. Trial holes shall be required to positively identify all communications cables, fibre optic cables, gas and water pipe location, as well as all other services within or in the proximity of the intended excavation/piling area that cannot be accurately located or easily detected. Detailed information shall be obtained from the appropriate party as to the possibility of such services being located within the proposed construction area. It should be noted that CAFHI e-stop cables run on 110V DC signal and may not be detected by conventional cable detection method. As such, CAFHI shall be consulted for such cable detection and a site visit with relevant CAFHI personnel shall be arranged for to positively identify these cables. The Work Party shall take all necessary precautions to ensure that these “undetectable services” are located and protected during the earthworks. Examples of “undetectable services” are certain telecommunication / data cables, un-energized cables, CAFHI fuel pipes, fibre optic cables, co-axial cables and radar cables.
9. All trial holes work must be carried out with caution and dug by manual means until services are successfully located, or desired excavation depth is achieved with the standing supervision of both LCDW and Registered Earthwork Supervisor. Excavator or other machinery shall not be used for digging trial holes except for the top asphalt or concrete layer (Only Registered Excavator (REO) or Probational Registered Excavator Operators (PREO) will be allowed to operate the excavators).
10. The contractor shall stop any trial holes & trenching works if they encounter any unknown structure or obstruction. LCDW shall be on site to verify any presence of live services. Contractor must consult CAG project/maintenance officers before proceeding further.
11. The Work Party shall install safety barriers to protect workers from falling into trial holes when works are in progress or are left exposed.
12. The LCDW report shall also highlight all discrepancies between the services layout indicated on plans versus their actual location found on site. CAG project officer shall coordinate a meeting to sort out such discrepancies with all relevant services owners concerned.

Check box when completed.

13. Upon completing items 1 to 11, the Work Party shall submit an updated cable detection plan showing markings done on site, proposed work methods and services protection and/or diversion scheme to the CAG project officer, consultants and relevant service owners for approval at least 2 weeks before the planned commencement of actual excavation / piling work.

Attachment A7- 3



CHECKLIST FOR CARRYING OUT EARTHWORKS IN CHANGI/SELETAR AIRPORT

Objective:

To locate and trace all underground services, both charted and uncharted, before commencement of earthworks to ensure that all activities can proceed safely without damage or downtime to operating services.

Check box when completed.

1. Before commencement of any works on site, the Work Party shall Request for and obtain existing as-built services drawing using the **“REQUEST FOR INFORMATION ON UNDERGROUND SERVICES FOR EARTHWORKS”** (Form A) and purchases services drawings from other relevant agencies.

- CAG Engineering & Development Cluster, covering:
 - High Tension cables
 - External Airside and Landside Low Tension cables
 - Airfield lighting cables
 - Control cables
 - Water pipelines
 - Drainage subsoil pipes
 - Turf maintenance
 - CCTV cables

- Other CAG Divisions, covering
 - Horticulture (Irrigation pipes, Landscape Area and / or less than 2m from the tree collar)
 - Airside Operations (Airside Work Permit & Lane closure at airside)
 - Roadway Unit (Lane closure at landside)
 - Corporate IT and Technology (Structured cabling)
 - Airport Operations Management (LT cable for Airport Operations Systems at landside)

- Other relevant agencies, including
 - CAAS Aeronautical Telecommunication & Engineering, covering:
 - Communications
 - Navigation
 - Surveillance Services
 - SingTel
 - StarHub
 - CAFHI
 - CityGas / PowerGas
 - PUB - Sewage pipes
 - Tenants concerned, where necessary

Check box when completed.

2. The Work Party shall carry out services detection on site through engaging the services of a Licensed Cable Detection Worker (LCDW). The particulars of the licensed cable detector shall be submitted to the CAG project officer and consultants in charge for endorsement. The CAG project officer and consultants shall make necessary arrangements to ensure that all related electrical services are turned on to facilitate cable detection work. All work party and LCDW in Changi Airport shall ensure that appropriate cable detection method is used for the detection of CAFHI's e-stop cable system. Such cables run on 110V DC signal and are normally buried direct, as such, conventional cable detection method may not be able to pick up the location of these cables. A joint site inspection with relevant CAFHI representative, together with the work party, LCDW and CAG project officer shall be conducted to ensure that presence of CAFHI underground services are accurately identified.
3. After LCDW has completed the detection works, the LCDW will compile a comprehensive services layout report through the Work Party to CAG Project Officer and Consultants for approval. The LCDW report will recommend suitable measures to be taken to protect all services on site, based on sound industrial practice and recommendations by the services owners. The LCDW report showing exact locations of services found shall be submitted to relevant services owners for verification.
4. The LCDW report shall also highlight all discrepancies between the services layout indicated on plans versus their actual location found on site. CAG project officer shall coordinate a meeting to sort out such discrepancies with all relevant services owners concerned.
5. The Work Party shall submit an updated earthwork work plan showing marking done on site, the method statement for piling, and excavation works and services protection and / or diversion scheme to CAG project officer / consultants one week in advance for approval.
6. Prior commencement of earthworks, LCDW shall marked out the detected services on the piling / excavation works location using wooden pegs or different spray paints. It should be noted that CAFHI e-stop cables run on 110V DC signal and may not be detected by conventional cable detection method. As such, CAFHI shall be consulted for such cable detection and a site visit with relevant CAFHI personnel shall be arranged for to positively identify these cables.
7. Prior commencement of earthworks, the Work Party shall submit the "Application for Permit to Carry Out Earthworks" (Form C) to CAG project officer / consultants two weeks in advance for approval.
8. Standing earthwork supervisor, workers and piling / excavator operators on site shall be briefed by the LCDW on the services layout and the above markings and warned against carrying out any earthworks bounded within the marked-out area unless under the direct supervision of the LCDW and with the explicit approval of the Work Party's project manager, Consultant and CAG project officer.
9. The Work Party shall implement appropriate measures as required by the LCDW, Consultant and Services' Owner to protect the services found.
10. The Work Party shall install safety barriers to protect workers from falling into cable trenches when works are in progress or are left exposed.
11. Only Registered Excavator Operators (REO), Probational Registered Excavator Operators (PREO) and certified piling operator will be allowed to operate excavator / piling machines within the work area.

Check box when completed.

12. A competent full-time Registered Earthwork Supervisor shall be deployed to monitor the site operations during the entire earthworks and to provide close guidance to the excavator operator.
13. The Work Party shall provide protective steel plates or conduits over exposed services positions to prevent damage due to movements of heavy vehicles or human traffic over them.
14. If there is High Tension cable(s) near or within the vicinity of the excavation area, the project contractor's LCDW shall positively identify the cable by injection of signal to the cable at CAG substation. CAG in-house contractor shall assist to make the cable dead. The project contractor's LCDW shall also mark out the detected High-Tension cable(s) route on the ground using spray paint.
15. The contractors shall stop any excavation works if they encounter any unknown structure or obstruction. LCDW shall be on site to verify any presence of live services. Contractor must consult CAG project/maintenance officers before proceeding further.
16. If the proposed works were to overcross comms cable ducts, the Work Party shall submit method of support and protection of these ducts to CAG, CAAS Aeronautical Telecommunication & Engineering (ATE) Division and NCS Communications Engineering Pte Ltd, Line Plant Operations Division for approval. They shall also be informed prior to the dismantling of supports and the backfilling of comms cable ducts.
17. Where the works would be carried out over the Approach Control Radar (ACR) cables, NCS Communications Engineering Pte Ltd shall be engaged for on-site standby to respond quickly to any problem.
18. Excavation / piling by machine shall stop once cable slabs are exposed. Only manual excavation is allowed after the cable slabs are removed. Protection slabs over HT cables shall not be tampered with and shall be remained intact unless authorised by CAG and the Work Party's PE to remove them.
19. If unknown services are unaccounted in the process of excavation, Work Party shall stop all works immediately at the affected area and inform the CAG project officer to help to identify these services found.
20. Where necessary, the Work Party shall plan for further cable detection checks to scan the work area for other undetected / undetectable services. Given the technical limitations of the equipment currently available, investigative detection must be carried out at each stage of the construction process. Stage by stage detection of the underground services must be considered and incorporated within the construction schedule for deep excavation works. This procedure must be implemented until services are successfully located or the effective depth of the excavation is reached. In simple terms, detection / trial holes have been carried out before the earthworks, at intervals in accordance with the limitations of the detection (typically every 2 to 3 metres), until services are precisely located or the desired construction depth is achieved.

FORM A

File Reference : _____

Date : _____

To : See Distribution List

Dear Sir/Mdm,

**REQUEST FOR INFORMATION ON UNDERGROUND SERVICES FOR EARTHWORKS**

We are planning to carry out earthworks^ within the boundaries of Singapore Changi Airport / Seletar Airport*. Details of the project and scope of work is as follow:

Project Title	
Contractor	
Contact Person	
Contact Number	
Consultant	
CAG Officer-in-Charge	
Location of Works <i>(Please attached site layout plan)</i>	
Proposed Date of Commencement	
Proposed Date of Completion	
Request Required	Planning / Earthworks*
Type of Earthwork	Trial Trenching / Excavation / Piling / Boring / Soil Investigation / Sinking of Earth Rod / Others (Please Specify) * _____ _____
Maximum Depth of Earthworks	
Remarks (if any)	

We hereby request for information of any underground services under your purview that could be affected by the above-mentioned works. We will carry out cable detection and trial holes and where necessary, contact your staff to verify the services identified on site.

We will seek your approval before commencing the proposed earthworks.

Your reply with the required information within 2 weeks from the date of this submission would be appreciated.

Name & Designation : _____ Signature : _____

Contact No : _____

Distribution List

CAFHI (Engineering & Projects)
 Attn: CAFHI MGT (cafhimgmt@cafhi.com.sg)
[Fuel Hydrant Pipeline & Emergency Cable]

CAAS (Aeronautical Telecommunication & Engineering)
 Attn: Chan Kok Sunn (chan_kok_sunn@caas.gov.sg) /
 Austin Chia (austin_chia@caas.gov.sg) /
 Matthew Koh (matthew_koh@caas.gov.sg) /
 Low Chong Run (Low_chong_run@caas.gov.sg) /
 Elena Ng (elena_ng@caas.gov.sg) /
 Toh Seow Teng (toh_seow_teng@caas.gov.sg) /
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[Cargo Complex LT Cables]

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 CAG (Engineering & Development)
 Ng Siew Ping (ng.siewping@changiairport.com)
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 Bobby Chua (bobby.chua@changiairport.com) /
 Lim Su Wee (lim.suwee@changiairport.com) /
 Ramli Bin Hamdan (ramli.hamdan@changiairport.com)
[Airfield Lighting Cables]

CAG (Engineering & Development)
 Bernice Koh (bernice.koh@changiairport.com) /
 Teo Wei Yi (teo.weiyi@changiairport.com) /
[E&D Fibre Optics]

CAG (Engineering & Development)
 Queenie Koh (Queenie.koh@changiairport.com) /
 Brenda Yeam (Brenda.yeam@changiairport.com) /
 Soh Ying Shan (soh.yingshan@changiairport.com)
[CCTV Services]

CAG (Airport Management)
 Nur Atikah Bte Khirman (atikah.khirman@changiairport.com) /
 Toh Yee Huang Jaslyn (jaslyn.toh@changiairport.com)
[LT Cables for Airport Operations Systems at Landside]

CAG (Corporate IT and Technology)
 Noordin Mohamed (noordin.mohamed@changiairport.com) /
 Ilyas Suratmin (ilyas.suratmin@changiairport.com) / stc@changiairport.com
[Outdoor Structured Cabling IT Services]

CAG (Horticulture)
 Shaiful Sulaiman (shaiful.sulaiman@changiairport.com)
 Ling Hua Choo (ling.huachoo@changiairport.com)
[Irrigation pipes, Landscape Area and/ or less than 2m from the tree collar]

For Seletar Airport only:

CAG (Master Planning)
 Cheng Liping (cheng.liping@changiairport.com)
[Airport Development]

CAG (Seletar Airport)
 Darren Yee (darren.yee@changiairport.com)
[HT / LT Cables]

CAG (Seletar Airport)
 Richard Chia (richard.chia@changiairport.com)
[Airfield Lighting including ALCMS]

CAG (Seletar Airport)
 Bai Zhong Yang (bai.zhongyang@changiairport.com) /
[Potable/Fire Hydrant Pipelines]

Note: *The contractor(s) shall purchase the services plans for sewer, gas, communication cables for SingTel and Starhub as per these agencies requirements and seek separate approval from these agencies to commence excavation/piling works.*

FORM B

File Reference :

Date :

To : See Distribution List

Dear Sir / Mdm,

**APPLICATION FOR PERMIT TO CARRY OUT TRIAL HOLE WORKS**

We are planning to carry out trial hole works within the boundaries of Singapore Changi Airport / Seletar Airport*. Details of the project and scope of work is as follow:

Project Title	
Contractor	
Contact Person	
Contact Number	
Consultant	
CAG Officer-in-Charge	
Location of Works <i>(Please attached site layout plan)</i>	
Proposed Date of Commencement	
Proposed Date of Completion	
Maximum Depth of Earthworks	
Remarks (if any)	

We hereby apply for a permit to commence trial hole works as stipulated in the above location and undertake to comply with the requirements as specified in the checklist and guidelines attached.

Applicant:

Name & Designation : _____ Signature : _____

Contact No : _____

Consultant Support**CAG Approval**

Project Manager : _____ Approving Officer : _____

Signature : _____ Signature : _____

Date : _____ Date : _____

Status : Approved Reject

FORM C

File Reference : _____

Date : _____

To : See Distribution List

Dear Sir / Mdm,

**APPLICATION FOR PERMIT TO CARRY OUT EARTHWORKS**

We are planning to carry out earthworks within the boundaries of Singapore Changi Airport / Seletar Airport*. Details of the project and scope of work is as follow:

Project Title	
Contractor	
Contact Person	
Contact Number	
Consultant	
CAG Officer-in-Charge	
Location of Works <i>(Please attached site layout plan)</i>	
Proposed Date of Commencement	
Proposed Date of Completion	
Maximum Depth of Earthworks	
Remarks (if any)	

We hereby apply for a permit to commence earthworks as stipulated in the above location and undertake to comply with the requirements as specified in the checklist and guidelines attached.

Applicant:

Name & Designation : _____ Signature : _____

Contact No : _____

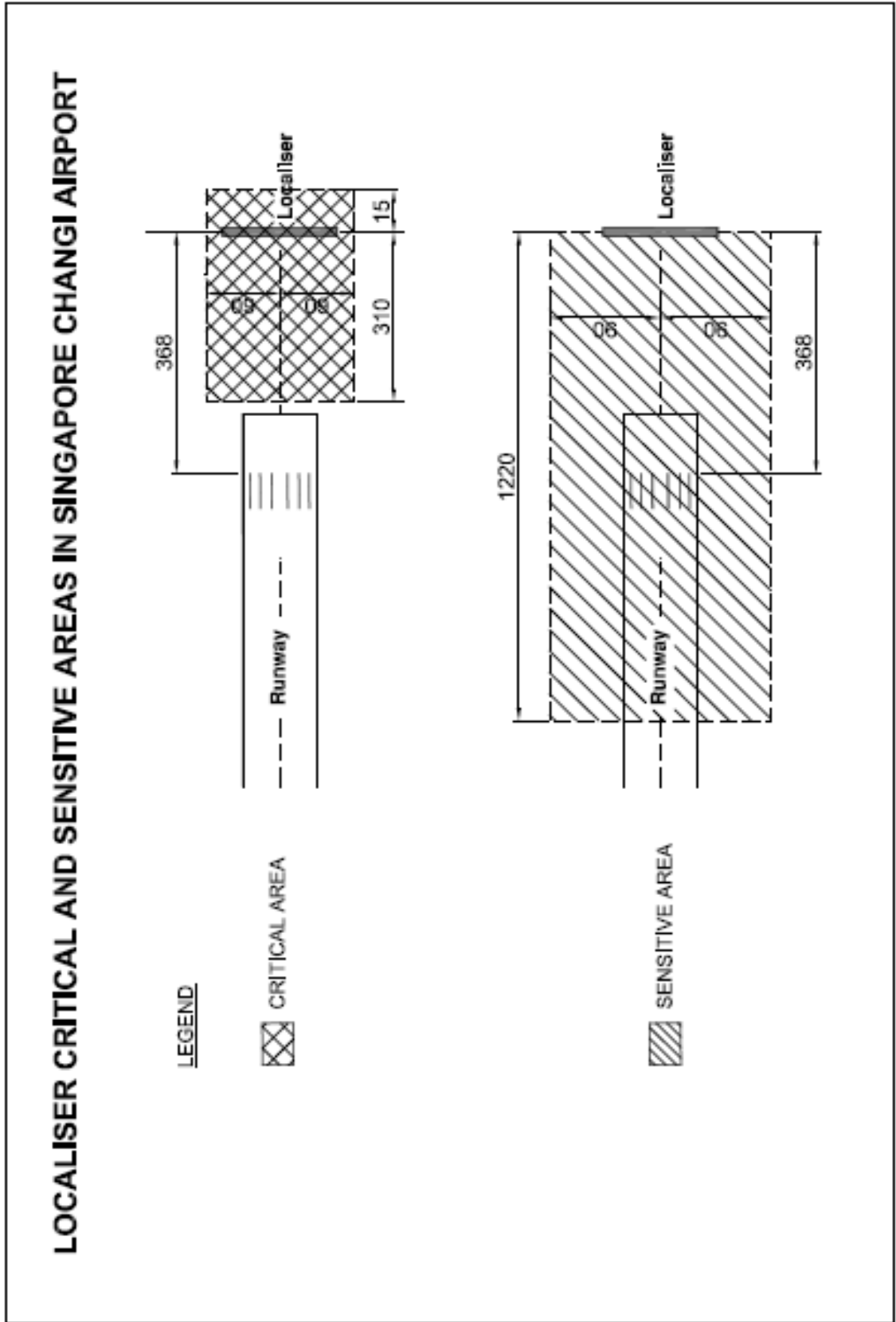
Consultant Support**CAG Approval**

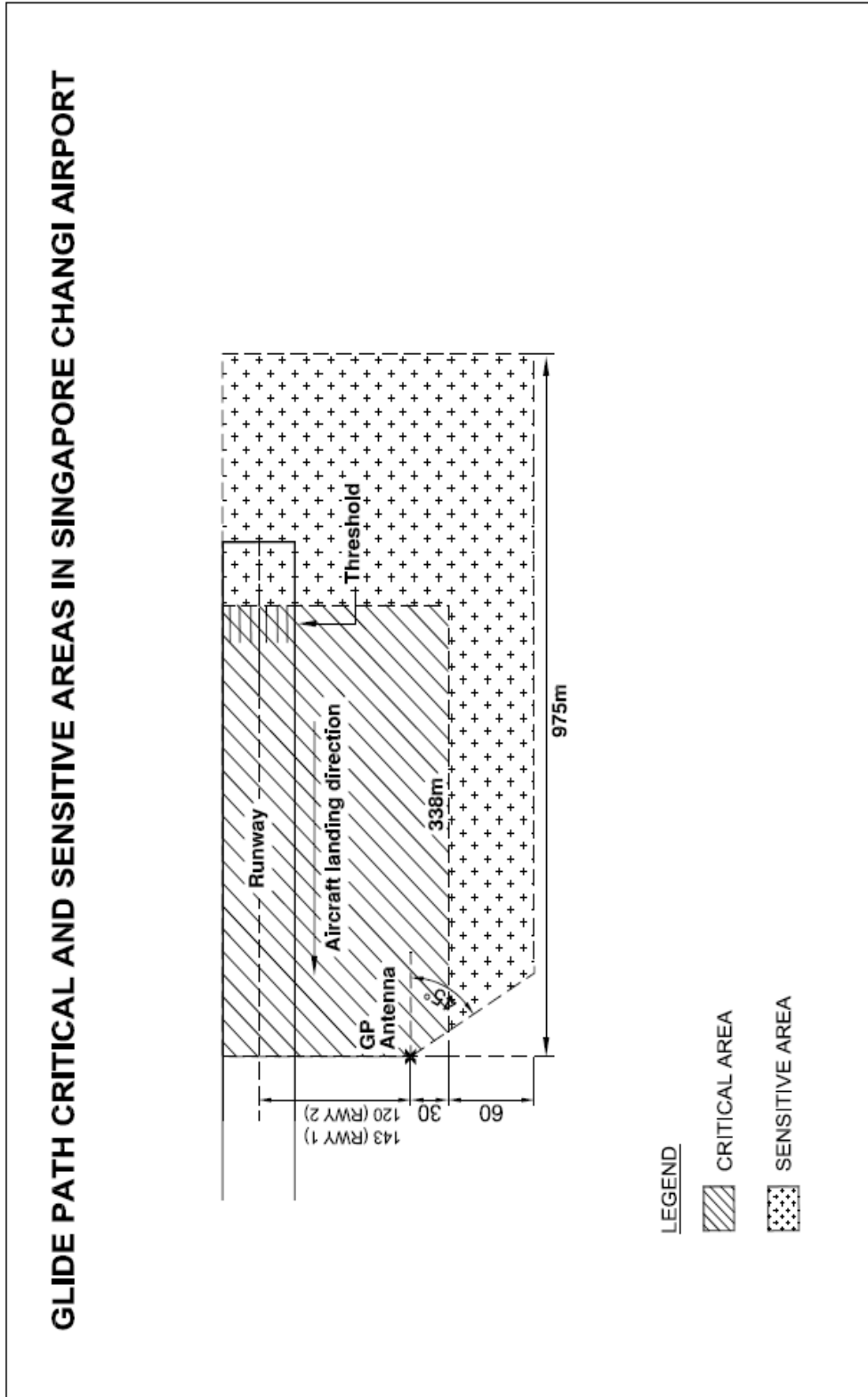
Project Manager : _____ Approving Officer : _____

