



Date: November 5, 2015

To: High Performance Transportation Enterprise Board

From: Brent E. Butzin, HPTE General Counsel  
Joe Mahoney, OMPD

Subject: I-70 Mountain Express Lane (PPSL) Toll Rate Adjustment

Purpose

The purpose of this memorandum is to summarize staff's planned approach for adjusting variable toll rates for the I-70 Mountain Express Lane (PPSL).

Action

This item is for discussion. The toll rate range for the I-70 PPSL was presented at public outreach events in September. The amount of the transponder and LPT toll rate was approved by the HPTE Board in October 2015. The HPTE Board requested more information on the decision process utilized by staff in making a change in the posted toll rate.

Background

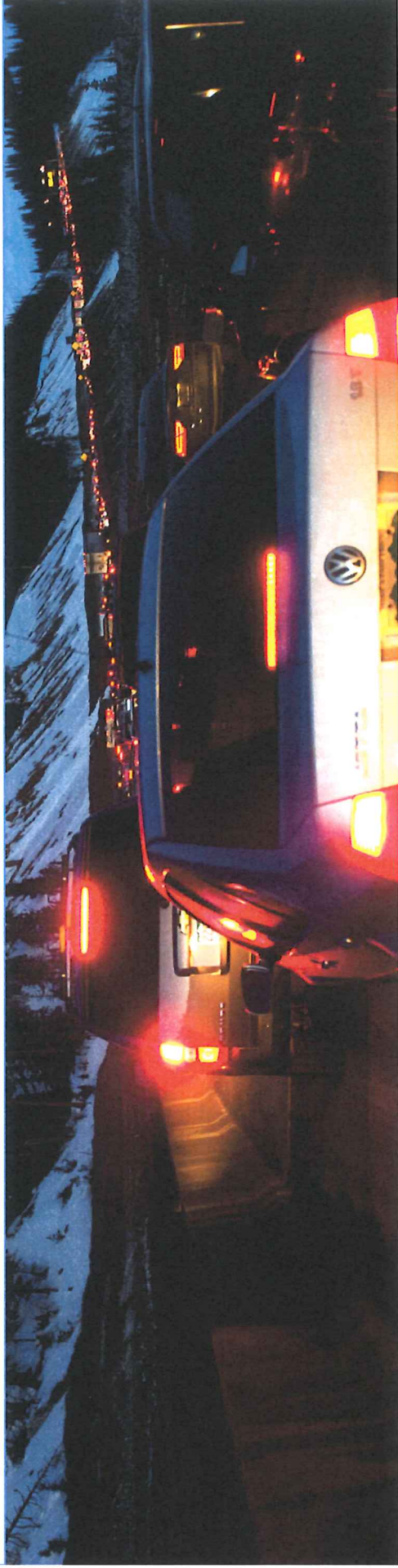
I-70 Mountain Express lane (PPSL) is expected to open for tolled traffic in December 2015. The I-70 Mountain Express lane will be the first toll operation in the nation focused exclusively on a recreational corridor. The information that has been collected historically concerning the value of time for travelers, which is used as a basis for setting toll rates, comes mostly from commuter corridor surveys. So there is little comparable data available for setting initial toll rates for the PPSL, or for predicting the flexibility required for adjusting toll rates over the course of a day of operations. The decision processes for adjusting toll rates substantially follow those practices established for dynamic pricing however the nature of the I-70 Mountain Express Lane corridor is that demand can vary greatly from day-to-day, season-to-season.

Details

HPTE's consultants have provided a detailed methodology which has been attached and is available for review. This document was developed with sufficient detail to support IT development and design engineering for the project. There is also an attached presentation to provide background on how staff will adjust toll rates during a day of operation.



