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# Handling Unplanned Expressways, Tunnel & Road Total Closures

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### DOCUMENT CONTROL

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### AMENDMENT HISTORY RECORD

Rev No.	Effective Date of Change	Section & Sub- Section Amended	Amendments/ References	Party Requesting for Change
1	XX Oct 2013	Whole Document	Due to organization change of division name from ITSC to ITSO.	DOM, ITSO OCC
2	XX Dec 2020	Whole Document	Due to change of Staff Designations in ITSO OCC. Delete SOE, insert DM Delete DySOE, insert DyAM	Mgr, ITSO OCC

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## Section 1. Introduction

- 1.1.1 This document describes the general principle for unplanned total closure of Expressway, Tunnel and arterial roads.
- 1.1.2 Unplanned total closures are for incidents that render an expressway, tunnel or arterial road unsafe or impassable for any traffic. E.g. Fire in the tunnel, tree fallen across all lanes of an open expressway or infrastructure collapse, emergency road works.

## Section 2. Personnel Involved

- a) ITSO OCC staff
- b) LTM & VRS staff
- c) Other LTA department staff
- d) External Agencies

## Section 3. Actions & Process

### Sub-Section 3.1 Unplanned Expressways or Tunnel Total Closure

- 3.1.1 Determine the incident area activate resources and secure the incident site. Open IR.
- 3.1.2 If there is immediate danger or if all lanes are impassable to traffic, DM proceed to give permission to close the Expressway or tunnel than inform TP. If there is no immediate danger or there are still lanes passable to all classes of traffic wait for TP to arrive on site to make the decision.
- 3.1.3 Once the permission for closure is given, OE shall inform VRS and LTM DO to deploy their men to the nearest exit point (or egress point) upstream from the incident site to start the closure (Refer Attachment 1) and divert traffic. This will be followed by 1) Entrances, 2) Main carriageway and 3) Exits closure sequence. Lastly, adjust the traffic lights at the junction of this exit slip road and other exit slip roads in favour of the traffic exiting the expressway or tunnel. For tunnel closure there are tunnel closure plan stored in the PP plan of the IW.
- 3.1.4 Inform VRS and LTM DO to deploy men to the affected expressway or tunnel slip road entrances to close the slip road entrances to prevent vehicles from entering the expressway or tunnel (Refer Attachment 1).
- 3.1.5 OE to put up the appropriate closure messages for the various VMS on the affected expressway or tunnel. If needed, open new IRs for other adjacent affected expressways and relate it to the closure incident IR. In addition, to inform Traffic Watch and if tunnel closure is affected to use RBBI to broadcast the message.
- 3.1.6 DM to escalate the incident to higher management, if it involves Tunnel closure to inform DDIT and Operations Manager immediately
- 3.1.7 Once incident is declared over and incident site is clear, open the slip road exits (starting from those nearest to the incident site first) followed by the main carriageway and last the entrances (starting with the entrance nearest to the incident site, until the starting point of the closure which will be the last to open). For Tunnel opening sequence it is stored in the IW PP plan.

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- 3.1.8 Above is a general guiding principal for closure, for handling of case specific incident please refer to appropriate procedure. (Note for tunnel fire refer to ITSO/OCC/SOP/EOP04.001, for infrastructure collapse refer to ITSO/OCC/SOP/AOP04.002, for tunnel flooding and spillage of loads refer to Attachment 2 and 3 respectively in this procedure)

### **Sub-Section 3.2 Unplanned Arterial Road Closure**

- 3.2.1 All arterial road closures due incident will be done and managed by TP.
- 3.2.2 OE to put up the appropriate VMS messages on the expressway or tunnel affected by the arterial road closure and adjusts traffic lights if necessary to avoid spillover onto the expressway or tunnel. In addition, OE to inform traffic watch.
- 3.2.3 Note if TP request for assistance and if resources allow RC or LTM shall be deployed to assist.
- 3.2.4 For arterial roads covered under CERTIS CISCO contract, DM can give the permission to send RC or LTM close the road before informing TP if there is immediate danger or when all lanes are impassable to traffic.

