Sopra Steria Asia Pte. Ltd.
3 Fusionopolis Way, #12-20
Symbiosis, Singapore 138633
Tel : (65) 6578 9988
Fax: (65) 6578 9989
www.soprasteria.sg
Incorporated in Singapore (Reg. No.:199908036K)

Singapore, 13 February 2019
Land Transport Authority
181 River Valley Road #04-00
Intelligent Transport System Centre (ITSC)
Singapore 179034

Attn: Mr. Oh Kok Wee
Engineer's Representative

Our Ref No: CTT231/SSA/D19.001.000/(19/036)

CONTRACT TT231
UPGRADING OF I-TRANSPORT SYSTEM
SUBMISSION OF KAP REPORT (PLANNED EVENT) (VERSION B)

Dear Sir/Mdm,

Please find attached to this letter the official submission of the following document:

1. **TT231 – KAP Report (Planned Event) (Version B)**

   Document Ref: CTT231/SSA/D19.001.000/KAP/RPT
   Version: B
   Dated on: 13 February 2019

Yours faithfully,

Oscar Jiang

Project Manager

Encl

KAP Report (Planned Event)

Land Transport Authority

Contract Reference: TT231

Upgrading of i-transport System

Sopra Steria Asia Pte. Ltd.

Contact:

+65 65789988

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Version A	25 Nov 2018	Initial Submission
Version A Revision 2	04 Jan 2019	Version A Revision 2
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Version B	13 Feb 2019	Final Submission

Authorisation

	Name	Title
Prepared by	LYU Min	Traffic Engineer
Reviewed by	Oscar JIANG	Project Manager
Approved by	HOR Chee Sung	Deputy Programme Director

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KAP Report (Planned Event)

1. Introduction

1.1. Overview

This document is a centralized reference for operational requirement specification for planned event in the upgraded i-transport, including the description of workflow, graphical user interface functionalities, geographical map features, knowledge domain, rules of plans and special cases for planned events. Business intelligence (BI) related requirement for planned event will be documented in separate UNA BI report. This document is the product of the Knowledge Acquisition Process (KAP) and User Need Analysis (UNA) which was jointly conducted by Sopra Steria Asia Pte Ltd (SSA) and Land Transport Authority (LTA).

1.2. Tender specifications

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Cohesive Operation S

Pages from
20_TT231 - TS03 - Sy

1.3. Scope

This document contains the detailed description of operational requirement and knowledge based (KB) rule based on workflow of the following types of planned event:

1) Planned Road Event
2) Planned Off-road Event
3) Planned Road Closure (road works)
4) New Development

1.4. User groups

Table 1.1 User Group Definition

User Group	Description
OCC Operators (Ops)	In charge of handling incidents
Event Planner (EPL)	In charge of handling on road / off road events
Traffic Operation Planning (TOPL)	In charge of handling planned road maintenance and new development events

1.5. Abbreviations

Table 1.2 Abbreviations

Code	Description
1M	One Motoring
AE	Adjoining Expressway
AER	Affected Equipment Range
BI	Business Intelligence
EMAS	Expressway Monitoring Advisory System
EAC	EMAS on Major Arterial Corridor
EO	Event Organiser
ER	Event Record
GLIDE	Green Link Determining System
GUI	Graphical User Interface
IR	Incident Record
ITPT2	i-Transport 2
KAP	Knowledge Acquisition Process
KB	Knowledge Base
LTA	Land Transport Authority
OCC	Operation Control Centre
PGS	Parking Guide System
RTC	Road and Transportation Committee
SCATS	Sydney Coordinated Adaptive Traffic System
UNA	User Need Analysis
VMS	Variable Message Sign

2. Knowledge acquisition process & user need analysis sessions

Various rounds of KAP sessions conducted with planned event team and planned road works team to refine the requirements. Some requirement are captured during UNA sessions. The table below provides the summary of the sessions.

Table 2.1 KAP & UNA Planned Event Sessions

S/N	Topic	Date
KAP session 6	• Planned event introduction • Current practice	1 Aug 2018
KAP session 7	• Off road event workflow • On road event AER • End Event • Conflict ERs	8 Aug 2018
KAP session 8	• VMS grouping • VMS message content discussion • Message structure standardization • Parameters to be sent to iSprint • Conflict ERs • Planned event category	15 Aug 2018
KAP session 9	• ER creation via uploading • Road closure definition • AER discussion on planned event and planned work works • 1st cut of VMS KB proposal • Area naming convention	21 Aug 2018
KAP session 10	• Planned event report • Ad-hoc message • Planned road works workflow	4 Sep 2018
KAP Recap Session 1	• Review of on road event requirement • Compare past year plans • Discussion on digitalisation of plans provided by event organizer	8 Oct 2018
KAP Recap Session 2	• Review of planned event requirement • Requirement to highlight important junctions • Canning message • SOP checklist and cue table	11 Oct 2018
KAP/UNA Recap Session 1	• GLIDE plan discussion • Surveillance camera requirement • KPI measurement • Wrap up planned event requirement	14 Nov 2018

3. Planned road event

3.1. Overview

The workflow of planned road event (road closure)can be summarised as below:
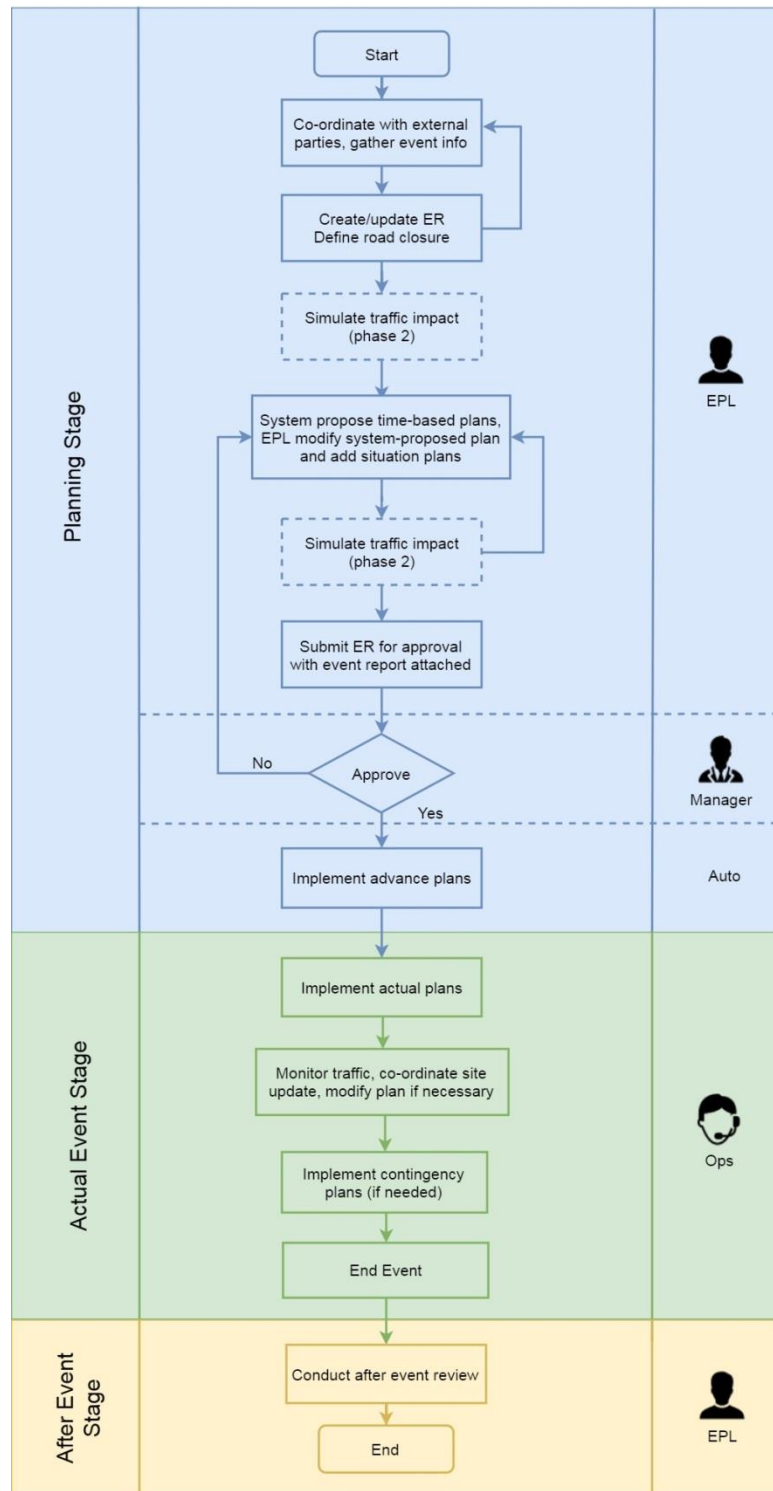
Note: The activity in dashed box is optional

Figure 3.1 Planned Road Event Workflow

Some plans for the event are supposed to be proposed / launched by KB, while some requires manual input / implementation. System responsibility during planning stage and actual event stage are summarised in the tables below:

Table 3.1 Plan Generation Responsibility Table for Planned Road Event

Plan Generation	Advance	Actual	Contingency
VMS plan (time-based)	KB	KB	KB
VMS plan (situation-based)	N.A.	EPL	EPL
GLIDE plan (time-based)	N.A.	EPL	N.A.
GLIDE plan (situation-based)	N.A.	EPL	EPL
Mobile Camera plan	KB to propose junctions requiring mobile cam		
Radio Broadcast	KB	KB	Ops
Canning Message	N.A.	KB	Ops
OBU Message	N.A.	KB	KB

Table 3.2 Plan Implementation Responsibility Table for Planned Road Event

Plan Implementation	Advance	Actual	Contingency
VMS plan (time-based)	Prompt + Auto	Prompt + Ops	Prompt + Ops
VMS plan (situation-based)	N.A.	Ops	Ops
GLIDE plan (time-based)	N.A.	Prompt + Auto (Verify by Ops)	N.A.
GLIDE plan (situation-based)	N.A.	Ops	Ops
Mobile Camera plan	Contractor to deploy mobile cam		
Radio Broadcast	Auto	Auto	Ops
Canning Message	N.A.	Auto	Ops
OBU Message	N.A.	ERP2	Ops+ ERP2

3.2. Pre-planning stage

3.2.1   Event record creation

Event planner (EPL and TOPL) can create new event record by clicking the button on event panel.
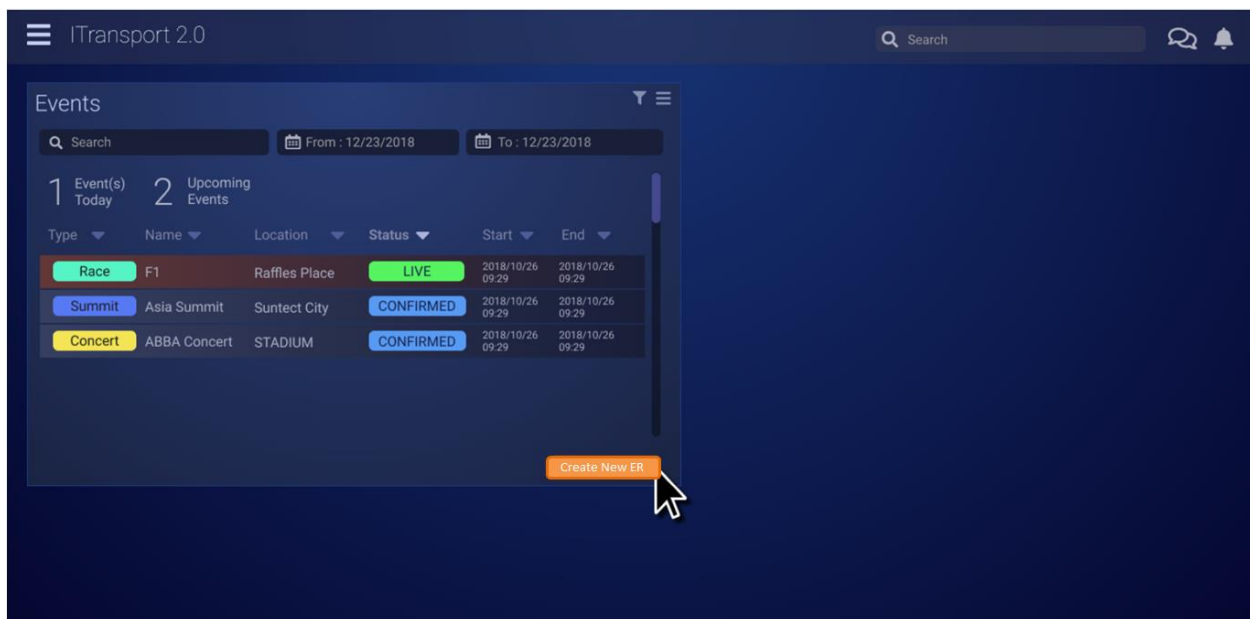
Figure 3.2 Event Record Creation

3.2.1.1 Pre-filling ER fields from excel template

Uploading function will be provided to allow EPL to upload an Excel file with the event information provided by the event organiser. The Excel file will contain necessary restrictions and instructions like pre-defined dropdown list, data type/length validation, input message when a cell is selected, error alert after invalid data is entered, worksheet/workbook protection etc. The restrictions will be further confirmed with EPL team during design phase. The dropdown list value will be provided and maintained by LTA.

3.2.1.2 Event basic info tab

The following information will be uploaded into ER as basic information of the event:

1) Event title
2) Event date & time
3) Event organizer (e.g. Singapore Press Holdings, HiVelocity Events Pte Ltd)
4) Event owner
5) Event supporter (e.g. SportSG, Health Promotion Board)
6) Event location
7) Event type (e.g. Running/Cycling/Walkathon, Other Sport Event, Street Festival or Bazaar, Promotion of Commercial Products, Other)
8) Closure purpose
9) Number of spectators / participants
10) Public hotline: Number(s), Operation dates & hours
11) Person(s) in charge: Name(s), Contact number, Command post contact number
12) LTA Divs point of contact: Name(s), Contact number

The details will be finalized with LTA in the design stage.

3.2.1.3 Duplicate from historical ER

LTA shall be able to create a new event by duplicating from the existing / historical ER and edit on the basis of the duplicated ER. The event basic information listed in Section 3.2.1.2 will be duplicated except road closure, event location and event time, as well as all the plans including VMS messages, radio broadcast messages, OBU messages etc.

3.2.2 Road closure definition

3.2.2.1 Road closure parameter

The second tab of the uploading template is the road closure table which defines the road stretch and the date/time to be closed by a series of points. The point can be defined by the any of 4 sets of the parameters below:

1) Road name + lamp post number
2) Junction box number
3) Bus stop number
4) Latitude + Longitude

Note that there might be a limitation to use lamppost number + road name to define road closures due to incomplete/inaccurate data. SSA found out from the past event sheets shared by LTA that the lamppost number and road names provided by the event organizer cannot be found in UMH2.0 (lamppost info referential). It is either the data is not up to date in UMH2.0 or the event organizer gave wrong information on the lamp post and road name. SSA will further confirm on this at the design stage.

Road closure can be defined using the information below and generated by GIS route engine, users shall provide full information of all the 5 parameters below:

1) A series of points using any one of the 4 parameter sets above
2) Direction, indicated by the sequence of points
3) Lanes to be closed
4) Closure date/time
5) Re-open date/time

Some shortcuts will be provided to simplify the road closure definition process, details will be finalised during design stage:

1) A checkbox indicating if the full stretch of road is closed will be provided to simplify the road closure definition process without defining multiple points.
2) A checkbox indicating if all lanes are closed will be provided to simplify the road closure definition process without selecting all the lanes to be closed.

3.2.2.2 Define road closure via uploading

Similarly to the event basic information, road closure can be defined via uploading function as well. The template with necessary data field and dropdown list values will be finalized in the design stage. EPL and TOPL can upload road closures by pressing "Upload Road Closure" (Figure 3 below).

3.2.2.3 Define road closure via GIS

Alternatively, EPL as well as TOPL can define and modify directly from the system. The exact lane closures can be specified within Road Closure tab. By Clicking on the circular green buttons user can toggle if lane is closed or not. Right clicking on the toggle will allow user to delete the lane (Figure 3 below). Corresponding GUI functionality will be provided and details of GUI will be finalized during design stage.
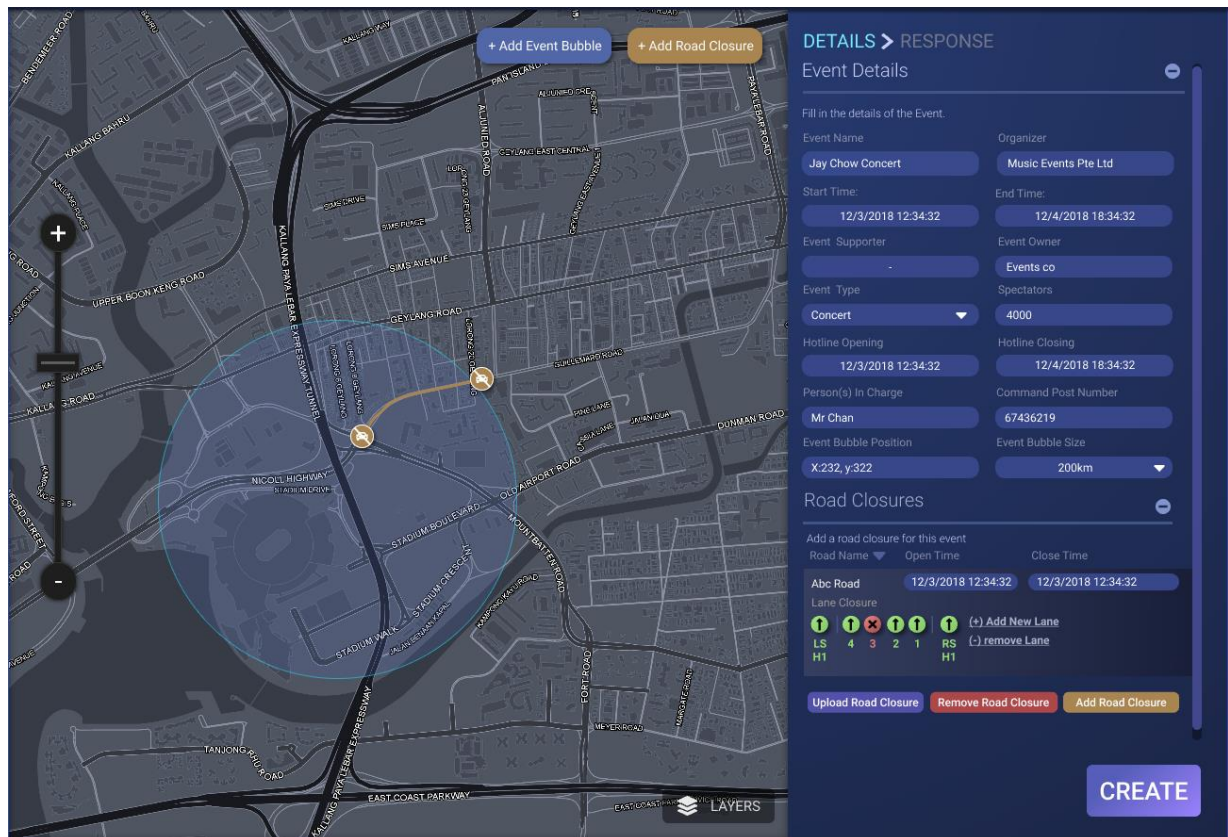
Figure 3.3 GUI Mock-up for Event Basic Info, Road Closure Definition and Area-of-Influence

3.2.2.4 Conflict ER logic

System shall prompt event planner (EPL and TOPL) if the new ER road closure has overlapping with other ERs in the same time period. The details of conflict ER logic is to be finalized during design stage.

