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Document No: ITSO/OCC/SOP/EOP04.003		
<p style="text-align: center;">Handling Critical Infrastructure or Road Damage or Collapse</p>		

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DOCUMENT CONTROL

REV	DOCUMENT TITLE & COPY NUMBER	Date	Prepared by	Reviewed by	Approved by
0	Handling Critical Infrastructure or Road Damage or Collapse Copy____of ____	15 th December 2009	Muhamad Ridha (OE)	Alfred Loh (SOE)	Soh Ling Tim (MOPN)
1	Handling Critical Infrastructure or Road Damage or Collapse Copy____of ____	XX October 2013	Chiam Zhi Wei (DysOE) Chua Teck Leong (AOM, ITSO OCC)	Ng Soon Han, Frankie (DOM, ITSO OCC)	Yeo Se Lay (SM,Ops)
2	Handling Critical Infrastructure or Road Damage or Collapse Copy____of ____	XX December 2020	Daniel Wu (AOM) Lye Keng Fatt (DM, ITSO OCC)	Ng Soon Han, Frankie (Mgr, ITSO OCC)	Yeo Se Lay (DDIT)

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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 ITSO OCC in operational handling and managing of a critical damage to either the road itself or road infrastructure that make the road unsafe for use. It also describes the general handling process for a road or infrastructure collapse.

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 Critical Damage to Roads or Infrastructure

- 3.1.1 Upon receiving reports of damage to roads or road infrastructure, send LTM & RC to investigate, if possible use camera to view the reported damaged site. DM or OE to contact LTA Road Asset Maintenance to inform them of damage.
- 3.1.2 When RC or LTM arrive on site OE to request for an initial assessment of the nature and extent of damage. If initial assessment is that physical damage is extensive and it is not safe for pedestrian or vehicle use, LTM and RC shall take steps to close the affected portion to all road users and inform ITSO OCC.
- 3.1.3 ITSO OCC shall immediately contact RAMs to inform them of the outcome of the initial assessment.
- 3.1.4 If the closure is not a total closure, DM shall follow the usual criteria for escalation to higher management.
- 3.1.5 OE to inform TP and traffic watch of closure and execute the steps for lane closure.
- 3.1.6 If casualties are involved, OE to activate or inform TP to activate the emergency services.
- 3.1.7 If the damage poses an immediate danger and results in the total closure. DM shall authorize the closure first than inform TP. OE shall follow the general guiding principle state in ITSO/OCC/OP/AOP03.004 for total closure. DM to inform LTOC.
- 3.1.8 When RAMs arrive on site, they will make a detailed assessment. If they declare the damage is not critical and safe for use, DM will allow the lane or road or expressway to be open.
- 3.1.9 If RAMs assessment is that the damage is critical and poses a danger to the road users the affected area shall remain close until repair is done and RAMs declares site is safe.
- 3.1.10 DM shall escalate the incident to higher management via sms (Refer to Attachment 3), and they will decide to activate the LTA CMG.

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Sub-Section 3.2 Infrastructure and Road Collapse

- 3.2.1 Upon receiving reports of roads or road infrastructure collapse, send LTM & RC to investigate, if possible use camera to view the collapse site. DM or OE to contact LTA Road Asset Maintenance and LTOC to inform collapse.
- 3.2.2 When RC or LTM arrive on site DM shall authorize the closure first than inform TP if it poses an immediate danger. OE shall follow the general guiding principle state in ITSO/OCC/OP/AOP03.004 for total closures.
- 3.2.3 OE to activate the emergency services for assistance.
- 3.2.4 DM shall escalate the incident to higher management via sms (Refer to Attachment 3), and they in turn will activate the LTA CMG
- 3.2.5 OE to inform traffic watch of closure and take all execute steps for closure. Allow RAMS and their contractor to carry out the repair of affected area.
- 3.2.6 Affected area to remain close until it is declared safe by the relevant authority.

