

The M1 Freeway Managed Motorway in Melbourne, Australia



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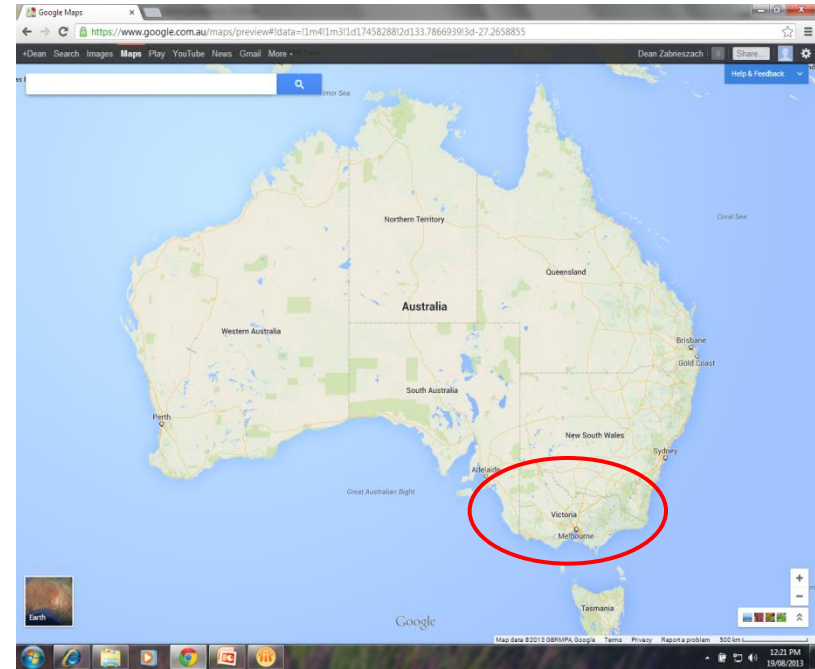
Melbourne, capital of the state of Victoria

