Changi Airport
Landside Roadway Manual
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1. INTRODUCTION TO THE LANDSIDE ROADWAY MANUAL

1.1 SCOPE

This manual sets out the standards and procedures for the planning of landside roadway activities around Changi Airport. These include, but are not limited to, road works & road-related facilities, road closures, oversized heavy vehicle movements and goods delivery & construction vehicle movements. This manual also explains the steps to apply for the Landside Road Work Permit prior to activity commencement.

1.2 OBJECTIVES

The objectives of this document are to:

a) Prescribe the approval process for the Landside Road Work Permit;

b) Set out the guidelines and regulations for landside roadway activities; and

c) Educate CAG Project Officers (POs) and Contractors on road safety and traffic control.

1.3 ABOUT THE MANUAL AND THE PERMIT

The Landside Roadway Manual plays an important role in ensuring all CAG POs are aligned in upholding road safety around the Airport via standardized guidelines. This indirectly helps minimize any operational disruptions in the Airport (e.g. passengers missing flight due to accident at work site).

The Landside Road Work Permit is an instrument that ensures adherence to the guidelines. Submitted to the Roadway Unit (RWU) for approval, these applications serve two purposes: 1. Ensure compliance to guidelines; 2. Provide the RWU visibility of landside road works around the Airport for coordination / de-conflicting of works.

Please note that the above documents are governed by the Landside Roadway Unit (RWU).

1.4 ABOUT THE ROADWAY UNIT (RWU)

The RWU was formed in 2015 with the objective of managing Changi Airport’s landside roadway activities. This need arose due to the increasing amount of construction work being done in tandem with Changi’s development (e.g. Jewel, T4, T5).

The RWU comprises officers from various related portfolios, each contributing their domain expertise to ensure all aspects of the roadway are considered:

Roadway Unit group email: roadway.unit@changiairport.com
1.5 DEFINITIONS

The following definitions shall apply throughout this document, unless the context otherwise requires:

- “Airport” refers to Changi Airport;
- “Contractor” refers to the person appointed to carry out the project on-site;
- “Emergency works” refer to works that must be carried out immediately in order to end or prevent any circumstances likely to cause serious danger to any person or property;
- “Project Officer” or “PO” refers to the CAG officer in-charge of the assignment;
- “Project Manager” or “PM” refers to the main contractor’s point-of-contact.

1.6 USEFUL REFERENCES

a) Street Works Act (obtain from: http://statutes.agc.gov.sg)
b) LTA Code of Practice for Works on Public Streets
c) LTA Code of Practice for Traffic Control at Work Zone
d) LTA Standard Details of Road Elements

The LTA documents can be obtained from their website: https://www.lta.gov.sg/content/ltaweb/en/industry-matters/development-and-building-and-construction-and-utility-works/street-proposals.html
2. APPLYING FOR THE LANDSIDE ROAD WORK PERMIT

2.1 OVERVIEW OF PROCESS
The following diagram outlines the steps taken by a CAG PO from the start to end of a landside road work project:

![Flowchart of landside road work process]

**Project Initiation**: POs should first read this manual to understand the requirements for the project. POs must also brief their Contractors on the requirements in this manual and ensure compliance by their Contractors.

**Preliminary Consultation**: If a PO is unsure of the requirements put forth in the manual, he/she should approach the RWU for a preliminary consultation. POs should note that preliminary consultation with the RWU does not amount to approval of the proposed works.

**Preparation of Documents & Notification**: Once a PO and his/her Contractor are clear on the requirements of their landside roadway activity, they shall jointly prepare the required documents and notification (if any). It is the onus of the PO to vet through the documents and ensure Contractor’s compliance before submitting them to the RWU. The detailed list of documents to be submitted is outlined in Section 2.2.

The Landside Road Work Permit should be submitted via email to the Roadway Unit (roadway.unit@changiairport.com) at least 5 working days in advance.
The application form can be downloaded from CAG’s Intranet (links found at the end of this manual) by the CAG PO for the Contractor, or from the Changi Airport website: http://www.changiairport.com/content/cacorp/en/e-services/documents.html

**Landside Road Work Permit Application:** Upon submission, the RWU will review the application. Should there be concerns raised by the RWU, POs and their Contractors are to revise the application in line with the comments and resubmit. All comments given by the RWU constitute part of the requirements to be adhered to. Please note that without approval from the Roadway Unit, the requested roadway activities must not commence.