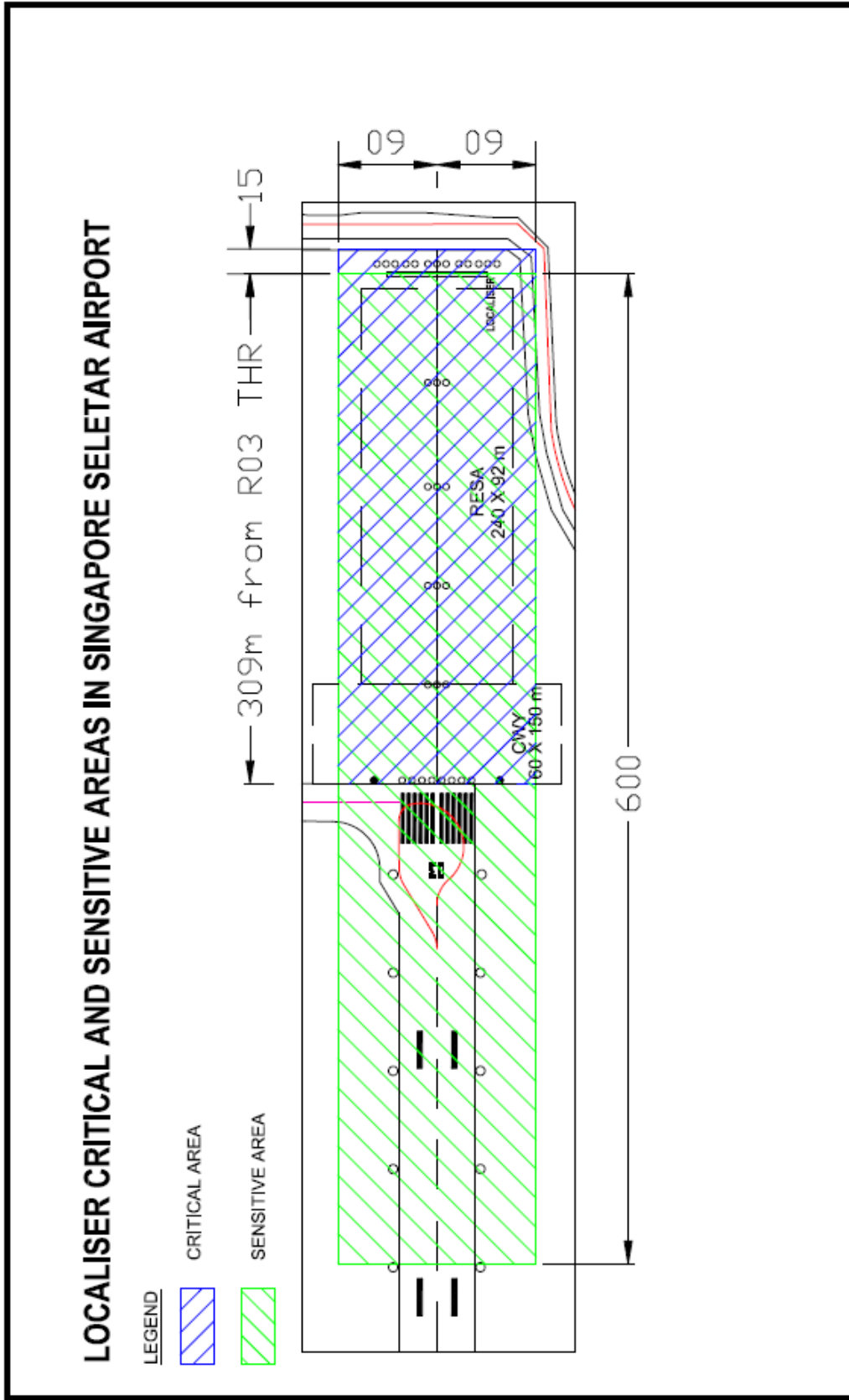
Signature : _____ Signature : _____

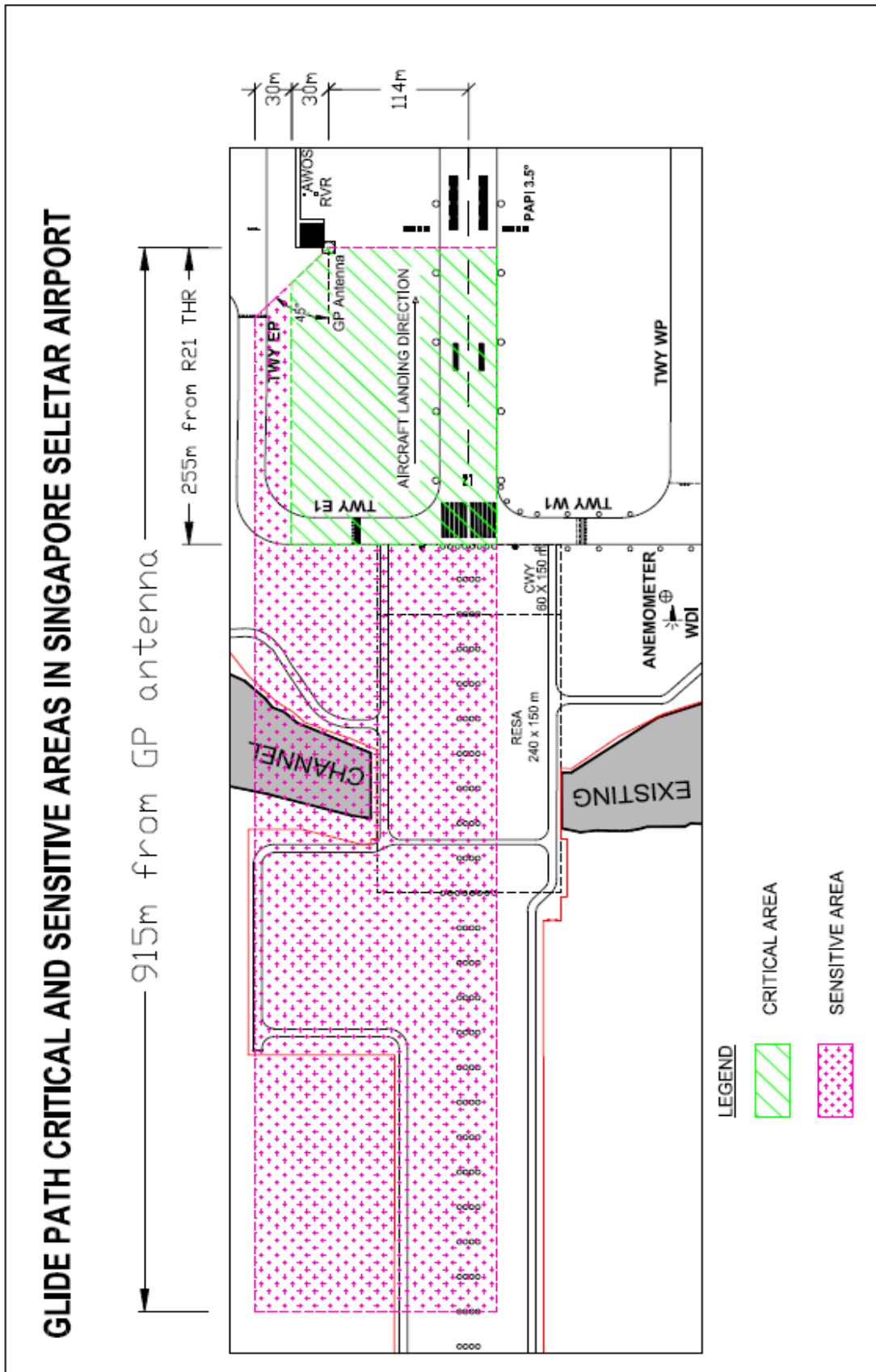
Date : _____ Date : _____

Status : Approved Reject

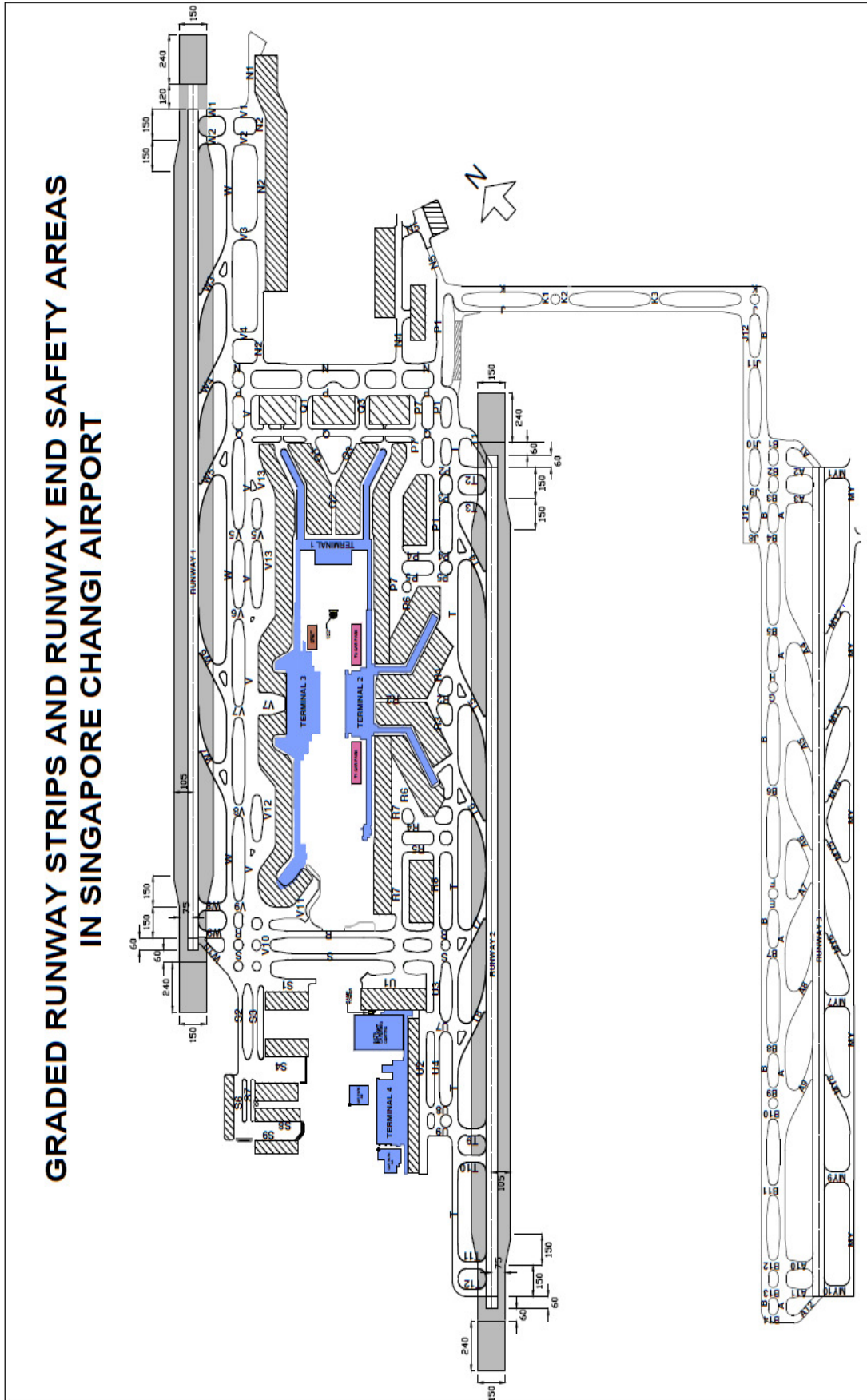


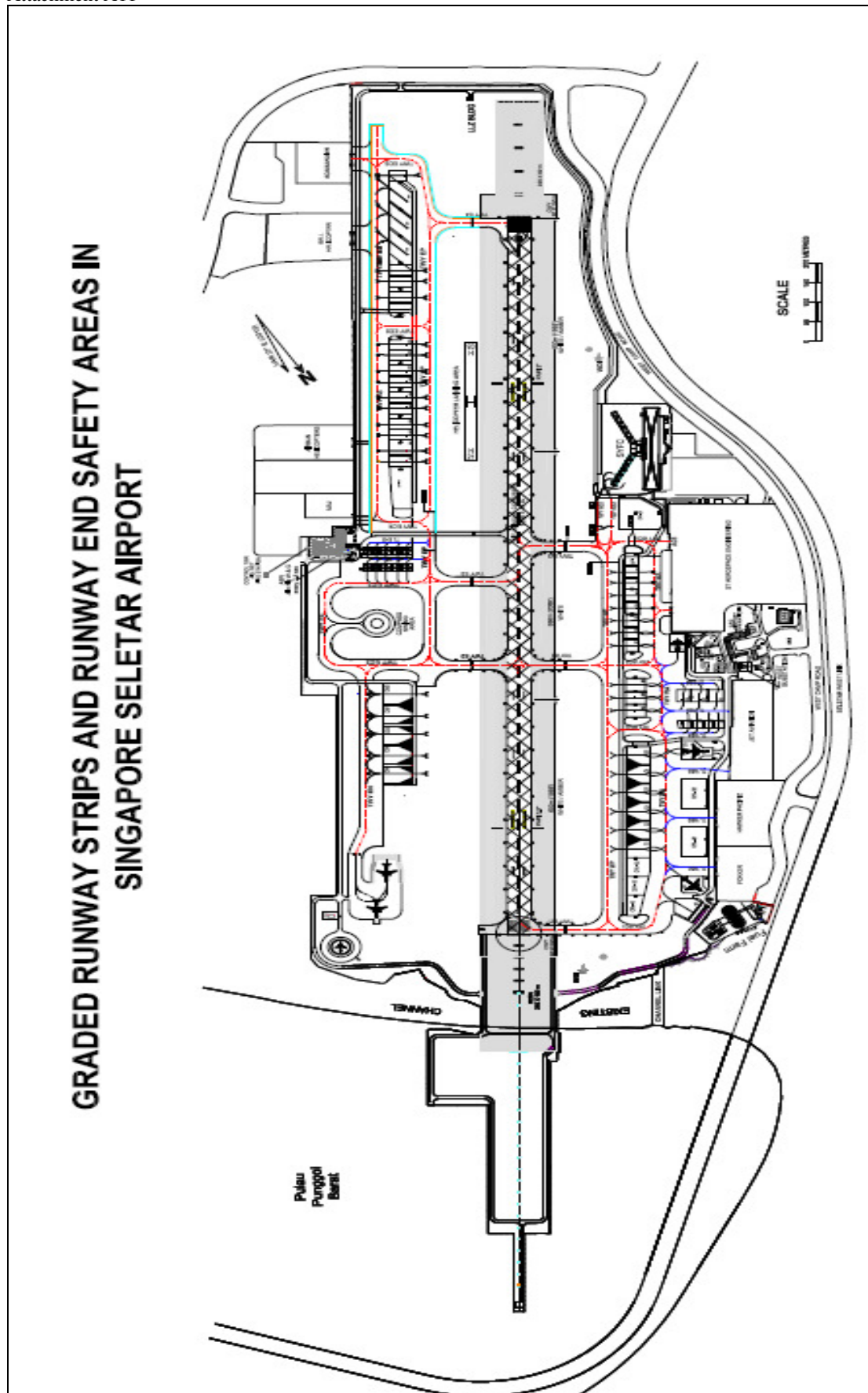




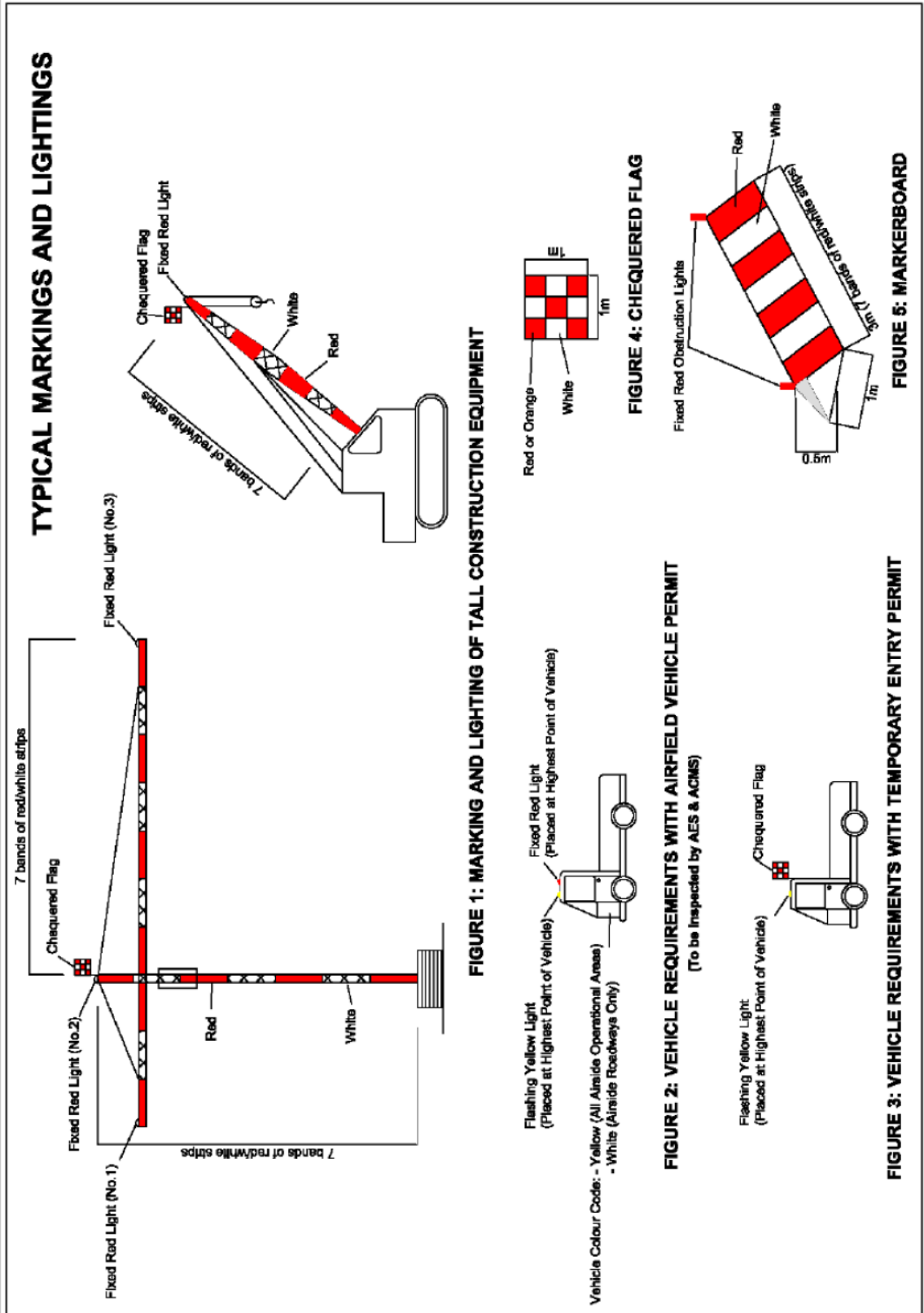


Attachment A10

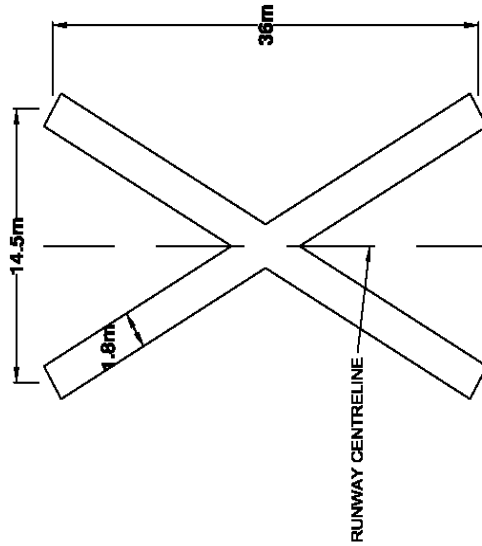






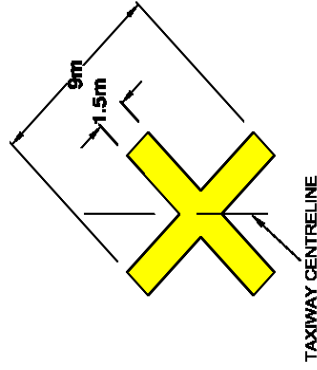


CROSS MARKERS FOR A CLOSED RUNWAY, TAXIWAY OR PORTION THEREOF



CLOSED RUNWAY MARKER

- TO BE PLACED AT EVERY ENDS AND ALONG THE CLOSED RUNWAY.
- SPACING OF MARKERS AT 300m
- WHITE, NON REFLECTIVE PAINT



CLOSED TAXIWAY MARKER

- TO BE PLACED AT EVERY ENDS OF CLOSED TAXIWAY
- YELLOW, NON REFLECTIVE PAINT

Attachment A15

Risk Assessment Form

This form is to be compiled and completed by the Work Party upon consultation with ALL Stakeholders.

Project Title:										Project Manager/ Organisation: <Name/Designation/Organisation>				Assessment Start Date: <For subsequent review and/or revisions, insert Reviewed date (dd/mm/yyyy) or Revision number>	
Project Synopsis: <enter a complete description of the project and the environment in which the project is to be operationalised and indicate the stage of the project documented in this risk assessment, e.g. conceptual planning and design or detailed design or detailed construction and method or a combination of the different stages of the project, and indicate if this is an updated risk assessment>															
Work Activities		Identified Hazards	Consequences		Existing Mitigating Measures and Safety Risk Index of Ultimate Consequence				Introduced Action(s) to Further Reduce Risk and Existing Safety Risk Index of Ultimate Consequence						
S/N	Description	Description	S/N	Description of: Unsafe Event & Ultimate Consequence	Existing Defences to Control Safety Risks	Probability (5,4,3,2 or 1)	Severity (A,B,C,D or E)	Risk Category (U,T or A)	Introduced Defences to Further Reduce Existing Risks	Probability (5,4,3,2 or 1)	Severity (A,B,C,D or E)	Risk Category (U,T or A)	Action by Stakeholder / Organisation	Expected Completion date	Mitigating measure completed? (Insert completed date)
1			1a			<Indicate if 5,4,3,2 or 1>	<Indicate if A,B,C,D or E >	<Indicate if U,T or A>		<Indicate if 5,4,3,2 or 1>	<Indicate if A,B,C,D or E >	<Indicate if U,T or A>	<Name/ Designation/ Organisation>		Implemented on site before work at <venue> kicks off (i.e. on dd-mmm-yyyy, XXXX hrs) by <Name/ Designation/ Organisation>. Accepted by SAG Meeting.
2			2a												
CHECKED AND CONFIRMED BY					ENDORSED & APPROVED BY					ACKNOWLEDGED BY					
_____ <Name(s)/Designation(s)/Division(s) or Organisation(s)/Signature(s)/Date(s) – WSH RA Leader etc.>					_____ <Name/Designation/Organisation/Date – Work Party>					_____ <Name(s)/Designation(s) of CAG Project Officer(s)/CAG Division(s)/Date(s)>					
Note: By signing this form, all signatories acknowledge that they have, to their best efforts, participated in the risk assessment process to identify possible hazards and mitigating measures to keep the risks to an acceptable or a tolerable level and have sighted all relevant records on the joint risk assessment process (e.g. notes of meeting, letters, emails, etc).They should also disseminate the information contain herein to relevant personnel and ensure that the mitigating measures will be implemented accordingly.															

Attachment A15

Probability of Occurrence		
Quantitative definition	Meaning	Value
Frequent	Likely to occur many times (<i>has occurred frequently in the industry</i>).	5
Occasional	Likely to occur sometimes (<i>has occurred infrequently in the industry</i>).	4
Remote	Unlikely, but possible to occur (<i>has occurred rarely in the industry</i>).	3
Improbable	Very unlikely to occur (<i>not known to have occurred in the industry</i>).	2
Extremely Improbable	Almost inconceivable that the event will occur (<i>e.g. information not available in the literature</i>).	1

Table 1: Risk Probability Classification

Severity of Occurrence		
Aviation definition	Meaning	Value
Catastrophic	<ul style="list-style-type: none"> Results in loss of life or destruction of equipment 	A
Major	<ul style="list-style-type: none"> A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely. Serious injury or life-threatening occupational medical conditions (<i>includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning</i>). Major equipment damage 	B
Hazardous	<ul style="list-style-type: none"> A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of the increase in workload, or as a result of condition impairing their efficiency. Serious incidents. Injury to persons that require medical treatment or ill-health leading to disability (<i>includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders</i>). 	C
Minor	<ul style="list-style-type: none"> Nuisance. Operating limitations. Use of emergency procedures. Minor incidents. Injury or ill-health requiring first-aid only (<i>includes minor cuts and bruises, irritation, ill-health with temporary discomfort</i>). 	D
Negligible	<ul style="list-style-type: none"> Not likely to cause damages, injury or ill-health. 	E

Table 2: Risk Severity Classification

Risk Probability	Risk Severity				
	Catastrophic A	Major B	Moderate C	Minor D	Negligible E
Frequent 5	5A	5B	5C	5D	5E
Occasional 4	4A	4B	4C	4D	4E
Remote 3	3A	3B	3C	3D	3E
Improbable 2	2A	2B	2C	2D	2E
Extremely Improbable 1	1A	1B	1C	1D	1E

Table 3: Risk Tolerability Matrix

Table 4: Risk Tolerability

Risk Category	Region / Risk Index	Criteria
U	Unacceptable 5A, 5B, 5C, 4A, 4B, 3A	The risk is unacceptable and operations should not take place until sufficient major risk mitigating measures have been implemented to reduce the risk to an acceptable level.
T	Tolerable 5D, 5E, 4C, 4D, 4E, 3B, 3C, 3D 2A,2B,2C,1A, 1B	The risk is of concern and risk mitigating measures should be put in place to reduce the level of risks to as low as reasonably practicable. Where further risk reduction / mitigation is not practicable or viable, the risk may be accepted provided endorsement is given by management.
A	Acceptable 3E, 2D, 2E, 1C, 1D, 1E	The risk is considered acceptable.

REQUIREMENTS FOR CONSTRUCTION WORKS IN THE AIRSIDE (CHANGI AIRPORT)

1 Construction Works in the Airside

- 1.1 Construction works in the airside refer to works on or near aircraft movement areas and on the roadway system that result in physical changes to infrastructure in the airside, e.g. new runway, taxiway, aircraft stands, buildings, roads, pavements, fixtures, systems, etc.
- 1.2 Construction works within the operating aerodrome may impact the use of airside facilities for aircraft operations and ground handling operations and vehicular traffic. The requirements stipulated in this document apply to construction works, including preparatory activities, in the airside.
- 1.3 The following areas and systems are defined as airside facilities:
 - a. Aircraft Manoeuvring Areas – runways, runway strips, taxiways, taxiway strips and taxilanes;
 - b. Operational systems (e.g. airfield lighting, iFerret, navigation aids, etc.) and their respective critical and sensitive areas, if applicable;
 - c. Apron – aircraft stands (including equipment staging area), equipment parking area, Aircraft Docking Guidance System, Passenger Loading Bridge, fuel pits and emergency stop switch, flood lights, INS signs, CCTV cameras, etc.;
 - d. Critical installations – AFLCC, ILS LLZ Building, Middle Marker, GP Building, South Pump House, Fire Station, Ramp Tower, etc.;
 - e. Roadways – Perimeter Road, primary and secondary roadways in the aprons, etc.; and
 - f. Baggage Handling Area (BHA) – Baggage Handling System (BHS), parking or staging area, and driveway within BHA.

Note: For the purpose of Airside Work Permit application, all the above except (f) are considered part of the airfield.

- 1.4 The Project Officer who is managing construction works in the airside shall ensure that the Work Party carrying out the works are properly briefed and informed of the requirements stipulated in the latest edition of the Airport Operational and Safety Requirements (AOS), Airside Works Procedure Manual (AWPM).
- 1.5 No construction activities shall take place in the airside unless approval has been granted by CAG Airside Development & Baggage (Airside Works team).
- 1.6 Refer to Annexes A – D for more details.

1 Airside Work Permit (Airfield)

- 1.1 The Project Officer is required to engage Airside Development & Baggage (Airside Works team) on the scope of works to be carried out in the airside **at least 3 months** prior to the targeted commencement of works.
- 1.2 The purpose for consultation is to assess the impact on operations and to confirm the need for closure of affected airside facilities, if any. Please forward your enquiries via email to Airside Works team at grp.airsideworks@changiairport.com. Alternatively, enquiries can also be forwarded to lim.sengkee@changiairport.com