Internationally voted “World’s Most Livable City” - 4 times in the past decade

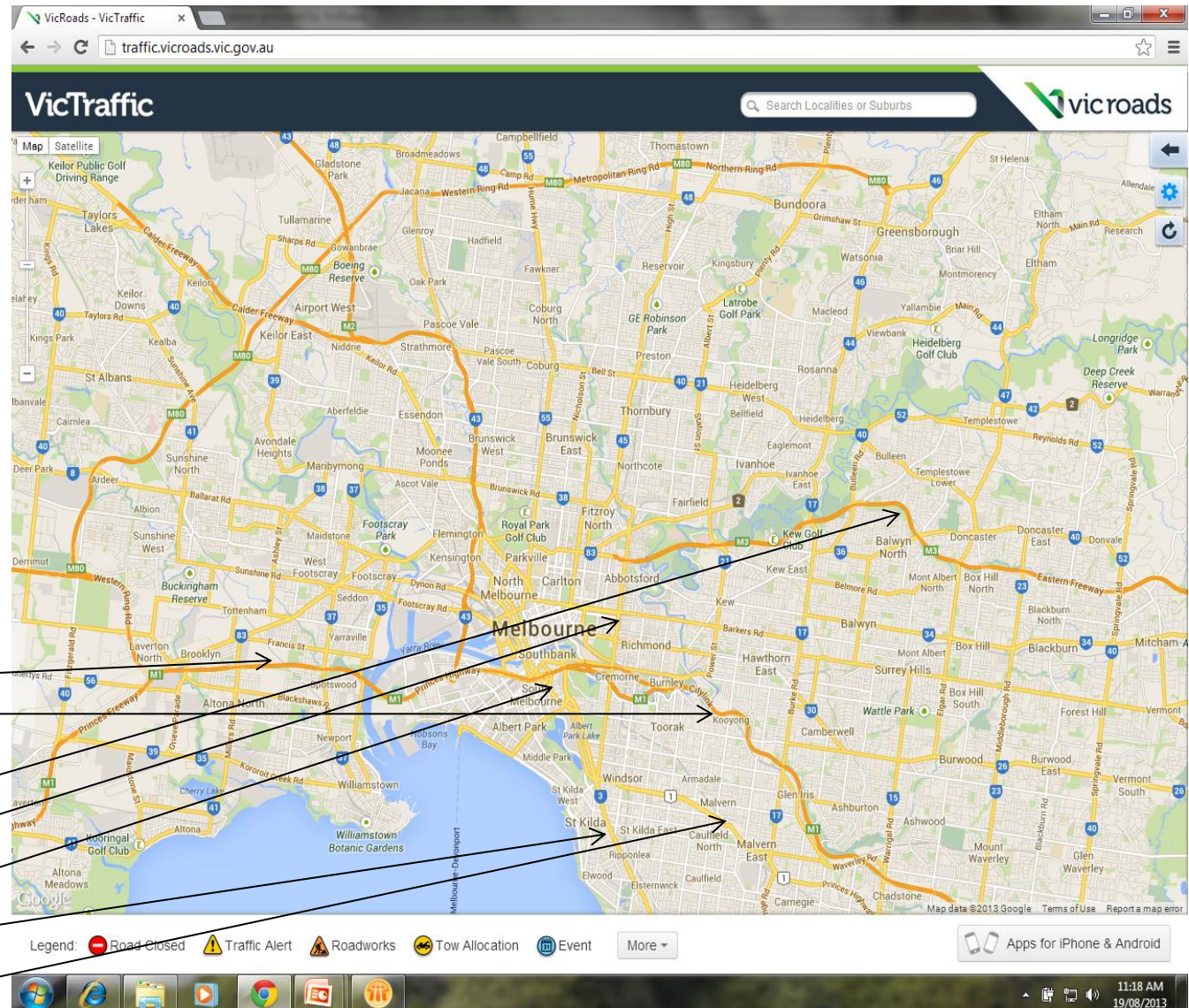


Victoria – General Information

- 227,600 sq km or 3% of the area of Australia
- Most densely populated state – 5.5m people, 24% of Australia
- 4.1m people (>70%) in Melbourne
- 4.4 million motor vehicles, 33% of Australian total
- 3.5 million licensed drivers
- 154,750 km of public roads
- 51% of arterial road travel is in Melbourne
- 25% of Australian road freight task



Melbourne Metropolitan Daily Traffic Volumes

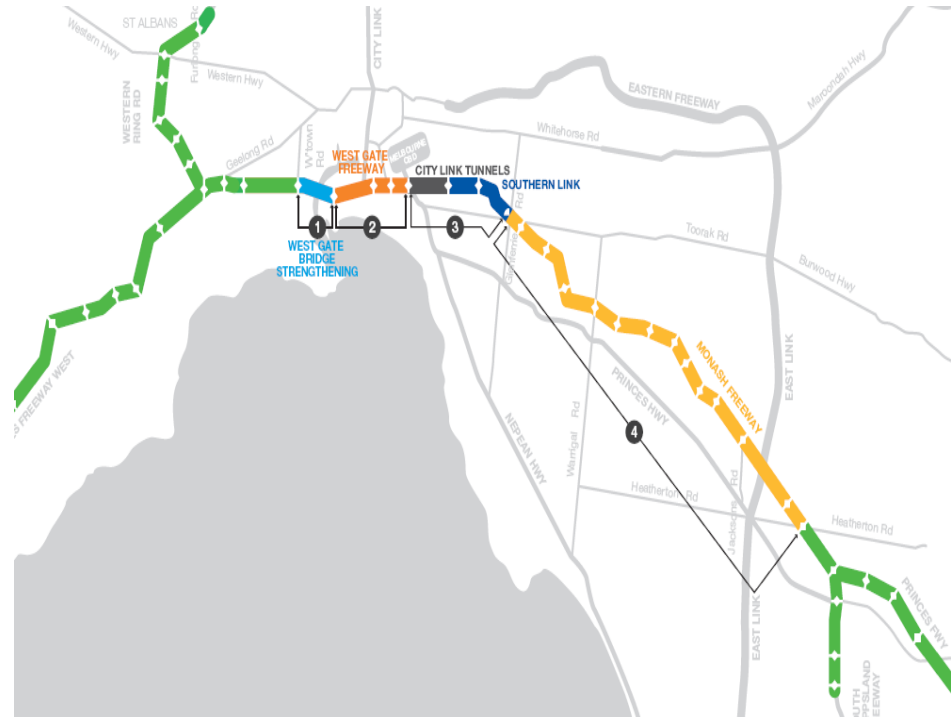


Problems on Melbourne's freeways

- Daily volumes on Melbourne's freeways are growing around 5% pa
- Peak-hour traffic throughput is in decline - some sections have declined as much as 25% in the past 5 years.
- Regular flow breakdown and congestion during peak periods leading to:
 - Under-utilisation of the freeway
 - Reduced level of service
 - Longer and less reliable travel times
 - Greater risk of incidents and reduced safety

The importance of the M1 route in Melbourne

- Heavily trafficked and economically important transport connection
- Carries the greatest volume of traffic of any freeway in Melbourne and levels are rising, 180,000 veh/day, incl. 20,000 trucks
- Services freight, business and private travel within and across Melbourne
- A key freight link between the port and industrial areas, east and west of the city