**Work Activity Commencement & Conclusion:** Once approval has been given by the RWU, the Contractor can commence work, and has to notify the Terminal Management Centre (i.e. TMC) at 6307 8686 before work start and after work end. The PO and the Contractor should also keep the TMC and RWU informed of any complications of the work activity.

### 2.2 LANDSIDE ROAD WORK PERMIT APPLICATION DOCUMENTS

These are the following documents to be submitted:

- Landside Road Work Permit Application Form (Annex A of this manual)
- CAG Project Officer’s Checklist (Annex B of this manual)
- Supporting Documents (where applicable): Method statement, risk assessment, hoarding plan, traffic management plan (compliant with LTA code of practice), traffic survey results (e.g. vehicle count, traffic study) for full-day road closure and/or diversion), contingency plan etc. Section 3 provides details on the specific documents to be submitted depending on the nature of your works
- Approval for related Work Permits (if required): Refer to Section 2.3.
- Letters of Clearance from other Authorities (e.g. LTA): Refer to Section 2.3.

Submission of the necessary Supporting Documents is mandatory such that the RWU can evaluate the impact to operations before approving the permit application.

### 2.3 RELATED WORK PERMITS

**CAG Internal Work Permits**

Should there be trial holes, excavation works and / or piling works as part of the landside roadway activity, the CAG PO is to ensure that their Contractor gets the necessary permits related to these activities. Please refer to the Airport Operations Safety manual (AOS) for the application forms (Attachment 7-1, Attachment 7-2, Form A, B, C). The Contractor must have obtained approval for these permits before the RWU approves the Landside Road Work Permit. These should be appended to the Landside Road Work Permit application.

The CAG PO is to provide the Contractor with the latest version of the AOS from EDG’s Safety Management Team / downloaded from Newforma.
**LTA Permission to Work**

If works are being done on the East Coast Parkway (ECP) before South Cross 2 aerobridge, these areas belong to Singapore’s Land Transport Authority (LTA) and fall outside the purview of CAG and the RWU. Please obtain the permission from LTA via LTA PROMPT: [https://prompt.lta.gov.sg/WebUIPWAS/login.aspx](https://prompt.lta.gov.sg/WebUIPWAS/login.aspx). LTA has 3 types of permits: 1. Permit to Carry Out Works; 2. Notification of Road Closure; 3. Permit for Vehicle Movement.


**SPF Road Closure Permit**

For event organizers, if the road needs to be closed for the event (e.g. Chingay, OCBC Cycle), a road closure permit is to be obtained from SPF. Please read [http://www.police.gov.sg/e-services/apply/licenses-and-permits/road-closure-permit](http://www.police.gov.sg/e-services/apply/licenses-and-permits/road-closure-permit) for more information. This is not required if the event is on CAG land.
3. **STANDARDS & REGULATIONS FOR LANDSIDE ROADWAY ACTIVITIES**

3.1 **GENERAL REQUIREMENTS**

a) The Contractor must obtain an approved Landside Road Work Permit from the Roadway Unit before the commencement of any landside roadway activities. These are defined as any external work located at landside that may cause operational impact and road congestion, including works that happen on the grass turf area. Some examples are: road works, lane closures, excavations, oversized vehicle deliveries and heavy vehicle movements.

b) All works shall comply with prevailing statutory requirements stated in this manual and in LTA’s Code of Practice for Traffic Control at Work Zone.

c) The PO shall ensure that a site inspection is conducted with the Contractor to verify the condition of the site before the commencement of any work. Any discrepancies or complications must be highlighted to the Roadway Unit.

d) The Contractor shall inform the RWU and TMC of the commencement and completion dates of the proposed works.

e) The Contractor shall notify the RWU and TMC immediately of any site problems that are likely to affect the proper operation of the services in airport.

f) The Contractor shall inform TMC at 6307 8686 at the start and end of the work.

g) After the completion of the work, the Contractor shall be responsible for maintaining the new and existing installation in proper working conditions and keeping all drawings updated at all times.

h) Work site must be kept tidy, and all debris must be removed from the Airport by the Contractor daily.

i) In applying for the Landside Road Work Permit, the Contractor is to submit the Landside Road Work Permit Application Form (Annex A), CAG PO Checklist (Annex B), and the following as supporting documents: method statement, risk assessment, contingency plan.

j) If the road works are on LTA’s roads, the Contractor is required to forward the Written Permission from LTA to the RWU upon approval, before the actual work commences.