## **Section 4. Abbreviations**

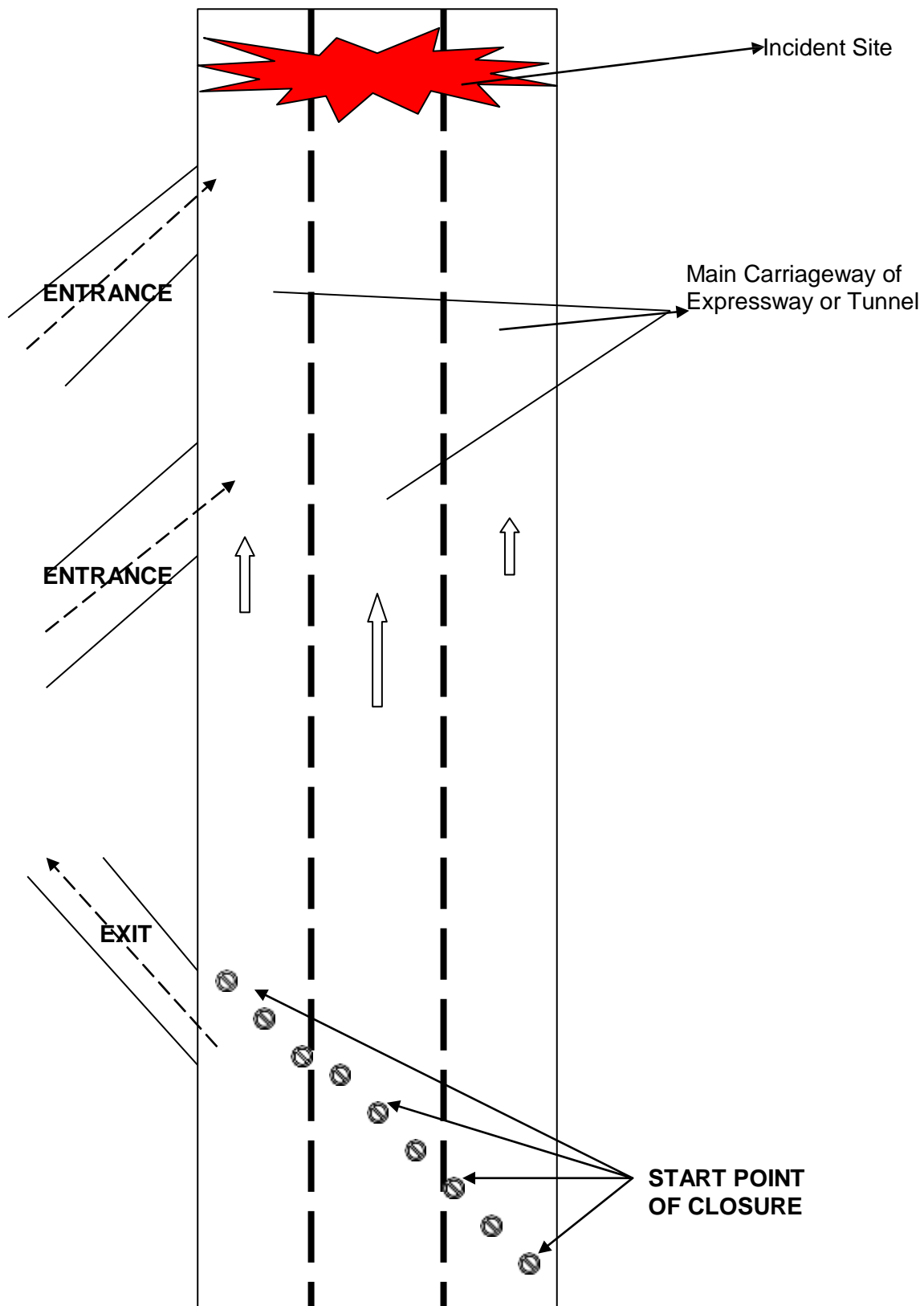
CMG Crisis Management Group  
EMAS Expressway Monitoring Advisory Service  
ITSO Intelligent Transport Systems Operations  
LTA Land Transport Authority  
LTM Land Transport Authority Traffic Marshals  
NEA National Environment Agency  
Nparks National Parks  
OE Operations Executive  
OCC Operations Control Center  
PTZ Pan Tilt Zoom Camera  
PUB Public Utilities Board  
RC Recovery Crew  
RAM Road Asset Maintenance  
DM Deputy Manager  
SPF Singapore Police Force  
SCDF Singapore Civil Defense Force  
TM Traffic Management  
TP Traffic Police  
VRS Vehicle Recovery Service  
VMS Variable Message Signs

## **Section 5. References & Attachments**

1. Intelligent Transport Systems Operations (Operations), Integrated Standard Operating Procedures
2. ITSO Crisis Management Procedure

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# ATTACHMENT 1-Closure Principal for Expressway



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## ATTACHMENT 2-Tunnel Flooding

A 2.1 The following areas of the CTE Tunnels are the lowest sections of the tunnels and are likely to be flooded should the main drainage pump totally fails to operate:

- a. Kampong Java Tunnel
  - i. Pump Sump 01 at CTE 4.99km
- b. Chin Swee Tunnel
  - i. Pump Sump 02 at CTE 3.68km
  - ii. Pump Sump 03 at CTE 2.45km
- c. Before Chin Swee Tunnel
  - i. PS 04 is a portal sump. Its overflow will channel to PS 03.