**COLORADO**  
Department of  
Transportation



**I-70 Mountain Express Lane Operations  
Project Leadership Team  
Nov 20, 2015**



# I-70 Mtn. Express Lane Operations – Agenda

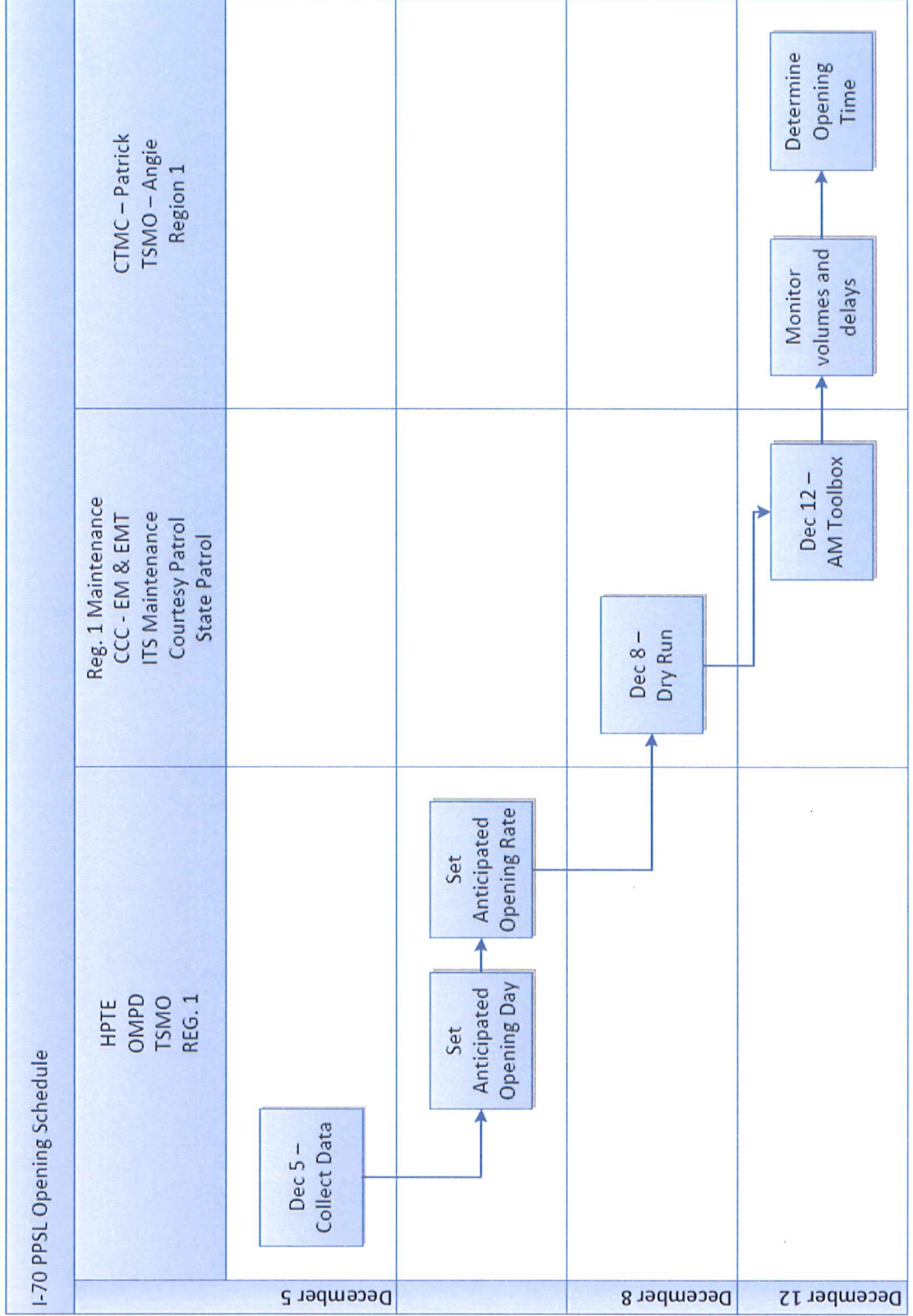
1. Normal Operations
2. Toll Rate Changes
3. Incident Management
4. Weather Management