Why we need to Manage Freeways

Traffic conditions can change quickly

2:59pm



3:00pm



3:01 pm



3:02pm



3:03pm



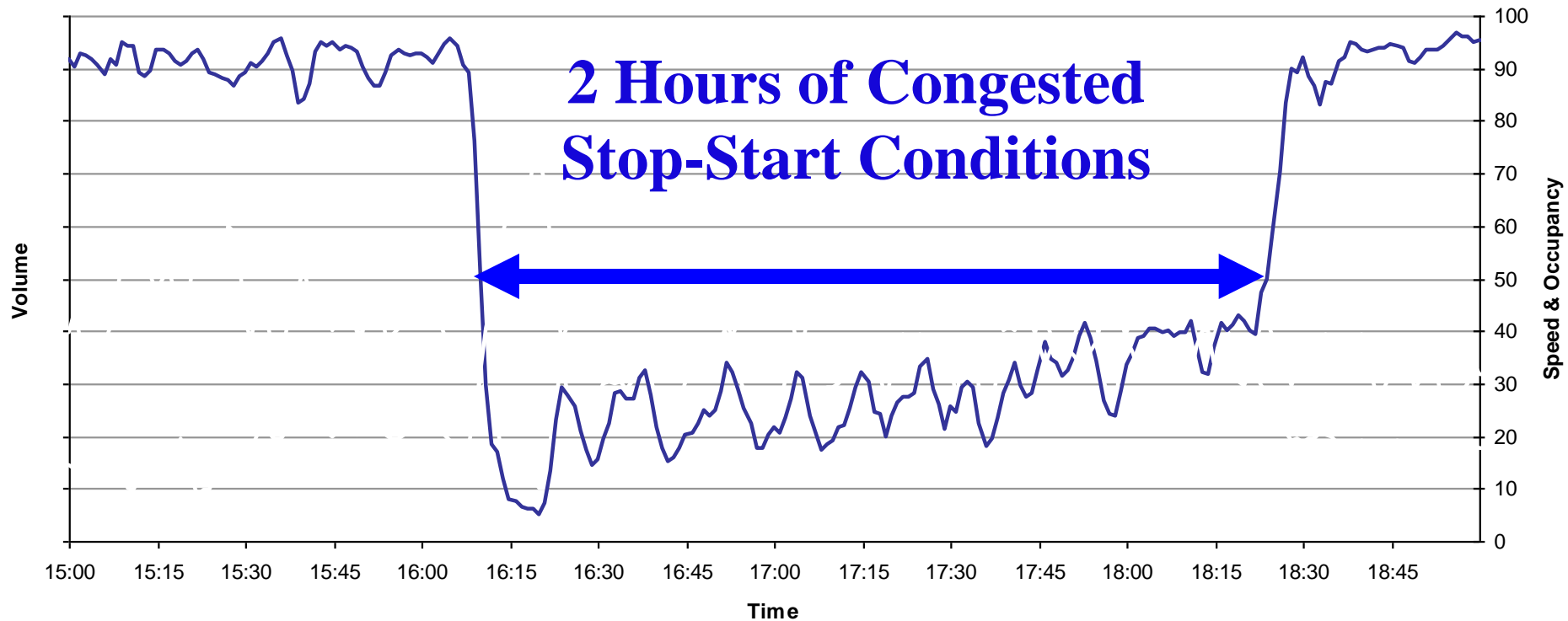
Lost Productivity

Monash Freeway East of High Street Eastbound
3 Minute Rolling Average Monday 3rd & 23rd August 2004

