



# Chapter 5

## Congestion Relief Measures

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### Introduction

5.1 The implementation of congestion relief measures during an incident is time-critical. Prompt traffic diversion can stop accumulation of vehicles at specific spots, and prevent the congestion from spreading to other portions of the transportation network. Dissemination of timely traffic information, on the other hand, facilitates travellers to avoid the congested region by changing their travel plans, such as their choice of route or destination, departure time and transport modes. In addition, traffic management measures such as traffic signal control and contra-flow arrangements can ease the congestion during and after an incident.

### Key Departments and Current Practices

#### *Police*

5.2 Police officers on the ground have first-hand information about the traffic conditions and incidents that occur within their regions. They also obtain information about incidents through "999" emergency calls. However, the different Police regions or Regional Command and Control Centres do not have information about the traffic conditions of the transport network outside their domain.

5.3 We note that the Police have command over traffic diversion through formulating and implementing traffic diversion plans, taking control over signalised junctions by manual control of the traffic light by a field officer, and directing traffic at strategic locations to enhance vehicular flow.

### ***Transport Department***

5.4 We understand that the Transport Department (TD) uses different devices to collect real-time traffic information. One of the prime sources of such information is the Closed-Circuit Television (CCTV) system. Currently, there are 544 CCTV cameras installed at strategic locations to give TD a general overview of the traffic conditions across the territory. However, there are many "blind spots" in the CCTV system, such as the affected location at Prince Edward Road East, that have to be supplemented by information from the Police on the ground.

5.5 Incidents that occur on free flowing key routes, in particular road tunnels, can be detected by Automatic Incident Detection (AID) technology. At the moment, detection devices are installed in some road tunnels<sup>5</sup> and the Tsing Ma Control Area to detect incidents which result in slow moving or stagnant traffic, so that instantaneous response can be made by the operators.

5.6 In addition, the journey time to the three road harbour crossings is measured by the Journey Time Indication System (JTIS) through tracking the

5 AIDs are currently installed at the Eastern Harbour Crossing, Western Harbour Crossing, Aberdeen Tunnel, Airport Tunnel, Tate's Cairn Tunnel, Tai Lam Tunnel, Shing Mun Tunnels and Tseung Kwan O Tunnel.

position and general speed of a fleet of buses equipped with Global Positioning System (GPS), supplemented by video images captured by cameras at strategic locations, thus showing the speed of vehicles.

5.7 There are also loop detectors embedded underneath the roadway. They are used to collect traffic information.

5.8 Apart from the above devices, TD obtains traffic information from sources such as public transport and tunnel operators, as well as the Integrated Call Centre.

5.9 On traffic control, TD liaises with the Police on diversion arrangements and plans contra-flow arrangements in the case of prolonged road closure<sup>6</sup>. To prevent the building up of traffic queues, TD adjusts the traffic signals through the Area Traffic Control (ATC) System to provide more green time for the diversion routes. TD also alerts tunnel operators to monitor the traffic situation and take prompt actions to enhance the traffic flow within their tunnels.

5.10 On transport arrangements, TD liaises with bus companies on bus diversion plans, and alerts the railway operators to monitor the transport demand and strengthen train services when there is serious congestion.

<sup>6</sup> Contra-flow arrangements may not be effective short-term relief measures because of the lead-time required to remove the barriers, especially in cases where there are concrete central dividers.

### *Highways Department*

5.11 Apart from the Police and TD, the Highways Department (HyD) helps to facilitate early reopening of the roads by carrying out emergency repair and removing blockages on the roads. HyD also assists the Police, TD, other works departments and utility companies to decide on the course of actions; gives advice on the duration of an incident that involves their expertise; and plans for the reopening of the road.

## Areas for Improvement and Recommendations

### *Data Collection*

5.12 We note that the three major incidents occurred at approximately the same time in separate locations with traffic interaction. As a result, neither TD nor the Police had the overall picture of the traffic situation individually. Insufficient real-time data hinders planning and implementation of diversion plans in a holistic manner to achieve the maximum effect.