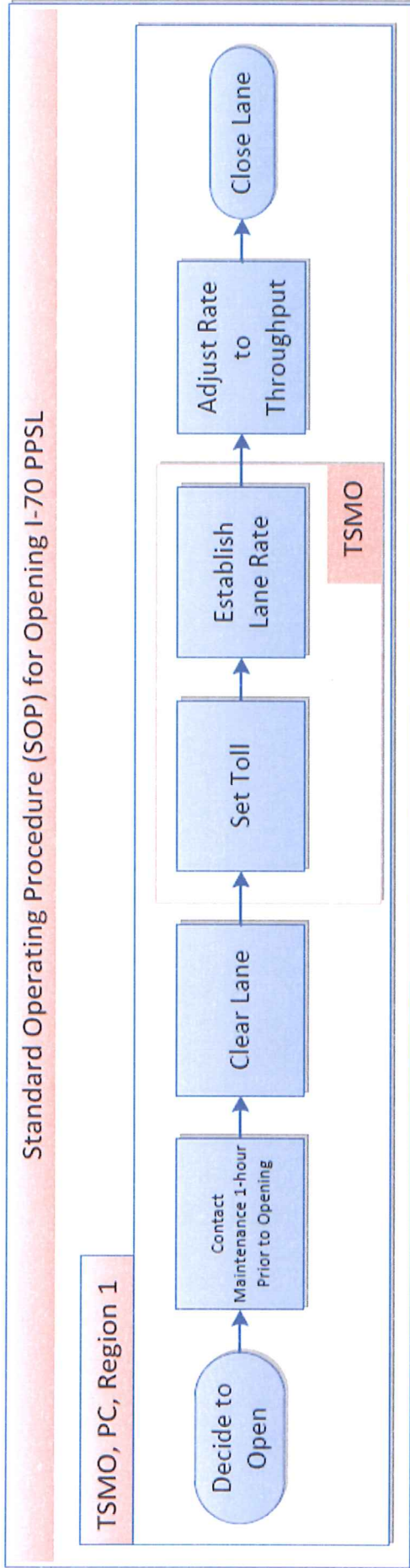


# I-70 Mtn. Express Lane – Normal Operations





# I-70 Mtn. Express Lane – Normal Operations





## I-70 Mtn. Express Lane – Toll Rate Adjustments

- ❖ Successful operations depend upon providing reliable travel-time through the Corridor
  - Too many vehicles in the Express Lane will reduce reliability
  - Too few vehicles is inefficient
  - Demand will fluctuate from weekend to weekend
- ❖ Establishing a proper toll rate/range for the congestion and level of demand being experienced will provide the operating flexibility required to meter how vehicles use the I-70 Mountain Express Lane.



## I-70 Mtn. Express Lane – Toll Rate Adjustments

- ❖ **Toll Rate Adjustments are Based Upon Measured Demand:**
  - Demand is based Upon an Assessment of Existing Volumes in the Corridor and Upstream Volumes that will soon reach the Corridor
  - I-70 Mountain Express Lane Project has 13 stations, each station measures volume and speed at the Express Lane and adjacent two GP Lanes.
  - Upstream Volumes are measured at:
    - Silverthorne / EJMT / US 40 Empire / Empire Junction On-Ramp



## I-70 Mtn. Express Lane – Toll Rate Adjustments

- ❖ Method for Toll Rate Adjustments:
  - Volumes are measured and transmitted to the Operations Center at 60 second intervals.
  - Volume data collected and transmitted at 60 second intervals is measured as Density.
  - Very roughly 3,000 VPH traveling at 50 MPH for a distance of one mile equates to a one minute Density of 60.
  - Data for all of these points will be projected on monitors at the Operations Center.