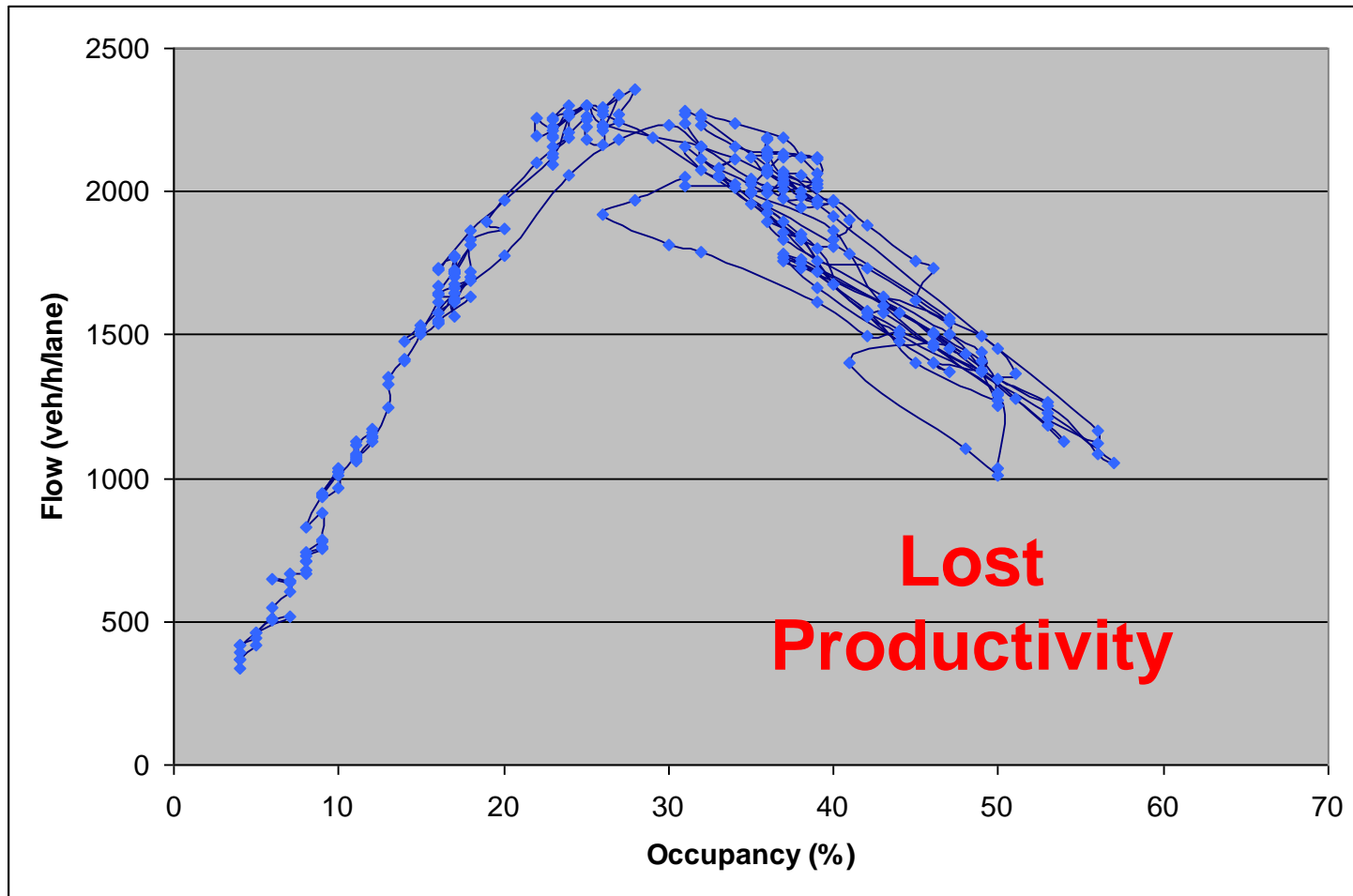


Speed Reduction

Monash Freeway East of High Street Eastbound
3 Minute Speed Rolling Average Tuesday 3rd August