- 1.3 The Project Officer is required to provide information about the proposed works, including but not limited to the following:
 - a. Purpose/nature of works;
 - b. Proposed work schedule indicating the dates and working hours;
 - c. Schematic superimposed on maps/architectural drawings/layout plans of current infrastructure indicating clearly the areas of works and the boundary of each work site (including areas for staging machinery and equipment, assembly area, site office etc.);
 - d. Phasing plan for various stages of works (including pre-construction activities, e.g. ground surveys);
 - e. Approved risk assessment(s), documenting relevant risks and corresponding mitigating measures for safety hazards and potential disruptions to aircraft operations, and ground handling operations;
 - f. Associated changes to procedures, e.g. push-back, road diversion, etc.; and
 - g. Contact details of key personnel from the project management team, inclusive of consultant/main contractor.

1.4 The Project Officer is required to consult the relevant stakeholders on the considerations related to safety, the method of works, impact on security and operations of critical systems and safety prior to seeking approval from Airside Works team to commence works. Furthermore, written approval/ permits are required for certain work activities. Refer to the list of stakeholders in the table below.

Area of Concern	Approving Agency for Pre-requisite Requirements
Works affecting airport security infrastructure	Aviation Security (CAG) and Airport Police Department
Works on the inner perimeter fencing and/or PIDS	Engineering & Development Group (CAG) and Aviation Security (CAG)
Hot works	Airport Emergency Services (CAG)
Works requiring isolation of fire alarm system	Airport Emergency Services (CAG)
Works within another project’s work boundary	Relevant Project Officer
Works affecting tenanted and/or operational spaces	Rentable Properties (CAG), Airside Operations (CAG), Engineering & Development Group (CAG) and/or Airport Emergency Service (CAG)
Works affecting/on the external façade of terminal buildings	Facilities Management (CAG)
Works on/affecting active roadways	Airside Management (CAG) and Airside Operations (CAG)
Closure of aircraft stands/ roadways	Airside Operations (CAG)
Closure of Aircraft Manoeuvring Area	Airside Operations (CAG) and Changi Tower (CAAS)
Aerodrome reporting requirements (e.g. AIP and NOTAM)	Airside Operations (CAG)
Trial hole works	Refer to stakeholders in AOS
Earthworks	Refer to stakeholders in AOS
Obstacle clearance for works involving tall machinery/equipment	Air Navigation Services Policy & Planning Division (CAAS)
Works near radio navigation and landing aids	Aeronautical Telecommunications & Engineering Division (CAAS)
Works on airfield lighting system, drainage, M&E systems	Engineering & Development Group (CAG)
Works on CCTV, iFerret, ADGS	Engineering & Development Group (CAG) and Airside Operations (CAG)
Works affecting fire hydrant system	Airport Emergency Services (CAG)
Works affecting fuel system	Changi Airport Fuel Hydrant Installation (CAFHI)
Works on Baggage Handling System or works in the Baggage Handling Area	Engineering & Development Group (CAG) and Airside Development & Baggage (Baggage Ops) (CAG)

1.5 The Project Officer is encouraged to use the “How-to-complete-AWP” Guide (see Supplementary Document for Appendix 1 to Annex A) to guide him/her in verifying that all the necessary requirements in the “Checklist for Project Officer (Airfield)” (see [Appendix 1](#)) have been fulfilled before submitting the application to Airside Works team for approval.

- 1.6 The Project Officer shall prepare the “Airside Work Permit (Airfield)” form (see Appendix 2) and submit together with the supporting documents via email to Airside Works team as listed in paragraph 1.2.
- 1.7 The application shall be submitted **at least 3 working days** (not inclusive of the submission date) prior to the requested start date; failure which the application may be rejected due to insufficient processing time. Do note that the required 3 working days will be reset if the application is rejected.
- 1.8 Construction activities shall **not** commence until approval has been granted by Airside Works team. Upon approval, the Project Officer must ensure that works are conducted within the approved duration and authorised daily working hours at the approved work site(s).
- 1.9 The Project Officer shall ensure that the approved work sites are well maintain and hazards are kept under control. As such, the conduct of housekeeping activities such as grass cutting, FOD and waste disposal, cleaning of temporary site office and/or access roads, etc., does not require approval by Airside Works team.
- 1.10 For extension of permit, a fresh application will be needed. However, if there are no changes to the earlier supporting document(s), references to these supporting document(s) can be stated in the application without having to attach a copy.
- 1.11 In the event of early completion of works before the approved end date, the Project Officer is encouraged to update Airside Works team accordingly.

2 General Instructions

- 2.1 Any incidents in the airside must be reported immediately to Airside Operations - Airside Management Centre (AMC) at 6541-2275 immediately. The Project Officer or appointed representative shall respond immediately to the site to take immediate control of the area and to prevent exacerbating safety hazard or further disruption to operations.

- 2.2 During the course of works, Airside Operations or Air Traffic Control may issue instructions to stop work arising from non-compliance, e.g. unauthorised works, failure to abide by aerodrome safety requirements or due to operational reasons etc. Upon receiving stop work instruction, the Project Officer shall take immediate actions to clear all equipment and personnel from the work area. The Project Officer shall provide an update to Airside Operations as soon as the work area is cleared.

**Checklist for Project Officer
(Airfield)**

Appendix 1
to Annex A

Project Title: _____

Scope of Works: _____

This checklist is designed to assist the appointed Project Officer in complying with all the necessary requirements **before** the application for Airside Work Permit. Supporting documents (marked with an "*") are to be appended with the application. Alternatively, references to approved document can also be made to support the application for subsequent applications. For this, the reference and approval date are to be stated in the Remarks column.

<u>S/N</u>	<u>Description</u>	<u>Status (✓ if completed, else N.A.)</u>	<u>Remarks</u>
	<u>Airport Operational & Safety (AOS) Requirements</u>		
1	The Work Party has obtained the latest copy of the AOS requirements; has read and is able to comply with the requirements.	<input type="checkbox"/>	
	<u>Works on Security Gates, Fences or Related Facilities</u>		
2	For works on the inner perimeter fencing of the airport, the application* has been approved by E&D/CAG and AVSEC/CAG. (Refer to AOS, Section A)	<input type="checkbox"/>	
3	The erection of new security fence, door, gate or barrier has been completed and accepted by CAG and APD before works affecting the existing security fence, door, gate or barrier is allowed to commence. (Refer to AOS, Section A)	<input type="checkbox"/>	
4	AVSEC/CAG and APD have been consulted on works near or affecting airport security infrastructure. (Refer to AOS, Section A)	<input type="checkbox"/>	
	<u>Airport Fire Safety Requirements</u>		
5	The Work Party is able to comply with the airport fire safety requirements as stipulated in the CAG Fire Safety Manual and also the regulations and safety practices of the SCDF. (Refer to AOS, Section B)	<input type="checkbox"/>	
	<u>Hot Works</u>		
6	The Hot Work Permit* has been approved by AES/CAG. (Refer to AOS, Section B)	<input type="checkbox"/>	
	<u>Works requiring Isolation of Fire Alarm System</u>		
7	Isolation of Fire Alarm System* has been approved by AES/CAG. (Refer to AOS, Section B)	<input type="checkbox"/>	

Airport Safety Training

8 The Work Party's personnel (supervisory level) have attended the Airport Operational and Safety (AOS) briefing and test. (Refer to AOS, Section C)

Work Programme

9 The work proposal (e.g. Method Statement, design, demarcation layout, type of barricade used etc.) and detailed daily programme for the works have been approved by the Project Officer. (Refer to AOS, Section C)

10 For works affecting/impacting any aircraft manoeuvring areas, the Project Officer is satisfied that the Work Party's Standard Operating Procedures (SOPs) comply with CAG's requirements and procedures, as well as the MOAS. (Refer to AOS, Section C)

11 For works within another project's work boundary, the Project Officer has sought concurrence to co-exist and ensure that coordination between the two project teams has been established.