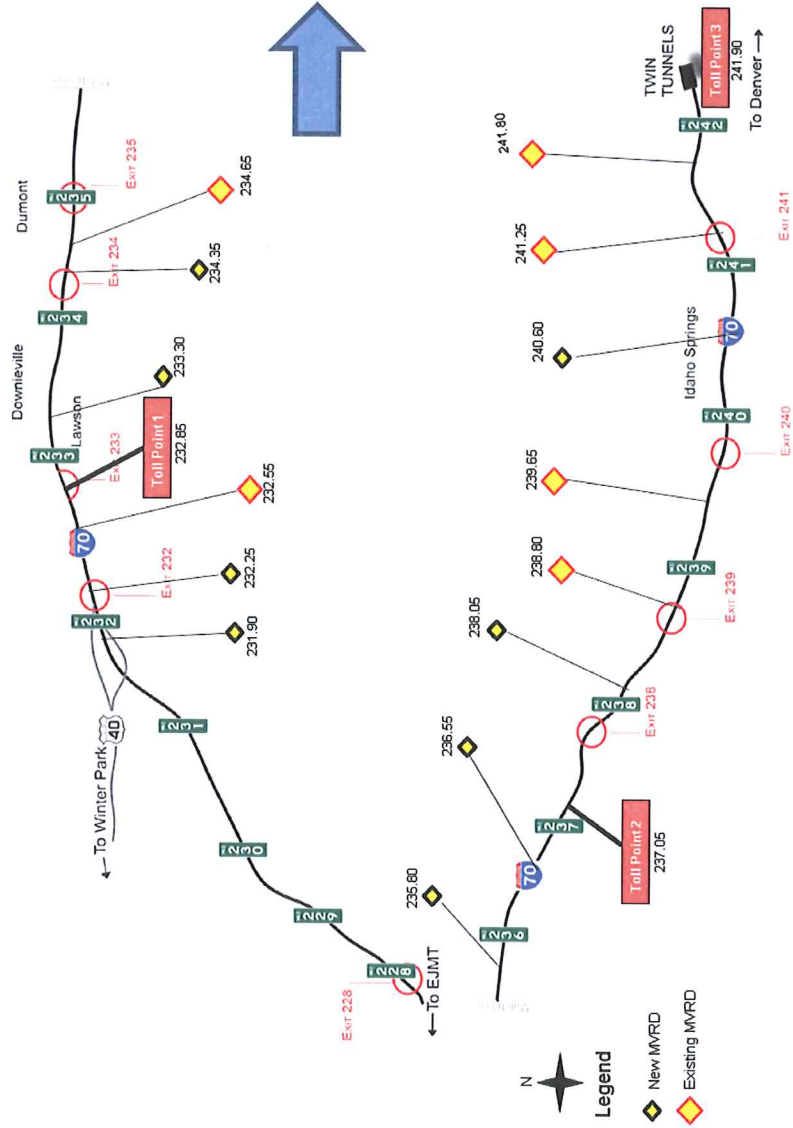
## I-70 Mtn. Express Lane – Toll Rate Adjustments

- ❖ **Method for Toll Rate Adjustments:**
  - **Time of Day Pricing Schedule**
    - On the Thursday prior to the upcoming weekend a time of day pricing structure will be set based upon historical data, recent data trends, and traffic and weather forecasts of the upcoming weekend
    - This weekend specific toll structure is to minimize real-time toll rate changes during operations
    - This uses a specific scenarios of toll rates for various traffic density levels
  - **Real Time Toll Rate Adjustments**
    - Adjustments to Toll Rates will be at the direction of the I-70 Corridor Manager based upon specific data triggers on existing density in the corridor and volumes measured upstream



# I-70 Mtn. Express Lane – Toll Rate Adjustments

The system will monitor traffic density in the **Express Lane** and **GP Lanes** at each Microwave Vehicle Radar Detector (MVRD) location. The Colorado Transportation Management System (CTMS) will display a screen that shows the color-coded density at each location. The display will include six columns; the first column will show the current density, the second will show the density from the previous minute, the third will show the density from two minutes ago, etc. Thus, the display will show corridor conditions for the previous five minutes



Milepost	t	t-1	t-2	t-3	t-4	t-5
231.90	27	27	22	21	21	20
232.25	27	28	22	21	21	20
232.55	22	22	21	21	20	20
233.30	22	22	21	21	20	20
234.35	22	21	21	20	20	19
234.65	22	21	21	20	20	19
235.80	21	21	20	20	19	19
236.55	21	21	20	20	19	19
238.05	21	20	20	19	19	18
238.80	21	20	20	19	19	18
239.65	20	20	19	19	18	18
240.60	20	20	19	19	18	18
241.25	20	20	19	18	18	18





# I-70 Mtn. Express Lane – Toll Rate Adjustments

System for making real-time toll rate adjustment decisions in the Operations Center

Application Console: (ITS\_ADMIN) (TEST)

Zoom Scale  Flip View  West  East  All IUS(12)  All VMS(3)  All VMS(15)  All VMS(15)  All Selections(0) Turn On Turn Off

Map I-70

Segment	11:00 AM	10:55 AM	10:50 AM	10:45 AM	10:40 AM	10:35 AM	10:30 AM	10:25 AM	10:20 AM	10:15 AM	10:10 AM	10:05 AM	10:00 AM
West Bound	10	10	10	10	10	10	10	10	10	10	10	10	10
East Bound	14	14	14	14	14	14	14	14	14	14	14	14	14
GP1	18	18	18	18	18	18	18	18	18	18	18	18	18
GP2	20	20	20	20	20	20	20	20	20	20	20	20	20
MS1	23	23	23	23	23	23	23	23	23	23	23	23	23
LS1	24	24	24	24	24	24	24	24	24	24	24	24	24
IS1	26	26	26	26	26	26	26	26	26	26	26	26	26
IS2	27	27	27	27	27	27	27	27	27	27	27	27	27
IS3	31	31	31	31	31	31	31	31	31	31	31	31	31
IS4	38	38	38	38	38	38	38	38	38	38	38	38	38
IS5	42	42	42	42	42	42	42	42	42	42	42	42	42
IS6	45	45	45	45	45	45	45	45	45	45	45	45	45