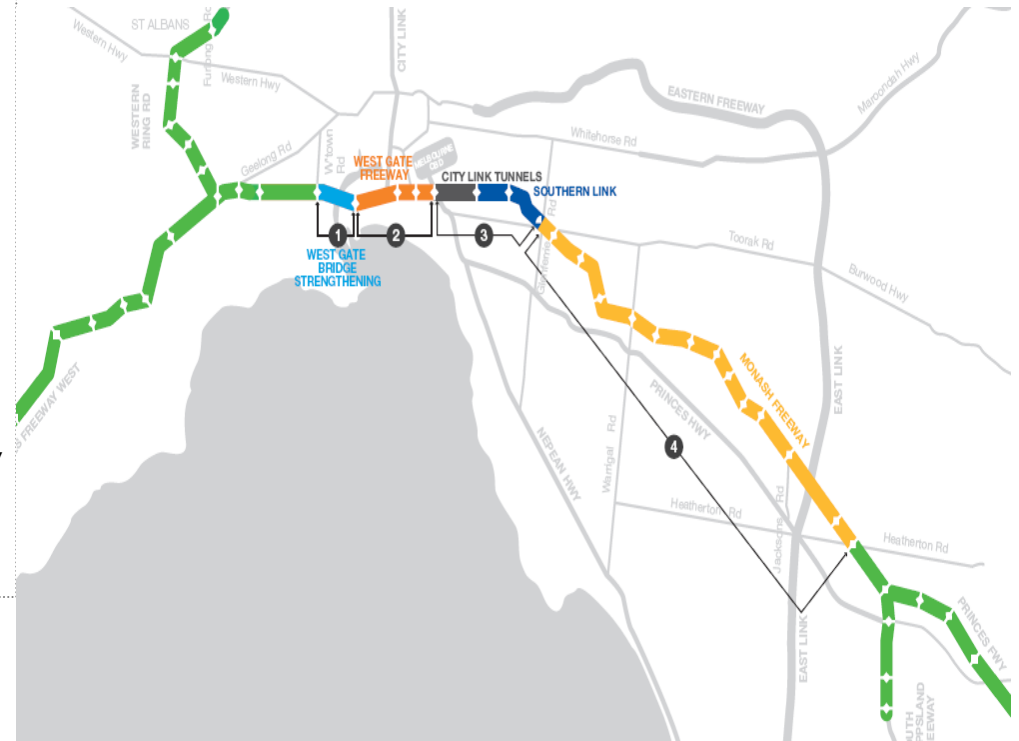
Fundamental Diagram - Flow vs Occupancy

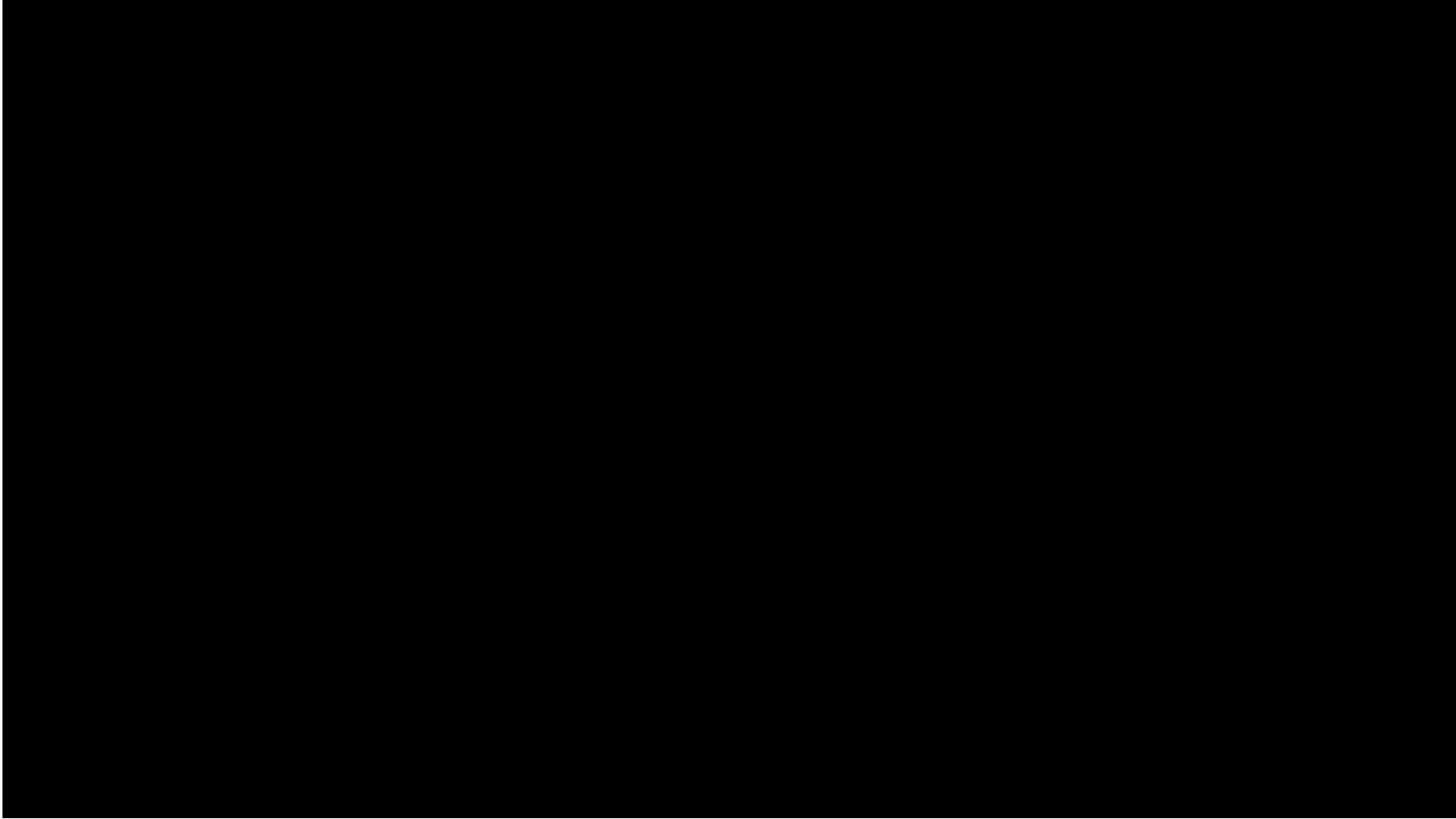


Typical lane flow breakdown at Critical Bottleneck

M1 Managed Motorway Project Overview & Objectives

- Maximise performance across the entire 75 km route
- Maximise utilisation of West Gate Bridge and City Link tunnels
- Improve the efficiency of the route by reducing travel times, travel time variability and congestion
- Improve safety
- Improve access to the freeway network






Coordinated Freeway Ramp Signals to address Congestion



Coordinated Freeway Ramp Signals

- **Features:**

- Dynamic start up and shut down algorithms that ensure the system only operates when required
- Implements a new cycle time every 20 sec based on:
 - Capacity on the freeway
 - Queue length on the ramps
 - Estimated wait time on the ramp
- Balancing of queue lengths and provide equity of access across the network