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
LTOC	Land Transport Operations Center
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

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ATTACHMENT 1- CRITICAL STRUCTURAL DAMAGE OR COLLAPSE CHECKLIST (OPEN EXPRESSWAY)

1. Time	2. Incident Zone OE	Other Zone OE	DM
H + 0 min	<input type="checkbox"/> Detect & confirm damage or collapse by CCTV camera or other means e.g. EMAS patrol, public call <input type="checkbox"/> For critical damage send VRS or LTM for initial assessment <input type="checkbox"/> Inform DM & Create IR <input type="checkbox"/> Close affected sections of expressway if damage is confirmed to be critical or if there is a collapse. <input type="checkbox"/> Activate more LTM & VRS to assist if total closure is required	<input type="checkbox"/> For collapse call SCDF & Police to inform: <ul style="list-style-type: none"> ➤ Incident location ➤ Any Casualties ➤ Total closure ➤ Camera to view ➤ access route to incident site ➤ Assist in putting up VMS messages. <input type="checkbox"/> For critical damage call TP to inform: <ul style="list-style-type: none"> ➤ Incident location ➤ Total closure ➤ Camera to view ➤ access route to incident site ➤ Assist in putting up VMS messages <p>* Call SCDF and Police again at (H + 1 To 3) if unable to determine the access route to incident site.</p>	<input type="checkbox"/> Strategize with VRS & LTM DO on how best to secure the affected site <input type="checkbox"/> Inform RAMS and Maintenance staff (Duty HP). Number can be obtained from 1 call LTA 62255582 <input type="checkbox"/> Assist to call external agencies if required <input type="checkbox"/> Inform OE on SCDF and SPF access route. <p>* Call SCDF again at(H + 1 To 3) if unable to determine the access route to incident site.</p>

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H + 1 To 3 min	<input type="checkbox"/> Call Traffic Watch. <input type="checkbox"/> Clear non-incident bound traffic if required. <input type="checkbox"/> If total closure is required send VRS & LTM to the various entrances to close them and also deploy to the nearest upstream exit before the incident site to divert traffic.	<input type="checkbox"/> Assist to handle public queries if any. <input type="checkbox"/> Assist to liaise with other agencies <input type="checkbox"/> Call One-Call-Center (6538 8330) . <input type="checkbox"/> Call LTOC (6396 2952) . <input type="checkbox"/> Assist to adjust traffic light at junction where more green time is needed for vehicles exiting the affected expressway	<input type="checkbox"/> Call DDIT. (9668 3651) <input type="checkbox"/> Call KPE if there is a potential spillover to KPE <input type="checkbox"/> SMS incident to Key Officers.
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Time	3. Incident Zone OE	Other Zone OE	DM
Arrival of VRS & LTM	<input type="checkbox"/> Check VRS & LTM on site is assisting to secure site and control traffic <input type="checkbox"/> Get latest update from VRS or LTM on site and confirm on site if there is any infrastructure damage <input type="checkbox"/> Update Traffic Watch.	<input type="checkbox"/> To assist as required or directed by DM. <input type="checkbox"/> To continue to carry out own zone duties.	<input type="checkbox"/> Update DDIT & CMG (if CMG was activated). <input type="checkbox"/> If SCDF or SPF scene commander arrives, assist and follow instructions as required. As they will be in charge of incident scene management & investigation. <input type="checkbox"/> Update KPE on expected. congestion: <ul style="list-style-type: none"> ➤ Junctions ➤ Adjoining expressway
Arrival of SCDF and Police.	<input type="checkbox"/> Monitor and receive update on site from VRS or LTM. Update IR <input type="checkbox"/> Provide necessary assistance to SCDF or SPF as directed by DM.	<input type="checkbox"/> To assist as required or directed by DM. <input type="checkbox"/> To continue to carry out own zone duties	<input type="checkbox"/> Info update to DDIT (9668 3651) & CMG <input type="checkbox"/> Render assistance and act in accordance to SCDF or SPF scene commander in ITSO OCC as far as practicable

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Re-opening of Expressway	<input type="checkbox"/> Wait for clearance from DM for affected expressway opening. <input type="checkbox"/> Once the clearance is given inform LTM and VRS to commence Tunnel re-opening <input type="checkbox"/> Remove response plan and close IR and release VRS and LTM when no longer required	<input type="checkbox"/> Update Traffic Watch <input type="checkbox"/> To continue to carry out own zone duties	<input type="checkbox"/> Seek confirmation from Police or SCDF scene commander or RAMS engineer-in charge that recovery and repair process has completed and it is safe to open. <input type="checkbox"/> Update DDIT and seek permission to re-open expressway. (9668 3651) <input type="checkbox"/> Once permission given, to declare incident stand down and instruct OE to commence opening of expressway <input type="checkbox"/> Update KPE & CMG
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ATTACHMENT 2-CRITICAL STRUCTURAL DAMAGE OR COLLAPSE CHECKLIST (TUNNEL)