Total Records: 15

RTMS  Speed (mph)  Density (GP)  Streaming Cameras

Id	Direction	Sub Type	Sub Type	Location	Description	Owner	Last Update	Status
184802	→ east	Incident	Accident	ITS	PPSL 170...170 PPSL L...	ITS A...	08/31/15 10:...	Minimal Open
184023	→ east	Incident	Accident	ITS	PPSL 170...Test	ITS A...	08/14/15 11:...	Severe Open

Events Log Toll History Toll Schedule

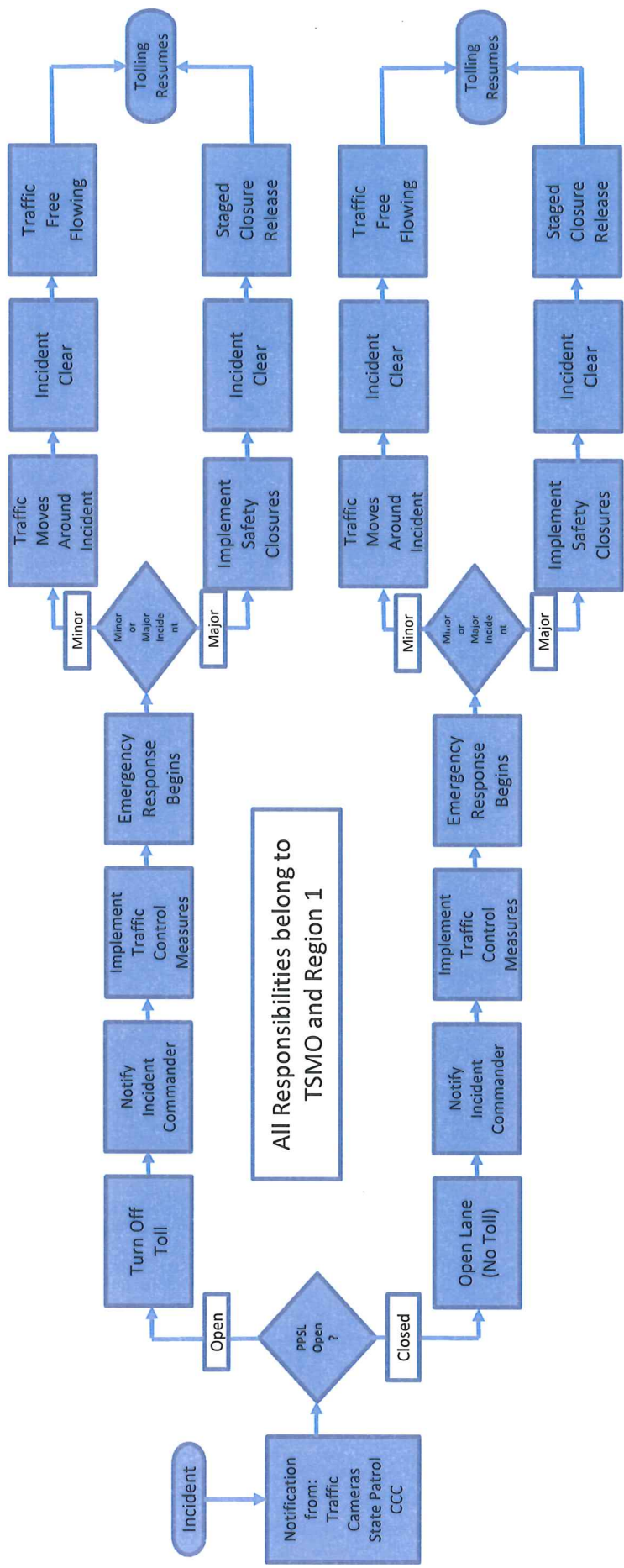
Map I-70 @ FALL RIVER RD (10271)