Please state the name of Project Officer whom you have liaised with.

12 For works affecting tenanted (e.g. parking lots, EPA) and/or operational spaces (e.g. offsite ESA, Evacuation Assembly Area, access route to critical installations), the Project Officer has coordinated with the respective stakeholders to co-exist and if necessary, alternative arrangements have been made to address the stakeholder's concerns.

Note: critical installations include, but are not limited to, AFLCC, GP building, LLZ building, MM hut, Fire Stations, VIP complex etc.

13 Facilities Management/CAG has been consulted and concurred with the works affecting the external façade of the terminal building.

14 For works within RSAF's operational areas (West of Runway 02L/20R or East of Runway 02R/20L), the RSAF has approved the work programme to be carried out. (Refer to AOS, Section C)

Works affecting Active Roadway or Pedestrian Foot Path

15 Prior to the commencement of works, the Work Party has submitted a detailed proposal on the plans to carry out the works, including all the necessary safety and traffic marshalling measures to the Project Officer for evaluation and approval. (Refer to AOS, Section C)

- 16 Airside Management/CAG has been consulted on any potential impact to safety and has concurred with the works on/affecting active roadway or pedestrian foot path.
- 17 Airside Ops/CAG has been consulted on any potential impact to operations and has concurred with the works on/affecting active roadway or pedestrian foot path.
- 18 The request for closure of roadway* has been approved by Airside Ops/CAG.
- Closure of Airside Facilities
- 19 The request for closure of aircraft stand(s)* has been approved by Airside Ops/CAG.
- Please state the reference number of AIP Supplement (if required).**
- 20 The request for closure of the aircraft manoeuvring area(s)* has been approved by Airside Ops/CAG and Changi Tower/ CAAS and the associated NOTAM(s)* issued.
- Please state the reference number of NOTAM/AIP Supplement.**
- 21 For work activities which coincide with runway closure period, arrangement has been made for the Work Party to report to Runway Entry/Exit Point (REP).
- Aerodrome Reporting
- 22 The Project Officer has read and understood the requirements listed in Changi Aerodrome Manual (CAM) Section 4.1 Aerodrome Reporting. Project Officer has consulted and obtained confirmation from Airside Ops on the requirement (current/impending/non-issuance) of AIP Supplement/AIP Amendment/AIC for the purpose of the works.
- Trial Hole Works
- 23 The application for permit to carry out trial hole works* has been approved. (Refer to AOS, Section C)
- Earthworks
- 24 The application for permit to carry out Earthworks* has been approved. (Refer to AOS, Section C)

Use of Mobile Machinery, Tall Construction
Machinery/Plant, Temporary Structures, Stockpile

25 The application for the deployment of mobile machineries, tall construction machineries/plant, temporary structures, stockpile* has been approved by CAAS Air Navigation Services (ANS) Policy & Planning Division. (Refer to AOS, Section D)

26 If there is a requirement to demobilise machinery for operational reasons to another area within the airside (designated as staging area), that staging area* has been approved by CAAS Air Navigation Services (ANS) Policy & Planning Division.

Works near Communications, Navigation and Landing and Surveillance Aids

27 CAAS ATE Division has been consulted and has concurred with the works to be carried out in the vicinity of ATE facilities (e.g. HF Stations & Antennae, Multilateration System Sensors (MLAT), Instrument Landing System) and its corresponding critical and/or sensitive areas. (Refer to AOS, Section F)

Hazard Identification and Risk Assessment

28 The approved Risk Assessment* has been submitted. (Refer to AOS, Section J)

Works affecting Other Airport Systems

29 Relevant stakeholders have been consulted and have concurred with the works. (E.g. Airfield lighting, CCTV, iFerret, drainage, fire hydrant, ADGS, fuel system & M&E systems etc.)

Please state the type of system and name of officer whom you have liaised with.

Declaration

This is to certify that all the above checklist requirements, where applicable, are fulfilled. All approved documents are duly appended in this submission.

Submitted by (Project Officer):

Name: _____

Designation: _____

Organisation: _____

Signature: _____

Date: _____

**Airside Work Permit
(Airfield)**

Appendix 2
to Annex A

Project Title: _____

Layout of Work Area (to attach drawings if the space below is insufficient)

Please provide layout(s) showing location of work area, staging area (if any) and demarcation, with relevant dimensions. Any distance to operational areas (e.g. runway, ILS critical and sensitive areas, taxiway, taxilane, aircraft stand, roadway etc.) should be clearly indicated. For works within closed aircraft movement areas, the layout is to depict the placement of closure markers and associated markings, with relevant dimensions to adjacent operational areas.

Scope of Works: _____

Period of Works:
(Requested) _____ to _____

Date (DD/MM/YY) &
Time (HH:MM)

Date (DD/MM/YY) &
Time (HH:MM)

Daily Working Hours: _____ to _____
(HH:MM) (HH:MM)

Remarks: _____

I/We hereby apply for a permit to commence airside works as stipulated in the above location and undertake to comply with the requirements as in the appended checklist.

In the event that works are completed before the authorised end date, I/We will update Airside Development & Baggage (Airside Works team) at the earliest opportunity.

Requested by (Consultant/Contractor):

Supported by (Project Officer):

Name: _____
Designation: _____
Organisation: _____
Contact No. (H/P): _____
Signature/Date: _____

Name: _____
Designation: _____
Division: _____
Contact No. (H/P): _____
Signature/Date: _____

Approved by Airside Development & Baggage (Airside Works team)/CAG:

(For Official Use only)

Permit Number: AWP / /

Name: _____
Designation: _____

Signature: _____
Date: _____

Remarks: _____

Supplementary Document for Appendix 1 to Annex A

"How-to-complete-AWP" Guide

This guide was designed as a reference material to assist Project Officer in completing the AWP (Airfield) Checklist (i.e. Appendix 1 to Annex A). This guide does not replace any of the manuals that document the requirements (e.g. AOS).

<u>S/N</u>	<u>Description</u>	<u>Status (✓ if completed, else N.A.)</u>	<u>Actions to be taken by Project Officer</u>
<u>Airport Operational & Safety (AOS) Requirements</u>			
1	The Work Party has obtained the latest copy of the AOS requirements; has read and is able to comply with the requirements.	<input type="checkbox"/>	This is a mandatory requirement. It must be a 'tick'; 'NA' is not acceptable.
<u>Works on Security Gates, Fences or Related Facilities</u>			
2	For works on the inner perimeter fencing of the airport, the application* has been approved by E&D/CAG and AVSEC/CAG. (Refer to AOS, Section A)	<input type="checkbox"/>	'Tick' if: E&D and Avsec have approved works on inner perimeter fencing ----- 'NA' if: otherwise
3	The erection of new security fence, door, gate or barrier has been completed and accepted by CAG and APD before works affecting the existing security fence, door, gate or barrier is allowed to commence. (Refer to AOS, Section A)	<input type="checkbox"/>	'Tick' if: CAG and APD has accepted the completed erection of new security fence, door, gate or barrier, before works affecting existing security fence, door, gate or barrier commenced ----- 'NA' if: otherwise
4	AVSEC/CAG and APD have been consulted on works near or affecting airport security infrastructure. (Refer to AOS, Section A)	<input type="checkbox"/>	'Tick' if: Avsec and APD have been consulted for 1. works on or affecting ANY airport security infrastructure; or 2. works to be carried out within 3m of airport fences; or 3. works to be carried out between inner and outer fence ----- 'NA' if: otherwise
<u>Airport Fire Safety Requirements</u>			
5	The Work Party is able to comply with the airport fire safety requirements as stipulated in the CAG Fire Safety Manual and also the regulations and safety practices of the SCDF. (Refer to AOS, Section B)	<input type="checkbox"/>	This is a mandatory requirement. It must be a 'tick'; 'NA' is not acceptable.
<u>Hot Works</u>			
6	The Hot Work Permit* has been approved by AES/CAG. (Refer to AOS, Section B)	<input type="checkbox"/>	'Tick' if: AES has approved hot works ----- 'NA' if: otherwise

Works requiring Isolation of Fire Alarm System

- 7 Isolation of Fire Alarm System* has been approved by AES/CAG. (Refer to AOS, Section B) 'Tick' if: AES has approved isolation of fire alarm system
'NA' if: otherwise
-

Airport Safety Training

- 8 The Work Party's personnel (supervisory level) have attended the Airport Operational and Safety (AOS) briefing and test. (Refer to AOS, Section C) This is a **mandatory** requirement. It must be a 'tick'; 'NA' is not acceptable.

Work Programme

- 9 The work proposal (e.g. Method Statement, design, demarcation layout, type of barricade used etc.) and detailed daily programme for the works have been approved by the Project Officer. (Refer to AOS, Section C) This is a **mandatory** requirement. It must be a 'tick'; 'NA' is not acceptable.

- 10 For works affecting/impacting any aircraft manoeuvring areas, the Project Officer is satisfied that the Work Party's Standard Operating Procedures (SOPs) comply with CAG's requirements and procedures, as well as the MOAS. (Refer to AOS, Section C) 'Tick' if: satisfied with Work Party's SOPs when works are carried out (regardless of the aircraft manoeuvring areas being operational or closed) on
1. runway or within the runway strip;
or
2. taxiway or within the taxiway strip;
or
3. military taxiway or within the military taxiway strip
-

- 'NA' if: no works on the runway/runway strip/taxiway/taxiway strip/military taxiway/ military taxiway strip

- 11 For works within another project's work boundary, the Project Officer has sought concurrence to co-exist and ensure that coordination between the two project teams has been established. 'Tick' if:
1. co-existing has been agreed; and
2. coordination has been established for the proposed works to be carried out within another project team's work boundary (i.e. at the same location)
-

Please state the name of Project Officer whom you have liaised with.

- 'NA' if: there is no on-going work at the same location

- 12 For works affecting tenanted (e.g. parking lots, EPA) and/or operational spaces (e.g. offsite ESA, Evacuation Assembly Area, access route to critical installations), the Project Officer has coordinated with the respective stakeholders to co-exist and if necessary, alternative arrangements have been 'Tick' if: relevant stakeholders have been consulted for
1. works affecting any tenanted and/or operational spaces
2. alternative arrangements (as advised) have been made
-

made to address the stakeholder's concerns.

'NA' if: otherwise

Note: critical installations include, but are not limited to, AFLCC, GP building, LLZ building, MM hut, Fire Stations, VIP complex etc.

- 13 Facilities Management/CAG has been consulted and concurred with the works affecting the external façade of the terminal building.

'Tick' if: FM has concurred the works to be carried out on the external façade of the terminal building, including bus bays, parking lots, roadways (except underpass)

'NA' if: work area does not encroach into the abovementioned

- 14 For works within RSAF's operational areas (West of Runway 02L/20R or East of Runway 02R/20L), the RSAF has approved the work programme to be carried out. (Refer to AOS, Section C)

'Tick' if: RSAF has approved works to be carried out within RSAF's operational areas (West of Runway 02L/20R or East of Runway 02R/20L)

'NA' if: otherwise

Works Affecting Active Roadway or Pedestrian Foot Path

- 15 Prior to the commencement of works, the Work Party has submitted a detailed proposal on the plans to carry out the works, including all the necessary safety and traffic marshalling measures to the Project Officer for evaluation and approval. (Refer to AOS, Section C)

'Tick' if: Project Officer has evaluated and approved on safety and traffic marshalling measures for works affecting active roadway and/or pedestrian foot path

'NA' if: works does not affect active roadway and/or pedestrian foot path

- 16 Airside Management/CAG has been consulted on any potential impact to safety and has concurred with the works on/affecting active roadway or pedestrian foot path.

'Tick' if: Airside Management has concurred the works on/affecting active roadway and/or pedestrian foot path

'NA' if: works does not affect active roadway and/or pedestrian foot path

- 17 Airside Ops/CAG has been consulted on any potential impact to operations and has concurred with the works on/affecting active roadway or pedestrian foot path.

'Tick' if: Airside Ops has concurred the works on/affecting active roadway

'NA' if: works does not affect active roadway

- 18 The request for closure of roadway* has been approved by Airside Ops/CAG.

'Tick' if: Airside Ops has approved closure of roadway

'NA' if: works does not affect active roadway

Closure of Airside Facilities

19 The request for closure of aircraft stand(s)* has been approved by Airside Ops/CAG.

Please state the reference number of AIP Supplement (if required).

'Tick' if: Airside Ops has approved
1. any request for closure of aircraft stand(s) for works to be carried out; or
2. layover at aircraft stand(s) has been assigned

'NA' if: closure of aircraft stand is not required

20 The request for closure of aircraft manoeuvring area(s)* has been approved by Airside Ops/CAG and Changi Tower/ CAAS and the associated NOTAM(s)* issued.

Please state the reference number of NOTAM/AIP Supplement.

'Tick' if: works requiring closure of taxiway(s), taxilane(s) and/or runway has been approved

'NA' if: closure of taxiway, taxilane and/or runway is not required

21 For work activities which coincide with runway closure period, arrangement has been made for the Work Party to report to Runway Entry/Exit Point (REP).

'Tick' if: work party is reporting to Runway Entry/Exit Point (REP)

'NA' if: otherwise

Aerodrome Reporting

22 The Project Officer has read and understood the requirements listed in Changi Aerodrome Manual (CAM) Section 4.1 Aerodrome Reporting. Project Officer has consulted and obtained confirmation from Airside Ops on the requirement (current/impending/non-issuance) of AIP Supplement/AIP Amendment/AIC for the purpose of the works.

This is a **mandatory** requirement. It must be a 'tick'; 'NA' is not acceptable.

Trial Hole Works

23 The application for permit to carry out trial hole works* has been approved. (Refer to AOS, Section C)

'Tick' if: works requiring trial hole works has been approved

'NA' if: otherwise

Earthworks

24 The application for permit to carry out earthworks* has been approved. (Refer to AOS, Section C)

'Tick' if: works requiring earthworks has been approved

'NA' if: otherwise

Use of Mobile Machinery, Tall Construction Machinery/Plant, Temporary Structures, Stockpile

25 The application for the deployment of mobile machineries, tall construction machineries/plant, temporary structures, stockpile* has been approved by CAAS Air Navigation Services (ANS) Policy & Planning Division. (Refer to AOS, Section D)

'Tick' if: CAAS ANSPP has approved for works requiring the deployment of mobile machineries, tall construction machineries/plant, temporary structures, stockpile

'NA' if: otherwise

26 If there is a requirement to demobilise machinery for operational reasons to another area within the airside (designated as staging area), that staging area* has been approved by CAAS Air Navigation Services (ANS) Policy & Planning Division

'Tick' if: CAAS ANSPP has approved the staging area

'NA' if: otherwise

Works near Communications, Navigation, Landing and Surveillance Aids

27 CAAS ATE Division has been consulted and has concurred with the works to be carried out in the vicinity of ATE facilities (e.g. HF Stations & Antennae, Multilateration System Sensors (MLAT), Instrument Landing System) and its corresponding critical and/or sensitive areas. (Refer to AOS, Section F)

'Tick' if: CAAS ATE has been consulted for

1. works to be carried out within the GP/LLZ critical and sensitive areas; or
2. works to be carried out within 15m radius of all ANS equipment

'NA' if: works are carried out outside the above stated areas

Hazard Identification and Risk Assessment

28 The approved Risk Assessment* has been submitted. (Refer to AOS, Section J)

This is a **mandatory** requirement. It must be a 'tick'; 'NA' is not acceptable.

Works affecting Other Airport Systems

29 Relevant stakeholders have been consulted and have concurred with the works. (E.g. Airfield lighting, CCTV, iFerret, drainage, fire hydrant, ADGS, fuel system & M&E systems etc.)

'Tick' if: system owner and user of the affected system have concurred the works

'NA' if: no other airport system is affected

Please state the type of system and name of officer whom you have liaised with.

1 Airside Work Permit (Baggage)

- 1.1 The Project Officer is required to engage Airside Development & Baggage on the scope of works to be carried out in the Baggage Handling Area (BHA) **at least 1 month** prior to the targeted commencement of works.
- 1.2 The purpose is to consult Airside Development & Baggage to assess the impact on operations and to confirm the need for closure of affected baggage facilities e.g. arrival belts, transfer input lines and/or race track, if any.
- 1.3 The Project Officer is required to provide information about the proposed works, including but not limited to the following:
 - a. Purpose/nature of work;
 - b. Proposed work schedule indicating the dates and working hours;
 - c. Schematic superimposed on maps/architectural drawings/layout plans of current infrastructure indicating clearly the areas of works and the boundary of each work site (including areas for staging machinery and equipment, assembly area, site office etc.);
 - d. Phasing plan for various stages of works;
 - e. Approved risk assessment(s) with the relevant signatures by CAG Project Officer highlighting relevant risks and corresponding mitigating measures for safety hazards and potential disruptions to baggage handling operations;
 - f. Impact on vehicular traffic flow, pedestrian walkway, CCTV coverage, FIDS etc.; and
 - g. Contact details of key personnel from the project management team, inclusive of consultant/main contractor.

- 1.4 **For closure of baggage handling facilities**, submit the closure request form (see Appendix 1) at least 10 working days before the targeted date of closure to the following personnel:

Name/ Designation	Email Address
Joseph Lim/ Assistant Manager, Airside Airside Development & Baggage	joseph.lim@changiairport.com
Mokhtar Hussian/ Senior Support Officer, Airside Development & Baggage	mokhtar.hussian@changiairport.com

- 1.5 If any baggage conveyor or facilities are affected by the proposed works, alternate loading line if available, shall be proposed by the Project Officer to support the request for closure.
- 1.6 Arising from limited storage spaces for baggage handling equipment low headroom and high volume of vehicular traffic within the BHA, a risk assessment for the proposed works must address the corresponding impact on safety and efficiency of baggage handling operations.
- 1.7 For temporary storage / staging of materials and equipment in the BHA (including transfer baggage handling facilities), approval of space must be granted by Airside Development & Baggage. The approved staging area must be properly cordoned. In addition, contact details of the Project Officer and contractor’s key personnel shall be clearly printed and displayed on the cordon. The request for closure of baggage handling facilities/roadway must be submitted for approval.
- 1.8 Note that closure of any driveway in the BHA should be avoided. If temporary closure of any driveway is necessary, please seek approval from Airside Development & Baggage for closure and respective road diversion plan.
- 1.9 The Project Officer shall use the “Checklist for Project Officer (Baggage)” (see Appendix 2) to guide him/ her in verifying that all the necessary requirements have been fulfilled before submitting the application to Airside Development & Baggage for approval.
- 1.10 The Project Officer shall prepare the “Airside Work Permit (Baggage)” form (see Appendix 3) and submit together with the supporting documents to Airside Development & Baggage **at least 10 working**

days prior to the targeted date of commencement of works. This request should be sent via email to the following personnel.

