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<h2>Handling System Failures</h2>		

ITSO/OCC/SOP/AOP03.003	Handling System Failures
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DOCUMENT CONTROL

REV	DOCUMENT TITLE & COPY NUMBER	Date	Prepared by	Reviewed by	Approved by
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2	Handling System Failures 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 major system failure. The failure of any of the system may cause a major disruption to road traffic operations and in some cases result in the closure of tunnel operations.

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 Localized Power Failure

- 3.1.1 Localized power failure refers to a power loss caused by a trip in ITSO own power facilities and not an external power source loss.
- 3.1.2 When a localized power failure occurs, the emergency panel, emergency generator or UPS system will take over the power distribution until the localized power failure is rectified.
- 3.1.3 For such a case where the emergency power supply takeover most of the systems, facilities and equipment function will not be affected but FC shall inform the contractor immediately to rectify the localized power failure, inform the ITSO maintenance representative and LTOC.
- 3.1.4 However, it must be noted that the tunnel boost lighting and line lightings may be affected. OE shall send RC and/or LTM to check on the lighting levels in the tunnel and warn motorist using the tunnel of defective lightings and to reduce speed. This warning shall be given via the TTPs, TIPs and TEPs leading to the tunnel and in addition DyAM shall inform traffic watch to broadcast warning message over the radio.
- 3.1.5 If the emergency power system does not take over and other ITSO systems are affected, DM and OE must inform police, LTOC and mobilize available resources to close the tunnel(s). DyAM shall inform traffic watch of current situation and advise on the closure messages to be broadcasted.
- 3.1.6 Suspend all pending and active Roadwork request and dispatch the RC/LTM to immediately stop all ongoing expressway Roadwork.
- 3.1.7 DM shall escalate the incident to higher management via sms.

Sub-Section 3.2 Total Power Failure

- 3.2.1 Total power failure refers to a power loss in power supply caused by external power source such as Power Grid. This could be an area power loss (Power Grid sub-station) or island wide power loss.

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- 3.2.2 For an area power loss not affecting ITSO or Tunnel, all OCC activities will resume as normal except tunnel(s), expressways and EMAS arterial corridors roadwork's affected by the area power loss.
- 3.2.3 DM and DyAM shall assess the operational impact and decide the best course of actions needed.
- 3.2.4 For expressways affected by the area trip; if the street lightings, TTPs and TIPs are affected, advise motorist via traffic watch to reduce speed, suspend and/or stop all road works for the area.
- 3.2.5 FC shall report and liaise the power failure to Power Grid
- 3.2.6 Notify police of the area power trip and the affected area major traffic light junctions. FC shall inform the respective traffic light contractors of the affected traffic lights.
- 3.2.7 For area trip affecting ITSO and Tunnel the emergency panel, emergency generator or UPS system will take over the power distribution for ITSO and tunnel.
- 3.2.8 For such a case where the emergency power supply takes-over, most of ITSO and tunnel systems, facilities and equipment function will not be affected.
- 3.2.9 However, it must be noted that the tunnel boost lighting and line lightings may be affected. OE will send RC or LTM to check on the lighting levels in the tunnel and warn motorist using the tunnel of defective lightings and to reduce speed. This warning shall be given via the TEPs, TIPs and TTPs leading to the tunnel and in addition inform traffic watch to broadcast warning over the radio.
- 3.2.10 FC shall inform Police and traffic light contractors of the affected traffic light junctions.
- 3.2.11 If the emergency power distribution does not take over and other ITSO systems are affected, DM and OE must notify police and mobilize available resources to close the tunnel(s). DyAM shall inform traffic watch of current situation and advise on the closure messages to be broadcasted
- 3.2.12 Suspend all pending and active Roadwork request and dispatch the RC/LTM to immediately stop all ongoing expressway Roadwork.
- 3.2.13 For all scenarios DM shall escalate the incident to higher management via sms and FC shall inform the respective systems and equipment contractors to standby because upon power recovery there might be a sudden surge that may cause their equipment to be damaged.

Sub-Section 3.3 Partial System Failures

- 3.3.1 Partial system failures can be described as failure within a system but the system still has a 60% functioning ability e.g. the IW in fallback mode, or failure of a subsystem e.g. one Regional Computer group.
- 3.3.2 For partial system failures, FC shall inform the relevant and respective contractors to immediate rectification following the allocated response and downtime. FC shall also inform the respective ITSO system representative.

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- 3.3.3 DM and OE shall assess the operation impact and implement the best course of actions such as suspend all roadwork requests and stop ongoing road works (except for works that are of higher priority such as the safety of motorist).
- 3.3.4 For partial disconnections of surveillance cameras and/or IW total failures, DM and/or DyAM shall inform ADO to dispatch RC to patrol the affected portion of the expressway on an hourly interval.
- 3.3.5 For partial lighting failure, DyAM shall advise motorist to reduce speed via the VMS and traffic watch to broadcast to the radio.
- 3.3.6 For all partial failures DM shall escalate to the higher management via SMS.