Time	Tunnel OE	Other Zone OE	DM
H + 0 min	<input type="checkbox"/> Detect & confirm damage or collapse by CCTV camera or other means e.g. EMAS patrol, public call <input type="checkbox"/> For critical damage send VRS or LTM for initial assessment <input type="checkbox"/> Inform DM & Create IR <input type="checkbox"/> Close affected sections of Tunnel if damage is confirmed critical or if there is a collapse and activate more LTM & VRS to assist if total closure is required. <input type="checkbox"/> Check & implement flashing amber for non-incident bound lane 1 in front of the VX door with nearest access to incident if needed. Open VX door upon arrival of SCDF, if access from non-incident bound only.	<input type="checkbox"/> For collapse call SCDF & Police to inform: <ul style="list-style-type: none"> ➤ Incident location ➤ Any Casualties ➤ Total closure ➤ Camera to view ➤ access route to incident site ➤ Assist in putting up VMS messages. <input type="checkbox"/> For critical damage call TP to inform: <ul style="list-style-type: none"> ➤ Incident location ➤ Total closure ➤ Camera to view ➤ access route to incident site ➤ Assist in putting up VMS messages * Call SCDF and Police again at (H + 1 To 3) if unable to determine the access route to incident site.	<input type="checkbox"/> Strategize with VRS & LTM DO on how best to secure the affected site <input type="checkbox"/> Inform RAMS Duty HP number can be obtained from 1 call LTA 62255582 and tunnel maintenance staff <input type="checkbox"/> Assist to call external agencies if required <input type="checkbox"/> Inform OE on SCDF and SPF access route. * Call SCDF again at(H + 1 To 3) if unable to determine the access route to incident site.

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H + 1 To 3 min	<input type="checkbox"/> Call Traffic Watch. <input type="checkbox"/> Clear non-incident bound traffic if required. <input type="checkbox"/> Call One-Call-Center (6538 8330) . <input type="checkbox"/> Call LTOC (6396 2952) .	<input type="checkbox"/> Assist to handle public queries if any. <input type="checkbox"/> Assist to liaise with other agencies <input type="checkbox"/> Assist to adjust traffic light at junction where more green time is needed for vehicles exiting the affected Tunnel	<input type="checkbox"/> Call DDIT. (9668 3651) <input type="checkbox"/> Strategize with VRS & LTM DO on how best to secure the affected site <input type="checkbox"/> Call KPE if there is a potential spillover to KPE <input type="checkbox"/> SMS incident to Key Officers.
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Time	4. Tunnel OE	Other Zone OE	DM
Arrival of VRS & LTM	<input type="checkbox"/> Check VRS & LTM on site is assisting to secure site and control traffic <input type="checkbox"/> Get latest update from VRS or LTM on site and confirm on site if there is any infrastructure damage <input type="checkbox"/> Update Traffic Watch.	<input type="checkbox"/> To assist as required or directed by DM. <input type="checkbox"/> To continue to carry out own zone duties.	<input type="checkbox"/> Update DDIT & CMG. <input type="checkbox"/> Once SCDF or SPF scene commander arrives, assist and follow instructions as required. As they will be in charge of incident scene management & investigation. <input type="checkbox"/> Update KPE on expected congestion (if required): <ul style="list-style-type: none"> ➤ Junctions ➤ Adjoining expressway
Arrival of SCDF and Police.	<input type="checkbox"/> Monitor and receive update on site from VRS or LTM. Update IR <input type="checkbox"/> Provide necessary assistance to SCDF or SPF as directed by DM.	<input type="checkbox"/> To assist as required or directed by DM. <input type="checkbox"/> To continue to carry out own zone duties	<input type="checkbox"/> Info update to DDIT (9668 3651) & CMG <input type="checkbox"/> Render assistance and act in accordance to SCDF or SPF scene commander in ITSO OCC as far as practicable