5.13 **For immediate improvement, it is important for the Police and TD to update and supplement each other on traffic information. We recommend using an incident map to collate information from different sources so that the severity and spread of congestion can be better assessed.**

5.14 Taking advantage of the technology that Hong Kong has already deployed, TD could explore the feasibility of using loop detectors underneath the roadway to collect real-time traffic data. If it is feasible, TD may consider widening the coverage of these detectors along traffic sensitive or public transport sensitive routes in the future .

5.15 In the longer term, we recommend improving the coverage of the CCTV system, especially along traffic sensitive or public transport sensitive routes. The concept of deploying mobile CCTVs can also be explored to make the data collection process more effective. This is in line with some public suggestions.

5.16 We also recommend that TD explore the feasibility of deploying a fleet of probe vehicles, probably buses and other public transport vehicles installed with GPS, to measure the network travel time and speed. The JTIS has already adopted this approach to estimate the travel time through different cross-harbour tunnels. We have received similar suggestions in this respect.

5.17 In addition, we recommend that TD examine the possibility of developing a system based on Geographical Information System to display real-time traffic information in the form of a Traffic Speed or Queue Map. It provides a convenient way to observe the growth of traffic congestion over time and space, as well as the spread of congestion in the region surrounding the incident site. This graphic display of traffic congestion will be useful for early detection of an incident, and for devising and monitoring the effects of diversion and signal control plans around the scene.

### *Traffic Management*

5.18 At the moment, traffic diversions are mainly formulated and implemented by police officers on the ground. TD only comes into play when prolonged road closure or more elaborate diversions are involved.

5.19 **As mentioned in Chapter 3, we recommend that joint coordination and steer between the Police and TD under the Joint Steering Mode be triggered by some agreed parameters to oversee and respond to the situation. Jointly developing the diversion routes would mean that the issues of the feasibility of the plan, staffing concerns, as well as the bigger picture of traffic management around the affected region can be addressed at the same time.**

5.20 **To enhance the ability to manage traffic during an incident, we recommend that TD develop a set of contingency plans on incidents occurring on traffic sensitive or public transport sensitive routes as mentioned in paragraph 3.26.** The manpower and logistical arrangements in the plans will help ensure adequate police officers to be deployed at major junctions to direct traffic, prevent emergency vehicles from being trapped in the congested traffic and relieve congestion to shorten the queue.

5.21 We have received a suggestion that the Government should conduct debriefings on incidents for bureaux and departments as frequently as the situation warrants. **We agree that there are merits for such debriefings so that lessons learned from an incident can be consolidated for future reference to enable better handling of similar situations in the future.**

5.22 In the future, we recommend that TD can explore the feasibility of developing a computerised expert-system-based incident management system. It can be used to monitor incidents and the traffic conditions of the affected areas, and help select and implement pre-programmed signal control strategies or diversion plans which are prepared based on contingency scenarios and lessons learned from past incidents. ETCC staff can fine-tune the pre-programmed plans based on real-time traffic conditions. All the data pertaining to how traffic evolved over the course of the incident, together with the control and management strategies adopted, will be logged in the computer system for future reference and improvements.

### *Traffic Impact Assessment*

5.23 One key factor in formulating an effective response is the incident duration and its resultant impact on traffic. Indeed, the activation of the Fixed Mode ETCC and its escalation to the Joint Steering Mode also rely on such an assessment.

5.24 Whereas the duration of an incident is estimated by the staff of the involved departments at the scene, its impact on traffic is assessed by TD, relying mainly on the experience of the staff involved.

5.25 To improve the accuracy of the traffic impact assessment, it is useful to develop a systematic way to learn from past experiences. **We recommend that records involving the types of incidents, their duration, clearance time,**

responses, resultant traffic conditions, extent and spread of congestion, as well as other important parameters be stored in the form of an Incident Database for evaluation and analysis.