Name/ Designation	Email Address
Rolando Delfin/ Senior Manager, Airside Development & Baggage	rolando.delfin@changiairport.com
Joseph Lim/ Assistant Manager, Airside Development & Baggage	joseph.lim@changiairport.com

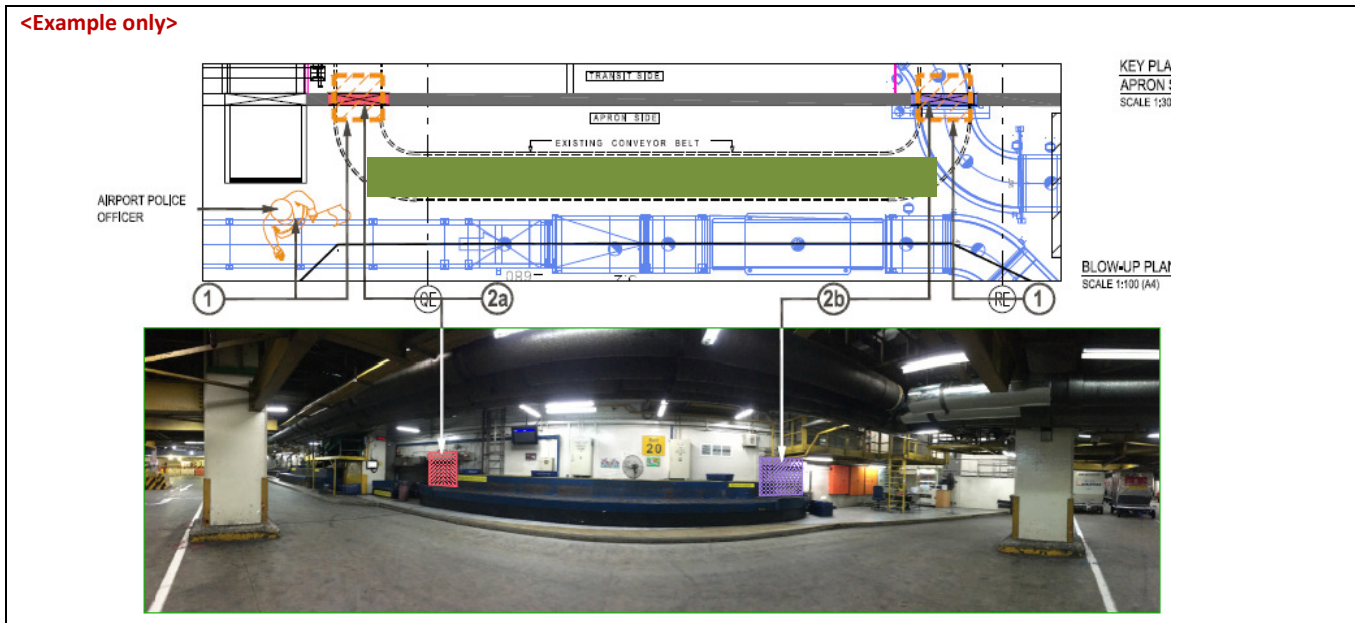
- 1.11 Work activities shall not commence until approval has been granted by Airside Development & Baggage. Upon approval, the Project Officer must ensure that works are conducted within the approved duration and authorised daily working hours at the approved work site(s).
- 1.12 **A fresh application** for Airside Work Permit (Baggage) is required whenever there are any changes to the supporting document(s)/permit(s) and/or conditions based on which an earlier Airside Work Permit has been granted.
- 1.13 For extension of permit, a fresh application will be needed. However, if there are no changes to the earlier supporting document(s), references to these supporting document(s) can be stated in the application without having to attach a copy.
- 1.14 In the event of early completion of works before the approved end date, the Project Officer is encouraged to update Airside Development & Baggage accordingly.

2 General Instructions

- 2.1 Any incidents in the airside must be reported to Airside Ops - Airside Management Centre (AMC) at 6541-2275 immediately. The Project Officer or appointed representative shall respond immediately to the site to take immediate control of the area and to prevent exacerbating safety hazard or further disruption to operations.
- 2.2 During the course of works, Airside Operations and/ or Airside Development & Baggage may issue instructions to stop work arising from non-compliance, e.g. unauthorised works, failure to abide by aerodrome safety requirements, etc. Upon receiving stop work instruction, the Project Officer shall take immediate actions to clear all equipment and personnel from the work area. The Project Officer shall provide an update to Airside Ops as soon as the work area is cleared

**Closure Request
(Baggage Handling Facilities)**

Project Title: _____



Site	Location of Work	Facility to be closed	Date (from/to)	Time (from/to)	Reasons for Closure	Remarks ¹
	T1 BHA	Belt 20	1/12/2015 to 10/12/2015	0000h to 0600h	Removal of baggage claim belt for upgrading works	Full closure

Requested by (Consultant/Contractor):

Name: _____
 Designation: _____
 Company/Section: _____
 Contact No. (H/P): _____
 Signature/Date: _____

Supported by (Project Officer):

Name: _____
 Designation: _____
 Division/Section: _____
 Contact No. (H/P): _____
 Signature/Date: _____

Approved by (Airside Development & Baggage/CAG):

Name: _____
 Designation: _____
 Remarks: _____

(For Official Use only)

Signature: _____
 Date: _____

¹

Please indicate alternate facilities available for use and whether the request is for daily or full closure.

CONDITIONS FOR APPROVAL OF CLOSURES

- 1 All requests for scheduled closures of **baggage handling facilities** must be submitted to Airside Development & Baggage at least **10 working days** before the intended day of work. Any urgent request must be submitted at least **24 hours** in advance and will be evaluated on a case by case basis.
- 2 All approved closures are subjected to changes and/or cancellation real time.
- 3 All works shall be completed within the approved duration of the facility closure. Request for extension to the closure period must be submitted at least **2 hours** before the expiry of the approved closure timing.
- 4 The Work Party is to call the Airside Management Centre (AMC Baggage Coordinator) at 6541 2255; 30 minutes prior to commencement of work and immediately after completion of work.

<p><u>For AMC Use Only</u></p> <p>The Closure approval has been updated as follows:</p> <ol style="list-style-type: none">1 In GMS*2 In Log Book* <p>*Please tick where applicable</p>
<p>Shift: _____ Name: _____ Sign: _____ Date: _____</p>
<p>Remarks:</p>

Checklist for Project Officer (Baggage)
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Project Title: _____

This checklist is designed to assist the appointed Project Officer in complying with all the necessary requirements **before** the application for Airside Work Permit. Supporting documents (marked with an "**") are to be appended with the application. Alternatively, references to approved document can also be made to support the application for subsequent applications. For this, the reference and approval date are to be stated in the remarks column.

S/N	Description	Status (✓ if completed, else N.A.)	Remarks
<u>Airport Operational & Safety (AOS) Requirements</u>			
1	The Work Party has obtained the latest copy of the AOS requirements; has read and is able to comply with the requirements.	<input type="checkbox"/>	
<u>Airport Security Clearance</u>			
2	The Work Party has applied for the seasonal airport pass for all personnel who are intended to be deployed for work in the Airport. (Refer to AOS, Section A)	<input type="checkbox"/>	
<u>CAG Renovation Work Permit</u>			
3	The Renovation Work Permit* for the scope and period of works has been approved.	<input type="checkbox"/>	
<u>Airport Fire Safety Requirements</u>			
4	The Work Party is able to comply with the airport fire safety requirements as stipulated in the CAG Fire Safety Manual and also the regulations and safety practices of the SCDF. (Refer to AOS, Section B)	<input type="checkbox"/>	
<u>Hot Works</u>			
5	The Hot Work Permit* has been approved by AES/CAG. (Refer to AOS, Section B)	<input type="checkbox"/>	
<u>Works requiring Isolation of Fire Alarm System</u>			
6	Isolation of Fire Alarm System* has been approved by AES/CAG. (Refer to AOS, Section B)	<input type="checkbox"/>	

Airport Safety Training

- 7 The Work Party's personnel (at all levels) have attended the Airside Safety Induction Briefing. (Refer to AOS, Section C)
- 8 The Work Party's personnel (supervisory level) have attended the Airport Operational and Safety (AOS) briefing and test. (Refer to AOS, Section C)

Work Programme

- 9 The detailed proposal (e.g. Method of Statement, demarcation layout etc.) on the plans to carry out the works has been approved by the Project Officer. (Refer to AOS, Section C)
- 10 Airside Development & Baggage/CAG and E&D/CAG have been consulted and have concurred with the works affecting Baggage Handling System, Hold Baggage Screening System, Inter-terminal Transfer Baggage System, equipment staging areas, etc.
- 11 Alternative arrangements (if necessary) have been made to address tenanted and/or operational spaces affected by the works.
- 12 For works within another project's work boundary, the Project Officer has sought concurrence to co-exist and ensure that coordination between the two project teams has been established.

Please state the name of Project Officer whom you liaise with.

Works Affecting Active Roadway or Pedestrian Foot Path

- 13 Prior to the commencement of works, the Work Party has submitted a detailed proposal on the plans to carry out the works, including all the necessary safety and traffic marshalling measures to the Project Officer for evaluation and approval. (Refer to AOS, Section C)
- 14 E&D/CAG has been consulted and has concurred with the works.
- 15 Airside Management/CAG has been consulted on any potential impact to safety and has concurred with the works on/affecting active roadway or pedestrian foot path.
- 16 Airside Operations/CAG has been consulted on any potential impact to operations and has concurred with the works on/affecting active roadway or pedestrian foot path.
- 17 The request for closure of roadway* (within Baggage Handling Area) has been approved by Airside Development & Baggage/CAG.

Closure of Baggage Handling Facilities

- 18 Request for closure* of relevant baggage facilities e.g. arrival baggage belt, departure race track, transfer input line, odd-size input/output lines, staging area, roadway etc. has been approved by Airside Development & Baggage/CAG.

Trial Hole Works

- 19 The application for permit to carry out earthworks* has been approved. (Refer to AOS, Section C)

Excavation/Piling Works

- 20 The application for permit to carry out earthworks* has been approved. (Refer to AOS, Section C)

Airside Driving Regulations

- 21 All drivers are bound by the rules as specified in the Airside Driving Theory Handbook. All vehicles and drivers are to comply with the stipulated regulations before they are allowed to operate in the airside vicinity. (Refer to AOS, Section H)

Hazard Identification and Risk Assessment

- 22 The approved Risk Assessment* with the relevant signature has been submitted. (Refer to AOS, Section J)

Note: RA is to be acknowledged by Project Officer

Works affecting Other Airport Systems

- 23 For works affecting other systems such as FIDS (including BMIDS), CCTV, BIDS, M&E installations, etc. in the BHA, relevant stakeholders have been consulted and have concurred with the works.

Declaration

This is to certify that all the above checklist requirements are fulfilled. All approved documents are duly appended in this submission.

Submitted by (Project Officer):

Name: _____
Designation: _____
Organisation: _____

Signature: _____
Date: _____

**Airside Work Permit
(Baggage)**

Project Title: _____

Project Consultant (if any): _____

Description of Project: _____

Main Contractor: _____ Organisation/Division In-charge: _____

Layout of Work Area (to attach drawings if the space below is insufficient)

Please provide the site layout view and clearly mark out the work area. Please include dimensions of the work area and distances to nearby facilities/ roadway.

Scope of Works: _____

Period of Works: _____ to _____
Date (DD/MM/YY) Date (DD/MM/YY)

Daily Working Hours: _____ to _____
(HH:MM) (HH:MM)

Remarks: _____

I/We hereby apply for a permit to commence works in the baggage handling area as stipulated in the above location and undertake to comply with the requirements as specified in the appended checklist.

In the event that works are completed before the authorised end date, I/We will update Airside Ops (AMC Baggage Coordinator) at the earliest opportunity.

Requested by

(Consultant/Contractor):

Supported by (Project Officer):

Name: _____

Name: _____

Designation: _____

Designation: _____

Organisation: _____

Division: _____

Contact No. (H/P): _____

Contact No. (H/P): _____

Signature/Date: _____

Signature/Date: _____

Approved by (Airside
Development & Baggage/CAG):

(For Official Use only)

Permit Number: AWP / / _____

Name: _____

Signature: _____

Designation: _____

Date: _____

Remarks: _____

1 CONDITIONS FOR CLOSURE OF AIRSIDE FACILITIES

- 1.1 To request for closure of aircraft manoeuvring areas (taxiway/taxilane), refer to the latest version of Airside Works Procedure Manual (AWPM) for Changi Airport. Submit the “Closure Programme” form in AWPM to Airside Operations (hereafter to be referred to as “Airside Ops”) for approval **at least 14 working days** before the targeted date of closure.
- 1.2 For closure of aircraft stand, passenger loading bridge/ fixed gangway, gate hold room and airside roadway, submit the request via the “Gate Closure Request” portal <https://www.cagswift.com/GCR/>, **at least 10 working days** before the targeted date of closure. Submission of less than the required lead time via the portal will be evaluated on case by case basis.
- 1.3 For external agencies requiring once off closure to aircraft stand/passenger loading bridge/fixed gangway/gate hold room/airside roadway, the work party to engage the relevant airport stakeholder to submit the application on their behalf.
- 1.4 Submission of closure request using the ‘Closure Request Form (Aircraft Stand)’ [see Appendix 1] is only permitted when the online portal is down or upon advised by Airside Ops.
- 1.5 For queries regarding request for closure of airside facilities, please contact the following personnel:

Airside Facility	Name/ Designation	Email Address
Aircraft Stands or Taxiway / Taxilane	Norshidah Arshad/ Assistant Manager	norshidah.arshad@changiairport.com
	Muhd Ardi Ismaon/ Principal Support Officer	muhd.ardi.ismaon@changiairport.com
Airside Roadway	Govindarajan Sundram/ Principal Support Officer	govindarajan.sundram@changiairport.com
	Saminathan Thanam/ Senior Associate	saminathan.thanam@changiairport.com

- 1.6 The Project Officer shall inform Airside Ops in the event that the schedule for approved closure needs to be adjusted. Except for the unforeseen circumstances, cancellation of approved closure must be informed at least 24 hours in advance. No extension of working hours is allowed unless prior approval has been granted by Airside Ops.

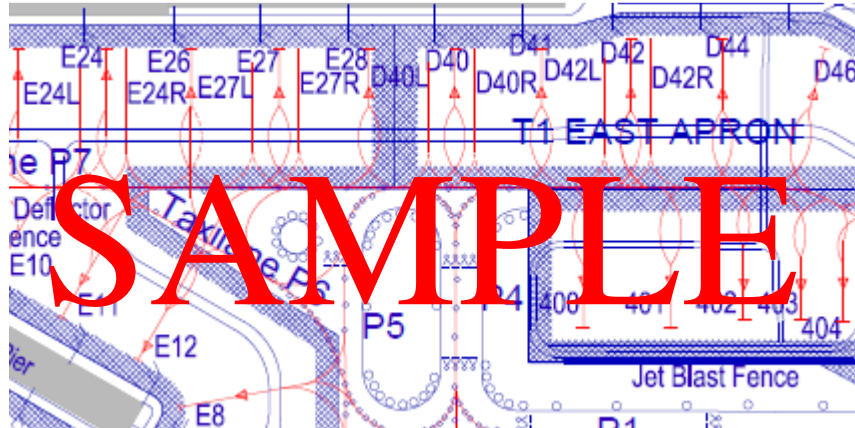
Closure Request Form


(Aircraft Stand/Gate/Busgate/Airside roadway)

Approval No.: _____

Project Title: _____

<example only>



Site	Location of Work	Facilities ¹ to be closed	Date (from/to)	Time (LT) (from/to)	Reasons for Closure	Remarks ²
	Aircraft Stand E28	Aircraft Stand	01 Jun 2021 To 30 Sep 2021	1000hrs – 1700hrs	PLB Upgrading	FULL CLOSURE

Requested by (Consultant/Contractor):

Name: _____
 Designation: _____
 Company/Section: _____
 Contact No. (H/P): _____

Signature/Date: _____

Supported by (Project Officer):

Name: _____
 Designation: _____
 Division/Section: _____
 Contact No. (H/P): _____

Signature/Date: _____

Approved by (Airside Ops/CAG):

(For Official Use only)

Name: _____
 Designation: _____

Signature: _____
 Date: _____

Remarks: _____

- For aircraft stand, passenger loading bridge/fixed gangway and gate hold room to indicate the exact location of works and areas affected
- To indicate if closure is full closure or daily closure

CONDITIONS FOR APPROVAL OF CLOSURES

- 1 The request for the closures of airside facilities must conform to the requirements and specifications of work stipulated in the Airport Operational and Safety Requirements.
- 2 All approved closures are subjected to changes and/or cancellation real time. ACC will inform Project Officer at minus 2hrs for any cancellation of works.
- 3 All works shall be completed within the approved duration of the facility closure. Request for extension to the closure period must be submitted at least **2 hours** before the expiry of the approved closure timing.
- 4 The Work Party is to call the respective Sections; 30 minutes prior to commencement of work and immediately after completion of work.

Area of Works	Section	Contact No.
Aircraft stand, passenger loading bridge/fixed gangway and gate hold room	Airside Control Centre (ACC)	6541 2257 / 6541 2151
Airside Roadway	Airside Management Centre (AMC)	6451 2275

- 5 To provide the names and contact numbers of a recovery team which can respond to the emergencies or breakdown within 30 minutes.

<p><u>For ACC Use Only</u></p> <p>The Closure approval has been updated as follows:</p> <p style="margin-left: 40px;">1 In GMS*</p> <p style="margin-left: 40px;">2 In record of Closure of Airside Facilities*</p> <p>*Please tick where applicable</p>
<p>Shift: _____ Name: _____ Sign: _____ Date: _____</p>
<p>Remarks:</p>

1 SPECIFIC CONDITIONS FOR AIRCRAFT STAND AND PASSENGER LOADING BRIDGE (PLB)

- 1.1 The Project Officer shall check the general condition of the aircraft stand and PLB before starting work and report immediately to ACC of any irregularities.
- 1.2 For works to be carried out on the PLB (inclusive of the fixed gangway), the Project Officer shall ensure that an obstruction marker board (see Appendix 1) is placed at the end of the aircraft stand along the centre line to indicate the closure of the particular aircraft stand.
- 1.3 The work area is to be demarcated with approved barriers. All workers and activities shall be strictly confined within this designated work areas.
- 1.4 Steady red obstruction lights shall be placed on top of the marker boards and turned “ON” during the hours of darkness.
- 1.5 Warning signage (see Appendix 2) shall be placed on the affected PLB control console and Aircraft Docking Guidance System (ADGS) operator panel to prevent accidental usage of the systems.
- 1.6 Obstruction tapes with red and white stripes shall be used to cordon off the emergency stairs of the fixed gangway and the service stairs of the PLB to prevent inadvertent access.
- 1.7 When works are being carried out on the PLB or fixed gangway, the Project Officer shall assign one Supervisor to be present at site to oversee the work activities and the workers. It is the responsibility of the Supervisor to ensure that the PLB is fully retracted to the designated parking position before vacating it.
- 1.8 Conditions for Maintenance Work on PLB

The following conditions shall be observed when maintenance work is carried out for PLBs:

- a) Only Class A (PLB operations) Airfield Driving Permit (ADP) holders are allowed to operate the PLB;
- b) The ADP holders are required to draw the PLB keys from the Inspection team leader at Airside Management Centre (AMC) and returned the key immediately after completion of work;
- c) Safety marshallers shall be present to assist the PLB operator;
- d) The PLB must not be left unattended when it is closed for maintenance.