3.2 **WORKPLACE SAFETY REQUIREMENTS**

a) The Contractor shall, at its own cost and expense, comply with all laws and statutes now or hereafter in force including, but not limited to, the Workplace & Safety Health Act (Cap 354A) and any other orders, rules, regulations and notices thereunder. Without prejudice to the generality of this Clause, the Contractor shall comply at all times with such procedures.
and measures and any rules, regulations, notices, orders or directions which CAG may make, review and update from time to time relating to the work.

b) The Contractor shall, at its own cost and expense, ensure that its employees and all other persons at the site take all reasonable steps to safeguard their own safety and the safety of other persons who may be affected by their actions or omissions. The Contractor agrees to absolve CAG from liability for and to indemnify and keep indemnified CAG from all and any claims, losses, damages, liabilities, obligations, costs and expenses (including solicitor and client costs) whatsoever arising from any loss, damage or injury caused to CAG or any third party by the Contractor, its employees and/or such other persons in this regard.

c) The Contractor shall, at its own cost and expense, ensure that the site and all machinery, equipment, plants, articles and substances used for work are safe and without risk to the health of workers and any person within the site. The Contractor shall implement risk controls based on risk assessment conducted prior to commencement of work, in accordance with the Workplace & Safety Health (Risk Management) Regulations.

3.3 HOARDING REQUIREMENTS

All works exposed to members of public are required to have hoardings. The material used must be weather-proof and have an even surface. The graphics printed on the surface must also be approved by CAG.

The hoarding must be certified by a Structural Qualified Person.

The work site shall be hoarded up before commencement of works. All works shall be confined within the hoarded area.

The following documents are to be submitted together with the Landside Road Work Permit for approval:
- Hoarding layout plan
- Graphics/artwork of the hoarding
- Details of installation of hoarding, such as the method statement & the road closure schedule (if road closure is required to install the hoarding)

3.4 SAFETY BARRIER REQUIREMENTS

Concrete barriers that are in sight of the main traffic must be painted in black and yellow.

- Straight lines for straight road
• Arrows for road bends

In general, all safety barriers (be it concrete or water barrier) must be in good condition and be of the same size/height. In addition, blinker lights and cones are to be used at critical junctions to give adequate warning to fast-moving vehicles.

3.5 HOUSEKEEPING REQUIREMENTS

The CAG PO and his/her Contractor is to supervise and maintain the cleanliness of the roadway and turf area within and around the vicinity of temporary road access and work site during the entire duration of works.

Immediate remedial actions must be taken to clear any spillage onto the surrounding roadways and turf area resulting from the works, failing which the RWU may clear the spillage and recover all cost incurred from the Contractor.

There shall not be any parking of vehicles or deposition of debris, building materials etc. on the roadways, including the turf area.

Any damages to the road pavement, lane markings, road surface and other road furniture caused by the works shall be made good immediately at the Contractor’s expense. The Contractor shall ensure that the work site has been reinstated to its original condition upon completion of the work.
3.6 TRENCHING / EXCAVATION / PILING WORKS

As mentioned in Section 2.3, if the roadway activity involves trenching, excavation and / or piling, the relevant approved permit for the above works must be submitted together with the Landside Road Work Permit application to the RWU for information. The requirements stated in Section 3 still apply.

Open trenches, pits and large excavations on non-pavement area shall be hoarded up with appropriate barricades approved by CAG.

**Note:** For contingency purposes, the Contractor must always have steel plates ready to cover the hole in the event of traffic build-up or extension of works.

3.7 LANE CLOSURE REQUIREMENTS

3.7.1 GENERAL

For works that require partial or total road closures, the Contractor is required to take measures that minimize the impact of road works on traffic flow. These include but are not limited to:

- Using the one-for-one lane replacement method. Contractors are required to open up a new lane for every lane closed for road works. This will ensure that traffic can flow as per normal during the road works period. However, this method can only be used at sites where there is sufficient space for replacement lanes.
- Using the steel decking method. This involves the placing of steel decks over trenches to allow traffic to flow normally across the steel decks.
- Allowing only one traffic lane to be closed when road work is being carried out, unless otherwise approved by the RWU on a case-by-case basis.
- Executing road works only during permissible lane closure hours (refer to Section 3.7.2)
- Stopping work if the work is found to cause traffic congestion.

Contractors are also required to ensure safety for road users while works are being carried out. Contractors are required to:

- Place signage and traffic cones to provide motorists early warning of the road works ahead.
- Engage site supervisors trained in road safety and road works to oversee the works.

If partial or total road closure is required during the course of works, the Contractor is to submit a Traffic Management Plan as part of the Landside Road Work Permit supporting documents.