3.2.3   Attachment for additional information

Plans from external parties and agencies could be uploaded by users as attachment for information, including but not limited to:

1) APO plan
2) Barricade plan
3) Pedestrian diversion plan

4) Bus diversion plan

5) Portable VMS and messages

6) Traffic advisory plan

7) Shuttle bus plan

8) Evacuation plan

9) Event route

10) Snapshot of event

System can support uploading the attachment in format below and the name of attachment is up to EPL to decide. The total size of attachment is limited to 20MB per event record due to storage constraint.

1) PDF

2) JPG

3) JPEG

4) DOC

5) DOCX

6) PPT

7) PPTX

3.2.4 Area-of-influence definition

Area-of-influence defines the boundary of area that the traffic situation within it is highly likely to be affected by the event and needs to be closely monitored. Area-of-influence is a circle with 3 options of radius: 4km, 8km, 12km. EPL and TOPL has the flexibility to adjust the location of circle on GIS and select the suitable radius from the 3 options. Radius is adjustable to any desired value by management level. The GLIDE site, VMS (including VMS for KPE & MCE and short tunnel equipment) and cameras within the area-of-influence will be automatically highlighted.

Note: IW in ITSC OCC is not able to control equipment in KPE / MCE. System shall provide the function to allow users (both EPL and TOPL) to plan the VMS on KPE/MCE equipment which ITSC OCC has no control on, and send the plans over to KPE/MCE side for their implementation via email service within i-transport.

3.2.5 Affected Equipment Range (VMS)

Affected equipment range (AER) of VMS of planned on-road event will be composed of 2 parts.

Part 1: If the road closure is on expressway or EMAS arterial road (EA) or the closure end point interfaces with expressway EMAS arterial road (EA), standard total closure KB AER applies.

Table 3.3 Total Closure Affected Equipment Range

Road type of closure / the road interface with closure	Standard total closure AER on main carriageway	Standard total closure AER on adjoining road
Expressway	7/7 rule	2/2 rule
EMAS Arterial Road (EA)	2km + 1VMS + 4km	1VMS at entrance

Part 2: The rest of the VMS within area-of-influence.
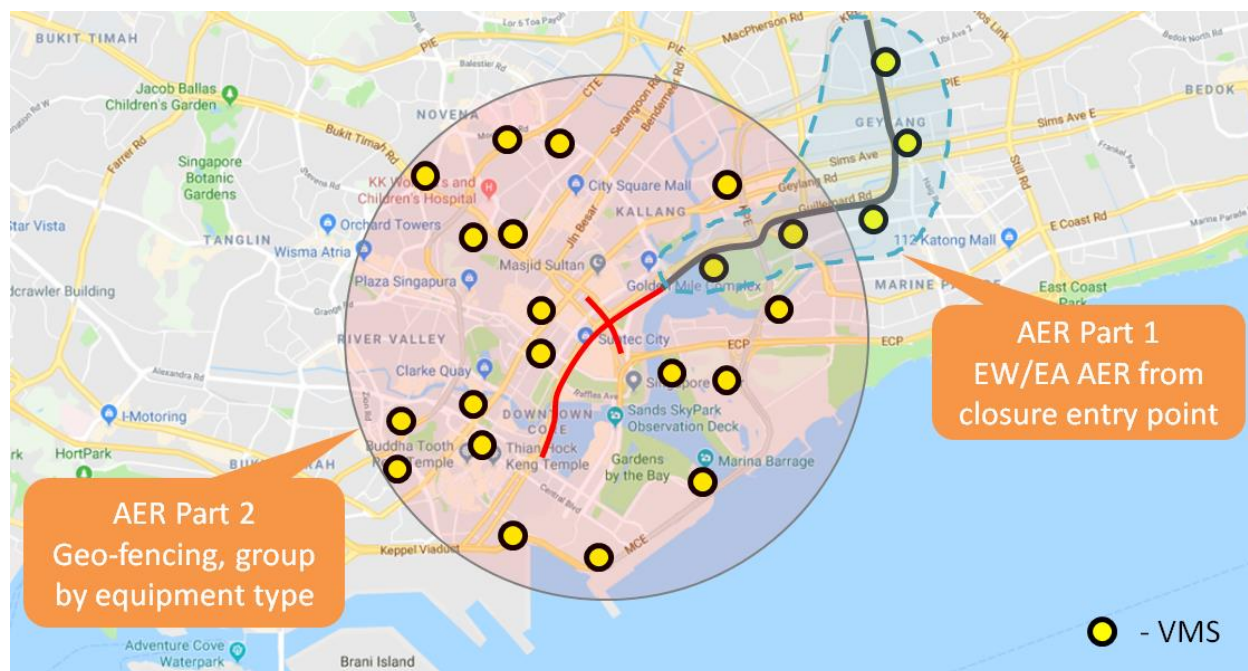
Figure 3.4 Illustration of 2 Parts of Affected Equipment Range

3.2.6 Corridor / junctions to be monitored

A list of base junction and base corridor will be provided by LTA. System shall automatically highlight the base junctions and base corridors within area-of-influence. Corresponding configuration page will be provided. The base junction and base corridor is a general configuration and shall be configurable in both configuration page and ER level to allow EPL and TOPL to add/delete junction and corridor. The changes made in ER will be saved in ER level without affecting the base corridor and base junction list.

For on-road events, on top of base junctions / corridors, the junctions interfacing road closure needs to be highlighted as well.
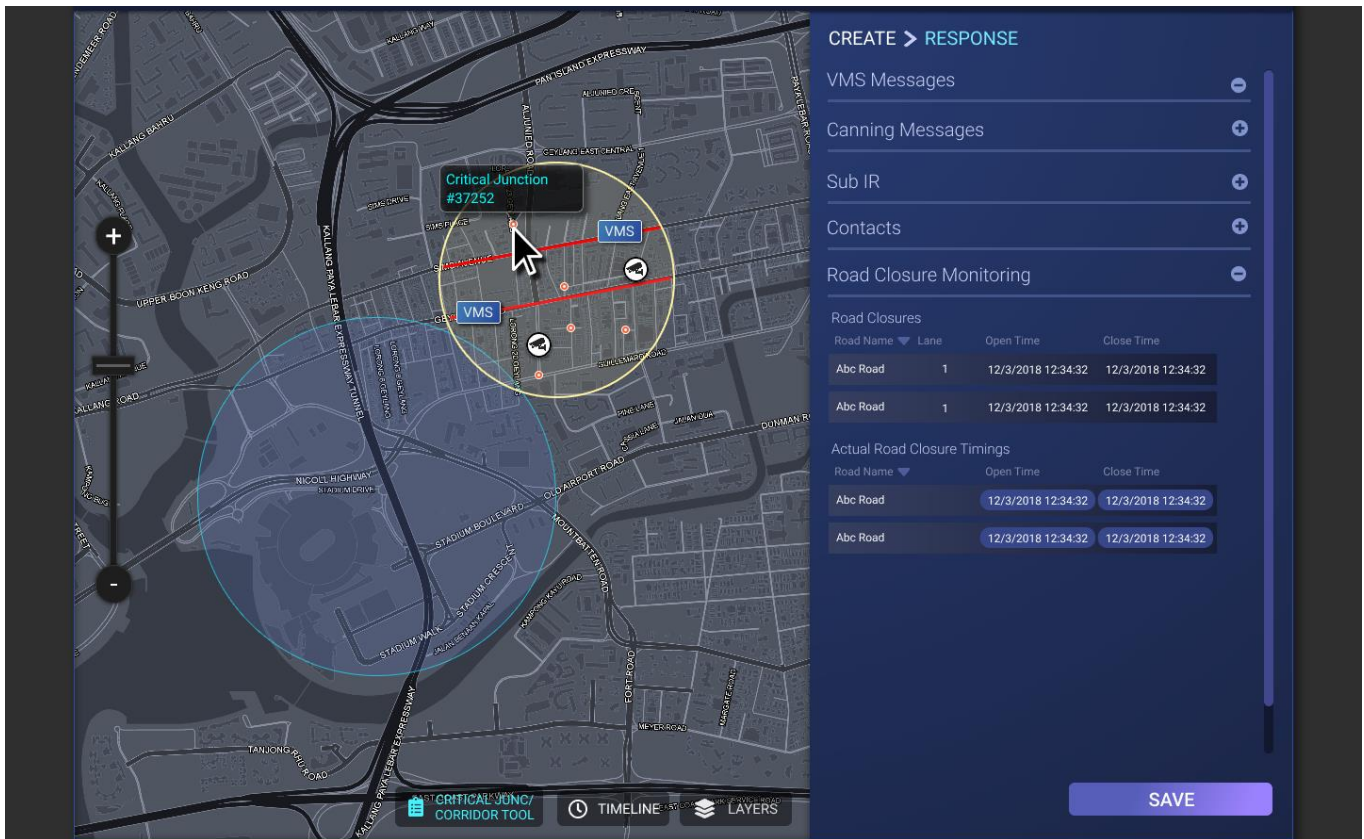
Figure 3.5 Critical Junction Monitoring

3.2.7 iSprint simulation (Phase 2)

Parameters that EPL requests to send to iSprint are as below, including but not limited to:

1) Event timing

2) Event date

3) GLIDE phase split and cycle length

4) Queue length

5) Travel delays

6) Message

7) Lane closure

Details will be discussed in phase 2.

3.2.8 RTC report generation

Please refer to UNA BI report for more details.

3.3. Planning stage

3.3.1 Time-based VMS plan – proposed by KB

VMS message of event can be categorised into 2 types: time-based messages with pre-defined time-frame, and situation-based messages for ad-hoc situations. The comparison of the 2 types of VMS messages are summarized as below:

Table 3.4 Comparison between Time-based Plan and Situation-based Plan

	Time-based Message	**Situation-based Message**
Definition	General event / road closure message with display time, implementation can be scheduled.	Location-specific message without display time, implementation is up to OpsOps judgement.
Example	• Advance message • Countdown message • Closure message • Alert of contingency message	• Implementation of general contingency message • Congestion message • Carpark full message
Handle by	Display time scheduler set by EPL, implementation / alert for implementation is from system.	Pre-defined plan, to be activated and launched by Ops

Time-based VMS plans usually refers to the advance message, actual message and some of the generic contingency message plans. The similarity and difference of implementation the 3 time-based stages are summarized in the table below:

	Advance	**Actual**	**Contingency**
Date	✔	✘	✘
Time	✔	✔	✘
Message	✔	✔	✔
Logo	✘	✔	✔
Start display time	✔	✔	✔
End display time	✔	✔	✘
Prompt to OPS	✔	✔	✔
Implementation	Auto launch	By OPS	By OPS

Figure 3.6 Comparison of Time-based VMS Plan of Different Stages

Figure 3.7 uses a particular VMS to further illustrates the differences and similarities in message structure of 3 stages.

Figure 3.7 An Example of Time-based VMS Plan of Different Stages

The first cut of time-based VMS message will be proposed by knowledge base (KB) as the basis of VMS plan. OCC planning can further edit based on plan proposed by KB. One set of time-based VMS plan is composed of several components:

1) VMS Grouping
2) Date / Time
3) Message Content
4) Display Date / Time

Figure 3.8 The Components of VMS Plan

As illustrated in Figure 3.8, by confirming the components above, the VMS plans of advance, actual and contingency stages can be easily composed by combining the necessary components. This section summarises the logic and rules of VMS grouping, VMS message date/time, VMS content and display date/time for KB to propose time-based situations plans.

KB will first propose 1st cut of message, the system also allow users to use/add in any type of VMS as long as they are defined and available in the system by clicking the 'New VMS Plan'. SSA to explore the feasibility to define template for each of the equipment except TIP, CVMS and RVMS in design stage.
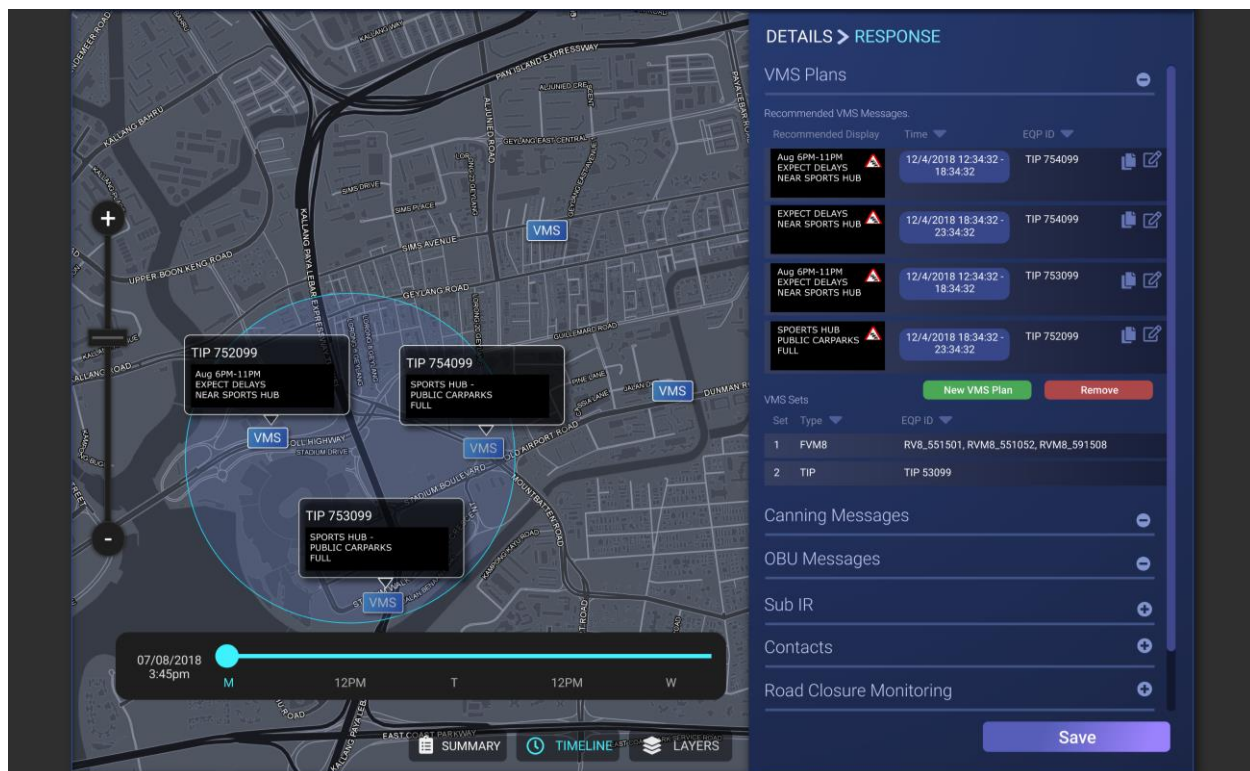
Figure 3.9 VMS Plan of Event Record

3.3.1.1 Logic of VMS grouping

As mentioned in 3.2.5, for the road closure on expressway / EMAS arterial road (EA) or interfacing with expressway / EMAS arterial road (EA), standard total closure KB rule for affected equipment range (AER) and message content applies.

The rest of VMS within area-of-influence and facing closure area shall be grouped by VMS type.

3.3.1.2 Logic of date / time on VMS

The scenarios for event date/time can be categorised into 5 types:

1) Single day, single time period. For example: 21 Sep 10:05pm-11:45pm

Upgrading of i-transport System
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2) Single day, multiple time periods. For example: 21 Sep 12pm-4pm, 6pm-9:30pm

3) Multiple day, single time. For example: 21 Sep 10pm-22 Sep 9:30am

4) Multiple day, same time. For example: 21-23 Sep, 7:30pm-9:30pm

5) Multiple day, different time. For example: 21 Sep 7:30pm-9:30pm, 23 Sep 8pm-10pm

The date/time for VMS in AER part 1(as defined in 3.2.5) is the date/time of the expressway / EMAS arterial (EA) to be closed or interfacing with road closure. The rest of the VMS shall only display the generic rule. Please refer to Section 3.3.1.3 for more details.

This section will standardize the date/time pattern for different type of VMS. The generic rule to follow for the date / time of 5 scenarios mentioned above are:

1) Rule 1: Date and time information will be proposed in yellow colour.

2) Rule 2: Date and time information will be aligned left.

3) Rule 3: System shall propose 'DD MMM' format for single date event; 'DD & DD MMM' for 2-day event in the same month; 'DD – DD MMM' for event lasting for more than 2 days in the same month; 'DD MMM & DD MMM' for 2-day event cross 2 months; 'DD MMM & D MMM' for event lasting for more than 2 days consecutively in 2 months.

4) Rule 4: The time will be in 12-hour format 'hh:mmam-hh:mmpm'. For example, '10:30am-10:30pm'. Rule 5: When the event start and end time are both before / after midday, system shall automatically omit the first am/pm. For example, '21 Jan 04:30pm-11:30pm' should be proposed as '21 Jan 4:30-11:30pm'

5) Rule 5: The leading 0 (if any) shall be automatically removed to save space for both date and time. For example, '05 Jan 09:30am-09:30pm' should be proposed as '5 Jan 9:30am-9:30pm'.

6) Rule 6: The minutes part – ':mm' - should be automatically removed if the time is on the hour. For example, '05 Jan 09:00am-11:00am' should be proposed as '5 Jan 9-11am'.

7) Rule 7: When there is no enough space for date and time, system shall automatically wrap the date time into next line. Hyphens are supposed to be broken. For example: when there is no enough space for '21 Jan 09:30am-09:30pm' in RVMS, system shall propose the date/time as shown below:
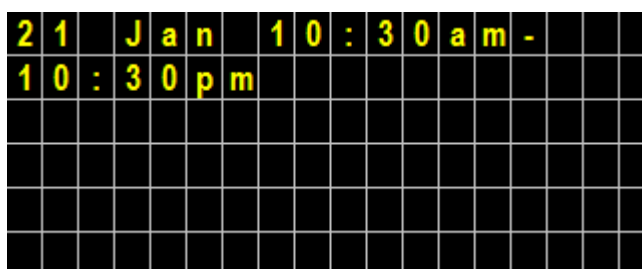
Figure 3.10 An example of Rule 8

8) Rule 8: Date and time will be truncated for further adjustment from EPL / TOPL when there is no enough space in whole VMS.