Sub-Section 3.4 Total Systems Failure

- 3.4.1 Total systems failure refers to a complete 100% failure of all systems or a group of systems.
- 3.4.2 In the event of a total systems failure in ITSO OCC all Road works shall be suspended or stopped. DM, DyAM and OE shall dispatch available resources and notify police for tunnel(s) closure due to lighting failure
- 3.4.3 TP, LTOC and traffic watch shall be informed. All available resources shall be activated to patrol all the expressways every 30mins
- 3.4.4 FC shall activate all relevant contractors and respective ITSO maintenance representative.
- 3.4.5 DM shall escalate to the management via sms using the DM handphone.
- 3.4.6 For a total communications failure, DM and OE shall use all alternative means of communications (including personal handphone) with the RC, LTM, Internal and external agencies.

Section 4. Abbreviations

CMG	Crisis Management Group
DyAM	Deputy Assistance Manager
EMAS	Expressway Monitoring Advisory Service
ITSO	Intelligent Transport Systems Operations
LTA	Land Transport Authority
LTM	Land Transport Authority Traffic Marshals
LTOC	Land Transport Operations Control
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

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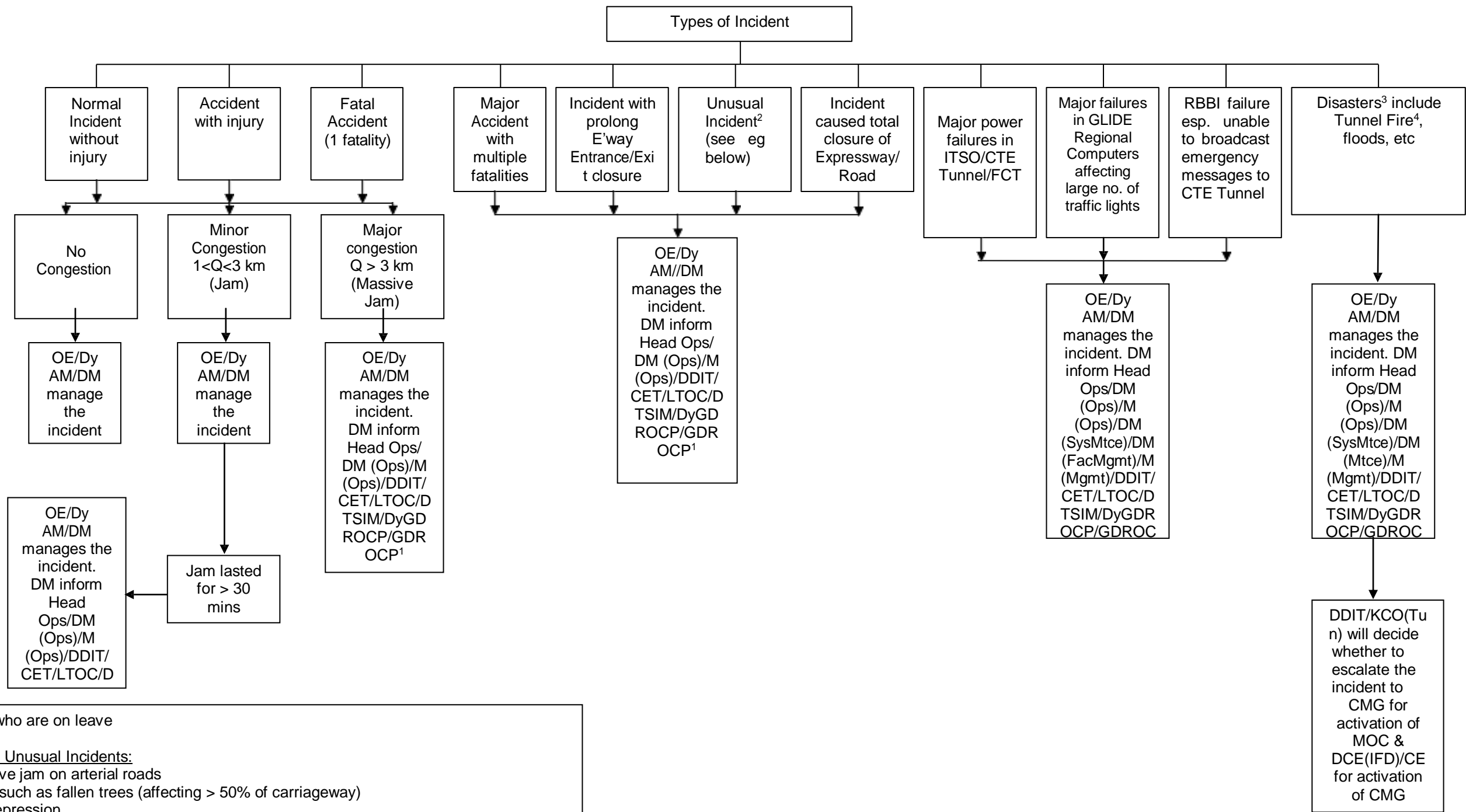
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SCDF Singapore Civil Defense Force
 TM Traffic Management
 TP Traffic Police
 VRS Vehicle Recovery Service
 VMS Variable Message Signs

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ATTACHMENT 1_

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) Extreme road depression
- (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