This plan should highlight the following (this is not exhaustive) on a map / photos:

- Location of work equipment (e.g. lorry crane)
- Extent of road closure
- Location of work safety equipment (e.g. traffic cones)
- Signage put up and their locations (e.g. diversion signages)
• Position of road marshals (if any)

3.7.2 PERMISSIBLE LANE CLOSURE HOURS

The table illustrates the allowable lane closure hours, which are typically non-peak hours.

<table>
<thead>
<tr>
<th>Location</th>
<th>Non-peak hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Airport Boulevard</td>
<td>• Day works : <strong>1000H to 1600H</strong></td>
</tr>
<tr>
<td></td>
<td>• Night works : <strong>0100H to 0500H</strong></td>
</tr>
<tr>
<td></td>
<td>• Works only allowed on weekdays, excluding public</td>
</tr>
<tr>
<td></td>
<td>holidays</td>
</tr>
<tr>
<td>Roads leading to and from Basement</td>
<td>• Night works : <strong>0100H to 0500H</strong></td>
</tr>
</tbody>
</table>

**Note:** The timings above are general guidelines. For partial / full closure of other roadways, the PO shall consult the Roadway Unit on the allowable hours for lane closure.

If RWU is not able to suggest the allowable hours for lane closure (possibly due to lack of information), the CAG PO is to carry out a traffic survey with his/her Contractor to determine the hours for closure and submit the findings to RWU along with the Landside Road Work Permit as a supporting document.

In the event of a clash of roadway activities, works must be rescheduled.

3.7.3 NOTIFICATION FOR ROAD CLOSURES

Depending on the extent of road closure, the PO must ensure that all stakeholders and users of the roadways are well informed in advance. The following table acts as a guide to the communication plans:

<table>
<thead>
<tr>
<th>Level of Notification Required</th>
<th>Extent of road closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>• Full Road Closure</td>
</tr>
<tr>
<td></td>
<td>• Road Diversion with a reduction in traffic handling capacity.</td>
</tr>
<tr>
<td>Communication Channel (where applicable)</td>
<td>- Airport Information Circular (AIC)</td>
</tr>
<tr>
<td></td>
<td>- Airport Facilitation Committee (AFC) meeting (held monthly)</td>
</tr>
<tr>
<td></td>
<td>- Notices displayed at car park lobbies (text message to be approved by CAG CMC)</td>
</tr>
<tr>
<td></td>
<td>- Notice on Changi Airport website (landing page), apps &amp; social networks (to be</td>
</tr>
<tr>
<td></td>
<td>approved by CMC &amp; RWU)</td>
</tr>
<tr>
<td></td>
<td>- National Taxi Association and taxi operators</td>
</tr>
<tr>
<td></td>
<td>- Public transport companies*</td>
</tr>
<tr>
<td></td>
<td>- Other affected stakeholders (e.g. APD, LTA, dnata, SATS)</td>
</tr>
</tbody>
</table>
Where scheduled bus routes are affected by the works, the applicant shall liaise with the relevant bus operators to ensure minimum disruption to the bus services.

| Level 2 | Partial Road Closure, no diversion involved | - Airport Information Circular (AIC) - National Taxi Association and taxi operators |
| Level 3 | Partial Road Closure (Inner road) with 50% reduction. | - Email notification to identified stakeholders |

Please contact RWU should you need assistance / advice on how to notify the relevant stakeholders.

**Protocol for Publishing AIC**

1. Obtain a reference number from Ms Zaridah Abdul Hamid (People Services).
2. Draft the AIC using the template, which can be accessed via the link: [http://intranet.changiairport.com/documents/18/5933712e-9e4c-464e-80db-67480828d1b9](http://intranet.changiairport.com/documents/18/5933712e-9e4c-464e-80db-67480828d1b9)
3. Email the completed AIC to intranet@changiairport.com for it to be uploaded onto the intranet. Copy Roadway Unit (roadway.unit@changiairport.com) & Ms Zaridah (Zaridah.abdul.hamid@changiairport.com) in your email for information.

3.8 **AVAILABILITY OF THE CAG PO & CONTRACTOR**

The CAG PO and the Contractor’s PM shall make themselves readily contactable via the contact information provided in the Landside Road Work Permit application, any time of the day during the duration of the actual work.