3.3.1.3 Logic of VMS content

As defined in 3.2.5, affected equipment range consists 2 parts, the message content logic is different as well :

Part 1: If the road closure is on expressway or EMAS arterial road (EA) or the closure end point interfaces with expressway EMAS arterial road (EA), standard total closure KB AER applies. The VMS in part 1 are affected because of the road closure on expressway / EA or the road closure interface with expressway / EA, even if some VMS are not in the area-of-influence. Therefore, the message to be displayed in these VMS shall be specific to the closed expressway / EA or the road connected to expressway / EA. In Figure 10, part of EAC 55 is closed, so the VMS within the standard EA total closure AER along EAC 55 shall display the message of 'Nicoll Hwy, Esplanade Dr closed'.

Part 2: The rest of the VMS within area-of-influence. Different from AER part 1, this part of VMS are to be monitored because they are within the area where traffic situation is highly likely to be affected. Instead of indicating a particular road is closed, the VMS of AER part 2 shall be proposed with a generic road closure message taking all the roads to be closed into consideration. The system shall automatically convert the list of road closure into area name when there is no enough space in VMS to list down all the closure road names, given that the mapping between road name and area name is provided by LTA. In Figure 10, the VMS in AER2 shall display the message of 'Nicoll Hwy, Esplanade Dr, Ophir Rd closed' when there is enough space to fit without hyphenation, else, display using area name ' Marina Centre closed'.

Figure 3.11 VMS Message Proposal for Different AERs

In addition to the 2 rules above, there are some other generic rules to follow:

1) Rule 1: Event message should be proposed in white colour.

2) Rule 2: Event message should be aligned left, starting from the next line of date/time (if any).

3) Rule 3: System shall automatically wrap the event message into next line.

4) Rule 4: Event message will be truncated for further adjustment from EPL / TOPL when there is no enough space in whole VMS.

3.3.1.4 Logic of VMS display time

The advance message for event on weekend and weekday are treated separately considering the fact that the traffic flow profile can be different. Actual day message is always on the actual day from 12am until the road re-open time. The rule of VMS display time for single day event are summarized below:

1) Rule 1: For single day event happen on weekdays except Monday, advance message shall start to display 2 days in advance of the first day of the event, 12:00am-11:59pm. Actual message shall display from 12am of event day until the road re-open time. (as shown in Figure 12)
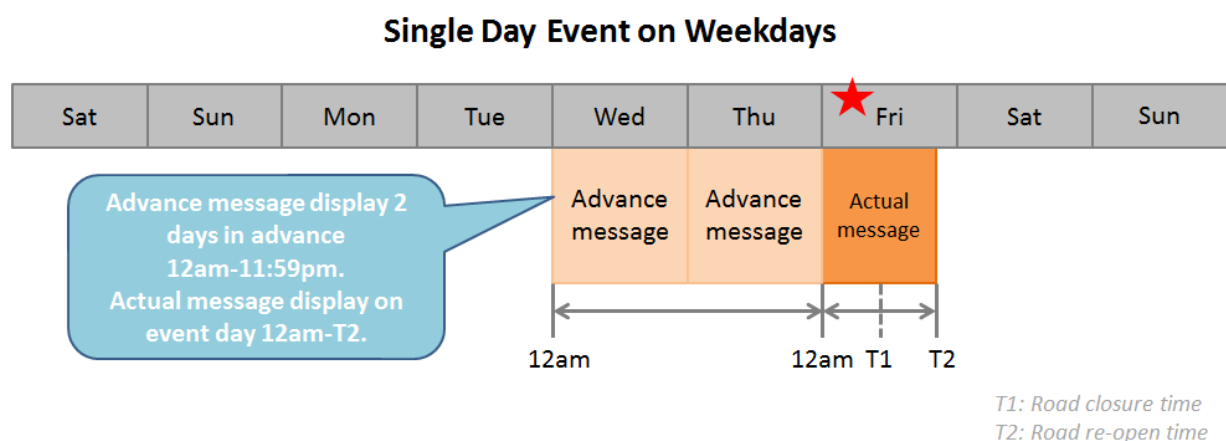
Figure 3.12 Single Day Event on Weekdays (except Monday)

2) Rule 2: For single day event happen on weekend, advance message shall display on the Saturday or Sunday of the week before event and 1 day in advance of the first day of the event, 12:00am-11:59pm. Actual message shall display from 12am of event day until the road re-open time. (as shown in Figure 13, Figure 14)

Single Day Event on Saturday
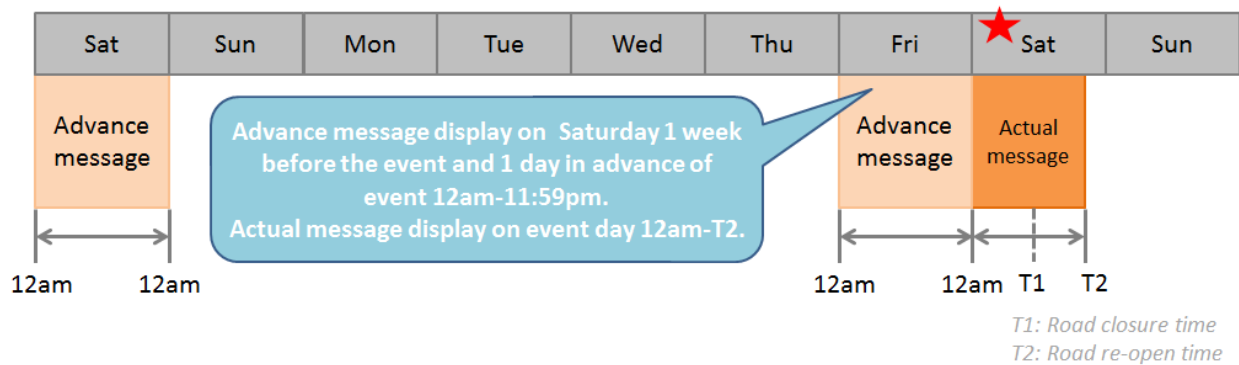
Figure 3.13 Single Day Event on Saturday

Single Day Event on Sunday
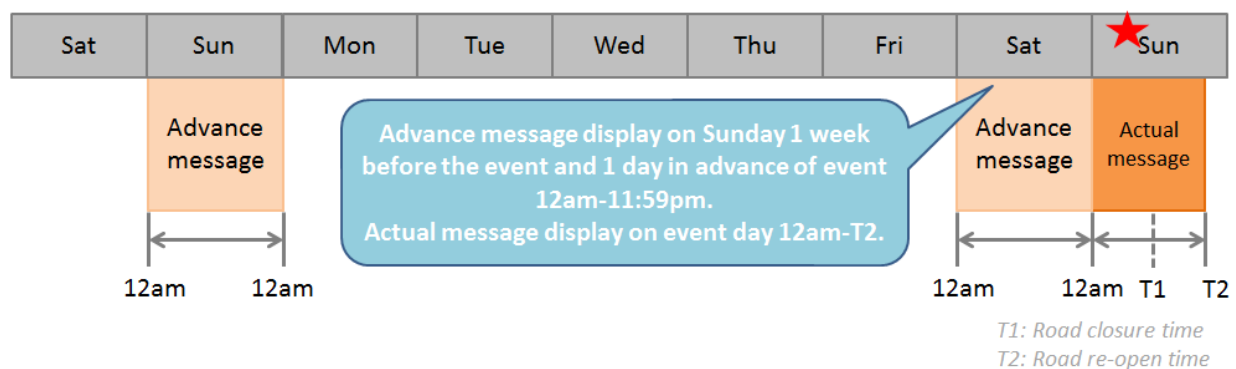
Figure 3.14 Single Day Event on Sunday

3) Rule 3: For single day event happen on Monday, advance message shall display on the Monday of the week before event and 2 day in advance (Saturday and Sunday), 12:00am-11:59pm. Actual message shall display from 12am of event day until the road re-open time. (as shown in Figure 3.15).

Single Day Event on Monday
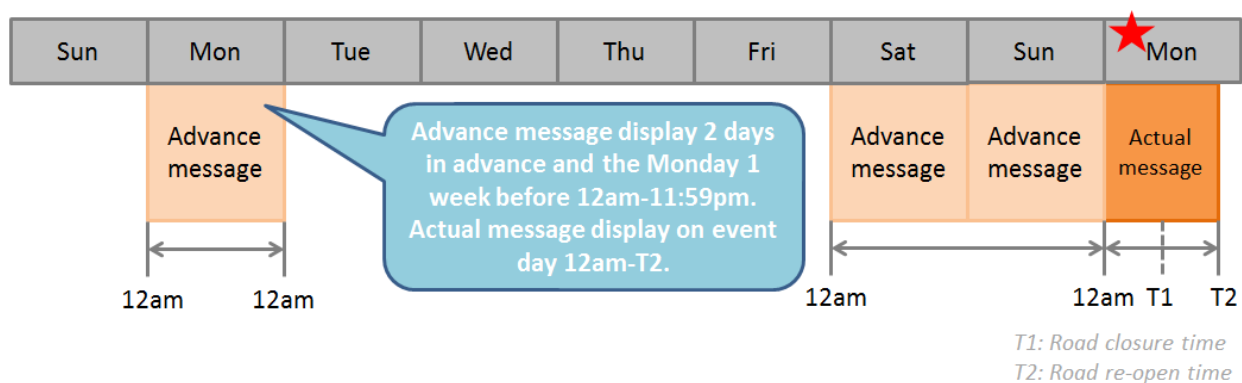
Figure 3.15 Single Day Event on Monday

4) Rule 4: For multiple days event, the advance message display time is the union display time of individual event day, 12:00am-11:59pm. Actual message shall display from 12am of event day until the road re-open time. Advance message of the next day shall start to display from road re-open time until 11:59pm. (as shown in Figure 3.16, Figure 3.17, Figure 3.18, Figure 3.19 and Figure 3.20). Actual message / contingency message will automatically take over actual message when there is overlapping.
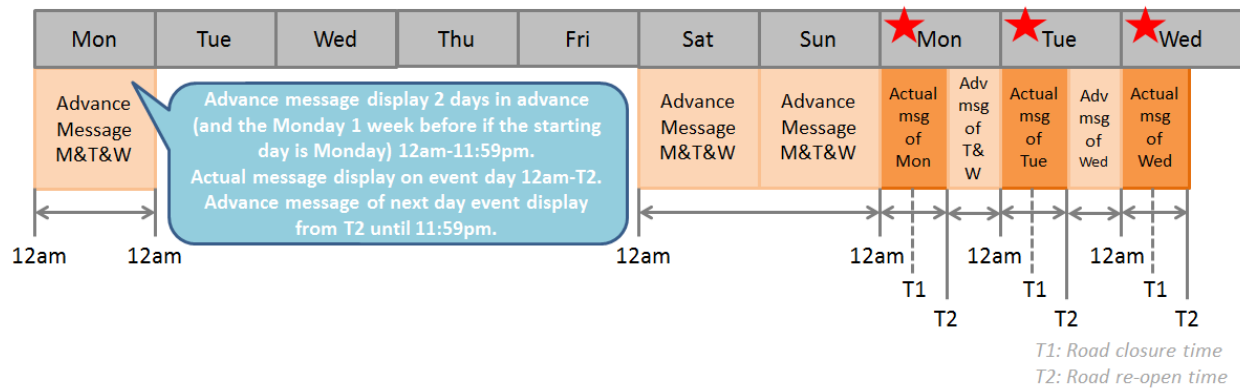
Figure 3.16 Multiple Days Event on Weekdays
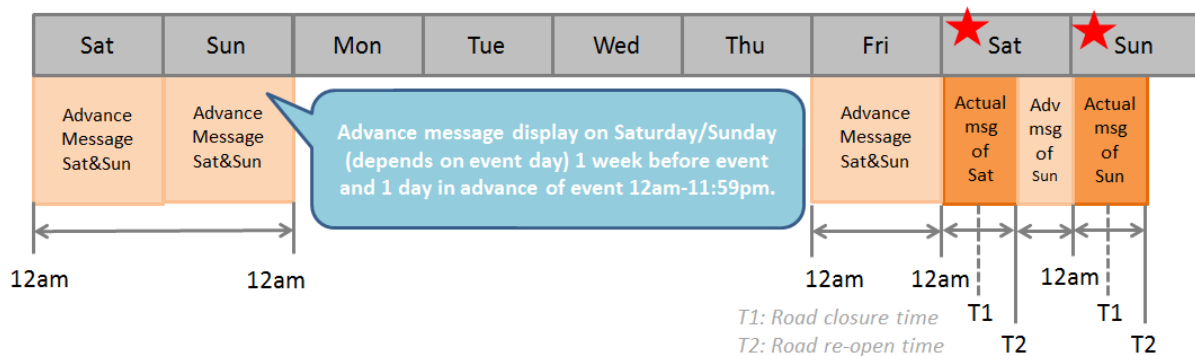
Figure 3.17 Multiple Days Event on Weekend
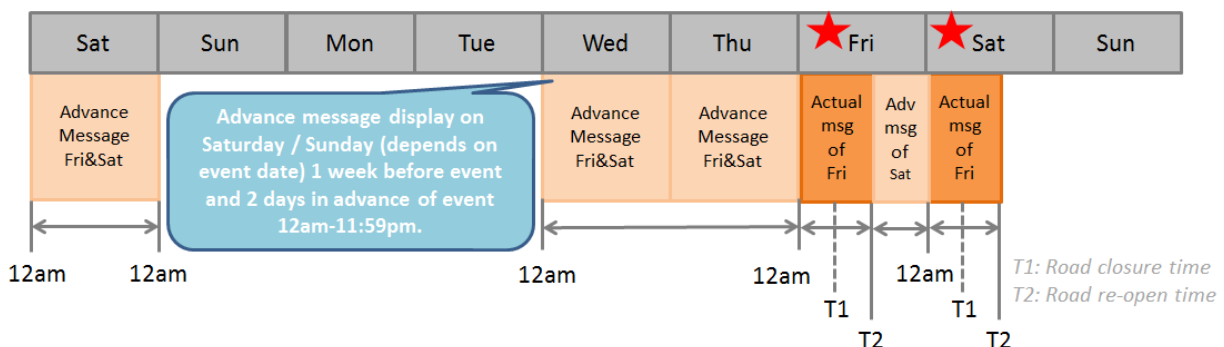
Figure 3.18 Multiple Days Event on Weekend and Weekday

Multiple Days Event on Weekday and Monday
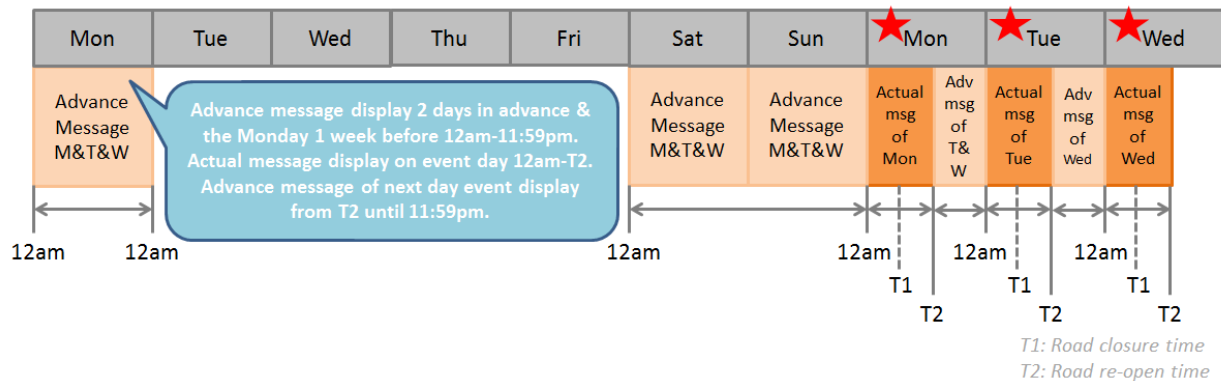
Figure 3.19 Multiple Days Event on Weekday and Monday

Multiple Days Event on Weekend and Monday
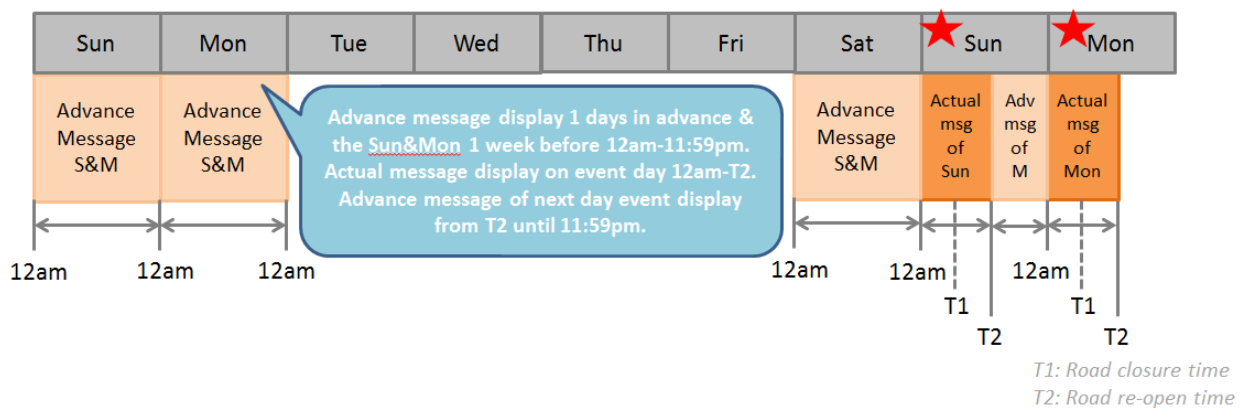
Figure 3.20 Multiple Days Event on Weekend and Monday

5) Rule 5: When event includes Monday and the Saturday / Sunday before Monday is the starting day, system shall not propose message for Monday (-1 week) to display advance message.

Corresponding configuration page will be provided for users (both EPL and TOPL) to configure the rule of advance message display time. The is a globe shall be applicable for all the event records regardless ER types. The configurable parameters are as shown in the table below, the details and UI will be finalized during design stage:

Table 3.5 Advance Message Display Time Configuration

Day	Criteria 1	Criteria 2
Monday	1 day before event	Same day 1 week before
Tuesday	2 days before event	
Wednesday	2 days before event	
Thursday	2 days before event	
Friday	2 days before event	

Day	Criteria 1	Criteria 2
Saturday	1 day before event	Same day 1 week before
Sunday	1 day before event	Same day 1 week before

3.3.1.5 Logic of comparison with past year plans

A search function will be provided for EPL to search the desired historical event to compare the VMS message in similar situation. System shall offer search suggestions and autocomplete the search result before user has even finish typing based on the historical event names in database. The filters for event searching function shall include:

1) Search bar to type event name
2) Dropdown list of event type
3) Time frame with selection of year/month/date/time.