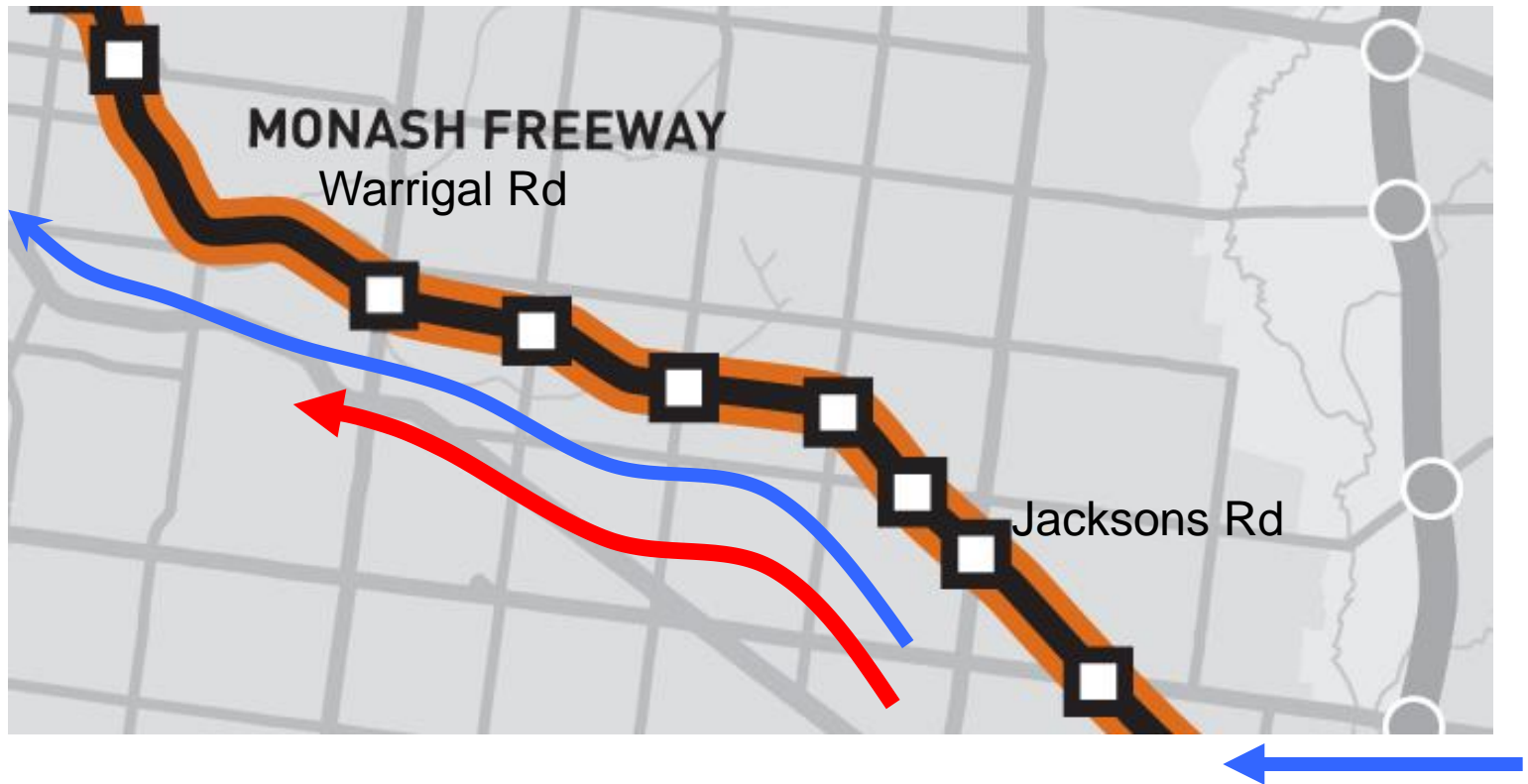


Melbourne Case Study

Coordinated Freeway Ramp Signals

2008

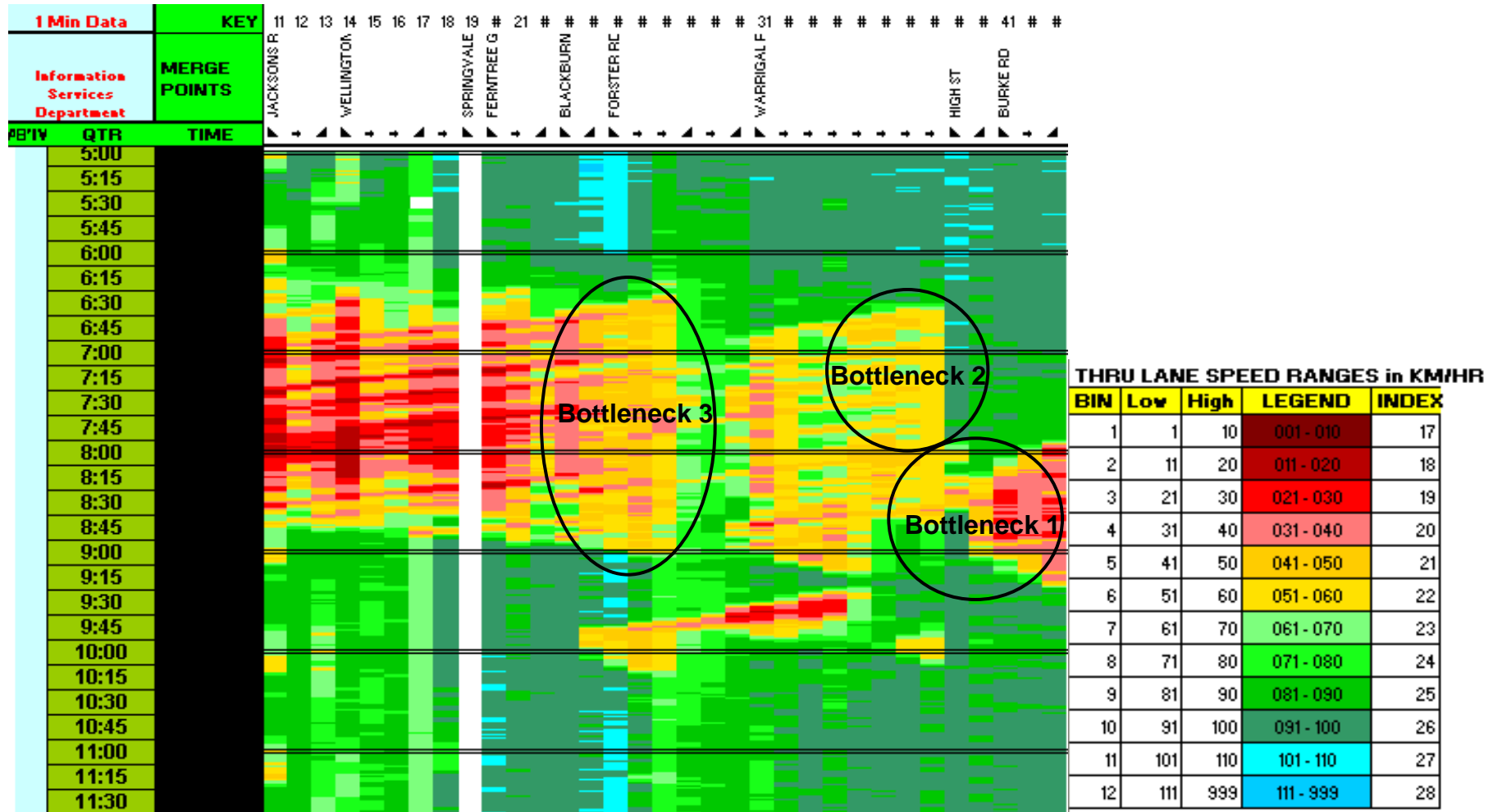