3.9 **NOTIFYING TERMINAL MANAGEMENT CENTRE**

The CAG PO shall ensure that the Contractor’s site supervisor complies with the following arrangements:

a) The Contractor shall seek clearance from TMC (6307 8686) before and after works.
b) The Contractor is to keep any traffic cones within the closed lanes, and not on lane markings.
c) TMC reserves the right to issue a stop work order where necessary. For instance, should there be an emergency and / or heavy congestion situation, TMC has the right to instruct the Contractor to reopen one of the lanes it had closed previously.
4 DRIVING REQUIREMENTS

4.1 CLASSIFICATION OF VEHICLES

Class 3A  Motor cars with unladen weight of 2500 kilograms and below with automatic transmission

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

Heavy vehicles include the following:

- Construction vehicles (Tipper truck, cement trucks, trailers, etc.)
- Oversized vehicles
- Goods delivery vehicles (Class 5 & above)

4.2 GENERAL

Should any of the projects involve delivery with heavy vehicles, the Contractor is to submit a Landside Road Work Permit application.

Before the movement of vehicles into the Airport, the PO and the Contractor must:

- Ensure that the driving route of the vehicles does not violate any height limit restrictions around the airport. (Refer to Annex C)
- Ensure that all drivers (from the Contractor or its sub-Contractors) coming to the airport are properly briefed on the planned delivery routes at the Airport beforehand. Please refer to Section 5.5 for the recommended materials to brief the Contractors and drivers.
4.3 REQUIREMENTS FOR CONSTRUCTION VEHICLES

Besides submitting Annexes A and B, POs of the various major development works shall submit the following information to the RWU as part of Supporting Documents:

- Schedule of delivery and volume forecast of construction vehicles to provide an indication of traffic density;
- Vehicle type & description of load (tipper truck, cement truck, lorry, trailers)
- Route of travel (marked out on Google map)
- Construction vehicle management plan, detailing the measures that the Contractor will take to minimize roadway disruptions (e.g. driver orientation, accident SOPs, traffic controllers deployed)

POs shall ensure that appropriate traffic control plans are implemented to expedite entrance clearance and directed to specific unloading points within the work site. The Contractor is required to notify TMC at 6307 8686 before the vehicle arrives and leaves the Airport.

4.4 REQUIREMENTS FOR OVERSIZED VEHICLE MOVEMENT

The use of the following oversized heavy vehicles on the road requires auxiliary police officers as escorts during the vehicle movement:

- Overall vehicle height exceeding 4.5 metres
- Vehicle laden weight of 80,000 kg or more
- Overall vehicle width of 3 metres or more

Besides submitting Annexes A and B, POs shall submit the following information to the RWU as part of Supporting Documents:

- Schedule of oversized vehicle movement
- Vehicle type & description of load
- Route of travel (marked out on Google map)

POs shall ensure that appropriate traffic control plans are implemented to expedite entrance clearance and directed to specific unloading points within the work site.

The Contractor is required to notify TMC at 6307 8686 before the oversized vehicle arrives and leaves the Airport.

**Note:** Contractors must submit application to LTA via LTA Prompt (one-stop online portal) and attach the approved application with the work permit submission.

(Source: Land Transport Authority (LTA) – Administration of Oversized Heavy Vehicle Movement)
4.5 REQUIREMENTS FOR GOODS DELIVERY

Loading / unloading of goods for terminal-related activities is to be done at the basement of the terminal, unless approval is obtained from the Departure (Security) team for loading/unloading at the kerbside. Kerbside approval will only be given for vehicles that cannot enter the basement or for oversized goods that cannot fit into elevators.

Drivers of all delivery vehicles assigned to enter the basement loading / unloading bays must check the height limits prior to arrival at the airport. For reference, the height limits are:

<table>
<thead>
<tr>
<th>Loading Bay</th>
<th>Height Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 1</td>
<td>3.8 metres</td>
</tr>
<tr>
<td>Terminal 2</td>
<td>3.8 metres</td>
</tr>
<tr>
<td>Terminal 3</td>
<td>3.8 metres</td>
</tr>
<tr>
<td></td>
<td>3.6 metres (Crowne Plaza loading bay)</td>
</tr>
</tbody>
</table>

Drivers must have with them an approved Basement Entry Form. This form can be downloaded from the following link: http://intranet.changiairport.com/web/avsec/, and must be approved by the CAG PO with whom the delivery company is liaising with. The form should also be CC-ed to Departure (Security) team for information. When the driver is away from the vehicle, he is to clearly display it on the vehicle windscreen so as to avoid the issuance of a notice of offence.

Alternatively, tenants may also issue their drivers with a Delivery Order (DO) to gain access into the basement. The auxiliary police officers deployed at the basement posts are empowered to turn away vehicles if they deem the DOs to be invalid.

Delivery vehicles should not be parked at unauthorised bays, and drivers are to abide strictly by the designated routes provided in the following section. If any deviation from the designated routes is required, PO has to submit the planned route to Roadway Unit for approval.