For each VMS, system shall allow user to compare up to 5 historical VMS plans. Corresponding GUI functionality will be provided and details of GUI will be finalized during design stage.

3.3.1.6 Logic of conflict VMS usage

System shall highlight the VMS that has been booked with another event with necessary information of another event, including:

1) VMS number
2) Event record number
3) Event date
4) Display time
5) Person-in-charge

Event planner shall negotiate with other event planners when there is conflict VMS usage. VMS is considered as in use from 2 hours before display start time to 2 hours after display end time.

		Upgrading of i-transport System
sopra steria		KAP Report (Planned Event)
CTT231/SSA/D19.001.000/KAP/RPT	Version B	32
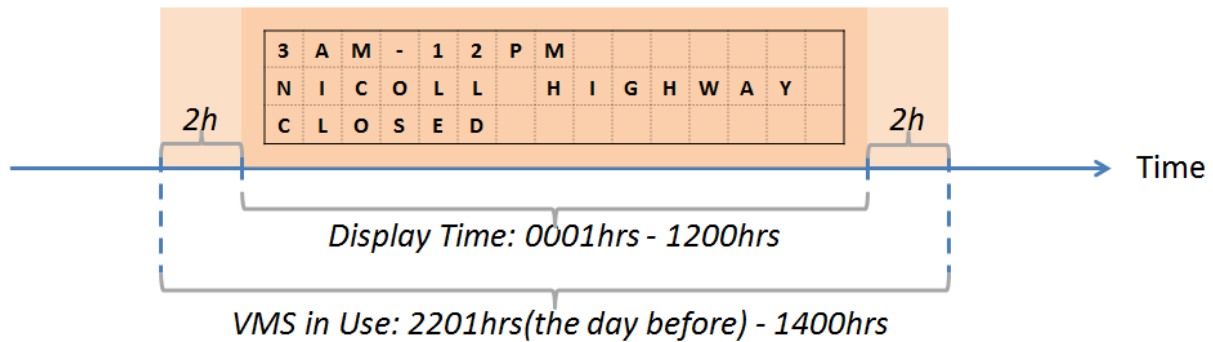
Figure 3.21 VMS in Use Illustration

3.3.2 VMS Plan – amended or defined by EPL

EPL can always modify the VMS plan on the basis of VMS plan proposed by system, the modification can be done includes:

1) Group VMS and create new plan for the VMS group
2) Add / delete VMS from the existing VMS plan proposed by system
3) Re-schedule existing VMS plan proposed by system
4) Amend content of existing VMS plan proposed by system
5) Enable advisory

The advisory shall be appended to the VMS message once enabled by EPL. The advisory can be one of the following:

1) Pls use public tpt
2) Expect delays
3) Pls use alt route

3.3.3 Situation-based VMS plan

Situation-based plan is the pre-defined plan to handle the incident on specific locations or other ad-hoc situation like carpark full. Instead of using the system-proposed / scheduled VMS plan for the IR, EPL prefer to have a pre-defined plan for the incident on specific locations and launch the plan when it happens during a planned event or after event. EPL can group the desired VMS and edit the content, the process is similar to create a new set of VMS plan but without a display time for a specific situation. The VMS will only be launched based on Ops judgment of the real situation.

3.3.4   GLIDE plan

GLIDE plan for event is only applicable in actual stage. As mentioned in 3.2.6, base junctions and base corridors within in area-of-influence will be highlighted automatically. There junctions are usually required to be closely monitored. Corresponding GLIDE plans will be defined for these junctions.

3.3.4.1 Time-based GLIDE plan

Similarly to the time-based VMS plan, time-based plan is the GLIDE plan for a single or a collection of junctions in the same reginal computer (RC), also as known as action plan, These action plans will be scheduled in the scheduler in SCATS. The i-transport system shall prompt Ops during event for the automatic implementation of actions plans in scheduler. No actions required from Ops, the prompt is just for information.

3.3.4.1 Situation-based GLIDE plan

Similarly to the situation-based VMS plan, incident plans in incident manager are pre-defined for some specific situations at specific locations. These incident plans in incident manager can only be implemented by Ops when the specific junction is detected as a hotspot junction with high degree of saturation (DS) or with unusual congestion detection (UCD) alarm. The planning and implementation of incident manager plans are requested to be done through i-transport system. Due to the limitation of SCATS, only basic functions can be called directly from i-transport without opening SCATS. The implementation of incident manager plan is up to Ops judgement. The operations that can be remotely done in i-transport are listed as below:

1) Apply an incident plan – normally this would just be to apply the ON action list then, after duration is completed, apply the OFF action list.
2) Get details of action lists – these could be shown to users but would probably need to be interpreted and turned into something meaningful.
3) Monitor the status of active incident plans – this includes seeing (and clearing) any errors that have occurred in any of the action lists.

To add, delete and modify incident plan are suggested to be done using SCATS access.

3.3.5   Mobile camera plan

The junctions fulfilling one of the logic below shall be identified as the locations requiring mobile camera surveillance support:

1) The signalised junction without J-eye
2) The un-signalised junction after an EA VMS

System shall be able to identified the junctions requiring mobile camera surveillance support automatically, provided that un-signalised junction information is available from GIS. From our understanding after checking with LTA, Mobile Cam Booking System is a separate system not interfacing with i-transport. Planners will be able to view the fixed camera from GIS but the information regarding the deployment of mobile cam will not be sent to i-transport.

3.3.6 Radio broadcast

Radio broadcast is applicable for both advance stage and actual stage. System shall propose the announcement of radio broadcast based on the template provided by LTA with necessary input from EPL including:

1) Nature of announcement
2) Duration of announcement (multiple): date, start time, end time and remarks
3) Frequency of announcement

Corresponding GUI feature for the data field above will be provided. The announcement will be sent to MediaCorp via the MediaCorp link in OCC. The EPL shall have the flexibility to edit the content. The template will be finalised with LTA during design stage.

3.3.7 Canning message

Considering that traffic updates in One Motoring is for real-time traffic information, only actual event message will be generated and updated in One Motoring. Similarly to radio broadcast, system shall generate the canning message with event logo based on the template provided by LTA. The EPL shall have the flexibility to edit the content. The template and logo will be finalised with LTA during design stage. Event logo to be displayed in One Motoring is subject to the modification on One Motoring side, which is not under i-transport 2.0 purview. Users shall have the option to active canning message or not for all type of planned events.

3.3.8 OBU message

Planned event OBU logic is defined by LTA but to be implemented under i-transport for actual and contingency stages only and for events with road closures. The logic shall follow the total closure OBU rule except that planned event will use event logo. The detail of the logic to be provided from LTA. Users (EPL and TOPL) shall also have the flexibility to select and group the link IDs and define the message for each set of link IDs.

3.3.9 Preview

EPL shall be able to see the VMS message, GLIDE timing, and mobile camera from GIS to have a holistic view of the event planning. A time slider bar will be provided in the bottom of GIS to allow preview of

different time periods. Event planner (EPL and TOPL) and management can now easily review the plans by scrolling thought the timeline. The equipment will update on the map in realtime. A summary panel is also provided at the top so management can easily see what is going on the VMS, CANNING, OBU and Road Closures. Management can also add notes on the right panel for operators to take note or actions. Management can then approve the plans by pressing "APPROVE" button.
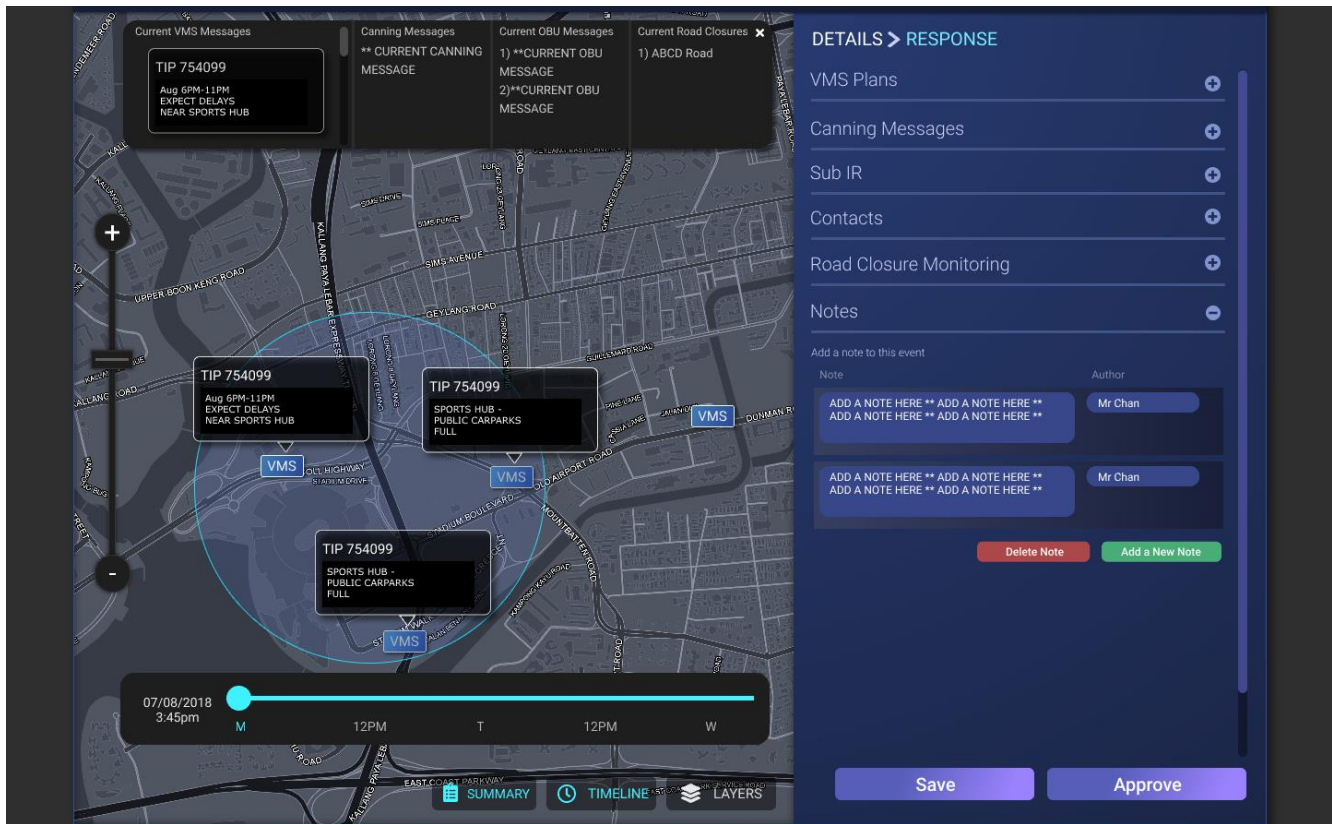
Figure 3.22 Event Record Preview

3.3.10 Event report

As the summary of the whole event, event report shall contain all the information of the event, including:

1) Event basic info
2) Road closure
3) VMS plan
4) GLIDE plan
5) Mobile camera plan
6) Radio broadcast announcement
7) Attachment (if any)

The template of the event report will be finalised with LTA in the design stage.

Upgrading of i-transport System
KAP Report (Planned Event)

3.3.11 Approval

The approval of the event and plans will be done through the system. The users from both EPL and TOPL shall configure the approval officer before submission by removing / adding approval officers from / to the default list of approving officers. The default approving officer will be pre-defined for each type of ER. Management level shall login to i-transport via their own account, preview the event and approve or reject the plan. An email can be trigger to management level as a notification by event planner (EPL and TOPL) when the event record is ready for review and approval .

3.3.12 Advance message dissemination

Advance message shall start to be implemented in the end of planning stage by scheduler. No action is needed from Ops or event planner (EPL and TOPL).

Similarly to unplanned event, system will provide planned event information (advance, actual and contingency) at disseminated module for external party usage.

3.3.13 OBU message dissemination

I-transport shall send all the link ID sets with message and display time 24 hours ahead of the event start time.

3.4. Actual event stage

3.4.1 Actual/contingency message dissemination

System shall prompt Ops for 15min/5min/1min before the road closure start and road closure end for Ops's awareness and Ops shall make their own judgement based on information from various channels like surveillance camera, coordination with event organiser on site and etc. For the roads to be closed / re-opened at the same time, system shall group them and prompt Ops only once.
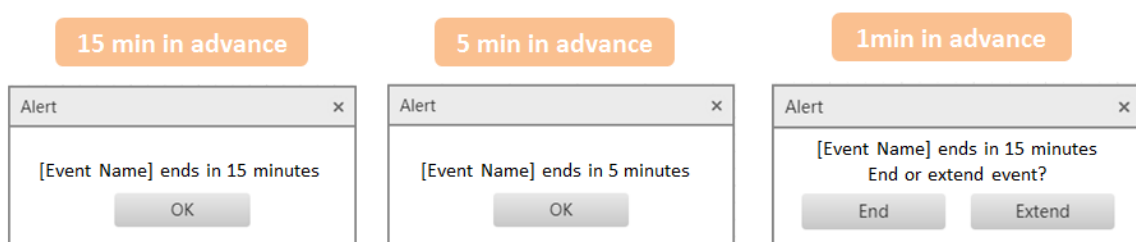
Figure 3.23 System Prompt Ops that Event Will End Soon

1) 'Extend' - contingency message implementation
2) 'End' - end ER, revert to default message
3)   No Action – the current message (actual event massage) will stay until further action is taken

3.4.2   GLIDE plan implementation

The action plans in scheduler will be automatically implemented with a prompt to Ops but no action needed from them. The GLIDE plans in 'Incident Manager' will need Ops judgement to decide when to implement.

3.4.3   Traffic situation monitoring

After event goes live, Ops shall monitor the incident as per normal IR creation. IR can be related to ER, and the linkage between IR and ER is based on Ops judgement. The incident type allowed to be linked to ER includes:

1) Heavy Traffic
2) Accident
3) etc.

A checkbox shall be provided to further indicate if the incident is major incident for 'Major Incident' section in Event Situation Report generation.

3.4.4   Standard operating procedure monitoring

Similar to the 'Monitor Tab' in incident record, a monitoring tab shall be provided with 2 parts:

1) Cue table to monitor the road close and re-open time
2) Response table to monitor the response time of external parties

3.4.4.1   Cue table

S/No	Location	Scheduled closure time	Actual closure time	Actual opening time	Remarks
01	Esplanade Dr twds Collyer Quay	2pm-11pm			
02	Bayfront Ave (Bayfront Bridge)	2pm-11pm			
03	Raffles Ave btw Temasek Ave & Nicoll Highway	2pm-11pm			
04	Republic Blvd & Republic Ave towards Raffles Ave (Permission to Park - PTP)	2pm-11pm			

Figure 3.24 An Example of Cue Table
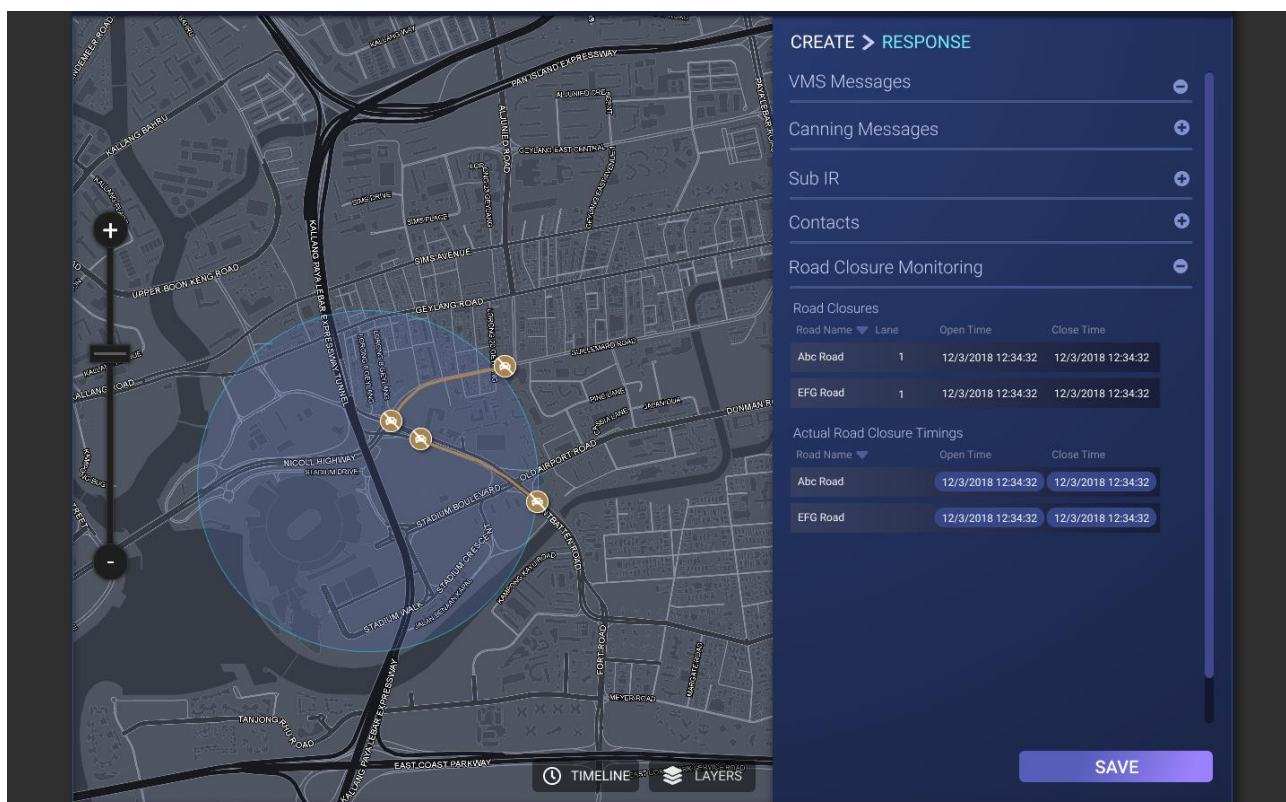
Figure 3.25 Road Closure Monitoring GUI

As shown in Figure 3.25, the road closure and time comes from the road closure definition in pre-planning stage. The actual closure and re-open time shall be logged automatically upon Ops clicking. The logic of 'Remarks' column is as below:

1) Actual opening time < Schedule opening time: 'Early opening'
2) Actual opening time = Schedule opening time: 'On time'
3) Actual opening time > Schedule opening time: 'Late opening'

3.4.4.2 Response table

Response table is to manage the external parties actions and ensure there is coordination established and resources available to respond to the event operations. It is for EPL to manually log the external parties' actions taken for ER. The external agencies include:

1) Public Utilities Board (PUB) – for flood/ sewage matters.
2) National Parks (NParks) –for tree pruning and falling matters.
3) National Environment Agency (NEA)- for spillage and cleanliness matters.
4) Singapore Power (SP) –for cable works matters.
5) Singapore Civil Defence Force (SCDF) – for emergency response/ evacuation matters.
6) Traffic Police – for traffic control devices (eg. signs, VMS, APOs), arterial towing and emergency response/evacuation matters.