5.26 In the longer term, with the development of a real-time computer-aided dispatch system as described in paragraph 4.43, the process of maintaining the Incident Database can be automated for easy access and retrieval.

5.27 Based on actual cases in the Incident Database, as well as contingency plans developed, traffic models can be developed and applied to provide a priori estimates of the traffic impact in terms of delay, spread and extent of congestion, etc. These a priori assessments will be useful for identifying critical sites, and for issuing early alerts should incidents occur.

### ***Measures to Facilitate Diversion***

5.28 We understand that on 9 May 2005, the Government departments experienced difficulty in diverting some motorists to use alternative routes and getting some buses to change routes due to objection of passengers. Understandably, such reactions were, to a great extent, due to the inclement weather and the lack of rail network around the congested area. Besides, some motorists and bus passengers preferred to stick to their original routeings and destinations because they were unfamiliar with the alternative routes.

5.29 There are suggestions that if a particular area is too congested, franchised bus services to the area should be suspended, or bus drivers should skip certain bus stops during emergencies. Given that these measures would give rise to serious disruption to the scheduled bus services, they should not be taken lightly. In particular, whether there are alternative modes of transport along the congested route has to be considered.

5.30 We also note suggestions that bus companies should provide special bus services on diverted routes to ferry passengers accumulated in the congested area. We understand that it has been the practice of bus companies to adjust the frequency of their services and implement bus diversion plans if such are required. The effectiveness of this method depends on the reaction of the passengers.

**5.31 To facilitate diversion arrangements, we recommend that more information and guidance be given to motorists on the alternative routes. On the other hand, prior arrangements and procedures should be established with public transport operators to ensure that bus route diversions are feasible and acceptable to the passengers on board. In addition, the information disseminated to passengers should be improved. The role of the bus regulators engaged by the bus companies to liaise with passengers under emergency situations should be strengthened. More training and clear guidelines for handling traffic congestion and incidents should be given to them.**

5.32 We also note that it took quite a long time to implement contra-flow arrangements at Prince Edward Road East. There is a suggestion that emergency openings be provided at central dividers at intermittent locations of major roads. We understand that such emergency openings are already available. **We recommend that Government should consider whether to increase its provision taking into account the financial and safety implications.**

5.33 We have received suggestions regarding the provision of better signages for traffic diversion. While this will facilitate diversion, it will be a more viable measure for planned incidents. However, for emergencies, such signages would be difficult to manage. TD may consider the feasibility of using mobile Variable Message Signs as mentioned in paragraph 6.11(i) to achieve the same effect.

### ***Recovery Management***

5.34 We consider that while a lot of actions are taken to clear the site and divert traffic at the height of the emergency, follow-up actions after the clearance of the site should not be overlooked.

5.35 **We recommend that traffic management measures such as diversion should continue to be adopted even after the clearance of the site to ensure that traffic will return to normal in a smooth and swift manner. New alternative routes may need to be tailored to the evolving traffic situation in the aftermath of an incident. Besides, TD should continue to monitor the traffic conditions in the affected region and adjust the traffic signals through the ATC System for**

effective queue management and dissipation.

## ***Road Design and Rail Network***

5.36 There are a number of suggestions related to enhancement of the road design and rail network, such as reviewing the adequacy of relief roads, incorporating the concepts of network connectivity and reliability in planning and constructing the road networks and building more rail lines. Some also comment that while the north-south bound roads in Kowloon are more developed, the east-west bound roads are not adequate. They consider that there is a need to increase the capacity for east-west bound traffic.

5.37 While we recognise that the unavailability of diversion routes had contributed to the serious congestion on 9 May 2005, and the lack of rail network in central-eastern Kowloon had made diversion even less feasible, the planning and provision of this long-term infrastructure is outside the Task Force's ambit.