4.6 USEFUL COLLATERALS FOR DRIVERS

To aid the PO in the preparation of briefing notes to Contractors & drivers on the landside roadway guidelines, these are some materials that he/she can share with the latter:

- Road safety brochure (Annex C)
- Step-by-step procedure to manage each traffic scenario (refer to Section 8)
- Hard copy of the assigned route map and site in-charge person’s contact numbers (refer to Annex A)

4.7 GUIDELINES FOR COMPLIANCE BY CONTRACTORS & DRIVERS

- Drivers must strictly adhere to all traffic rules, speed limits and height limits of the assigned route.
- Drivers are not allowed to leave their vehicle unattended with the engine running.
- Drivers must not deviate from the route plan.
• Contact the site person in-charge for further instruction or rendered assistance for unexpected incidents.
• Drivers must ensure goods are properly labeled and secured to their vehicles to prevent the goods from toppling.
• Drivers must not park vehicles in unauthorised parking zones.
• Drivers must retain a copy of the road safety brochure in the vehicle when arriving at the airport.
• Drivers must be contactable via the contact information given in the application form, at any time of the day during the duration of the actual work.
5. **HEIGHT LIMIT WORKS REQUIREMENTS**

5.1 **INSTALLATION OF STRUCTURES**

In general, the structure installed should not alter the height limit dedicated for the route. Guidelines:

a) For permanent overhead gantries, the minimum vertical clearance from soffit of structure to road level shall be 5.7m as per LTA Civil Design Criteria for Road and Rail Transit Systems.

b) Structures hanging overhead along the roadway should not be less than the height limit dedicated for that route.

c) Temporary structures (erected for decoration) along the roadway should not be lower than the existing height limit of the roadway.

d) Protruding structures by the side of the road should be at least 0.6m away from the kerb.

e) For height restriction gantries that function as a protection to the overhead structure or any object above the carriageway, a minimum vertical clearance of 0.3m shall be allowed for between the lowest point of the gantry frame and the overhead structure or any object above the carriageway.

5.2 **MODIFICATION OF CEILING HEIGHT**

a) Any works that directly or indirectly modify the effective floor-to-ceiling height of any external terminal building (above any roadway) shall be declared in the Landside Road Work Permit for approval.

b) If modification of the ceiling involves changes in height limit along the affected route, proper signage needs to be installed.

5.3 **WORK FLOW PROCESS FOR HEIGHT LIMIT RELATED WORKS**

The CAG PO and his/her Contractor should clear the method statement with EDG Structures team first before applying for the Landside Road Work Permit. The method statement should describe how the temporary / new height limit structure will be installed.

After the method statement is approved by EDG Structure, the PO is to submit the following Supporting Documents for permit application:

- Risk Assessment;
- Traffic management plan; and
- Photos of height clearance from the roadway to soffit of new structure.
6. **HORTICULTURE OUTDOOR REQUIREMENTS**

6.1 **GENERAL**

The Contractor shall avoid all existing trees and shrubs whenever possible.

6.2 **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.

6.3 **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.
6.4 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.

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.
6.5 GROUND PREPARATION FOR PLANTINGS / REINSTATEMENT WORKS

The Contractor shall use only approved soil mix (3:2:1 volumes 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 turf / groundcovers, 0.6m for all on-grade shrubs and flowerbeds; and 1m deep for all on-grade trees / palms.

6.6 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.

6.7 REINSTATEMENT OF TURF

All turf supplied by the Contractor shall be healthy, vigorous and be of approved type and quality (*Axonopus compressus*). The grass shall be at least 50mm thick.
All turf supplied should be free from weeds especially *Mimosa pudica, Imperata cylindrica* (lalang) and *Eleusine indica*;

Turf shall be laid abutting unless otherwise directed by CAG Horticulture, with no appreciable spaces between adjoining turfs. Each sod shall be properly pegged down to prevent movement or displacement of any kind, and the turfing shall thereafter be firmed down and rolled or compacted (except on slopes) with a suitable hand roller. Upon completion, the turfed area shall present a uniform and regular appearance;

### 6.8 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.

### 6.9 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.

### 6.10 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 / turf 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 / turf for maintenance. The Contractor will have to replace, at his own cost, plants / turf 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.

### 7. NON-COMPLIANCE WITH REQUIREMENTS

#### 7.1 GENERAL

The Contractor is deemed to have read through the Landside Roadway Manual and complied with the requirements. The RWU reserves the right to withdraw the approved work permit when the Contractor fails to comply with any of the requirements herein and/or any other instructions given by CAG.