7) Event organizer –for traffic control devices (eg. signs, VMS, APOs), arterial towing and emergency response/evacuation matters.

Please note that the external party responding to incident during event will be logged under IR (related to ER) as per normal.

3.4.5   Event situation report generation

Please refer to UNA BI report for more details. Before generation, EPL shall be able to select the desired incidents records to be included in the report.

3.5. After event stage

After event review will be conducted based on the After Action Review report. Please refer to UNA BI report for more details. Before generation, event planner (EPL and TOPL)shall be able to select the desired incidents records to be included in the report.

3.6. Special cases

There are 2 events that doesn't comply with any rules and are defined as special cases:

1) Formula 1
2) Singapore Air Show

System shall not propose any plan for these 2 events and EPL shall define the plans manually by themselves. However, EPL can duplicate from past year ER and amend the ER to save time. EPL shall be able to control PGS VMS in Formula 1.

4. Planned off-road event

4.1. Overview

The workflow of planned off-road event (no road closure) can be summarised as below:
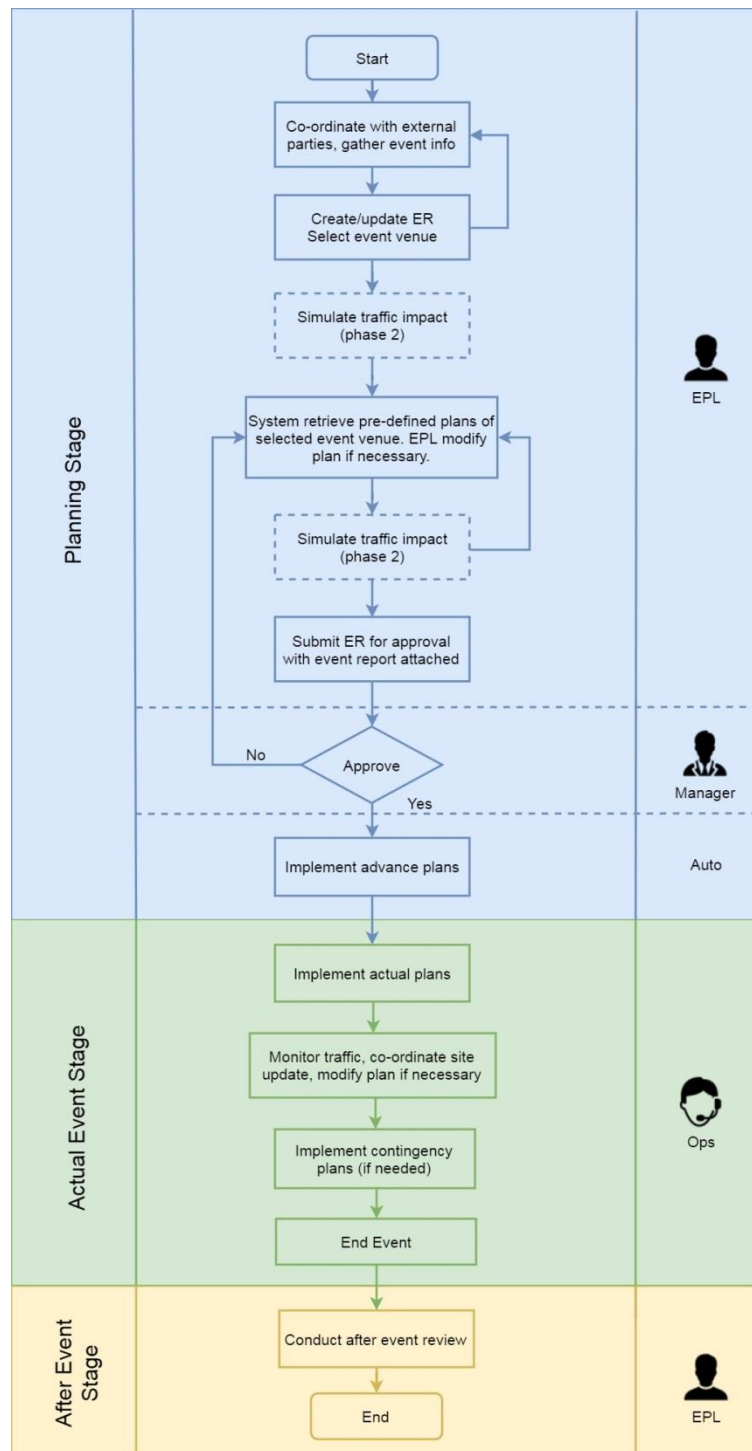
Figure 4.1 Planned Off-Road Event Workflow

Note: The activity in dashed box is optional .

Different from planned road event which involved road closure, off-road event happens in the known event venue, which means the traffic impact and affected equipment range are more predictable and relatively fixed compared with planned road event. The plans can be fixed once the event venue is selected.

Some plans for the event are supposed to be proposed / launched by KB, while some requires manual input / implementation. System responsibility during planning stage and actual event stage are summarised in the tables below:

Table 4.1 Plan Generation Responsibility Table for Off Road Event

Plan Generation	Advance	Actual	Contingency
VMS plan (time-based)	KB*	KB*	KB*
VMS plan (situation-based)	N.A.	N.A.	KB*
GLIDE plan (time-based)	N.A.	EPL	N.A.
GLIDE plan (situation-based)	N.A.	EPL	EPL
Mobile Camera plan	KB to propose junctions requiring mobile cam		
Radio Broadcast	KB	KB	Ops
Canning Message (optional)	N.A.	KB	Ops

Note: KB* means pre-define in KB.

Table 4.2 Plan Implementation Responsibility Table for Off Road Event

Plan Implementation	Advance	Actual	Contingency
VMS plan (time-based)	Prompt + Auto	Prompt + Ops	Prompt + Ops
VMS plan (situation-based)	N.A.	N.A.	Ops
GLIDE plan (time-based)	N.A.	Prompt + Auto (Verify by Ops)	N.A.
GLIDE plan (situation-based)	N.A.	Ops	Ops
Mobile Camera plan	Contractor to deploy mobile cam		
Radio Broadcast	Auto	Auto	Ops

| Canning Message (optional) | N.A. | Auto | Ops |

4.2. Pre-planning stage

4.2.1   Event venue configuration

Currently, most of the off-road event happens at:

1)   Singapore Expo
2)   Sports Hub
3)   Gardens by the Bay
4)   Marina Bay Sands
5)   Sentosa
6)   Suntec City
7)   Marina Cruise Centre
8)   Etc.

The area-of-influence, affected equipment range, message content, affected GLIDE site and plans can all be pre-defined in event venue configuration page by EPL. EPL can add new event venue and define the related plans in configuration page. The changes of event venue made in configuration page will be saved permanently and be applied to the ER at the event venue from the change date onwards.

4.2.2   Event record creation

Similarly to planned road event creation, a planned off-road event record can also be created via uploading function. Refer to section 3.2.1, 3.2.2, 3.2.3 for more information.

4.2.3   Duplicate from historical ER

LTA shall be able to create a new event by duplicating from the existing / historical ER and edit on the basis of the duplicated ER. The event basic information listed in Section 4.2.2 will be duplicated except, event location and event time, as well as all the plans including VMS messages, radio broadcast messages, OBU messages etc.

4.2.4   Area-of-influence adjustment

As mentioned in 4.2.1, the area-of-influence is pre-defined by event venue. System will propose the pre-defined area-of-influence and EPL can adjust accordingly, same as section 3.2.4. However, the change made in ER will only be saved in ER level, without affecting the pre-defined area-of-influence, To permanently adjust the area-of-influence or pre-defined parameters / plans, EPL are suggest to make

changes in configuration page. The GLIDE site, VMS and cameras within the area-of-influence will be automatically highlighted.

4.2.5   Affected equipment range

As mentioned in 4.2.1, the affected equipment range is pre-defined by selecting event venue.

4.2.6   Corridor / junctions to be monitored

Similar to planned road event, refer to section 3.2.6.

4.2.7   iSprint simulation (Phase 2)

Similar to planned road event, refer to section 3.2.7.

4.2.8   RTC report generation

Similar to planned road event. Please refer to UNA BI report for more details.

4.3. Planning stage

4.3.1   VMS plan modification

The first cut of VMS plan, regardless of time-based or situation-based, will be proposed from the pre-defined plans by selecting the venue. VMS message display time shall follow section 3.3.1.4. The time to be displayed on the VMS shall follow section 3.3.1.2, the only change will be the a/b in planned road event stands for the road close and re-open time, while the a/b stands for the event start time minus 1 hour and event end time plus 1 hour.
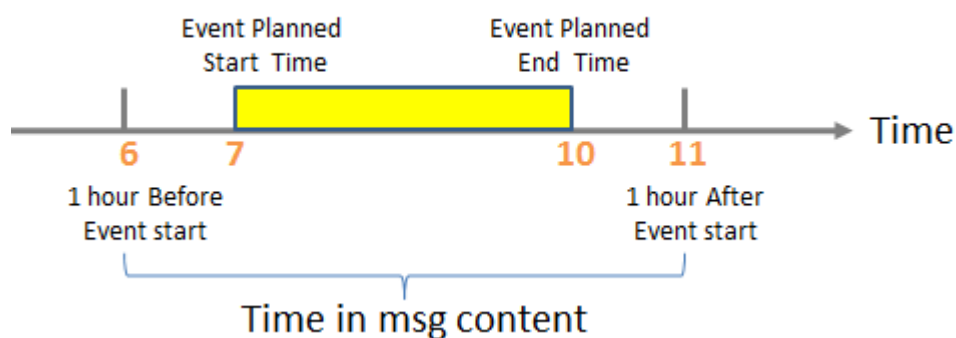
Figure 4.2 Time in VMS Message for Off-road Event

4.3.2   GLIDE plan modification

Similar to planned road event, refer to section 3.3.4.

4.3.3 Radio broadcast

Similar to planned road event, refer to section 3.3.6.

4.3.4 Canning message

Similar to planned road event, refer to section 3.3.7. The canning message for off-road events should have the option to be activated or not to be activated.

4.3.5 Preview

Similar to planned road event, refer to section 3.3.8.

4.3.6 Event report for approval

Similar to planned road event, refer to section 3.3.9.

4.3.7 Approval

Similar to planned road event, refer to section 3.3.10.

4.3.8 Advance message dissemination

Similar to planned road event, refer to section 3.3.11.

4.4. Actual event stage

4.4.1 Actual/contingency message dissemination

Similar to planned road event, refer to section 3.4.1.

4.4.2 GLIDE plan implementation

Similar to planned road event, refer to section 3.4.2.

4.4.3 Traffic situation monitoring

Similar to planned road event, refer to section 3.4.3.

4.4.4 Standard operating procedure monitoring

Since planned off-road event doesn't include any road closure, only response table is needed in Monitor Tab. Refer to section 3.4.4.2 for more details.

4.4.5 Event situation report generation

Please refer to UNA BI report for more details. Before generation, EPL shall be able to select the desired incidents records to be included in the report.

4.5. After event stage

After event review will be conducted based on the After Action Review report. Please refer to UNA BI report for more details. Before generation, EPL shall be able to select the desired incidents records to be included in the report.

5. Planned road works

5.1. Overview

The workflow of planned road works can be summarised as below:
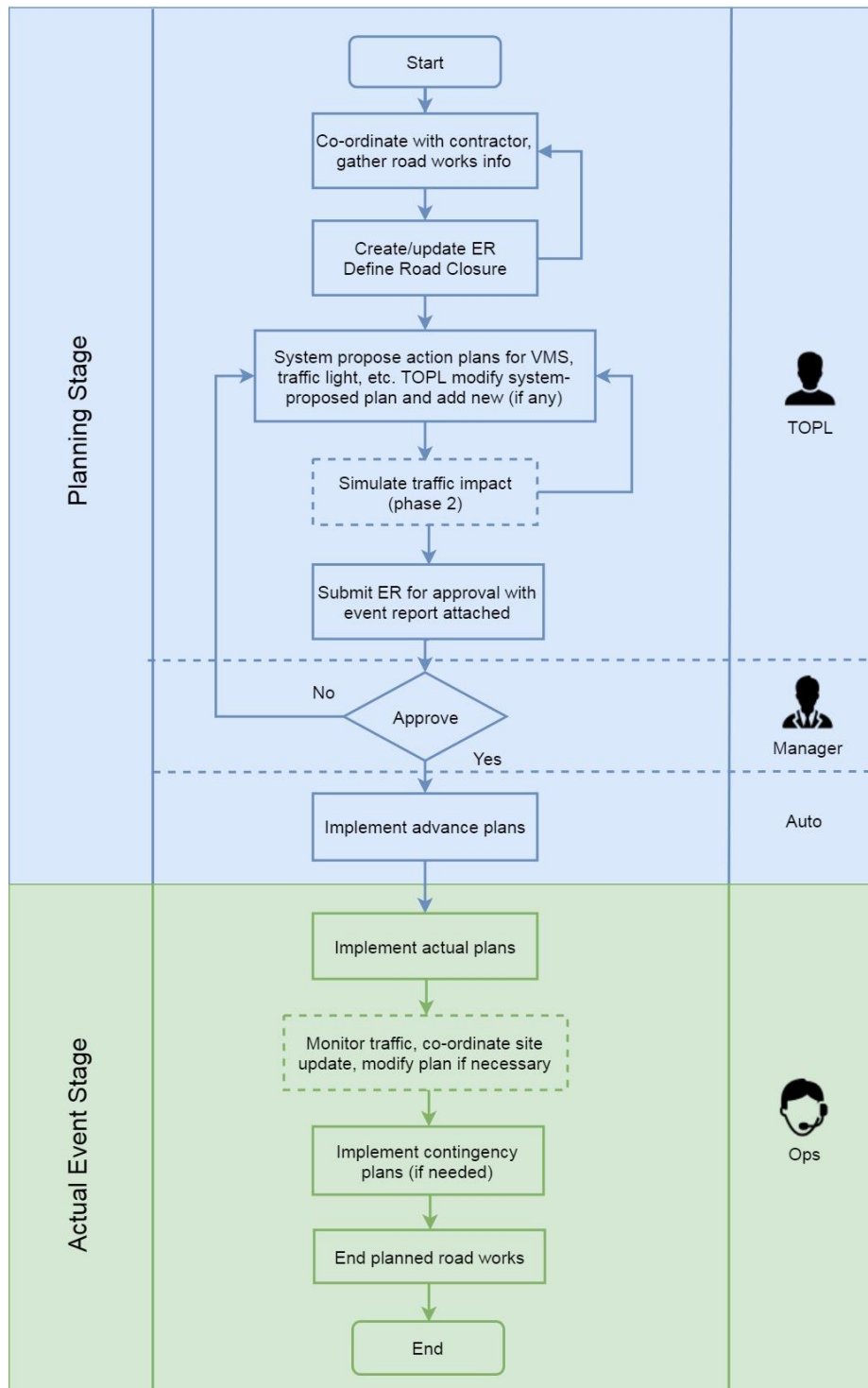
Figure 5.1 Planned Road Works Workflow

Note: The activity in dashed box is optional .

Planned road works need neither to be included in RTC report nor approval from management as majority of which are regular maintenance road works. Additionally, no after event review needs to be conducted.

Some plans for the event are supposed to be proposed / launched by KB, while some requires manual input / implementation. System responsibility during planning stage and actual event stage are summarised in the tables below:

Table 5.1 Plan Generation Responsibility Table for Planned Road Works

Plan Generation	Advance	Actual	Contingency
VMS plan (time-based)	KB	KB	KB
VMS plan (situation-based)	N.A.		
GLIDE plan (time-based)	N.A.		
GLIDE plan (situation-based)	N.A.		
Mobile Camera plan	N.A.		
Radio Broadcast	KB	KB	Ops
Canning Message	N.A.	KB	Ops
OBU Message	N.A.	KB	KB

Table 5.2 Plan Implementation Responsibility Table for Planned Road Works

Plan Implementation	Advance	Actual	Contingency
VMS plan (time-based)	Prompt + Auto	Prompt + Ops	Prompt + Ops
VMS plan (situation-based)	N.A.		
GLIDE plan (time-based)	N.A.		
GLIDE plan (situation-based)	N.A.		
Mobile Camera plan	N.A.		
Radio Broadcast	Auto	Auto	Ops
Canning Message	N.A.	Auto	Ops
OBU Message	N.A.	ERP2	Ops+ ERP2

5.2. Pre-planning stage

5.2.1 Event record creation and closure definition

Similarly to Section 3.2.1, a new event record can be created by clicking the button on event panel. Some data fields of basic event information of planned road works are different from EPL events, such as:

1) ERMS number for expressway closure
2) Maintenance work type
3) Etc.

Since the event basic information and road closure definition is not as complicated as EPL events, TOPL will use the system to directly key in the information and define road closure from GIS (refer to 3.2.2.3 for more details).

5.2.2 Duplicate from historical ER

LTA shall be able to create a new event by duplicating from the existing / historical ER and edit on the basis of the duplicated ER. The event basic information listed in Section 5.2.1 will be duplicated except road closure, event location and event time, as well as all the plans including VMS messages, radio broadcast messages, OBU messages etc.

5.2.3 Attachment for additional information

Similar to EPL, TOPL user can upload attachment such as:

1) Total closure diversion plan
2) Press release statement
3) etc.

in supported format listed in Section 3.2.3. The total size of attachment is limited to 20MB per event record due to storage constraint.

5.2.4 Area-of-influence adjustment

Similar to planned road event, refer to section 3.2.6. In addition to the 3 default options, 4km / 8km / 12km, TOPL can define the radius as any desired value. The GLIDE site, VMS and cameras within the area-of-influence will be automatically highlighted.

5.2.5 Affected equipment range

Similarly to planned road event, AER of planned road works also depends on the road type.