1.9 Conditions for Maintenance Work on PLB at Multiple Aircraft Receiving Stands (MARS)

MARS is a type of aircraft stand that allows the flexibility of parking two narrow-body aircraft at each stand. For the closure of MARS, the Project Officer must specifically indicate whether the closure is affecting the main, left or right stand(s) of the MARS.

For example:

- a) If F52L is closed for works
 - F52R can still be used for active parking
 - The signs stating PLB under maintenance and ADGS under maintenance to be hung on the ADGS consoles of F52L and operator panel of PLB (outer arm)
 - Marker boards to be placed at beginning of lead-in of F52L
- b) If F52R is closed for works
 - F52L can still be used for active parking
 - The signs stating PLB under maintenance and ADGS under maintenance to be hung on the ADGS consoles of F52R and operator panel of PLB (inner arm)
 - Marker boards to be placed at beginning of lead-in of F52R

c) If F52 is closed for works

- Main, Left and Right stands cannot be used
- The signs to be hung on all ADGS and PLB consoles and chains put up at the 3 stands
- Marker boards to be placed at the beginning of lead-in lines of all 3 stands

OBSTRUCTION MARKINGS

The work area shall be clearly defined by obstruction markers in the day and shall be lighted during the hours of darkness.



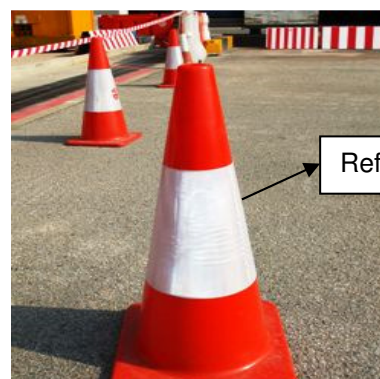
1) Marker board with obstruction lights



2) Water-filled plastic barrier



3) Reflector



4) Traffic Cone with Reflective Strip



5) Yellow Flashing Light



6) Metallic Barrier

CLOSURE SIGN

Closure sign on PLB Control Panel





APPLICATION FOR PERMIT TO CARRY OUT WORKS ON INNER FENCING OF SINGAPORE CHANGI AIRPORT

WORK PARTY:
PROJECT TITLE:
LOCATION OF WORKS: (To attached plans of affected areas)
REMARKS:
WORK DURATION:
I/We hereby apply for a permit to commence inner fencing works as stipulated in the above location and undertake to comply with the requirements as specified in the checklist and guidelines attached.
<u>APPLICANT:</u>
NAME OF PROJECT DIRECTOR/MANAGER: _____ SIGNATURE: _____ DATE: _____

APPROVED

NOT APPROVED

Supported by (CAG Engineering & Development Cluster)	Approval by CAG Aviation Security Unit:
Civil/PIDS Officer: _____	CAG AVSEC OFFICER: _____
SIGNATURE AND DATE: _____	SIGNATURE AND DATE: _____

	 <p>CHANGI airport group</p> <p>Changi Airport Group (Singapore) Pte Ltd</p> <p>SELETAR AIRPORT</p> <p>AIRSIDE SAFETY NOTICE</p>	<p>Date:</p> <p>23 Aug 2018</p> <p>No. 10 / 2018</p>
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REQUIREMENTS FOR CONSTRUCTION WORKS IN AIRSIDE

1. INTRODUCTION

- 1.1 Construction works in the airside may impact the availability and safe usage of airside facilities for aircraft operations, as well as ramp, baggage and cargo handling operations.
- 1.2 No construction activities shall take place in the airside unless approval has been granted by CAG Seletar Airport Operations.

2. DETAILS

- 2.1 All construction works carried out in the airside of Seletar Airport shall comply with the requirements stipulated in this Airside Safety Notice.
 - Refer to Annex A for requirements associated with the application for Airport Work Permit for construction works in the airside.
 - Refer to Annex B for terms and conditions for works in the airside

3. GENERAL

- 3.1 A copy of this notice will be incorporated in the next edition of the AOS.
- 3.2 Contents in this notice supersedes Airside Safety Notice Reference 13/2017 dated 30 Nov 2017.
- 3.3 Please bring the contents of this notice to all personnel concerned.

Jeffrey Tay
Manager (Operations)
Seletar Airport

This Airside Notice contains information on Operational and/or Safety matter.

Recipients must ensure that this Airside Notice is copied and made known to all staff members who need to take appropriate action or who may have an interest in the information (including any in-house or contracted organization and relevant outside contractors). To make changes to the recipient list, email Jessie or Sahudin at jessie.tan@changaiairport.com or sahudin.basiran@changaiairport.com.

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Annex A

Requirements For Airport Work Permit (AWP) Applications

1 Construction Works in the Airside

- 1.1 Construction works in the airside refer to works that result in physical changes to infrastructure in the airside, e.g. new buildings, roads, pavements, fixtures, systems, etc.
- 1.2 Construction works within the operating aerodrome may impact the use of airside facilities for aircraft operations and ground handling operation. The requirements stipulated in this document apply to construction works, including preparatory activities, in the airside.
- 1.3 The following areas and systems are defined as airside facilities:
- a. Aircraft Maneuvering Areas – runways, taxiways, taxilanes and adjacent areas to these, as well as operational systems (e.g. Airfield lighting RIDS, etc.);
 - b. Apron – aircraft stands (including equipment staging area), equipment parking area, flood lights, CCTV cameras, etc.;
 - c. Buildings – LLZ Building, GP building etc;
 - d. Roadways – Perimeter Road, primary and secondary roadways, etc.
- 1.4 The Project Officer who is managing construction works in the airside shall ensure that the Contractor carrying out the works are properly briefed and informed of the requirements stipulated in the latest edition of the Airport Operational and Safety Requirements (AOS).

2 Conditions for Approval of Works – Airport Work Permit

- 2.1 The Project Officer is required to engage Seletar Airport Operations Safety Team (SAO Safety Team) on the scope of works to be carried out in the airside **at least 1 month** prior to the targeted commencement of works. Please contact the following personnel for information on Airport Work Permit:

Name / Designation	Email Address
Jeffrey Tay / Manager	Jeffrey.Tay@changiairport.com
Jess Law / Manager	jess.law@changiairport.com

Annex A

- 2.2 The purpose is to assess the impact on operations and to confirm the need for closure of affected airside facilities, if any. The Project Officer is required to engage Seletar Airport Operations (SAO) on the requirements. Please contact the following personnel for information on required closures and coordination:

Name / Designation	Email Address
Glenn Phuah / Manager	Glenn.Phuah@changiairport.com
Sahudin Bin Basiran / Senior Associate	Sahudin.Basiran@changiairport.com

- 2.3 The Project Officer is required to complete and submit the Airport Work Permit Application Form together with the following documents:
1. Risk Assessments
 - a. Need to have considered aviations safety risks
 - b. Comply with the Risk Assessment format & matrix in CAG Safety Management System Manual
 2. Method of Statement
 3. Project Timeline
 4. List of Workers
 5. Other relevant permits e.g. Hot Work Permit, Confined Space Permit, Work at Height Permit, Lifting Permit, etc.
 6. SAO-0016-FORM-001 Airside Work Permit Form
 7. Actual Work Location on the Aerodrome Map
 8. SAO-0016-Form-002 AWP (Airside) Checklist for Project Officer
 9. SAO-0016-Form-003 (Escorts Identification & Safety Communication)

Please contact Jess Law, Seletar Airport Operations Safety Team (SAO Safety Team) at jess.law@changiairport.com for the latest forms pertaining to the Airport Work Permit applications

- 2.4 For Construction works in the Airside, the Project Officer shall use the “AWP (Airside) Checklist for Project Officer” to guide him/ her in verifying that all the necessary requirements have been fulfilled before submitting completed checklist together with the completed Airport Work Permit Application Form to the Safety Team for approval.
- 2.5 The Project Officer shall ensure that the contractor:
- Identifies suitable escorts of (1) supervisory level and, (2) holds a Seasonal Seletar Airport Pass, (3) English Speaking
 - Arrange with Safety Team for the escorts to attend escort briefing
 - Surrenders all seasonal airport passes to Seletar Airside Operations (SAO) for compliance to daily withdrawal and collection of airport passes regime

Note: Only escorts that have attended the escort briefing are allowed to draw the airport passes from SAO daily prior to commencement of work and return the airport passes at the end of each workday.

Annex A

- 2.5 Construction activities shall not commence until approval has been granted by SAO Safety Team. Upon approval, the Project Officer must ensure that works are conducted within the approved duration and authorised daily working hours at the approved work site(s).
- 2.6 The Project Officer shall ensure that the approved work sites are well maintained and hazards are kept under control. As such, the conduct of housekeeping activities such as grass cutting, FOD and waste disposal, cleaning of temporary site office and/or access roads, etc., does not require approval by SAO Safety Team.
- 2.7 A fresh application for any construction works is required whenever there are any changes to the supporting document(s)/permit(s) and/or condition(s) based on which an earlier Airport Work Permit has been approved.

4 General Instructions

- 4.1 Any hazards and incidents in the airside must be reported to SAO at 6481 5077 immediately. The Project Officer or appointed representative shall respond immediately to the site to take immediate control of the area and to prevent exacerbating safety hazard or further disruption to operations.
- 4.2 During the course of works, SAO may issue instructions to stop work arising from non-compliance, e.g. unauthorised works, failure to abide by aerodrome safety requirements, etc. Upon receiving stop work instruction, the Project Officer shall take immediate actions to clear all equipment and personnel from the work area. The Project Officer shall provide an update to SAO as soon as the work area is cleared.

TERMS AND CONDITIONS FOR WORKS IN THE AIRSIDE

1 INTRODUCTION

1.1 This Notice contains the conditions for construction, upgrading and repair works to be carried out in the airside and for any works that have or will potentially impact the use of airside facilities for aircraft operations. The airside organisation with the intention to carry out works or which are engaging external contractors to do works at the aircraft stands and roadways (hereafter to be referred to as “airside”) shall comply with the conditions prescribed in this Notice.

1.2 The airside organisation (hereafter referred to as “Project Officer”) shall ensure that the personnel engaged to carry out the works are properly briefed and is informed of the requirements to comply with the conditions as stated further in this Notice and all relevant rules published in Airside Notices.

2 CONDITIONS FOR WORKS

2.1 Approval For Works At The Airside And / Or Shutdown Of Airside Facilities

2.1.1 The Project Officer shall seek the approval of CAG(S) Seletar Airport Operations (hereafter to be referred to as “SAO) for the type of works to be carried out in the airside at least 2 weeks prior to the commencement of works. The purpose would be to seek approval to perform works in the airside and/or shut down airside facilities, including any part of the roadways and/or access points for vehicles and drivers into the airside. This request should be sent via email to sahudin.basiran@changiairport.com and glenn.phuah@changiairport.com that includes the following:

- (i) Purpose/ nature of work;
- (ii) Detailed work schedule that indicates working hours with date and time of commencement and completion of works);

- (iii) Details on closure of airside facilities and/or roadways including detailed drawings and a schematic to indicate the intended area for closure;
- (iv) An endorsed Risk Assessment that includes descriptions of potential disruptions and hazards to aircraft operations, ground handling, WSH and airside operations with the necessary mitigating actions.
- (v) Coordinator's Name and contact details who will be responsible for liaising with SAO;

- 2.1.2 Work shall not commence until approval have been received from SAO.
- 2.1.3 Upon Approval, the coordinator assigned by the Project Officer shall inform SAO via telephone at 64815077 daily prior to the commencement of works. At the end of each day, the assigned coordinator shall report the progress back to the same office.
- 2.1.4 All daily works shall be completed within the approved duration. No extension of closure period is allowed unless prior approval had been granted by CAG(S) SAO. Requests for consideration for extension of works must be submitted **at least one hour before** the end of the previously approved closure timing up to a maximum of 3 hours.
- 2.1.5 Project Officers shall resubmit the "Request for Closure of Apron Facilities" forms (refer to annex B-1) at least 24 hours prior, if extensions as mentioned in 2.1.4 are to exceed 3hours.
- 2.1.6 It is the responsibility of the Project Officer to inform SAO of any cancellation to the approved works or closure of airside facilities. A new "Request for the Closure of Apron Facilities" must be submitted if there are any deviations to the earlier request.

2.2 Closure of Aircraft Stand or Gate Hold Room (GHR)

- 2.2.1 Should closure of the aircraft parking stand or GHR be necessary to facilitate the intended work, the Project Officer must submit the "Request for Closure of Apron Facilities" form (Please refer to Annex B-1) to SAO at least 7 working days prior to the commencement of works.

2.2.2 For works carried out in the airside involving any part of the movement area (Apron, Parking Stand, Runway and Taxiways, the Project Officer shall ensure that an obstruction marker board is placed along the work area. The specifications of the marker board is as follows:

- (i) Height: 0.5 metres
- (ii) Length: 3.0 metres;
- (iii) Width: 1.0 metres;
- (iv) Marked with alternate red and white or orange and white stripes
(in accordance to ICAO Annex 14 SARPs 7.4.7)
- (v) Steady red obstruction lights shall be placed on top of the
- (vi) Marker boards and turned on during the hours of darkness.
(in accordance to ICAO Annex 14, 6.3)

2.2.3 When works are being carried out in the airside, the Project Officer shall ensure that at least one Supervisor is present at the work area at all times to have oversight on the activities and the workers. The Supervisor shall ensure that the work area is clear of FOD prior to vacating the work area.

2.3 Airfield Driving Permit (ADP)

2.3.1 All drivers operating any vehicle in the airside shall possess a valid Seletar Airport Airfield Driving Permit (ADP) and comply with the Civil Aviation Authority of Singapore (Seletar Airport) By-Laws 2009, Rules and Regulations Handbook for Airside Drivers and/or Driving into Maneuvering Area & Standard Phraseology (Seletar Airport). Drivers are not permitted to enter the runway nor taxiways at all times unless they possess a Seletar Airport Category 1 ADP.

2.4 Airfield Vehicle Permit (AVP)

2.4.1 Vehicles operating in the airside shall possess a valid Seletar Airport Airfield Vehicle Permit (AVP) and shall comply with the Civil Aviation Authority of Singapore (Seletar Airport) By-Laws 2009 and it's Second Schedule on Requirements for a Vehicle Operating within Airside. Vehicles are not permitted to enter the runway nor taxiways unless they are certified with a Category 1 AVP.

- 2.4.2 Vehicles shall be sufficiently insured for operating in Seletar Airport Airside.
- 2.4.3 Vehicles, equipment and machinery used for the approved work shall be parked within the work site.
- 2.4.4 The Project Officer shall apply for approval from the Civil Aviation of Singapore (CAAS) Air Navigation Planning and Policy Division (CAAS ANSPP) if tall hoisting equipment and other tall equipment are required for the intended work.
- 2.4.5 In the event of a breakdown or malfunction to the equipment, the contractor must be able to provide a recovery team to salvage the vehicle or equipment within 30 minutes.

2.5 Temporary Entry Permit (TEP) For Vehicles

- 2.5.1 Any vehicle intending to enter the airside on an ad-hoc basis to set down personnel, deliver heavy equipment, construction material, goods or for other approved purposes may apply for a TEP issued by CAG(S) SAO. TEP applications can be submitted to CAG(S) SAO during office hours.
- 2.5.2 Such vehicles shall be sufficiently insured for operation in the Seletar Airside.
- 2.5.3 Vehicles with a TEP will only be allowed to operate in the airside for up to a maximum of 60 days within the calendar year. Under no circumstances will extensions be granted.
- 2.5.4 All TEP vehicles when operating in the airside must display an approved type of checkered flag and a flashing yellow light at the highest point of the vehicle.
- 2.5.5 The vehicle shall be accompanied by a holder of valid ADP who shall act as the steersman if the driver is not an ADP holder.

- 2.5.6 In the event of a breakdown or any incident, the contractor must be able to provide a recovery team to attend to the vehicle or equipment within 30 minutes.

2.6 Roadway Closure

- 2.6.1 Where the closure of a roadway is approved by SAO, the Project Officer shall provide road marshalls at the two ends of the closed lane with 'GO / STOP' signs to regulate the traffic.
- 2.6.2 When a roadway is to be closed for more than 3 days, the Project Officer shall provide traffic lights to regulate the traffic.

Placing of any work material including items such as water hoses, pipes etc across roadways are not permitted as this would impede the movement of vehicles and ground support equipment.

2.7 Signage/Obstruction Markings

- 2.7.1 The work area shall be clearly defined by approved type of obstruction markers in the day and shall be lighted during the hours of darkness with steady red obstruction lights.
- 2.7.2 For roadways, blinker lights shall be placed at every 2-metres interval on the diverted roadway. Water-filled plastic barriers are preferred for placement at edge of diverted roadway or works adjacent to an active roadway.
- 2.7.3 When an aircraft stand is closed, an approved type obstruction marker board shall be placed along the aircraft stand apron boundary line.
- 2.7.4 Pictures showing samples of Signage and Obstruction Markings are at Annex B-2 and B-3 respectively.
- 2.7.5 The Project Officer, granted with approval to carry out the work, is to ensure that all obstruction markings/signage are secured and maintained in an orderly manner at the designated location. The Project Officer shall

immediately rectify any markings/signage that have been damaged, misplaced or toppled. The markings/signage is to be removed promptly on completion of the work.

- 2.7.6 The Project Officer shall inspect the obstruction sign, e.g. marker boards, blinker lights, barricades etc. in the aircraft movement areas every 2 hours outside office hours. The Project Officer is to provide details of his inspection team to SAO. The inspection team is to respond immediately when aircraft operations are affected by the above signs or as alerted by SAO. The Project Officer is to ensure that the inspection team carries out the inspections every 2 hours.

2.8 Underground Services

- 2.8.1 Damage to any services/facility that may impede the safety of airside operations especially aircraft operations shall be reported immediately to SAO. The coordinator shall respond immediately to the site to take immediate actions in order to prevent further damage and disruptions.

2.9 Personnel/Equipment

- 2.9.1 The Project Officer shall abide by the Ministry of Manpower (MOM) "Employment of Foreign Workers Act, Chapter 91A" to conduct random checks on the workers under his contract to ensure validity of original work permits and verification of workers with the name list and file a copy of the check result for future reference.
- 2.9.2 The Project Officer shall ensure that the contractor submits a declaration every month to confirm that they have checked and confirmed that there is no infringement of Employment of Foreign Workers Act.
- 2.9.3 The Project Officer shall ensure that all personnel working in the airside have a valid airport pass issued by the Airport Police, and Visitor Pass holders are escorted at all times.
- 2.9.4 The Project Officer shall ensure that all seasonal airport passes are surrendered to SAO after the completion of each work day. He may

collect the passes at the start of the next working day for workers who are present.

2.9.5 The Project Officer shall ensure that all visitor passes are returned after the completion of each work day.

2.9.6 The Project Officer shall ensure that the personnel engaged to carry out the work do not bring in or consume food and drinks in the airside. The workers' attire shall not resemble the state security personnel uniform. The workers shall dress presentably at all times.