Total Records: 2



# I-70 Mtn. Express Lane – Incident Management

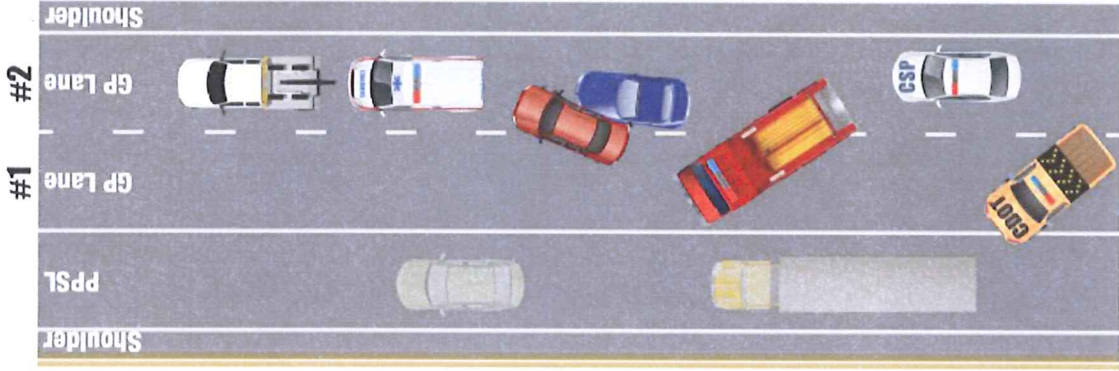
## Incident Mitigation Procedures for I-70 PPSL







# I-70 Mtn. Express Lane – Incident Management

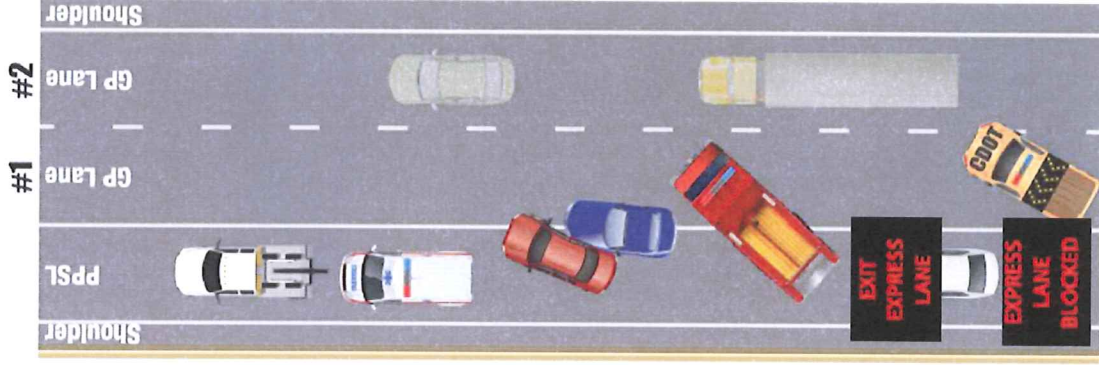


## Intermediate Incident: Scenario #1

- ❖ Incident Action Items:
  - Detection: cameras, speeds, field staff, 911 call
  - Dispatch of appropriate CDOT/CSP resources
  - GP Lane #1 and Lane #2 are anticipated closed for the entire incident
  - Traffic will operate in the PPSL ONLY
- ❖ Effect to PPSL
  - PPSL goes into Emergency Closure to allow first responders access to the incident
  - Once incident is cleared, PPSL will go into Clearing State (Open-No Toll)
  - If the PPSL is used for GP traffic to clear, all tolls will be suspended



# I-70 Mtn. Express Lane – Incident Management



## Intermediate Incident: Scenario #2

- ❖ Incident Action Items:
  - Detection: cameras, speeds, field staff, 911 call
  - Dispatch of appropriate CDOT/CSP resources
  - PPSL and GP Lane #1 are anticipated closed for the entire incident
  - Traffic will operate in the GP Lane #2 ONLY
- ❖ Effect to PPSL
  - PPSL goes into Emergency Closure to allow first responders access to the incident
  - Once incident is cleared, PPSL will go into Clearing State (Open-No Toll)
  - If the PPSL is used for GP traffic to clear, all tolls will be suspended



# I-70 Mtn. Express Lane – Normal Operations