Coordinated Freeway Ramp Signal Trial



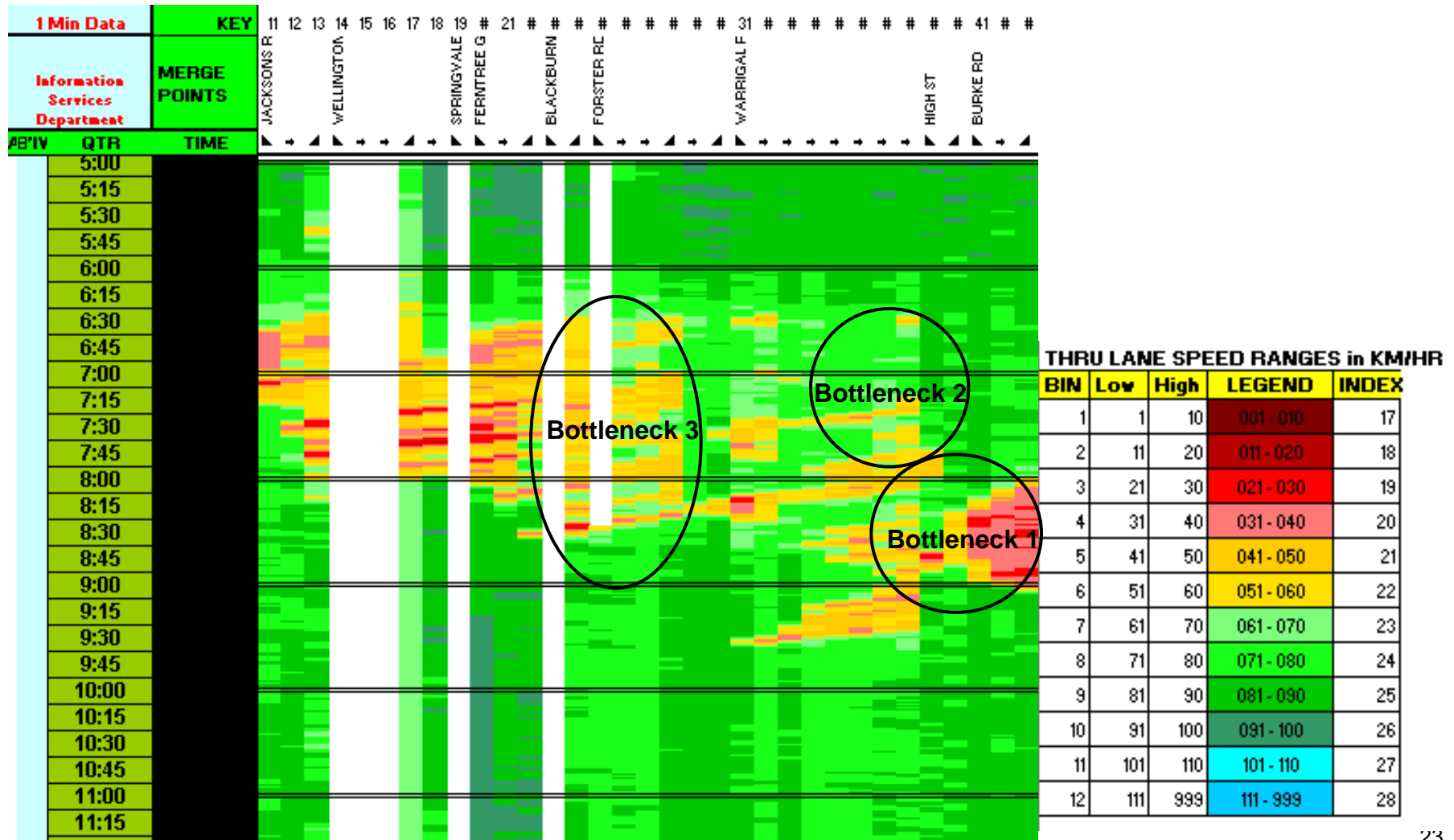
- 6 Existing inbound Ramps Metered
- Jacksons Road to Warrigal Road