2.9.7 The Project Officer is required to deploy a Supervisor to be present where lifting machines / cranes / maintenance platforms are in use and ensure the display of a valid safety inspection certificate on the lifting equipment. Such equipment shall be operated only by holders of the respective competency certificates. The Project Officer is to ensure that his personnel and subcontractors comply with the rules and regulations issued by MOM and CAAS from time to time. Regular checks for height limits of such equipment are conducted regularly. The Clearance Letter obtained from CAAS ANSPP shall be displayed at the worksite at all times.

2.10 Safety and Cleanliness

2.10.1 The Project Officer shall ensure that personnel carrying out the work in the airside:

- (i) Use approved type of safety vest;
- (ii) Do not smoke at all times (offenders will be brought to court);
- (iii) Do not eat at all times (compounded offence of \$170/-);
- (iv) Take precaution not to spill or drop any materials in transit. Any spillage or fallen materials must be removed immediately;
- (v) Remove all debris from the airside work area after completion of works daily;
- (vi) Remove all tools, equipment and machinery when not in use, from the work area;

- (vii) Maintain all temporary markings and obstruction markings in working condition; and
- (viii) Maintain temporary streetlights at no less than 20 lux level.

2.11 Security

2.11.1 The Project Officer shall ensure that the organization comply with Airport Police (APD) requirements with regards to structures adjacent to the security fencing or gates.

2.11.2 The Project Officer is to take necessary measure to ensure no stray animals enter the airside through any access / gates approved to facilitate the works in the airside.

2.12 Wildlife Management and Control

- (i) Contractors shall take appropriate measures to avoid attracting birds, dogs, cats and other wildlife to the airport. In addition, Contractors shall conduct regular checks to ensure that their workers adhere to these measures.
- (ii) No person shall consume any food or beverage in the airside. No person shall feed any bird or animal within the airside
- (iii) Contractors shall avoid damaging turf in the course of their activities as ponding could lead to the growth of insects and other invertebrates which in turn attract birds.
- (iv) Contractors shall minimise the presence of stockpiles or poles or wires and other such items which could act as perches for birds at worksites.
- (v) Contractors shall ensure that there are no gaps or holes in the hoardings, drain gratings, security grilles, gates and fences that could permit dogs, cats and other stray animals to enter the airfield.
- (vi) Contractors shall be required report any wildlife hazards and attractants (eg flocks of birds, presence of non-avian wildlife species, such as cats and dogs, presence of bird nests and fruit bearing trees) found within their worksites to CAG Seletar Airport Operations immediately.

2.13 Additional Conditions

- 2.13.1 The Project Officer shall ensure that all personnel comply with any directions, verbal or otherwise given by the SAO Officers.
- 2.13.2 The Project Officer & all staff must comply with CAAS (Seletar Airport) By-laws 2009 at all times.
- 2.13.3 During the course of works, SAO can issue instructions to stop work if there are any deviations from the requirements set in this document despite a previous approval. The site coordinator is required to take immediate measures to rectify all irregularities and report to SAO upon completion.
- 2.13.4 The Project Officer shall report all incidents/accidents in the airside to SAO immediately.

3 CONTACT NUMBER OF CAG (S) SELETAR AIRSIDE OPERATIONS UNIT

Duty phone: 6481 5077 / 9753 3361

Fax: 64831754

- 4 Please bring the content of this notice to all your staff and contractors concerned.

Seletar Airport Operation
Seletar Airport
Fax: 6483 1754

REQUEST FOR CLOSURE OF APRON FACILITIES

Details of closure:

S/N	LOCATION OF WORK	FACILITIES TO BE CLOSED/SHUTDOWN (Please specify clearly the sub-system affected e.g gate hold room, aircraft stand, floodlight)	DATE	TIME FROM/TO	NATURE OF WORK

WORK REQUESTED BY (Contractor Name)	WORK APPROVED BY (CAG(s) EDG)	ABOVE CLOSURE IS APPROVED / NOT APPROVED* (Seletar Airport Operations)
Name: Designation: Contact No: Date: Signature:	Name: Designation: Contact No: Date: Signature:	Name: Designation: Contact No: Date: Signature:

Remarks / Comments:

CONDITION FOR APPROVAL OF CLOSURES

1. The request for the closure of airside facilities must conform to the general conditions of work spelt out in the “TERMS AND CONDITIONS FOR WORKS IN THE AIRSIDE”.
2. The person requesting the closure (name as in the request form) shall ensure that their personnel comply with the Civil Aviation of Singapore (Seletar Airport) By-Law 2009.
3. Except for urgent request for closures to facilitate repair works, all requests for schedule closure of the airside facilities must be submitted to CAG(s) SAO in the prescribed form at least 7 days before the intended day of work.
4. Seletar Airport Operations (SAO) must be informed of any cancellation to the approved bookings at least 1 day in advance, except for unforeseen circumstances.
5. All approved closure are subject to changes and / or cancellation in real time.
6. To call SAO at 6481 5077 / 9753 3361 30 minutes prior to commencement of work and immediately after completion of work.
7. To provide the names and contact number of a recovery team (if applicable) which can respond to the emergencies or breakdown within half an hour.

<p><u>FOR SAO USE ONLY</u></p> <p>The closure approval had been updated as follows:</p> <ol style="list-style-type: none">1. In Watch Log2. Aircraft Stand Planning Sheet / BMS <p>(Please tick where applicable)</p> <p>Shift: _____ Name: _____ Initial: _____ Date: _____</p>
--

SIGNAGE

Proper signage must be placed at appropriate locations to guide and warn all drivers and other airport users of the work.



Traffic Signal Ahead



Two Way Traffic



Pass either Side



Height limit



Pass this Side



Stop



Turn Right Ahead



Left Turn Ahead



Deviation sign

OBSTRUCTION MARKINGS

The work area shall be clearly defined by obstruction markers in the day and shall be lighted during the hours of darkness.



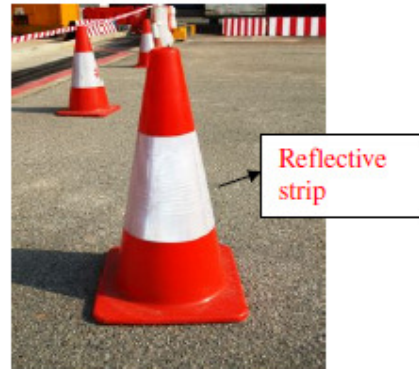
1) Marker board with obstruction lights



2) Water-filled plastic barrier



3) Reflector



4) Traffic Cone With Reflective Strip



5) Oscillating Light



6) Metallic Barrier

Attachment A19

Workplace Safety and Health (WSH) Requirements for Contractors

S/N	WSH Requirements
1	<p>Workplace Safety and Health Act The contractor/ supplier/ installer/ erector including its subcontractor shall comply with the Workplace Safety and Health Act and any subsequent amendments thereto, its regulations and any other subsidiary legislation in force for the time being (collectively “WSHA”) and shall take so far as is reasonably practicable, such measures to ensure the safety, health and welfare of any and all persons (including members of public) at the workplace. They in doing so shall bear all costs and expenses consequent thereon or incidental thereto.</p>
2	<p>Kick off meeting. All contractors /vendors/suppliers shall meet up with Changi Airport Group (“CAG”) project officers before work commencement so as to be fully aware of the task requirements, as well as the safety requirements.</p>
3	<p>In-house safety rules and other requirements The contractor/ supplier/ installer/ erector including its subcontractor shall follow and comply with in-house safety rules and any additional safety related requirements (by CAG, other authorities or as stated in the risk assessment) where applicable. Failure to comply may result in work suspension without compensation.</p>
4	<p>Safety Personnel The contractor/ supplier/ installer/ erector including its subcontractor shall ensure that its competent safety personnel carry out safety and health supervision on work activities they are engaged to perform. The safety personnel shall be at on-site at all times and be in charge of the safety and health of their workers, as well as any and all persons (including members of public), throughout the duration of its work activities.</p>
5	<p>Training The contractor/ supplier/ installer/ erector including its subcontractor shall ensure that all their workers are competently trained to conduct work activities carried out by them, as required under the WSHA, before allowing such persons to perform any work.</p>
6	<p>Maintenance of equipment’s, machinery and tools The contractor/ supplier/ installer/ erector including its subcontractor shall ensure that all machinery, equipment, and tools brought to the workplace are properly maintained and are safe for use.</p>
7	<p>Risk Assessment, Safe Work Procedures and Method Statements The contractor/ supplier/ installer/ erector including its subcontractor shall be responsible, at its own costs, for carrying out risk assessment for all work activities which may pose safety and health risks to any person who may be affected by these work activities. They shall also ensure that all works are carried out in accordance with safe work procedures and method statements. In this regard, the contractor/ supplier/ installer/ erector including its subcontractor shall furnish the said risk assessments to CAG before commencing work, and provide the said procedures and method statements to CAG upon request.</p>
8	<p>Personal Protective Equipment (PPE) The contractor/ supplier/ installer/ erector including its subcontractor shall provide its personnel with appropriate and adequate PPE, as well as train and ensure that the PPE are correctly used while at work.</p>

In-House Safety Rules for Contractors

1. Submit approved risk assessments to CAG for both routine and non-routine tasks prior to work commencement.
2. Obtain all necessary permits (e.g., hot work permit, work at heights permit, lifting permit, and/ or confined space entry permit) prior to work commencement.
3. Submit copies of Safety Data Sheets (SDS) for all hazardous materials such chemicals being brought on-site to CAG prior to work commencement, ensure that SDS of chemicals are available at work area at all times and ensure that only competent persons are permitted to handle chemicals.
4. Ensure PPE are in good condition, wear or use appropriate PPE during work whenever necessary.
5. Provide or ensure sufficient fire extinguishers are available at work areas.
6. Eat, drink, rest and smoke only in designated areas.
7. Obtain prior written approval from CAG before any area is used for storage of work materials or equipment, and not to store amounts above what is specifically approved by CAG.
8. Perform housekeeping in work areas during and after work and dispose of waste materials at designated waste disposal areas and into appropriate receptacles.
9. Ensure that only competent, trained and authorised persons are allowed to operate, repair or alter any equipment or machinery.
10. Do not enter any area other than assigned work area, unless authorised to do so.
11. Do not throw any objects from height.
12. Do not engage in horseplay while working.
13. Do not obstruct fire exits or evacuation routes, as well as fire-fighting and other emergency response equipment such as fire hydrants, fire extinguisher and water hose reels.
14. Seek medical attention if not feeling well.
15. Immediately report any unsafe act or unsafe condition observed to your supervisor or management for corrective action.
16. Immediately report any work-related occurrences and emergencies to the CAG project officer(s) in charge and Airport Emergency Service (AES) Changi (Contact No: 6541 2525), AES Seletar (Contact No: 481 3377) or AES Fire Safety (Contact No: 6541 2535).
17. For any incidents/ accidents, the work party is required to submit a detailed incident / accident investigation report to their respective CAG representative within 3 working days.

Acknowledgement

On behalf of my organisation, I hereby acknowledge that I have read and understood, and will comply with the above requirements and rules.

Signature : _____
Name (as per NRIC/ Passport) : _____
Designation : _____
NRIC/ FIN/ Passport Number : _____
Organisation : _____
Date : _____

**CHECKLIST FOR UNDERGROUND SEWERAGE & SANITARY SERVICE
DIVERSION WORKS IN CHANGI/SELETAR AIRPORT**

Objective: To carry out a thorough & complete sewerage & sanitary service protection and/or diversion works at the subject site

Item: **Check boxes when Completed**
(or indicate as “Nil” if not applicable or required)

-
- | | |
|--|--------------------------|
| 1. Engage qualified registered & competent contractor of the relevant trade & work head. | <input type="checkbox"/> |
| 2. Engage Registered Plumber (LP) registered under Singapore Plumbing Society (SPS), who holds a valid water service plumber licence. | <input type="checkbox"/> |
| 3. Consult CAG E&D Utilities Team and/or PUB(WRN)/NEA to obtain approval or written clearance on proposed works in vicinity of existing sewerage system (within influence zone or 25m corridor for sewers & 36m for DTSS) | <input type="checkbox"/> |
| 4. Have a copy and follow latest Guideline & comply with PUB’s Advisory Notes on:
- “General Requirements for the Protection of Sewers”
- “Prevention of Damage to the Sewerage System” | <input type="checkbox"/> |
| 5. Engage PUB registered CCTV contractor to carry out and submit pre & post construction CCTV inspections & reports (with CCTV video (DVD)) for any existing/new sewer within or adjacent to development lot to PUB(WRN) | <input type="checkbox"/> |
| 6. Engage Registered Surveyor to verify/set out/peg & prepare endorsed setting out plan for sewer alignment, pile positions, TERS alignment etc on site. | <input type="checkbox"/> |
| 7. Ensure no utilities services (cable, gas pipe, water pipe etc) shall over-cross/undercross within 1m from outer edge of sewers unless written clearance from CAG E&D Utilities Team and/or PUB(WRN) is obtained before any works at site. | <input type="checkbox"/> |
-

-
- 8. If reuse of existing sanitary/sewerage system is required – a thorough investigation by qualified person to ensure adequate capacity & good condition and an endorsed inspection report is to be submitted to CAG E&D Utilities Team and/or PUB(WRN)

 - 9. Coordinate with CAG E&D Utilities Team and/or PUB(WRN) for sewerage diversion services to be carried out by PUB(WRN)

 - 10. To notify or report to FMC, CAG E&D Utilities Team, CAG Project Officer and/or PUB-24 Hour Call Centre hotline at **1800-2846600** immediately should any sewerage service be damaged, exposed or any sealing work is required.
-

Applicant

Approval by CAG

Name of PD/Mgr: _____

Name of Project Officer: _____

Signature/Date: _____

Signature/Date: _____

Supported by Consultant:

Name of QP: _____

Signature/Date: _____

CHECKLIST FOR UNDERGROUND WATER SERVICE DIVERSION WORKS IN CHANGI/SELETAR AIRPORT

Objective: To carry out a thorough & complete water service protection and/or diversion works at the subject site

Item: **Check boxes when Completed**

(Or indicate as “Nil” if not applicable or required)

-
- | | |
|--|--------------------------|
| 1. Engage qualified registered & competent contractor of the relevant trade & work head. | <input type="checkbox"/> |
| 2. Engage Registered Plumber (LP) registered under Singapore Plumbing Society (SPS), who holds a valid water service plumber licence. | <input type="checkbox"/> |
| 3. Consult CAG E&D Utilities Team and/or PUB(WSN) on proposed works & detected existing water mains for advice on whether diversion is required. | <input type="checkbox"/> |
| 4. Coordinate with PUB(WSN) for water mains diversion services to be carried out by PUB(WSN). | <input type="checkbox"/> |
| 5. Coordinate with CAG E&D Utilities Team and/or PUB(WSN) to obtain clearance/advice prior to commencement of diversion or connection works to existing water mains. | <input type="checkbox"/> |
| 6. Engage Registered Surveyor to verify/set out/peg & prepare endorsed setting out plan for water mains alignment, pile positions, Earth Retaining and Stabilizing Structure (ERSS) alignment etc on site. | <input type="checkbox"/> |
| 7. Ensure no utilities services (cable, gas pipe, sewerage pipe etc) shall over-cross/be erected over any or a drain undercross a water main within a clearance of 0.5m(dia<300mm) & 1m(dia>500mm). | <input type="checkbox"/> |
-

-
- 9. Ensure no manhole is allowed on top of any water main and there is a horizontal clearance of 1m between the manhole and water main.
 - 10. To notify or report to FMC, CAG E&D Utilities Team, CAG Project Officer and/or PUB's 24-hour Call Centre at Tel No. **1800-2846600(24 Hrs)** immediately in the event of damage to any existing water main or water quality & supply pressure issues or possible contamination of the water supply downstream.
 - 11. To notify FMC and Terminal Mechanical Team before shutting and reopening valve.
 - 12. To request for CCTV inspection.
 - 13. To request for water quality test.
 - 14. To coordinate with respective Terminal Mechanical Team to check the condition of water before discharging into tank.
-

Applicant

Approval by CAG

Name of PD/Mgr: _____ Name of Project Officer: _____

Signature/Date: _____ Signature/Date: _____

Supported by Consultant:

Name of QP: _____

Signature/Date: _____

CHECKLIST FOR UNDERGROUND GAS SUPPLY SERVICE DIVERSION WORKS IN CHANGI/SELETAR AIRPORT

Objective: To carry out a thorough & complete gas service protection and/or diversion works at the subject site

Item: **Check boxes when Completed**
(or indicate as "Nil" if not applicable or required)

-
1. Engage qualified registered & competent contractor of the relevant trade & work head.
 2. Engage EMA Licensed Gas Service Worker (LGSW) who holds a valid gas service worker licence.
 3. Consult CAG Project Officer and/or PowerGas or CityGas on proposed works & detected existing gas mains for advice on whether diversion is required.
 4. Coordinate with PowerGas or CityGas through email at gasenquiry@singaporepower.com.sg for gas diversion services to be carried out by PowerGas or CityGas.
 5. Engage Registered Surveyor to verify/set out/peg & prepare endorsed setting out plan for gas mains alignment, pile positions, TERS alignment etc on site.
 6. Contractor(s) to attend safety briefings by PowerGas or CityGas on precautions & mitigation measures to prevent damage to existing gas lines during excavation & earthworks.
 7. All excavation works in the vicinity of identified gas transmission lines to notify and be supervised by PowerGas or CityGas.
 8. To notify or report to CAG Project Officer and/or PowerGas or CityGas Customer Service Centre at Tel No. **1800-7521800** promptly if any existing gas pipe is damaged or gas leak pipe is detected.
-

Applicant

Approval by CAG

Name of PD/Mgr: _____ Name of Project officer: _____

Signature/Date: _____ Signature/Date: _____

Supported by Consultant:

Name of QP: _____

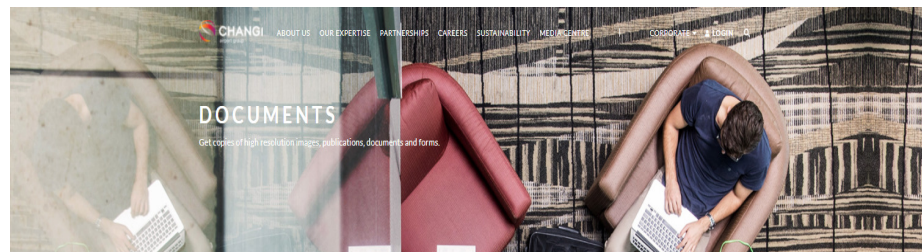
Signature/Date: _____

TERMS AND CONDITIONS OF WORKS IN LANDSIDE

1. Please refer to the Landside Roadway Manual for detailed requirements.

This can be found on CAG Website → Documents → Airside Management → Landside Roadway Manual:

<https://www.changiairport.com/corporate/e-services/documents.html>



Air Cargo	+
Airline	+
Airport Management	-
• Landside Roadway Manual PDF 2.62 MB	

2. All works on landside require a permit. CAG project officers are to apply for a permit on behalf of their contractors using the One Calendar portal

One Calendar: <https://onecalendar.changiairport.com>

Shared accounts have been provided for various divisions. If unsure, please email roadway.unit@changiairport.com

3. The height limit for roads in Changi Airport can be found in obtained from the respective CAG Project Officers.



CHECKLIST FOR WORK PARTY'S SAFETY REPRESENTATIVE CARRYING OUT DAILY INSPECTION IN CHANGI/SELETAR AIRPORT

Day	Night
-----	-------

Weather Condition:	Please state: _____
--------------------	---------------------

*please circle when was the inspection was conducted

Prior to the end of each day's work and / or daily before dusk, the Work Party's representative (eg: RTO) shall inspect his worksite in the vicinity of the aircraft movement areas or in assigned work areas to ensure that all mandatory items specified in AOS Manual are checked as followed (non-exhaustive listing):

No	Check Item	Checked OK	Checked Not OK	NA	Not Checked	Remarks
1	Work area adequately demarcated to prevent workers from straying out of work area or unauthorized access to site.					
2	No material storage adjacent to the security fencing or gates without prior approval of CAG and APD.					
3	Works to be carried out and / or material storage shall be kept at least 3m away from airport fences?					
4	No storage of flammable materials or other hazardous substances on site.					
5	Excavated trenches and pits are adequately barricaded to prevent personnel / vehicle from falling into such trenches / pits.					
6	Warning signs for road diversion, deep excavation, keep out zones are displayed.					
7	Unserviceability lights consisting of a 50-50 mix of types running on two different power sources are installed and functional. (Checks should be conducted just before dusk or at end of work shift)					
8	Marker boards are properly weighed down.					
9	Unserviceability markerboards of at least 0.5m in height, 3.0m length painted in 7 bands of alternate red and white vertical stripes, starting with and ending with red, are provided to serve as guidance to pilots, warning them of closed area.					