Table 5.3 Affected Equipment Range for Planned Road Works

S/N	Scenario	Total Closure AER on Entrance	Total Closure AER on Main Carriageway	Total Closure AER on Adjoining Road
1	Expressway entrance slip road closure	Follow IR AER, assume IR happens at portal	N.A.	N.A.
2	CTE Tunnel entrance slip road closure	Follow IR AER, assume IR happens at portal	N.A.	N.A.
3	MCE&KPE tunnel entrance slip road closure	Follow IR AER, assume IR happens at portal	N.A.	N.A.
4	Expressway exit slip road closure	N.A.	3/3 rule	2/2 rule
5	CTE Tunnel exit slip road closure	N.A.	3/3 rule	2/2 rule
6	MCE&KPE tunnel exit slip road closure	All the MCE/KPE entrance (only for actual and contingency stage)	3/3 rule	2/2 rule
7	Expressway main carriageway	N.A.	7/7 rule	2/2 rule
8	CTE Tunnel main carriageway	N.A.	7/7 rule	2/2 rule
9	MCE&KPE main carriageway	N.A.	7/7 rule	2/2 rule
10	Short Tunnel (WVT, SGT))	Follow IR AER	N.A.	N.A.
11	Short Tunnel (FCT)	Use area-of-influence, to be defined by user	N.A.	N.A.
12	EA / Normal arterial road total closure	N.A.	Use area-of-influence, to be defined by user	Use area-of-influence, to be defined by user
13	U-Turn closure	Not under KB	Not under KB	Not under KB
14	Road Diversion	Not under KB	Not under KB	Not under KB

5.2.6　iSprint simulation (Phase 2)

Similar to planned road event, refer to section 3.2.7.

5.3.　Planning stage

5.3.1　VMS plan

The first cut of VMS plan will be proposed by KB based on the road closure. Due to historical issues, the existing templates of regular plan road works are customized case by case, which leads to the unstandardized AER and structure of messages. Since KB is rule-based, the AER will be standardized (refer to Section 5.2.3) as well as the message structure, as illustrated in the figure below.

In the case where the entrance slip road to expressway is closed

Current Template Patterns

- To AAA (ZZZ) closed
- XXX Rd to AAA(ZZZ) closed
- Entry to AAA(ZZZ) closed
- XXX Rd entry to AAA(ZZZ) closed
- etc.

standardization

Proposed by KB

Entry to AAA (ZZZ) closed
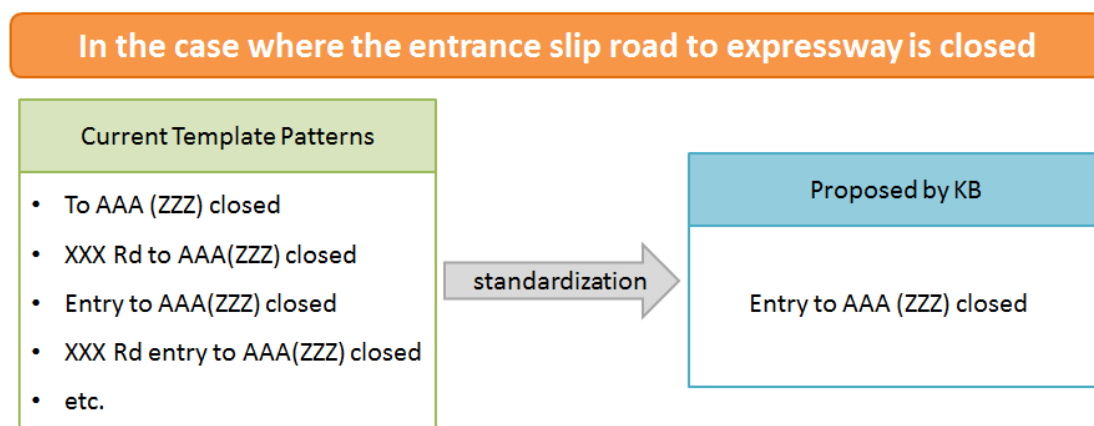
Figure 5.2 Before and After Standardization of VMS Message for Planned Road Works

TOPL shall further modify the AER or the message content if TOPL want exactly the same message as the template. The further modification needed from TOPL is due to the fact that current template is ad-hoc and fully customized case by case without a clear rule, which has nothing to do with the accuracy of KB as long as KB can propose according to the rule mutually agreed with LTA.

Table 5.4 Standardization of VMS Message for Planned Road Works

S/N	Scenario	Template provided by LTA	Proposed by KB after standardization
1	Expressway entrance slip road closure	• To PIE(Changi) closed • Moulmein Rd to CTE(SLE) closed • To AYE(Tuas) closed	Entry to AAA (ZZZ) closed

S/N	Scenario	Template provided by LTA	Proposed by KB after standardization
		• Entry to ECP(Changi) closed • Entry to KPE(TPE) closed	
2	CTE Tunnel entrance slip road closure	• Entry to Tunnel closed, Stop No Entry • Entry to Tunnel closed	Entry to AAA (ZZZ) closed
3	MCE&KPE tunnel entrance slip road closure	• MCE(AYE) Entry to Tunnel closed	Entry to AAA (ZZZ) closed
4	Expressway exit slip road closure	• CTE(SLE) Exit closed/ To CTE(SLE) closed • Eng Neo Exit closed • Toa Payoh Exit 16A closed • ECP(Changi) Exit & Fort Rd Exit closed, MCE(ECP) Exit 5 closed	[Exit Name] closed (Note 1: Exit name spelling shall comply with the spelling of pre-defined reference points in database which is used currently for IR, therefore, the exit number like Exit 16A will not appear in the KB-proposed messages if the exit is not defined in such way.) (Note 2:Multiple slip road closures road works are suggested to be created as separate ERs.)
5	CTE Tunnel exit slip road closure	• Clemenceau Exit & Merchant Exit closed, Clemenceau Exit & Merchant Exit on CTE closed • Outram Exit closed	[Exit Name] closed (Note 1: Exit name spelling shall comply with the spelling of pre-defined reference points in database which is used currently for IR, therefore, the exit number like

S/N	Scenario	Template provided by LTA	Proposed by KB after standardization
			Exit 16A will not appear in the KB-proposed messages if the exit is not defined in such way.)
6	MCE&KPE tunnel exit slip road closure	• Sheares Ave Exit closed, Sheares Ave Exit on KPE cls • ECP(Changi) on KPE cls • Bartley Rd East on KPE cls • Central Boulevard Exit on MCE closed, Trailers with Containers must Exit Keppel	AAA(ZZZ) [Exit Name] closed (Note 1: Exit name spelling shall comply with the spelling of pre-defined reference points in database which is used currently for IR, therefore, the exit number like Exit 16A will not appear in the KB-proposed messages if the exit is not defined in such way.)
7	Expressway main carriageway	• AYE(Tuas) closed aft Exit 1 Maxwell • AYE(Tuas) closed aft Buona Vista Rd	AAA(ZZZ) closed aft B (Note: Exit B is the immediate exit upstream the closure start point)
8	CTE Tunnel main carriageway	• CTE Tunnel closure	AAA(ZZZ) closed aft B (Note: Exit B is the immediate exit upstream the closure start point)
9	MCE&KPE main carriageway	• MCE Tunnel closure • KPE Tunnel closure	AAA(ZZZ) closed aft B (Note: Exit B is the immediate exit upstream the closure start point)
10	Short Tunnel (WVT, SGT)	• Woodsville Tunnel closure • Sentosa Gateway Tunnel closure	Tunnel cls
11	Short Tunnel (FCT)	• Fort Canning Tunnel closure	Tunnel cls

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KAP Report (Planned Event)

S/N	Scenario	Template provided by LTA	Proposed by KB after standardization
12	EA / Normal arterial road total closure	Xxxxx closed aft yyyy Xxxx underpass closed Xxx closed btw yyy & zzz Xxx & yyy twds zzz closed Xxx closed from yyy to zzz Xxx closed btw yyy & zzz, xxx closed aft yyy Xxxx towards yyy closed Xxx exit to yyy closed	XXX closed btw B & A If no enough space, change to XXX(ZZZ) closed aft B (Note 1: Exit A is the immediate exit downstream the closure end point. Exit B is the immediate exit upstream the closure start point) (Note 2:Underpass and flyover will be part of XXX which is pre-defined in database) (Note 3: Exit name spelling shall comply with the spelling of pre-defined reference points in database which is used currently for IR) (Note 4: Multiple closures road works are suggested to be created as separate ERs)
13	U-Turn closure		Need manual input from user
14	Road Diversion	Road diversion at xxxx	Need manual input from user

The reference point of KB-proposed message shall follow the pre-defined spelling / short form in database which is currently used for incident records. Therefore, the exit number like Exit 16A will not appear in the KB-proposed messages if the exit is not defined in such way in database. Multiple closures are also suggested to be created as separate ERs to simplify the KB rules.

Similarly to Section 3.3.2, TOPL has the flexibility to define VMS groups and edit the message manually.

5.3.2 GLIDE plan modification

Similar to planned road event, refer to section 3.4.2.

5.3.3   Radio broadcast

Similar to planned road event, refer to section 3.3.6.

5.3.4   Canning message

Similar to planned road event, refer to section 3.3.7.

5.3.5   OBU message

Similar to planned road event, refer to section 3.3.8.

5.3.6   Preview

Similar to planned road event, refer to section 3.3.9.

5.3.7   Advance message dissemination

Similar to planned road event, refer to section 3.3.12.

5.3.8   OBU message dissemination

Similar to planned road event, refer to section 3.3.13.

5.4. Actual event stage

5.4.1   Actual/contingency message dissemination

Similar to planned road event, refer to section 3.4.1.

5.4.2   GLIDE plan implementation

Similar to planned road event, refer to section 3.4.2.

5.4.3   Traffic situation monitoring

Similar to planned road event, refer to section 3.4.3.

5.4.4   Standard operating procedure monitoring

Similar to planned road event, refer to section 3.4.4.

Upgrading of i-transport System
KAP Report (Planned Event)

6. New development

6.1. Overview

The workflow of planned road works can be summarised as below:
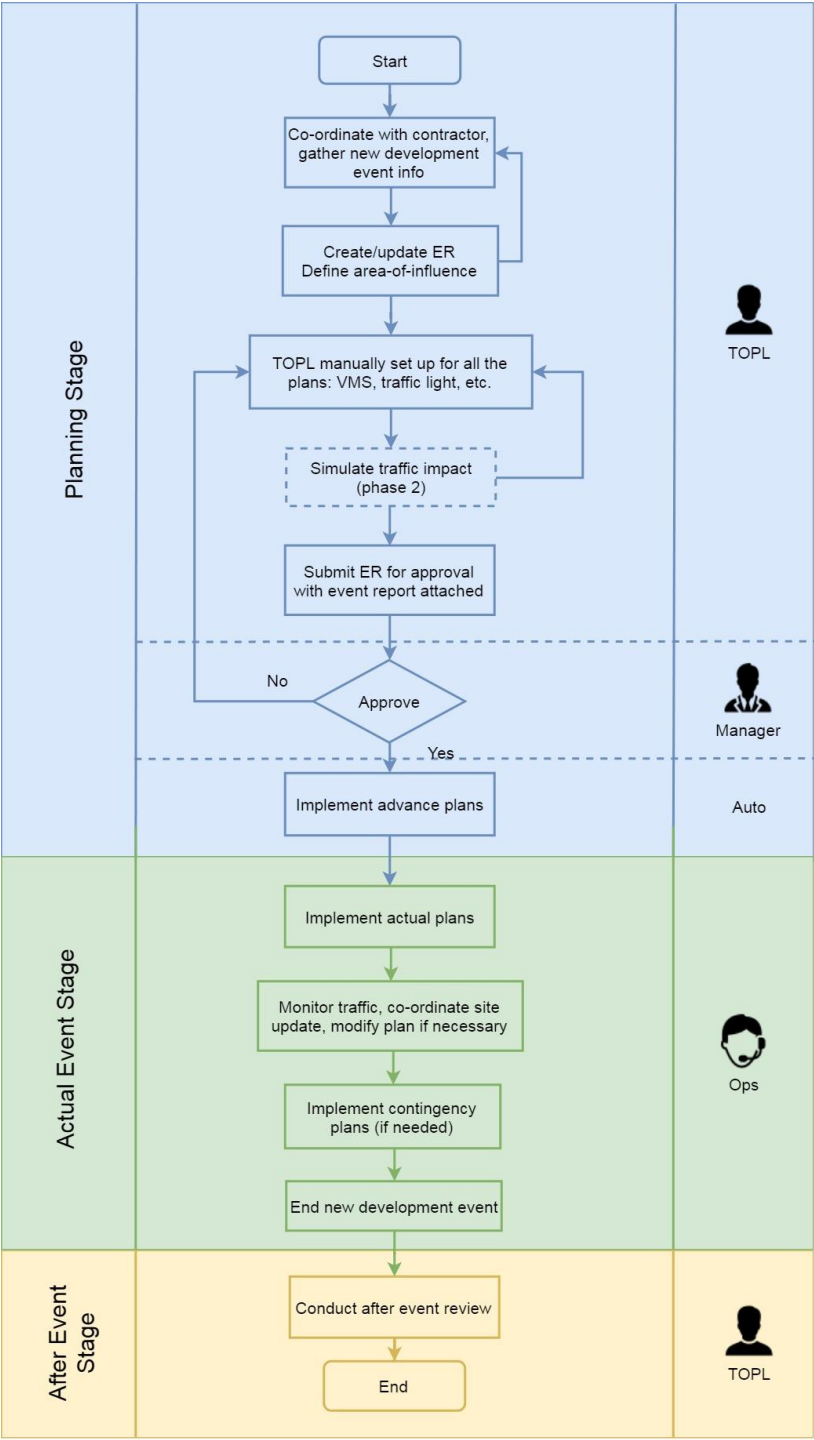
Figure 6.1 Planned Road Works Workflow

Note: The activity in dashed box is optional .

As agreed with LTA, new development ER is purely ad-hoc, there is no rule for affected equipment and action plans. TOPL will manually define the action plans through the system instead of KB proposal. System responsibility during planning stage and actual event stage are summarised in the tables below:

Table 6.1 Plan Generation Responsibility Table for New Development

Plan Generation	Advance	Actual	Contingency
VMS plan (time-based)	TOPL	TOPL	TOPL
VMS plan (situation-based)	N.A.	N.A.	TOPL
GLIDE plan (time-based)	N.A.	TOPL	N.A.
GLIDE plan (situation-based)	N.A.	TOPL	TOPL
Mobile Camera plan	KB to propose junctions requiring mobile cam		
Radio Broadcast	TOPL	TOPL	Ops
Canning Message	N.A.	TOPL	Ops
OBU Message	N.A.	TOPL	TOPL

Table 6.2 Plan Implementation Responsibility Table for New Development

Plan Implementation	Advance	Actual	Contingency
VMS plan (time-based)	Prompt + Auto	Prompt + Ops	Prompt + Ops
VMS plan (situation-based)	N.A.	N.A.	Ops
GLIDE plan (time-based)	N.A.	Prompt + Ops	N.A.
GLIDE plan (situation-based)	N.A.	Ops	Ops
Mobile Camera plan	Contractor to deploy mobile cam		
Radio Broadcast	Auto	Auto	Ops
Canning Message	N.A.	Auto	Ops
OBU Message	N.A.	ERP2	Ops+ ERP2

6.2. Pre-planning stage

6.2.1 Event record creation and opening definition

Similarly to Section 3.2.1, a new event record can be created by clicking the button on event panel. Since the event basic information and road closure definition is not as complicated as EPL events, TOPL

will use the system to directly key in the information and define road opening from GIS (similar to define road closure) provided that the new road to be opened is already updated in GIS.

6.2.2   Attachment for additional information

Similar to EPL, TOPL user can upload attachment such as:

1) Diversion route plan
2) Press release statement
3) Traffic impact analysis
4) etc.

in PDF, JPG and JPEG format. The total size of attachment is limited to 20MB per event record due to storage constraint.

6.2.3   Area-of-influence adjustment

Similar to planned road event, refer to section 3.2.6. In addition to the 3 default options, 4km / 8km / 12km, TOPL can define the radius as any desired value. The GLIDE site, VMS and cameras within the area-of-influence will be automatically highlighted.

6.2.4   Affected equipment range

As agreed with LTA TOPL, TOPL user have the flexibility to manually add / delete equipment when creating plan. KB will not propose AER and corresponding plans for new development ERs.

6.2.5   iSprint simulation (Phase 2)

Similar to planned road event, refer to section 3.2.7.

6.3. Planning stage

6.3.1   Action plans

As agreed with LTA TOPL, the action plans for new development including VMS plan, GLIDE plan, canning message, radio broadcast, OBU message and junctions requiring mobile camera surveillance support will be manally defined by TOPL instead of being proposed by KB.

6.3.2   Preview

Similar to planned road event, refer to section 3.3.8.

6.3.3   Advance message dissemination

Similar to planned road event, refer to section 3.3.11.

6.4.   Actual event stage

6.4.1   Actual/contingency message dissemination

Similar to planned road event, refer to section 3.4.1.

6.4.2   GLIDE plan implementation

Similar to planned road event, refer to section 3.4.2.

6.4.3   Traffic situation monitoring

Similar to planned road event, refer to section 3.4.3.

6.4.4   OBU message

Similar to planned road event, refer to section 3.3.8.

6.5.   After event stage

After event review will be conducted based on the After Action Review report. Please refer to UNA BI report for more details. Before generation, TOPL shall be able to select the desired incidents records to be included in the report.

7. Miscellaneous event record

There are some situations when the event needs to be recorded in the system (could be for reporting purpose) while no action needed for them, for example:

1) ECLO (planned train disruption)
2) etc.

On top of the 4 types of event records mention in Section 3/4/5/6:

1) Planned Road Event
2) Planned Off-road Event
3) Planned Road Closure (road works)
4) New Development

A functionality of miscellaneous ER will be provided to cater to the situation mentioned above for both TOPL and EPL with generic data fields including:

1) Event title
2) Event date & time
3) Event organizer
4) Person(s) in charge: Name(s), Contact number, Command post contact number
5) Remarks

In the event of ECLO, TOPL user can create a miscellaneous ER and log down the event details as free text in remarks so that this ER can be included in RTC report. The data fields for a general miscellaneous ER will be finalized in design phase.

Road closure definition and attachment uploading function will be provide as per normal. Refer to Section 3.2.2 and Section 3.2.3 for more details.