A Stop Work Order and / or Board of Inquiry will be carried out in the event of a safety breach and / or major accident(s) during the course of the work.
The RWU also reserves the right to withdraw the approved work permit should the Contractor deviate from the approved work arrangement (e.g. working on other sites other than the approved, working beyond approved hours).

The work permit will only be re-issued when the RWU is satisfied with the remedial action(s) taken by Contractors and upon receiving the written commitment by the CAG PO on the measures to be put in place by the Contractors to prevent a repeated occurrence.

7.2 DISPLAY OF WORK PERMIT

The Contractor should readily furnish the original copy of the work permit at the work site when demanded by the CAG PO to avoid the issuance of a temporary stop work order.

7.3 DEVIATIONS FROM THE APPROVED WORKS

Should there be changes to the road activity, such that it deviates from the approved work arrangement, the Contractor and the CAG PO should update the RWU and seek approval again.

Some examples of such changes are:
- Rescheduling / delays in work completion
- Changes in location of work site
- Changes in work activity
- Occurrence of incident / accident (see next section for details)

Depending on the extent of deviation, the Contractor may need to amend the application documents for resubmission.

7.4 TEMPORARY STOP WORK ORDER

If the Contractor fails to comply with any of the requirements given and/or any other instructions given by CAG, the CAG duty operations officer may issue a stop work order immediately. The Contractor is to rectify the issue immediately within the next 2 hours, with photo evidence proving the rectification action. The case will then be highlighted to RWU for further deliberation with the CAG PO. Even if the Contractor has rectified the issue, the temporary stop work order will only be lifted with the approval of the RWU.

The temporary stop work order will also be issued if the Contractor fails to update the RWU of any deviations from the approved works. Until thorough investigation and explanation is provided on why the deviation was not communicated by the CAG PO, this stop work order will not be lifted.

In addition, CAG may also change the temporary stop work order to a withdrawal of the Landside Road Work Permit if the duty operations officer deems that the road traffic condition around the work site has worsened due to the deviation from the agreed work arrangements.
8. TRAFFIC INCIDENT MANAGEMENT & REPORTING

8.1 INCIDENT REPORTING WORKFLOW

An incident report shall follow the process below:

a) Contractor will notify Terminal Management Centre (TMC) and PO of incident and extent of disruption.
b) PO will contact the Airport Operations Centre (AOC) to provide detailed information immediately after being notified by Contractor.
c) AOC will assess the nature of the incident with the PO and trigger the existing activation protocol for the situation.
d) TMC will contact Fault Management Centre (FMC) to activate relevant CAG EDG officers and contractors.

Important contact numbers:
- AOC: 9183 8879
- TMC: 6307 8686
- FMC: 6541 2424
### 8.2 POSSIBLE SCENARIOS OF INCIDENTS / ACCIDENTS

<table>
<thead>
<tr>
<th>Incident/Accident</th>
<th>Traffic Management Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery vehicles unable to find designated site</td>
<td>Vehicle to stop by road shoulder&lt;br&gt;• Call PM to escort the vehicle to designated site</td>
</tr>
<tr>
<td>Delivery vehicles hit height limit gantry</td>
<td>Vehicle to stop by road shoulder&lt;br&gt;• Call TMC hotline&lt;br&gt;• CAG PO and coordinate with EDG contractors and TMC for repair works&lt;br&gt;• PM to escort delivery vehicles to designated site</td>
</tr>
<tr>
<td>Traffic accidents, eg. collision with other vehicles</td>
<td>• PM to assist TP/APD and TMC for traffic management, recovery and investigation</td>
</tr>
<tr>
<td>Vehicle breakdown</td>
<td>• Driver to inform PM &amp; CAG PO</td>
</tr>
<tr>
<td>Spillage of concrete</td>
<td>• CAG PO to inform TMC</td>
</tr>
<tr>
<td>Damage to road surface</td>
<td>• PM to assist TP/APD and TMC for traffic management, recovery and investigation</td>
</tr>
</tbody>
</table>
ANNEX A: LANDSIDE ROAD WORK PERMIT

(Click here to open the file from CAG Intranet)
ANNEX B: CHECKLIST FOR PROJECT OFFICER

(Click here to open the file from CAG Intranet)
ANNEX C: CHANGI LANDSIDE ROAD SAFETY BROCHURE

(Click here to open the file from CAG Intranet)
ANNEX D: TERMS AND CONDITIONS OF WORKS IN LANDSIDE
TERMS AND CONDITIONS FOR WORKS AT LANDSIDE

1 INTRODUCTION

1.1 This section contains the conditions for works to be carried out at the landside and for any works that have or will potentially impact the operation of the landside roadway. The project officer with the intention to carry out works or which are engaging external contractor to do works at the landside compound include roadways and turf area (hereafter referred as “landside”) shall comply with the conditionals prescribed in this section.