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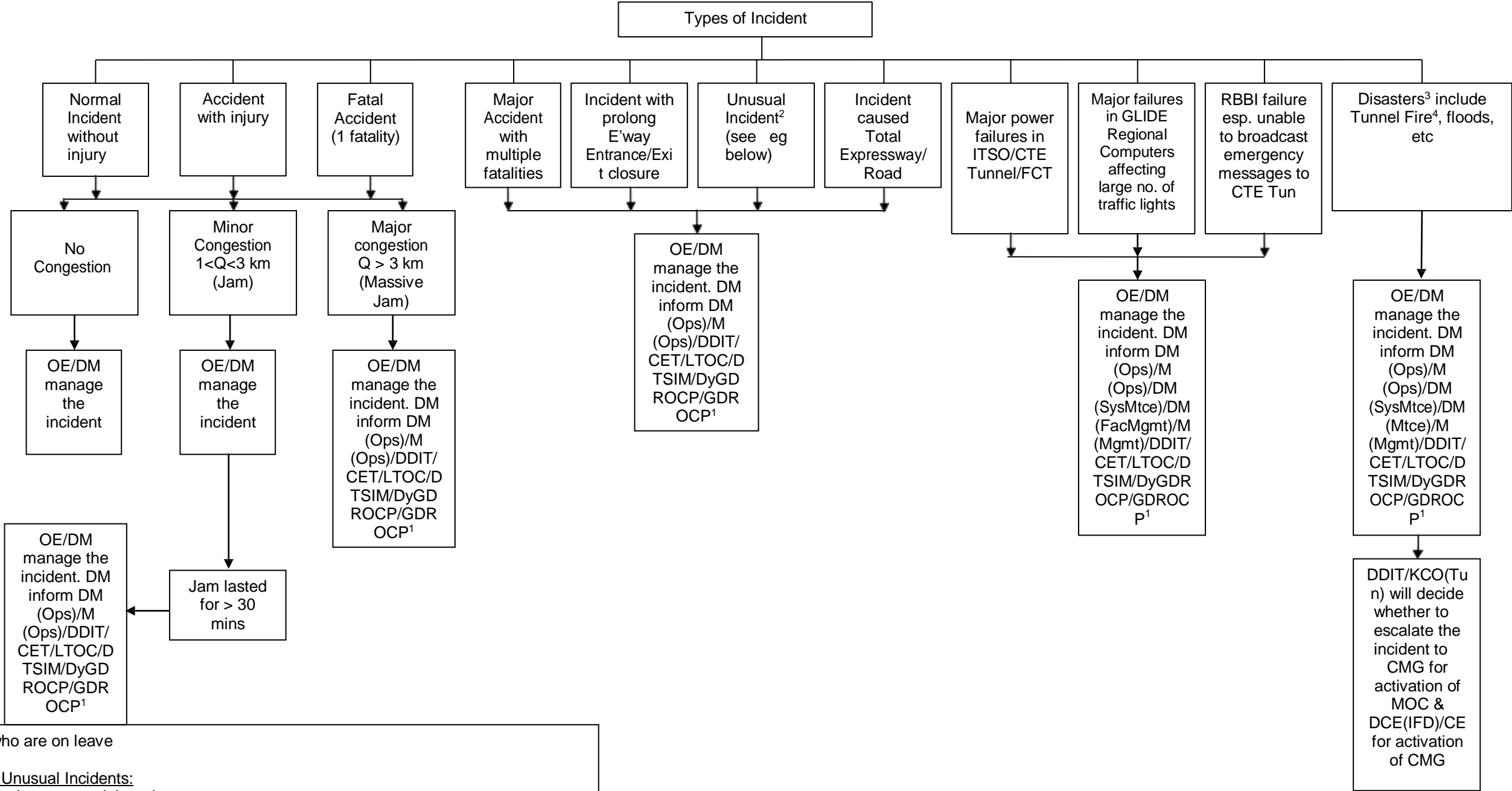
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Re-opening of Tunnel	<input type="checkbox"/> Wait for clearance from DM for Tunnel opening. <input type="checkbox"/> Once clearance given, VRS to sweep both bound tunnel clearance before re-opening to public use. <input type="checkbox"/> Inform LTM and VRS to commence Tunnel re-opening <input type="checkbox"/> Remove response plan and close IR and release VRS and LTM when no longer required	<input type="checkbox"/> Update Traffic Watch	<input type="checkbox"/> Seek confirmation from Police or SCDF scene commander or RAMS engineer-in charge that recovery and repair process has completed and it is safe to open. <input type="checkbox"/> Update DDIT and permission to re-open Tunnel. (9668 3651) <input type="checkbox"/> Once permission given to declare incident stand down and instruct OE to commence opening of Tunnel <input type="checkbox"/> Update KPE & CMG
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ATTACHMENT 3

ESCALATION OF INFORMATION ON INCIDENTS



¹To exclude those who are on leave

²Some 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)

³Disaster – Please refer to the LTA CMG Minor Disaster List

⁴For 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