8. End of document

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1.	All	-	Remove all "GUI Mock-up to be inserted".	Replaced with figures.
2.	10	1.4	Add RTC : Road and Transportation Committee.	Added in Table 2.
3.	11	2	1. Add a section to introduce the users, what they do and the different types of events they manage. 2. Introduce and standardize the way the users are named in the document e.g. Ops for OCC Operators, Event Planner (EPL) for members of the OCC Planning team, Traffic Ops Planner (TOPL) for members of the Traffic Operation Planning team. 3. Knowledge Acquisition Process & User Need Analysis Sessions, Table 1 KAP & UNA Planned Event Sessions KAP/UNA Recap Session 3: Rename this to KAP/UNA Recap session 1 (this differs from the previous KAP recap session as this involved UNA).	1. Added as Section 1.4 2. Added as Section 1.4 3. Updated in Table 3.
4.	13	3.1	1. For the actions in the workflow, indicate who is the actor. [TOPL] 2. The workflow should include ITSO TOPL Workflow on New Developments. pl see email dated Thu 02/08/2018 3:51 PM for KAP Meeting 7 and the appendix 1 for details. 3. Regular maintenance works do not need to be included in RTC report, but New Developments will need to have an option to be included in RTC. 4. Some planned road works are fixed as they are the usual maintenance work (example: CTE Tunnel Slip roads, MCE Tunnel slip roads, SGT, WVT, KPE Tunnel slip roads	1. Updated. 2. Added Section 5 and 6 3. Same as 2 4. As agreed with Carissa, KB will propose the standardized message Refer to section 5.3.1 5. Same as 2

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			etc…). Therefore, certain planned road works must have fixed templates stored into the system so that user can use back the templates to prepare for closure messages. We prefer fixed template for planned closure for usual maintenance work, as it delivers consistency information to motorists. 5. TOPL need to generate event report & AAR for New Developments, not for Regular maintenance works.	
5.	13 35	3.1 4.1	[EPL] 1. The pre-planning stage and planning stage can be combined. During pre-planning / planning stage, we create ER after we receive all the plans from Event Organiser and upload into system. We will run a traffic simulation and assess the traffic impact on I-sprint (available only during phase 2 of Itpt2) to generate RTC report. This report to be sent to management via the I-tpt2 system. Concurrently, the event planner will plan the event (geo-fencing, affected equipment, messages content, radio message, traffic plan, etc.). The event report stated under planning stage should be reflected under After Event Stage as AAR report. 2. The generation of RTC report in Pre-Planning Stage does not require approval to proceed on with the Planning Stage.	1. The reason to have pre-planning stage and planning stage is based on the workflow chart and slides provided by LTA. According to the workflow and the discussion on recap sessions in Oct 2018, there are 2 rounds of simulation. The 1st simulation is to simulate the traffic impact caused by event based on road closure (on road) and event venue / historical dates (off road), at this moment, EPL is still gathering more information for the event and planning the response plans including VMS, traffic lights etc. RTC report is to be generated at this stage to inform the management the

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				upcoming events and location / closure, no approval needed (updated in document).
				The 2nd simulation is to simulate the effectiveness of the whole set of plans (VMS, traffic lights, etc), how the traffic situation is going to be after having all these plans. At this stage, the response plans are done. The report to be generated at this stage shall be the event report which contains all response plan for a particular event (see the notes in red in the screenshot below) which we think is different from AAR report?
				Please clarify if any updates on the understanding above.
				Further clarification for the report for LTA confirmation: • Pre-planning stage – RTC report (a list of events)\\ • Planning stage – event report (event info + full set of

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				response plans) • During event – event situation report • After event – AAR report 2. Noted and updated in the workflow Figure 1.

6.	14	3.1	[TOPL, EPL]
			1. Planner refers to TOPL and OCC planning, while Ops refers to OCC? Pls clarify.
			
			2. Figure 1: Please explain what is "Simulate traffic impact (no plan)' and "Generate RTC report for approval of event (no plan)". What is the intention of "(no plan)"?
			
			3. Table 2 and 3: update the relevant sections that would explain the Planning stages (VMS time-based and situation-based, GLIDE time-based and situation-based) and Implementation stages (VMS time-based and situation-based, GLIDE time-based and situation) based on the following:
			   a. Planning Stage
			   • 3.3.1 Time-based VMS Plan
			   • 3.3.3 Situation-based VMS Plan
			   • 3.3.4 GLIDE Plan
			     - 3.3.4.1 Time-based GLIDE plan
			     - 3.3.4.1 Situation-based GLIDE plan
			
			4. Table 2:
			The canning message for off-road events should have the option to be activated or not to be activated.
			
			5. Table 3:
			
			   a. the radio broadcast (should be set
				1. User group definition is added in section 1.4.
				Section 3 & 4: EPL
				Section 5 & 6: TOPL
				Ops refers to OCC Operator
				2. Refer to the reply to item 5 above.
				3. Updated Table 4,5
				4. Updated in Section 4.3.4
				5. Updated in Table 5

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			auto or under OCC) for advance and actual should not be under planner to implement the planned road works. b. Under contingency, Ops should be able to intervene on the radio and caning messages instead of blank. c. Mobile Camera plan on Actual should be implemented by Ops & Auto, as this is a confirm plan to be used.	
7.	14	3.2.1.1	1. Change the title to "Pre-filling ER fields from an Excel template" 2. Clarify the paragraph as below: "Uploading function will be provided to allow EPL and TOPL to upload **an Excel file with** the event information **provided by** the event organiser. **The Excel file will contain** necessary restrictions and instructions [….]" 3. The information to be loaded into ER should be exactly the same as of today's event data sheet that we have shared with SSA. 4. Availability of machine-read conversion from hard copy information to information readable and executable for i-transport 2.0.	1. Done 2. Done 3. SSA will work with LTA on the complete list of required data fields during the design stage. 4. I-transport 2.0 is not able to extract information from hardcopy information (image) and convert it into machine-readable information. Alternatively, users can upload the image into the ER as an attachment but subject to file size limitation.
8.	14	3.2.1.2	[TOPL] 1. For planned road works, we need • location (road name), • closure date and time, • closure purpose, • Contact info for road project OIC,	1. As clarified with Carissa on the phone on 26 Dec, for planned road works on expressway and tunnel, TOPL require to have fixed

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			• ERMS Number for expressway closure 2. For New Developments works, we need • location (road name) • Road opening or road closure's date and time, • Opening details, such as ITH opening, new tunnel opening, new flyover, etc… • Contact info for road project OIC • Intersections affected • Area of monitoring We prefer a separate sheet or tab for planned road works and New Developments works to have a clearer view. Some info, such as the event title, event organiser, event owner, event supporter, event type, number of spectators/ participants, public hotline, event day person, not required by road works should be omitted from our page. 3. Provide examples for Event Organizer, Event Owner, Event Supporter, Event Type. 4. It is ok to indicate the name and contact number of the points of contact for event matters.	template to select the slip road to be closed and KB proposal for non-expressway road closure. New development ER doesn't really have a rule to follow, the requirement from TOPL is more to provide the functions for TOPL to add the response plans. As agreed, since the information provided by contractor is not as much event organisers from EPL side, TOPL is ok with creating ER, input necessary information and define road closure by TOPL themselves. No template is needed to create ER of event type planned road works and new development. Conclusion: the data fields in 1 & 2 will be in user interface for TOPL user to key in. Updated in 5.2.1 2. Updated in section 3.2.1.2 3. Noted.
9.	15	3.2.2.1	1. Typo: should be Bu**s**. 2. Indicate whether the 4 listed parameters should be all fulfilled ("and") or just any one	1. Done 2. The concept of defining road closure is to define lines via

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			of them is sufficient ("or"). 3. Clarify what is the technical feasibility need to be confirmed? 4. Assess the technical feasibility to include **ALL** road names in excel file, for user to select which road is closed. [TOPL] 5. We need to have the KM marking for the expressway total closures with directional flow indication included. Please refer to separate attached sample of ERMS application form for your better understanding.	a series of points. Any one of the 4 listed parameters is sufficient to be used to define dots. 3. Added note at 3.2.2.1 on the potential inaccuracy using lamppost number and road name to define road closures. 4. As mentioned above in point 2, we are using a series of points to define a line since the road closure is not the whole stretch of road. If using road name + lamp post number to define points, a list of all the Singapore road names can be provided in the dropdown list. The road names list is to be provided and maintained by LTA.
10.	15 16	3.2.2.1 3.2.2.2	1. Include the provision of uploading the road name only to simplify the indication of the road closure extent. 2. Assess the technical feasibility to include **ALL** road names in excel file. 3. Provide all road names for user to select which road is closed. 4. Technical availability to convert hardcopy event information to machine readable format.	1. We can add a checkbox to indicate if the full stretch of road is closed to simply the definition Updated in section 3.2.2.1. 2. Refer to reply to item 9.4 3. Refer to reply to item 9.4 4. Refer to reply to item 7.4

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11.	16	3.2.2.3	Clarify who is the "event planner" (EPL? TOPL? Event organizer?)	Done

12.	16	3.2.3	1. Clarify as below: "The **total** size of attachment**s** […]".
			
			[TOPL]
			2. For planned road works, we only require to upload the total closure diversion plan and press release statement copy. System should auto omit those that not applicable, when user select ER for planned road works.
			[EPL]
			
			3. Users are able to edit to add on or remove the basic info tab.
			
			4. Confirm that the event type includes
			
			   a. Running/walking, eg Sundown Marathon, JP Morgan Run , SC Marathon
			     • Competitive
			     • Social
			   b. Cycling, eg OCBC Cycling , SACA Cycling
			     • Competitive
			     • Social
			   c. Multiple Sports, eg Singapore Triathlon, Duathlon, Sea Games
			   d. Street festival eg Chinatown Light up, Orchard Rd Light up, Car Free Sunday
			   e. Religious, eg Thaipusam
			   f. Others (allow for free text input) e.g. F1, NDP, VVIP movement, funeral procession
			
			5. Please confirm that it includes **ALL** the fields based on the documentation that we have provided SSA with as reference and examples to follow.
				1. Done
				2. The attachments uploads are made by users who choose to attach any documents they think to be relevant to the ER. There is no limitation to the number of attachment as long as the total size of attachments is within 20MB.
				3. The Excel template need to be fixed. i-transport 2.0 will not be able to interpret the information in new added fields or tabs.
				4. The previous version of event type is: Running/Cycling/Walkathon
				Other Sport Event
				Street Festival or Bazaar
				Promotion of Commercial Products
				Other
				SSA will finalize the list of event types with LTA during the design stage.
				
				5. Refer to item 7.3

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13.	17	3.2.5	[TOPL] The expressway exit slip road closure for planned road works should be by default 3/3 rule. Not 7/7. The expressway entrance slip road closure should rule according to the entrance road name or the adjoining road if there is no VMS available at along the entrance road.	This table is not for TOPL, this is the AER for on road events for EPL which is the same as total closure AER.
14.	17	3.2.6	Correct this sentence to the following; A list of base junction and base corridor ~~(green wave corridor)~~ will be provided by LTA. System shall automatically highlight the base junctions and base corridors within area-of-influence.	Done.
15.	19	Figure 3 Figure 4	[EPL] 1. Under Advance, the Prompt to Ops is a red cross and Implementation is Auto launch. Is the "no prompt" requested by OCC? 2. Check and correct Figure 3 and Figure 4. In Figure 3, contingency Start display time has a tick while Figure 4 says Date/Time Contingency stage doesn't have date/time.	1. Updated as Prompt + Auto. Clarification: As agreed, the advance VMS message is auto launch since no action is needed from Ops. Does EPL still want to prompt Ops even when no action needed from them? After checking with Ops, they prefer no prompt. 2. Display time is from when to when the VMS message is up. Date/time is the date and time on the VMS as part of the message content. There is no inconsistency between the 2

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				figures
16.	20	3.3.1	[TOPL, EPL] Figure 6 The equipment should be TIP, TTP MVMS, AVMS, TIDM, etc… configuration in future might change, need to get updates from EMAS maintenance team for the panel displays. please refer back to the sample sent via email to Steria on 17/8/18, 8:56am and email on 16/8/18, 3:48pm. We can help to provide the dimension again, if needed.	Currently, the rule in report only covers TIP RVMS and CVMS which is most frequently used in terms of equipment quantity. For other types of equipment, manual edit for the message layout can be done by users as long as the equipment type is defined and available in i-transport2.0. i-transport only has control on TIP, TTP (expressway) CVMS, RVMS (EA) EVMS, AVMS (short tunnel) PGS VMS. Equipment like MVMS and TIDM is not defined in i-transport 2.0
17.	21	3.3.1.2	[TOPL, EPL] It should be 12mn, not 12am. We should be given edit function to change the date and time for the display message. Under the multiple day, single time, advance and closure message, the +1 should not be included in the message display.	Updated.
18.	22, 23	3.3.1.2	[TOPL, EPL] 1. All the wordings for proposed date and time displayed should be in yellow. The message display for date and time should be align to centre, please refer back to KAP MOM meeting 9 under point 1.1 as sample. 2. Remove round down and round up time concept.	1. Updated to yellow. According to MOM 9 point 2.2, LTA has confirmed that date time only align centre for AVMS, others align left. Please double confirm if you want to change to all

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			3. For TIP advance message:
			  a. Single day & multi-days event, timing with 15 char , aaaaaaa-bbbbbbb, should go to 2nd line and dates remain 1st line.
			  b. Single day, timing with 12 char, aaaa-bbbbbbb or aaaaaaa-bbbb should remain on 1st line
			
			4. For RVMS advance message:
			  • Single day and time with 9 char, need to fit into 1st line.
			    • Multiple dates with timing with 15 char, DDMMM-DDMMM aaaaaaa-bbbbbbb can fit into 1st line.
				align centre.
				2. Same as 3 below
				3. System will automatically put the word to the next line if cannot fit into the current line. However, the limitation of this function is that it recognize word only by space and when there is enough space after the time, it will automatically put the next line of message after the time, which is wrong. If user want to break the date & time when the time is too long, it will add the processing time of plan generation. SSA suggests to fix 1st row as date, 2nd row as time.
				4. Same as 3 above.

19.	24	3.3.1.3	1. Part 1: VMS messages for planned road works should be given drop down list to choose "xxx closed btw yyy & zzz" or "xxx closed aft yyy", etc… please refer to sample sent via email on 17/8/18 at 8.56am. 2. It should also have free text available for planned road works messages as the contents are different than planned event.	1. Separate logic for TOPL, refer to Section 5 where the logic is dedicated to planned road works. Especially Table 13. 2. The flexibility to edit the content / change display time / adjust the VMS etc is always there. Please refer to 3.3.2 for all the modification that can

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				be done.
20.	25 - 26	3.3.1.4	1. For all scenarios, the number of days in advance to determine the start of message display should be made into a configurable parameter. [TOPL, EPL] 2. Single day event on Saturday. The advance message should be Sat, Thu and Fri in advance. Please refer to sample sent via email on 26/11/18, 9:38am.	1. The configuration requests a configuration page for the rule of display time of adv VMS message. The change made in the configuration page will be saved permanently and will take effectiveness to all the new ER onwards. More clarification needed for the parameters requiring configuration. 2. The email on 26/11/18, 9:38am didn't mention this case, please double check. I was referring to the slides sent from LTA on 10 Oct. Please clarify if LTA wants to update the rule.
21.	27	3.3.1.4	[TOPL, EPL] For multiple days' event on weekdays, for example Tue and Wed, the advance message should display on Mon for closure on Tue and Wed, and advance msg on Tue for closure on Wed. Please refer to sample sent via email on 26/11/18, 9:38am.	Refer to Section 3.3.1.4
22.	28	3.3.1.4	[TOPL, EPL] Under the multiple days event on weekend, on Sat, the actual msg should be Sat and adv msg should be showing Sun. On Sun, the actual msg should be showing Sun. For multiple days	Updated.

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			event on weekdays and weekend, on Fri, the actual msg should be Fri and adv msg should be Sat. On Sat, the actual msg should be Sat. Typo error spotted.	
23.	28	3.3.1.5	[EPL] On the 5 historical VMS plans, clarify that the user would be able to compare up to 5 years of historical plans.	The maximum number of ER for planner to compare at the same time is 3 to be chosen amongst the records from past 5 years.
24.	29	3.3.1.6	[TOPL, EPL] The system should not highlight the VMS that has conflict with another event if it only shows VMS number. Conflict of VMS usage will be prompted if the display date and time of the advance and closure message matches one another.	Refer to Section 3.3.1.6. The System will not only highlight the VMS that has conflict. The logic of conflict VMS usage is discussed in KAP MOM 7 item 2.4 and also included in the report in the same section 3.3.1.6.
25.	29	3.3.2	[TOPL, EPL] VMS Plan – Amended or Defined by Planner System should record the changes history modified by Event planner, and prompt to next user when similar ER created in system.	Need more clarification with user.
26.	30	3.3.4.1	1. Replace the sentence *"Pending reply from SCATS consultant to confirm the operations that can be remotely done in i-transport"* with the list of functions required by TOPL, EPL that can be fulfilled remotely by SCATS. If too many, states the functions that cannot be fulfilled. 2. Time-based GLIDE plan Clarify whether the implementation will be in i-transport or need to launch GLIDE separately?	1. Refer to section 3.3.4.1. 2. Configuration needs to be done in SCATS separately. 3. Refer to section 3.2.6.

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			3. Situation-based GLIDE plan i-transport 2.0 will flag out the junctions with UCD and traffic alerts.	
27.	31	3.3.5	1. Correct the sentence as below: "The junctions **fulfilling** one of the logic below shall be identified as the locations **requiring** mobile camera surveillance support" 2. Correct the sentence as below: "System shall be able to **identify** the junctions **requiring** mobile camera surveillance support automatically, provided that un-signalised junction information is available from GIS. Mobile camera icon **with** scheduled date and time shall appear in GIS once the mobile camera deployment is done via Endura." 3. What feasibility is pending confirmation from ICD? [EPL, TOPL] 4. This is applicable if the proposed mobile camera location by the system is very near to the affected vicinity area. Need to have flexibility to allow user to have freedom to change or propose another location for the mobile camera deployment. Please provide proposed area of influence for mobile camera. 5. Could the system be able to show current CCTV coverage on the area of monitoring, and highlight corridor need additional coverage? Then we will drop a pin to identify preferred location for mobile cams. 6. Additional rule: Potential traffic hotspots as predicted by the system based on proposed road/lane closures info and prevailing traffic conditions.	1. Done 2. Done 3. Scheduled date and time will not be shown as I-transport2.0 doesn't have the information. 4. Removed. 5. System will show the camera within the area-of-influence but not the coverage of each CCTV because we don't have the coverage info of each CCTV. As discussed in 3.3.5, system will propose junctions requiring mobile cam support based on the logic agreed by LTA. 6. The visualization of hotspot junction can be done but the predicted hotspot information will only be available from iSprint, which is not available in phase 1.

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28.	31	3.3.7	1. Note that the event logo to be displayed in One.motoring is subjected to modifications on One.motoring side (not under i-transport 2.0 purview). [EPL] 2. To have the option to broadcast or not for off-road events.	1. Added in document 2. Updated in Section 3.3.7
29.	31	3.3.8	[EPL] Under preview – Event planner should be able to see the overall road closure plan, geo-fencing area, VMS locations and messages on each equipment, traffic light junctions (with or without J-Eyes) and traffic timing at each of the junction. If the map is too clustered or messy, what are the measures taken to prevent clustering?	There are different layers in GIS, user can switch off the unnecessary layers.
30.	31	3.3.9	[EPL] Are barricade plans and APO plans as other attachments? Please state the formats type that system able to view.	Yes as discussed, barricade plans and APO plans can be uploaded as attachment. Format types the system is able to view include pdf, jpg and jpeg. Updated in section 3.2.3.
31.	32	3.3.10	[TOPL, EPL] 1. Will there be any tablets to be provided to the approving officers to approve the proposed messages? This is so that the approving officers do not need to go back to office, sit on the workstation, preview the plan and approve it. Else, what are the other solutions to shorten the approving process on the proposed messages without using work station in OCC? 2. Under approval, where will the management's comments be captured on the system for event planner to address?	1. Tablets are provided for SM and above only. 2. Will be within the ER as a data field.