1.2 The project officer shall ensure that the personnel engaged to carry out the works are properly briefed and are informed of the requirements to comply with the conditions as stated further in this section and all relevant rules published in AOS manual.

2 CONDITIONS FOR WORKS AT LANDSIDE/TURF

2.1 Approval for Works at Landside

2.1.1 The Work Party is required to seek approval from CAG project officer for the excavation work permit and/or trial hole work permit. With the written approval from CAG project officer, the Work Party shall submit the Landside Road Work Permit to CAG(S) Landside Roadway Unit (hereafter to be referred to as “RWU”) at least five (5) working days prior to the commencement of work to seek RWU’s approval to perform works in the landside, including any part of the roadways, turf and/or access points for vehicles and drivers into the airside. Information required for the Landside Road Work Permit include:

i. Purpose/Nature of Works

ii. Work Schedule with written approval from CAG project officer;

iii. Details on closure of roadway/turf area (to provide details and drawings of proposed areas for closure)

iv. Description of potential disruption to landside roadway (if any). Please state the details and extent of closure/disruption and also measures to minimize the closure/disruption;

v. Duration of works (including date and time of commencement and completion of works);

vi. Name and contact number of project officer, coordinator who is responsible for submitting the permit;

vii. All request for work must be submitted to RWU (roadway.unit@changiairport.com)
More details on submission procedures and documents can be found in the Landside Roadway Manual.

2.1.2 Works shall not commence until approval has been obtained from RWU.

2.1.3 Upon approval of permit by RWU, the project officer shall display a copy of the approved permit at a prominent location of the site.

2.1.4 All daily works shall be completed within the approved hours of work. No extension of closure period is allowed unless prior approval has been granted by RWU.

2.1.5 For road closures, the contractor shall inform Terminal Management Centre (thereafter to be referred to as “TMC”) before the commencement and after the completion of work each day.

   It is the responsibility of the project officer to inform RWU & TMC of any cancellation of approved works or roadway closures.

2.2 Landside Road Work/ Road Diversion

2.2.1 Traffic management plan and risk assessment shall be submitted to RWU for lane closures or road diversion. Please refer to Landside Roadway Manual for detailed requirements.

2.2.2 During road closures and diversions, the contractor shall provide certified traffic marshals and required equipment to manage traffic.

2.2.3 Diversion road signage in accordance with LTA requirements shall be provided. Such signage shall be properly secured and maintained in an orderly manner. All road signage shall be removed immediately upon completion of work.

2.3 Works On Turf Area

2.3.1 For all works on turf area, project officer shall submit the Road Work Permit to RWU for approval at least five (5) working days before commencement of work. Hoarding would be required for works at passenger fronting areas where feasible. Please refer to Landside Roadway Manual for hoarding requirements.

2.4 Height Limit

2.4.1 For any installation of new gantry and signboard, the Project Office shall submit and seek CAG(S) Engineering & Development Group (EDG)/Structure and RWU’s approval on the proposed location and details of the installation. Please refer to the Landside Roadway Manual for information on existing height limits at landside.
2.4.2  For any road resurfacing works below any form of height limit, the Project Officer shall conduct a comprehensive round of height limit checks post resurfacing to ensure that the height limit is not compromised. The Project Officer shall also submit the height limit measurements to EDG/Structure team and RWU for endorsement.

2.5  Oversized Vehicle Movement

2.5.1  For use of vehicle of Class 5 and above, the proposed delivery hours and vehicle routing shall be submitted to RWU for approval. Please refer to Landside Roadway Manual on requirements for oversized vehicle to landside.

2.6  Housekeeping

2.6.1  The project officer shall ensure cleanliness of the work site, including:
   i.  All road warning signs shall be maintained and faulty ones shall be replaced immediately.
   ii. Work material shall not be placed on the roadway
   iii. Debris shall be removed from site upon completion of work at end of each work day.

2.7  Telephone Number of TMC and FMC

   Terminal Management Centre  6307 8686
   Fault Management Centre     6541 2424

2.8  Landside Roadway Manual

2.8.1  Please refer to the latest copy of the Landside Roadway Manual for detailed requirements for works in landside. A copy can be obtained from CAG intranet.