A 2.2 The OE shall inform the maintenance crew immediately whenever one pump is tripped.

A 2.3 The OE shall monitor the water level in the sump closely.

A 2.4 OE shall check if there is any power failure and whether the pump sump is powered and report the situation to the maintenance crew.

A 2.5 OE shall ensure that the pump sump is in the correct control mode.

A 2.6 OE shall monitor closely the tunnel situation especially at the pump sump locations through the CCTVs.

A 2.7 DM will inform the Manager (ITSO OCC) if the water level in the sumps does not subside and both pumps fail. DM shall inform Traffic Police to standby.

A 2.8 The OE shall inform the VRS DO to detail the Recovery Crew to check for any water ponding in the tunnels immediately.

A 2.9 If flooding in the tunnels is detected, the OE shall display warning signs or close lanes in the affected section of the tunnels.

A 2.10 OE shall request Traffic Police for assistance to control traffic at the scene.

A 2.11 DM will inform NEA Drainage Department Officer and SCDF of the flooding. SCDF will standby for pumping of the water if required.

A 2.12 DM will seek the Manager's advice to close the tunnels.

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A 2.13 Tunnel Closure

The Manager shall assess the site situations based on the information available. If he decides that the total closure of the tunnel is necessary, he will obtain clearance from Traffic Police and give the instruction to the DM to proceed with the closure. DM will activate SCDF to the site if all other possible alternatives have been exhausted. Manager will also instruct the Maintenance crew to liaise with SCDF for the pumping out of flood water.

A 2.14 The OE shall implement the Tunnel Closure and DM will inform DDIT

A 2.15 The OE will inform traffic watch and also use the RBBI to broadcast the tunnel closure message

A 2.16 Tunnels will be opened only after approval given by the Manager (ITSO OCC)

A 2.17 The Singapore Civil Defence (SCDF) has agreed to their fire engines pump out flood water. as the last resort. Following the process below:

a) The fire engine pumps shall be driven to the portals of said slip roads as indicated in the attached stretch. The engine pumps must be positioned as close as possible to the water where the tunnels are flooded so that shortest suction hoses are maintained.

b) The discharge water shall be pumped into the nearest surface drains that are outside the catchments of the tunnel portals.

c) Pump Arrangement:

<u>Pump Sump</u>	<u>Pump Location</u>	<u>Suction hose (m)</u>	<u>Discharge hose (m)</u>
PS01	A (Portal)	5	300
PS02	B (Portal)	5	300
PS03	C (Slip M)	5	500 (use Slip M)
PS04	D (Slip K)	5	450 (use Slip K)

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### ATTACHMENT 3-SPILLAGE OF LOADS

A 3.1 Loads dropped from vehicle in the tunnel may become a potential hazard as other vehicles may be damaged when running over the load or they will suddenly change lane while swerving abruptly from the dropped object.

A 3.2 Recovery crew must be detailed to the scene immediately when spillage of load is observed from the CCTV. The Recovery Crew shall remove the load and to keep the carriageway clear as soon as possible. If the dropped load is too massive for the crew to handle or the load is of hazardous nature the Operator will request for Traffic Police and NEA (National Environment Agency) for their help to divert traffic and remove the load. The Duty Office will also inform SCDF and request for their assistance if required.

A 3.3 If spilt load is too heavy or hazardous and it covers all lane, closure of tunnel section is required. OE to implement Tunnel closure after seeking DM permission.

A 3.4 DM shall seek clearance from TP and Manager (ITSO OCC) and given the permission and inform DDIT.

A 3.5 DM to escalate the incident to higher management via sms.

A 3.6 OE to inform Traffic Watch and use the RBBI to broadcast the tunnel closure message.