No	Check Item	Checked OK	Checked Not OK	NA	Not Checked	Remarks
10	Unserviceability lights placed across access/egress to the closed area at intervals not exceeding 3.0m.					
11	Lightings used to illuminate the work area are shielded and pointed downward to prevent glare to pilots.					
12	Existing lead-in line leading into the closed aircraft parking stand are blackened for closure more than 3 days continuously, but less than 3 months.					
13	Existing lead-in line leading into the closed aircraft parking stand are grinded or water-blasted off for closure more than 3 months.					
14	Booms of machineries / equipment are lowered when not in operation.					
15	Red obstacle lights are installed at highest point of equipment / machineries and turned on at dusk.					
16	Fences within the work area are checked to ensure no mean of access is created that may allow wildlife to enter the airside.					
17	All sites, vehicles, machineries or equipment are checked to ensure that no foreign object debris (FOD) would be generated.					
18	Work area does not encroach into aircraft operational areas.					
19	Valid hotwork / fire protection isolation permit for any works that may cause fire hazards.					
20	Availability of updated aerodrome maps. (dated: _____)					
21	Adequate and appropriate PPE are used at all time.					
22	Vector control measures are put in place to prevent mosquito breeding.					
23	Gas cylinders are properly secured and stored.					
24	Safe means of access and egress is provided and maintained on site.					
25	Scaffold if provided on site, is inspected by competent person a least once every 7 days and after adverse weather.					
26	Electrical cables are elevated at least 2.0m above ground and not in contact with any metallic surfaces.					
27	Unserviceable equipment and / or tools are tagged to prevent misuse.					
28	Electrical tools are checked by Licensed Electrical Worker (LEW) at least once a month.					
29	Lifting equipment and lifting gears possesses valid LG / LM Certificate.					

No	Check Item	Checked OK	Checked Not OK	NA	Not Checked	Remarks
30	CAAS height clearance approval letter displayed.					
31	Chequered flags displayed on highest point of TEP vehicle.					
32	Yellow flashing lights on vehicles are switched "ON" when in operation.					
33	No consumption of food and drink within the airside.					
34	No feeding of wildlife within airside.					

Others (Please specify items checked that are not included in the checklist):

Follow up actions taken:

Project / Site Location:

Date Inspected

Inspected By (Name, Company, Sign):

Checked By (Name, Company, Sign):



**CHECKLIST FOR CAG APPOINTED SAFETY REPRESENTATIVE / RTO CARRYING OUT
DAILY INSPECTION IN CHANGI/SELETAR AIRPORT**

Day	Night
-----	-------

Weather Condition:	Please state: _____
--------------------	------------------------

*please circle when was the inspection was conducted

Prior to the end of each day's work and / or daily before dusk, CAG appointed safety representative shall inspect the worksite in the vicinity of the aircraft movement areas or in assigned work areas to ensure that all mandatory items specified in AOS Manual are checked as followed (non-exhaustive listing):

No	Check Item	Checked OK	Checked Not OK	NA	Not Checked	Remarks
1	Work area adequately demarcated to prevent workers from straying out of work area or unauthorized access to site.					
2	No material storage adjacent to the security fencing or gates without prior approval of CAG and APD.					
3	Works to be carried out and / or material storage shall be kept at least 3m away from airport fences?					
4	No storage of flammable materials or other hazardous substances on site.					
5	Excavated trenches and pits are adequately barricaded to prevent personnel / vehicle from falling into such trenches / pits.					
6	Warning signs for road diversion, deep excavation, keep out zones are displayed.					
7	Unserviceability lights consisting of a 50-50 mix of types running on two different power sources are installed and functional. (Checks should be conducted just before dusk or at end of work shift)					
8	Marker boards are properly weighed down.					
9	Unserviceability markerboards of at least 0.5m in height, 3.0m length painted in 7 bands of alternate red and white vertical stripes, starting with and ending with red, are provided to serve as guidance to pilots, warning them of closed area.					

No	Check Item	Checked OK	Checked Not OK	NA	Not Checked	Remarks
10	Unserviceability lights placed across access/egress to the closed area at intervals not exceeding 3.0m.					
11	Lightings used to illuminate the work area are shielded and pointed downward to prevent glare to pilots.					
12	Existing lead-in line leading into the closed aircraft parking stand are blackened for closure more than 3 days continuously, but less than 3 months.					
13	Existing lead-in line leading into the closed aircraft parking stand are grinded or water-blasted off for closure more than 3 months.					
14	Booms of machineries / equipment are lowered when not in operation.					
15	Red obstacle lights are installed at highest point of equipment / machineries and turned on at dusk.					
16	Fences within the work area are checked to ensure no mean of access is created that may allow wildlife to enter the airside.					
17	All sites, vehicles, machineries or equipment are checked to ensure that no foreign object debris (FOD) would be generated.					
18	Work area does not encroach into aircraft operational areas.					
19	Valid hotwork / fire protection isolation permit for any works that may cause fire hazards.					
20	Availability of updated aerodrome maps. (Dated: _____)					
21	Adequate and appropriate PPE are used at all time.					
22	Vector control measures are put in place to prevent mosquito breeding.					
23	Gas cylinders are properly secured and stored.					
24	Safe means of access and egress is provided and maintained on site.					
25	Scaffold if provided on site, is inspected by competent person a least once every 7 days and after adverse weather.					
26	Electrical cables are elevated at least 2.0m above ground and not in contact with any metallic surfaces.					
27	Unserviceable equipment and / or tools are tagged to prevent misuse.					
28	Electrical tools are checked by Licensed Electrical Worker (LEW) at least once a month.					
29	Lifting equipment and lifting gears possesses valid LG / LM Certificate.					

No	Check Item	Checked OK	Checked Not OK	NA	Not Checked	Remarks
30	CAAS height clearance approval letter displayed.					
31	Chequered flags displayed on highest point of TEP vehicle.					
32	Yellow flashing lights on vehicles are switched "ON" when in operation.					
33	No consumption of food and drink within the airside.					
34	No feeding of wildlife within airside.					

Others (Please specify items checked that are not included in the checklist):

Follow up actions taken:

Project / Site Location:

Date Inspected

Inspected By (Name, Company, Sign):

Checked By (Name, Company, Sign):



HORTICULTURE OUTDOOR REQUIREMENTS

1 GENERAL

The Contractor shall avoid all existing trees and shrubs whenever possible. If works on Irrigation pipes, landscape Area and / or less than 2m from the tree collar, please submit photos of affected plants in relation to the surroundings.

2 REMOVAL OF PLANTS / CUTTING OF TREE ROOTS

The Contractor shall ensure that no shrubs / trees are to be removed from site and no tree roots are to be cut without prior approval from CAG Horticulture.

3 TRANSPLANTING OF PLANTS

Trees / shrubs identified to be salvaged shall be transplanted either to a different location on site or containerized and brought to CAG Horticulture nursery. The Contractor shall ensure that the plants are handled as per proper arboricultural / horticultural practices.

Plants to be transplanted shall be trenched and prepared as directed by CAG Horticulture. Plants shall be lightly pruned, have their rootball size determined and approved by CAG Horticulture, trenched to the required depth and filled with either sand or mulch. Plants shall be allowed to stabilize in the ground for the required period of time or as instructed by CAG Horticulture before being dug out and transplanted.

In transplanting, the rootball of transplanted plants shall be trimmed to remove damaged roots, be cleanly cut, and securely wrapped to prevent drying of roots and breakage of the rootball. Thereafter, it shall be containerized or planted in the ground as directed by CAG Horticulture. All necessary efforts and precautions shall be taken to ensure that the plants are not damaged during transplanting and replanting.

Plants to be re-planted, straightened or re-potted shall be trimmed or pruned as required by CAG. The plants shall thereafter be replanted on site as required and properly staked. Plants required to be transplanted shall be loaded and transported carefully to the receiving hole or container so that the rootball does not disintegrate.

The Contractor shall prepare the receiving planting hole or the container in advance so that the transplanted plant can be immediately planted after removal from the growing site. The plant shall be carefully planted using approved soil mixture and staked with proper stabilizing and firming of the planting area. The Contractor shall provide proper staking or bracing at his own expense whenever instructed by CAG Horticulture.

4 PROTECTION OF TREES ON SITE

Any trees that are to remain on site shall be within a protected area called the tree protection zone (TPZ). The radius of the zone is determined by measuring the diameter of the tree trunk (cm) at 1.5m above ground and multiplying it by 10. This radius should then be measured from the edge of the tree trunk in all directions, forming a circular protection area.

Once the TPZ is determined the Contractor must take the following measures: -

- a) Install fixed fencing (e.g. chain-mesh) to protect the TPZ.
- b) No entry of people, vehicles or machinery into the TPZ.
- c) No stockpiling of building materials, debris or soil within the TPZ.
- d) No storage / bringing in of fuel, oil dumps or chemicals within the TPZ.
- e) No altering of soil levels within the allocated TPZ.
- f) No open trenching within the TPZ.
- g) Pruning only allowed on dead, broken or overgrown branches.
- h) A tree shall not be used to attach temporary service wires, nails, screws or any other fixing device or as a winch support or anchorage.
- i) Take care to ensure no damage to tree trunks, roots and structural branches.
- j) Provide supplementary watering to all trees through dry periods during and after the construction process.



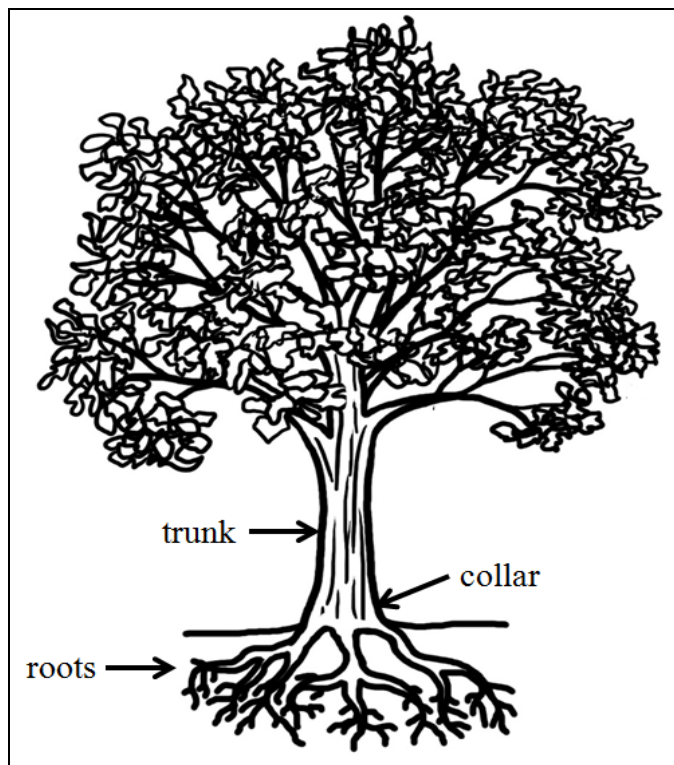
Example of TPZ Preparation



Example of TPZ Preparation

If the TPZ is less than 3m, the Contractor shall also provide a 3m radius clearance from the trees (measured from the tree trunk) to the works.

If excavation works are done, they must be kept at least 2m away from the tree collar (see diagram below). Large roots (more than 200mm in circumference) encountered during the excavation should not be severed.



5 GROUND PREPARATION FOR PLANTINGS / REINSTATEMENT WORKS

The Contractor shall use only approved soil mix (3:2:1 volume of loamy soil, compost and washed sand respectively) for all planting works. It cannot be mixed with excavated soil; and all excavated materials must be disposed from the work site at the end of each working day.

The Contractor is not allowed to prepare soil mix on site.

The Contractor shall ensure that the receiving hole / bed is free from water logging and that all water has proper percolation with a reasonable flow rate.

The Contractor shall backfill with approved soil mix to a depth 0.15m for groundcovers, 0.6m for all on-grade shrubs and flowerbeds; and 1m deep for all on-grade trees / palms.

6 CLEANING UP UPON COMPLETION

The Contractor shall upon completion of works, remove all surplus materials from site and reinstate all disturbed work areas in a neat and tidy condition, to the satisfaction of CAG Horticulture.

7 REPLACEMENT OF DAMAGED PLANTS

The Contractor shall replace any plants damaged during their course of work with good quality plants of similar size. The plant shall be healthy, vigorous, well established with good form, and free from pest and diseases. All replacement plants shall be approved by CAG Horticulture.

8 IRRIGATION SYSTEM

Irrigation lines, solenoid valves and / or water sources affected by the Contractor's work must be reinstated upon completion and must be running properly before handover to CAG Horticulture.

9 OTHER REQUIREMENTS

The Contractor shall provide any other materials that CAG Horticulture may deem required for the above works e.g. planting medium, hormones, seeds, chemicals, water retention gel, etc. as and when directed.

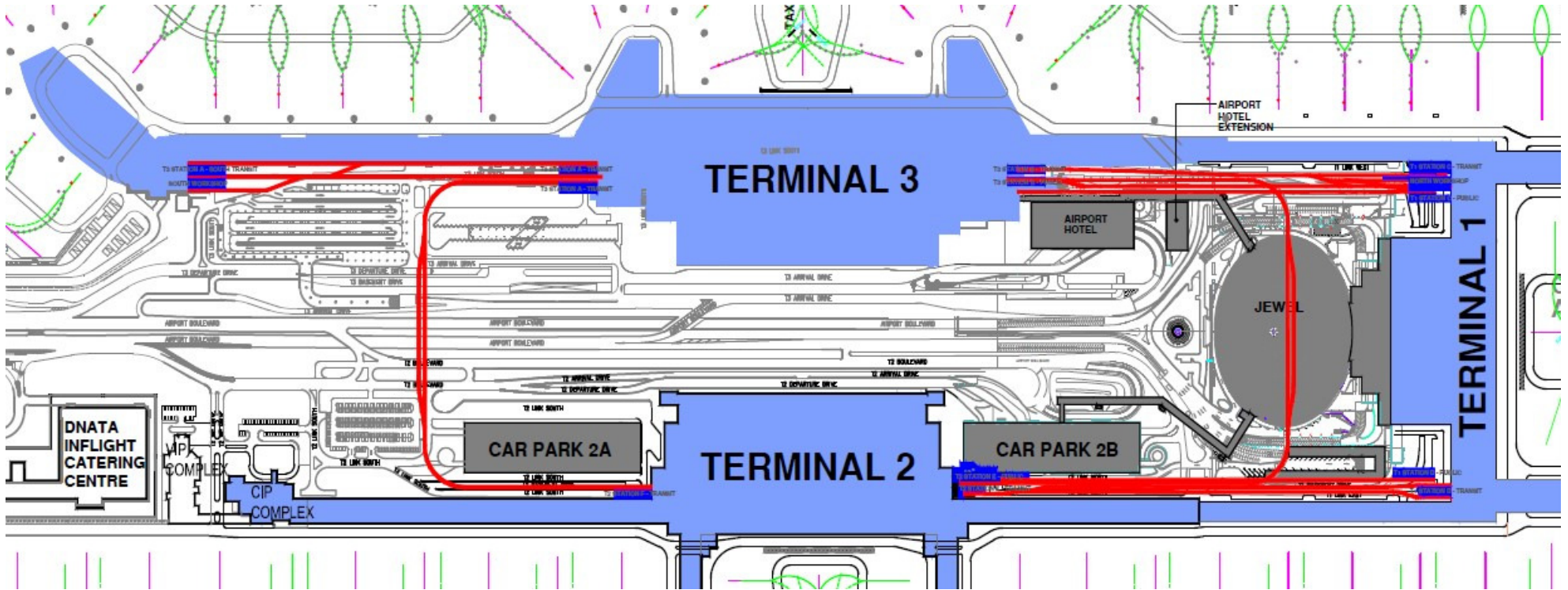
The Contractor will have to maintain the plants after the transplanting / planting works for 4 to 8 weeks or until established. A site inspection will have to be conducted before handing over the plants for maintenance. The Contractor will have to replace, at his own cost, plants that are dead during the course of the transplanting / planting works with the same species, sizes, girth etc. within a specified time to be decided by CAG Horticulture.



SKYTRAIN PERMIT-TO- WORK (PTW) APPLICATION REQUIREMENTS

1. The Changi Airport Skytrain is an Automated People Mover (APM) System that connects Terminals 1, 2 and 3 in both the public and transit areas.
2. The APM System consists of the workshops, equipment rooms, guideways and Skytrain cars.
3. The contractor shall apply for a Skytrain Permit-To-Work (PTW) for works where:
 - a. Work activities are on Skytrain guideway, within 6 metres of Skytrain guideway structure, maintenance/station platforms or inside Skytrain maintenance areas/workshops/equipment rooms;
 - b. Work activities are within Skytrain car;
 - c. Cranes, excavators, piling, scaffold, permanent/temporary structure and other heavy equipment operates above, below and within 6 metres of Skytrain guideway structure. The Contractor shall conduct a collapse zone analysis of cranes, excavators, piling, scaffold, permanent/temporary structure and other heavy equipment which an item or equipment might fall onto Skytrain guideway structure.
4. No work is allowed without any approved PTW. Access to the Skytrain areas is strictly prohibited due to safety reason and escort will be required. All costs incurred for the escort (Skytrain contractor or APO) will have to be borne by the Contractor.
5. The application of Skytrain PTW shall be submitted online at least 3 days prior to the commencement of works with the support of the respective CAG Officer-In-Charge. The Contractor shall submit the Risk Assessment, Method of Statement and collapse zone analysis, if any, when applying for the PTW. The approved work permit shall be clearly displayed on site at all times.
6. The Contractor shall seek clarification with CAG project officer or CAG Engineering Skytrain maintenance team if they are not sure of the above requirements.
7. Please refer to **Attachment A27-1** for the Skytrain Guideway Layout.

SKYTRAIN GUIDEWAY LAYOUT



LEGEND:

- : Skytrain Stations / Workshops
- : Skytrain Guideways