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32.	32	3.4.2	GLIDE Plan Implementation Action plans in scheduler will be automatically implemented with a prompt. We prefer Ops verification before the actual implementation.	Tentatively, Ops is ok to verify before implementation. Ops will confirm after discussing with EPL.
33.	32	Figure 18	[EPL, TOPL] All alert prompts to Ops to end of event should state the event name for ease of reference. There could be two events running concurrently so it is best to be specific which event ending in 15 minutes, 5 minutes and 1 minute.	Updated.
34.	33	3.4.3	Replace "To be confirmed by LTA" with "etc."	Please confirm the incident types allowed to be created before the acceptance of the document, so that we can add in the document accordingly.
35.	34	3.4.4.2	The section is confusing as it gives the impression the external parties can log into i-transport for the mutual coordination for the ER. Clarify that it is for the users to manually log the external parties' actions taken for the ER.	Done.
36.	35	4.1	For the actions in the workflow, indicate who is the actor.	Done.
37.	35	4.2.1	[EPL] There are also other off-road events that happen at: Gardens By The Bay, Marina Bay Sands, Sentosa, Suntec, Marina Cruise Centre, Qing Ming Festival. Please include them in.	Added. Refer to Section 4.2.1.the pre-defined plans and area-of-influence for off-road event venue are to be defined by the users. The users can modify and add new event venues. The event venues listed in the document are just for example, which does not means only the listed

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				venue can be used for off-road event.
38.	37	4.3.2	Replace the sentence: *"Pending reply from SCATS consultant to confirm the operations that can be remotely done in i-transport"* with the list of functions required by TOPL, EPL that can be fulfilled remotely by SCATS. If too many, states the functions that cannot be fulfilled.	Same as item 26.
39.	-	-	Confirm whether the KAP report for Planned Events fulfils the below requirements. If yes, indicate the section; if no, please provide the reasons. 1. To plan full road closure road work event messages directly from i-transport, e.g. i-transport shall be able to propose the EMAS messages once we indicate the closure location map on the GIS map. 2. Camera, VMS, traffic light junction locations should be available in a single GIS map and made accessible to those who require it for message planning purposes. 3. To keep track of past year message for same event based on date locations and time to compare with previous year proposed message 4. To have KB rule for populating relevant message for targeted VMS once the location and road closure influence/impact of event is identified. 5. To set time and date (scheduler) to display advance event message as temporary default message. 6. Require a prompt to implement, snooze or	1. Covered in Section 3.3.1. 2. Covered in Section 3.2.4 3. Covered in Section 3.3.1.5 4. Covered in Section 3.3.1 5. Covered in Section 3.3.1.4 6. Covered in Section 3.1 Figure 6 7. Covered in Section 3.3.1.5 8. VMS library for planned events will not be used anymore as messages will be generated by KB. Also, i-transport is not connected to any LTA PC. 9. See item 8. 10. Covered in BI. 11. I-transport is not public facing. This is discussed separately with the relevant team in LTA (one.motoring/MyTransport.sg team).

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			dismiss feature for operators when the date and time for putting up actual road closure message 7. Same search function as OCC workstation for message library e.g. multiple keywords, sentences. 8. To update VMS library remotely by OCC planning team. This requirement to be accessible from WOG PC or laptop. 9. To upload of Excel-based message into IW message library. 10. Overall map-based representation of: • Road closure events and • Road closure works for the next 30 days and show event active for the day in OCC workstation. 11. Features to disseminate event closure information on another platform (email, SMS, mobile phone LTA App) to target residents and businesses in the road closure area 12. Ability to analyze effectiveness of VMS messaging in influencing motorists to divert for events, incidents, massive jams etc. (both general and specific incident) 13. Additional parameter such as level of service, for purposed of traffic network health status check which can be used in the evaluation of whether a certain segment of the road can be closed and what would be the impact.	12. Covered in BI. 13. Covered in BI.

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Comments from TOPL				

1.	51	5.2.1	1. As there will be 2 different types of closures: road works and events, under the panel, can we change to "Create ER" instead of putting "Create New Events"? (REF page 17 figure 2)
			
			2. Planned road works information required to be captured will be:
			
			2.1 Maintenance works
			- ERMS No (if any), >>Section 5.2.1
			  Officer in-charge's name and contact who is responsible for the total road closure >>Section 5.2.1
			- Type of closure, location and time
			  >>Can provide examples of types of closure?
			  Closure location and time are in Section 5.2.1
			- Diversion route plan
			  >>Attachment. Section 5.2.2
			
			2.2 New development
			– OIC's name and contact number that responsible for the closure/ road opening. >> Section 6.2.1
			– Type of closure, location and time for the event, press release (usually in pdf)
			  >>Can provide examples of types of closure?
			  Closure location and time are in Section 6.2.1
			  Press release is attachment. Section 6.2.2
			– Diversion route plan
			  >>Attachment. Section 6.2.2
			– Traffic impact analysis
			  >>Attachment. Section 6.2.2
			
			Opening details to follow the press release. Example: **The new southbound Lornie Highway after MacRichie Viaduct will be opened on 28 October 2018, Sunday, at**
				1. Updated.
				
				2. See the reply for each data field in red on the left hand slide.
				
				3. Simplify the road closure definition for
				
				- Full stretch of road closure
				- All lane of one bound of road closure

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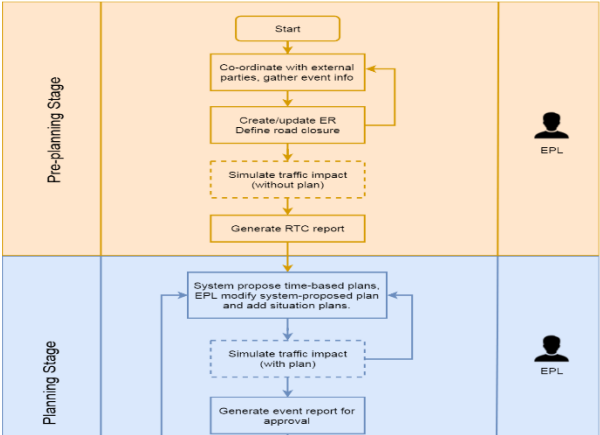| No	Page	Section	Comments	Reply to Comments / Description of Changes
			3am. This phase of opening will connect motorists travelling from Braddell Road and surrounding roads towards PIE and Farrer Road. >>Opening details will be free text data field. Captured in 6.2.1 3) 3.2.2.3 only displays the lane closure example. Please demonstrate/ show how the system going to define the total road closure from GIS.	
2.	51	5.2.3	We wish to reiterate that the directional flow of the planned road works is important for the messages planning. System needs to capture VMS available located at adjoining road and correct directional before the closure point. System need to capture VMS severing traffic towards the designated point.	If the closure is defined on expressway and EAC, system is able to capture the VMS on adjoining road based on the similar rule as incident. For arterial road, as discussed, system will only propose the VMS within area-of-influence.
3.	51	5.2.4	please add the rules for entrance, exit slip roads closures for tunnels and total tunnel closure. (see attached for proposed kb rules)	Updated.
4.	52	5.3.1	For equipment with space constraints, such as SGT VMS, KB need to adjust and propose appropriate msg such as use short forms.	As discussed, system will propose message based on fixed message structure. Users can further edit based on KB proposal.
5.	54	5.3.5	For planned road works: Preview only required on closure messages content with date and time. For new development: Preview on messages content + the GLIDE timing + mobile camera from GIS are required.	User can adjust the time slider bar to the closure date range to view only the closure messages. Message + GLIDE: can be done. As mentioned in DAR for version A, mobile cam

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				info is not available in i-transport 2.0.
6.	61	7	Generic info required for MISC ER (manage by TOPL) could be same as the comment item 1 for 5.2.1, – OIC's name and contact number that responsible for the closure/ road opening. >> Added in Section 7 – Type of closure, location and time for the event, press release >>Can provide examples of types of closure? >> Road closure function will be provided as added in Section 7. - Diversion route plan >> Attachment function will be provided mas added in Section 7. – Traffic impact analysis >> Attachment function will be provided mas added in Section 7.	The MISC ER will be open for both TOPL and EPL. See more details in red on the left hand side.
7.	24	3.3.1.2	For TOPL, planned road works please also provide the planning stage proposed by KB sample like page 24 to 34.	As discussed on 9 Jan 2019, there will be rules applicable to all equipment type, refer to Section 3.3.1.2 and 3.3.1.3 for more details.
8.	18	3.2.1.3	Info required for Duplicate from history ER, TOPL will need: - VMS Proposed messages - Radio broadcast message - msg for OBU when ERP2 in place - Time of the closure messages	Updated in 5.2.2
Comments from EPL				
9.	15	3.1 Figure 1	1. Pre-planning Stage to merge with Planning Stage. (as discussed 8/1/19) 2. The dotted box is an option box (as discussed on 8/1/19) 3. Can the process jump from box "Create/update ER define road closure" to	1. Done 2. Done 3. Since the step in between is optional, the process is as requested and no arrow is needed.

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			box "System propose time base plans…"? If yes, there should be an arrow to show this bypass. 4. Need function to add more approving officers. Approving officers can be team manager and above. (Discussed on 8 Jan 2019).	4. Included in Section 3.3.10
10.	17	3.2.1.1	How do the system accept external Excel template ? By SSA or LTA secured thumbdrive?	By LTA secured thumb drive.
11.	16	3.1 Table 4	1. EPL is not applicable on advance and contingency stages in glide plan (Time Base) 2. EPL is not applicable on advance and actual stages in glide plan(Situation-based) 3. All un-used columns to put as "N.A"	Updated in Table 4. Point 2, EPL is applicable for actual stage in GLIDE plan (situation-based) after clarification with LTA.
12.	16	3.1 Table 5	1. Prompt+Ops is applicable to actual stage in Glide plan(time-based) only 2. Ops is applicable to actual and contingency stages in Glide plan(situation base) 3. Contractor shall be responsible in Mobile	Updated in Table 5.

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			Cam Plan 4. All un-used columns to put as "N.A"	
13.	17	3.2.1.2	1. Event road closure list with closing & opening time & dates not in the list.	Road closure list is in Section 3.2.2 and please see the illustration in Figure 3.
14.	18	3.2.1.3	1. The data in the historical ER to change are listed in 3.2.1.2 except event location , road closures	Updated in Section 3.2.1.3. All the plans should be kept as well?
15.	20	3.2.4	Area of influence definition: Should also state the VMS for KPE & MCE are also included in this definition and will be automatically highlighted.	Updated in Section 3.2.4
16.	25	Figure 9	Equipment Types to be Proposed with VMS Messages by KB: Must include EMAS TTP, KPE (TVMS, EVMS, AVMS, TID), MCE (MVMS, TIDM, AVMM, EVMM), CTE, Woodsville, Sentosa Gateway, Fort Canning tunnels VMSs & ERP2 OBU if applicable based on AER.	As discussed on 9 Jan 2019, regardless of equipment type, system will propose date, time and message based on the agreed rules. EPL and TOPL shall adjust the layout of VMS messages by themselves.
17.	26	3.3.1.2	What is the generic rule? "*The rest of the VMS shall only display the generic rule*".	The AER Part 1 will display closure message with specific road name and message structure because it follows incident total closure message rule. AER part 2 VMS will display 'xxx closed'. Xxx can be closure road name / area name depending on the available space. Please find the details regarding this in Section 3.3.1.3 and Figure 14.

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18.	31	Figure 15	Monday (single day) event to have extra Monday (-1 week) advance message. Rational is to capture the regular Monday motorists to the closed area. Advance message days for Monday (single day) event = Monday (-1 week) + Saturday + Sunday 	Mon	Tue	Wed	Thurs	Fri	Sat	Sun	Mon
Advance					Advance	Advance	Actual		Updated.
19.	32	Figure 18	Similar to Item 10 comment above. Multiple event days with the 1st closure day starting on Monday, to have extra Monday (-1 week) advance message. Rational is to capture the regular Monday motorists to the closed area. Advance message days for Monday (single day) event = Monday (-1 week) + Saturday + Sunday | Mon	Tue	Wed	Thurs	Fri	Sat	Sun	Mon	Tue	Wed
Advance for M,T & W					Advance for M,T & W	Advance for M, T & W	Actual msg of Mon / Adv for T & W	Actual msg of Tue/ Adv for W	Actual msg of Wed		Updated. Can I clarify for event happen on Monday but Monday is not the starting day, for example,: Sun and Mon, does system need to propose adv message on Mon (-1 week) since no weekday motorist is informed.
20.	33	3.3.1.5	"*A search function will be provided for ~~OCC planning~~ EPL to search….*"	Updated.
21.	33	3.3.1.5	"*A search function will be provided for ~~OCC planning~~ EPL to search….*"	Updated.
22.	40	3.4.4.2	Do not limit the agencies to just the ones listed. Are the ones listed the default agencies?	User need to finalise the data fields in response table including field name, data type, drop-down list value and etc with SSA during design stage.
23.	43	4.1 Figure 26	Same content as Item 1	Updated.
24.	44	4.1 Table 8	Same content as Item 3	Updated.

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25.	45	4.1 Table 9	Same content as Item 4	Updated.
26.	22,23	3.3.1.2	1. The message display for date and time should be align to left as discussed on 8 Jan 2019. 2. For RVMS advance message: • Single day and time with 9 char, need to fit into 1st line. • Multiple dates with timing with 15 char, DDMMM-DDMMM aaaaaaa-bbbbbbb can fit into 1st line. If cannot fit in the 1st line, bbbbbbb shall go 2nd line as discussed on 8 Jan 2019	1. Mentioned in Section 3.3.1.2 2. The rule for VMS message display has been summarized in Section 3.3.1.2 (for date and time) and Section 3.3.1.3 (for event message), which is a generic rule applicable to all the VMS types.
27.	31	3.3.5	1. This is applicable if the proposed mobile camera location by the system is very near to the affected vicinity area. Need to have flexibility to allow user to have freedom to change or propose another location for the mobile camera deployment. Please provide proposed area of influence for mobile camera. *It was removed on last DAR *	As discussed on 8 Jan 2019, it will follow area-of-influence.
28.	General	-	All Planned Events messages (advanced, live, contingency) should be made available for 3rd party consumption (dissemination).	Updated in Section 3.3.11
29.	General	-	Confirm whether the KAP report for Planned Events fulfils the below requirements. If yes, indicate the section; if no, please provide the reasons. 11. Features to disseminate event closure information on another platform (email, SMS, mobile phone LTA App) to target residents and businesses in the road closure area Steria's reply: i-transport is not public facing.	Same as item 28.

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			This is discussed separately with the relevant team in LTA (one.motoring/MyTransport.sg team). Please agree that system will provide planned event information at disseminated module for external party usage.	

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1.	18	3.2.1.3	1. The data in the historical ER to change are listed in 3.2.1.2 except event location, road closures	Updated in Section 3.2.1.3. All the plans should be kept as well? Yes, as stated in 3.2.1.3 Reply from SSA: Noted. No change needed.
2.	20	3.2.4	Area of influence definition: Should also state the VMS for KPE & MCE are also included in this definition and will be automatically highlighted.	Updated in Section 3.2.4 IW in ITSC OCC unable to control SGT VMS presently. For clarification, 3 small tunnels; VMSes in SGT, WVT and FCT should include too Reply from SSA: As clarified with LTA, IW ITSC OCC has control on SGT VMS. Highlighted in Section 3.2.4 that these short tunnels are included also and system shall provide the function to allow users plan the VMS on KPE/MCE equipment which ITSC OCC has no control on, and send the plans over to KPE/MCE side for their implementation by email service within i-transport.
3.	32	Figure 18	Similar to Item 10 comment above. Multiple event days with the 1st closure day starting on Monday, to have extra Monday (-1 week) advance message. Rational is to capture the regular Monday motorists to the closed area. Advance message days for Monday (single	Updated. Can I clarify for event happen on Monday but Monday is not the starting day, for example,: Sun and Mon, does system need to propose adv message on Mon (-1 week) since

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			day) event = Monday (-1 week) + Saturday + Sunday 	no weekday motorist is informed. Yes, for 2 conditions only ; either Sat or Sun is 1st day of event Reply from SSA: Added as Rule 5 in Section 3.3.1.4
4.	22,23	3.3.1.2	1. The message display for date and time should be align to left as discussed on 8 Jan 2019. 2. For RVMS advance message: - Single day and time with 9 char, need to fit into 1st line. - Multiple dates with timing with 15 char, DDMMM-DDMMM aaaaaaa-bbbbbbb can fit into 1st line. If cannot fit in the 1st line, bbbbbbb shall go 2nd line as discussed on 8 Jan 2019	Mentioned in Section 3.3.1.2 The rule for VMS message display has been summarized in Section 3.3.1.2 (for date and time) and Section 3.3.1.3 (for event message), which is a generic rule applicable to all the VMS types. Possible to demonstrate all types of VMS in figures in the report Reply from SSA: Demonstration will be added in KBRS.

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1.	51	5.2.1	>>Can provide examples of types of closure for maintenance work? 1) Mill and patch 2) Road resurfacing 3) Maintenance work 4) Beam launching 5) Diversion work 6) Road painting 7) Water leakage/ pipe burst 8) Road repair 9) Geometry survey 10) Misc >>Can provide examples of types of closure for new development? 1) New road opening 2) Road expunction 3) Road widening 4) New building such as bus interchange 5) New tunnel/ expressway 6) Misc	Dropdown list value will be will be under 'Event Type' field, which has been mentioned in Section 3.2.1.2
2.	61	7	>>Can provide examples of types of closure? Provided. Refer to section 5.2.1	Same as item 1
3.	25	Figure 9	If the system unable to determine the size of VMS layout (for example: TIP 4 x 20 char, with icon 4 x 3), can it align with the current itransport IW system where the user can pre-select type of VMS equipment first before key in the actual message.	Similarly to Section 3.3.2, TOPL has the flexibility to define VMS groups and edit the message manually. In Figure 9, there is a button called 'New VMS Plan' which allows user to do so. Has been highlighted in Section 5.3.1 as well.
4.	21	3.2.5	Part 2: The rest of the VMS within area-of-influence Can confirm the VMS highlighted only serving towards the direction of closure point ?	Suggest not to automatically highlight the VMS serving towards the closure point at this moment because 1. System have no control of the destination and motorist can change the

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				direction heading to the closure anytime if they are not aware of the closure, they may just want to make a U-turn then drive towards road closure, which defeat the purpose of closure message: to broadcast the motorist nearby the closure area. 2. The definition of VMS towards road closure is unclear as road closure is not necessarily to be a stretch of road. For example, how to define the VMS on the parallel to road closure is towards or away from closure.