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## ATTACHMENT 4

### CTE TUNNEL Communications With External Agencies

#### OUTSIDE SECTOR 1

"Before Kampong Java Tunnel, going towards AYE"

#### SECTOR 1 / SECTOR 2

"Inside Kampong Java Tunnel, going towards AYE"

#### SECTOR 3

"Opened expressway, going towards AYE, after Kampong Java Tunnel"

#### SECTOR 4

"Inside Chin Swee Tunnel, going towards AYE"

#### SECTOR 5

"Inside Chin Swee Tunnel, going towards AYE, you can come in by Merchant Road entrance"

#### SECTOR 6

"Depressed expressway before Chin Swee Tunnel, going towards Ang Mo Kio, you can come in by Outram Road entrance"

#### SECTOR 7 (BEFORE UPPER CROSS STREET ENTRANCE)

"Inside Chin Swee Tunnel, going towards Ang Mo Kio, you can come in by Outram Road entrance"

#### SECTOR 7 (AFTER UPPER CROSS STREET ENTRANCE)

"Inside Chin Swee Tunnel, going towards Ang Mo Kio, you can come in by Upper Cross Street entrance"

#### SECTOR 8

"Opened expressway, going towards Ang Mo Kio, you can come in by Kramat Road entrance"

#### SECTOR 9

"Inside Kampong Java Tunnel, going towards Ang Mo Kio"

#### OUTSIDE SECTOR 9

"Outside Kampong Java Tunnel, going towards Ang Mo Kio"

**Note: For communication with external agencies actual entrance and exit names (as shown in ATTACHMENT 4) must be used to describe tunnel entrance and exit slip. Sectors 1-9 reference (See ATTACHMENT 5 for description) is used mainly for communication with tunnel contractors, LTA traffic marshals and Vehicle recovery service crew.**

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## **ATTACHMENT 5-TUNNEL SECTORS 1-9, PORTAL AND SLIP ROAD ID**

### **A5a) TUNNEL SECTORS**

- Sector 1 = Kg Java Tunnel towards AYE before exit to Cairnhill Circle
- Sector 2 = Kg Java Tunnel towards AYE after Cairnhill Circle
- Sector 3 = Open Expressway towards AYE between the two tunnels
- Sector 4 = Chin Swee Tunnel towards AYE before exit to Havelock Road
- Sector 5 = Chin Swee Tunnel and depressed expressway towards AYE
- Sector 6 = Depressed expressway and Chin Swee Tunnel towards SLE before  
Exit 2 to Clemenceau Ave/Merchant Road
- Sector 7 = Chin Swee Tunnel after exit 2 towards SLE
- Sector 8 = Open Expressway towards SLE
- Sector 9 = Kg Java Tunnel towards SLE

### **A5b) SLIP ROAD ID**

- Slip A = Entrance from Bt Timah Road to CTE towards SLE
- Slip B = Exit 6 to Bt Timah Road from CTE toward AYE
- Slip C = Entrance from Cairnhill Circle to Chin Swee Tunnel towards SLE
- Slip D = Exit 5 to Cairnhill Circle from Chin Swee Tunnel towards AYE
- Slip G = Entrance from Kramat Road to Kg Java Tunnel towards SLE
- Slip H = Exit 4 to Orchard Road from Open Expressway towards AYE
- Slip K = Exit 2 to Clemenceau Ave/Merchant Road from Chin Swee Tunnel  
towards SLE
- Slip K1 = Exit to Merchant Road from Chin Swee Tunnel towards SLE
- Slip K2 = Exit to Clemenceau Ave 2 from Chin Swee Tunnel towards SLE
- Slip L = Entrance from Merchant Road to Chin Swee Tunnel towards AYE
- Slip M = Entrance from Upper Cross St to Chin Swee Tunnel towards SLE
- Slip N = Exit to Havelock Road from Chin Swee Tunnel towards AYE

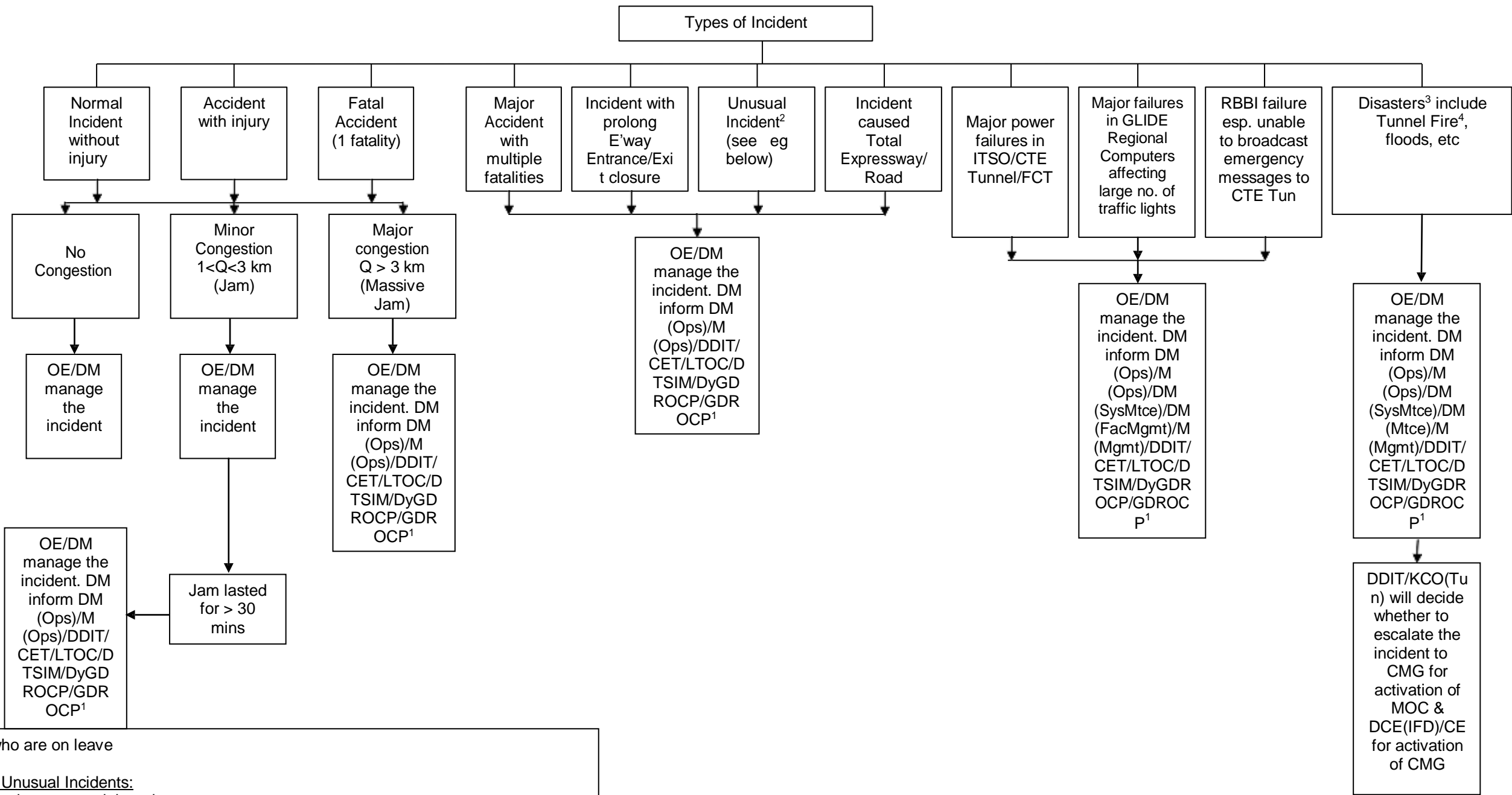
### **A5c) TUNNEL PORTAL NAMES**

- Bukit Timah Portal = Entrance of Kg Java Tunnel towards AYE
- Kramat Portal = Entrance of Chin Swee Tunnel towards AYE
- Chin Swee Portal = Entrance of Chin Swee Tunnel towards SLE
- Cairnhill Portal = Entrance of Kg Java Tunnel towards SLE

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ATTACHMENT 6

ESCALATION OF INFORMATION ON INCIDENTS



<sup>1</sup>To exclude those who are on leave

<sup>2</sup>Some examples of Unusual Incidents:

- (a) Abnormal massive jam on arterial roads
- (b) Huge obstacles such as fallen trees (affecting > 50% of carriageway)
- (c) Road cave-in
- (d) Serious upheaval of road surface
- (e) Flooding
- (f) Serious road settlement, subsidence or undulating carriageway over a considerable length of road
- (g) Unauthorised works on roads that adversely affect traffic flow / unusual events on roads
- (h) Severe damage to overhead gantry/cantilever sign causing massive jam or posing safety hazard (Also to inform DM (Fac Mgmt) & M (Mgmt) if it is an EMAS sign)

<sup>3</sup>Disaster – Please refer to the LTA CMG Minor Disaster List

<sup>4</sup>For Tunnel fire, SCDF takes command and control of the rescue and recovery operations

**SMS Message**

- (a) Est. Nos. of SMS per incident: (i) Start of an incident (ii) updates when there is a change in status (iii) End of an incident.  
Min. = 3nos.
- (b) Format : <Time> : <New or U/D> : <Type of incident> : <Location> : <Actions taken> : <Impact of incident>  
E.g. 0650hrs : New – Accident CTE(AYE) aft PIE(Changi) on Ln 1. TP & TW informed. Congestion 4km up to AMK Ave 1