**Area where
significant
benefits were
measured**

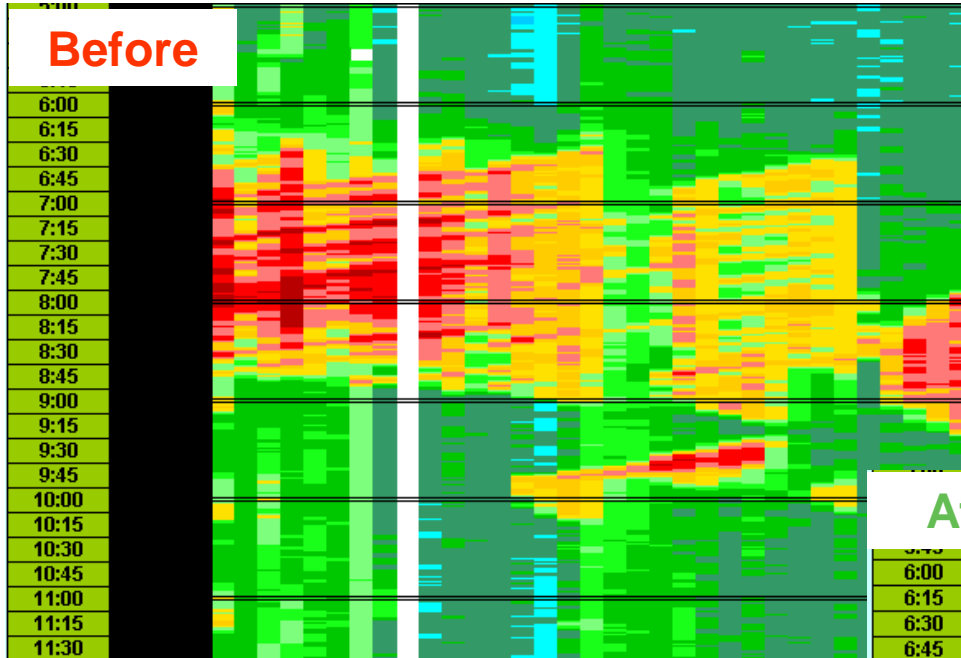
Fixed time ramp signals typical day/speed contour plot



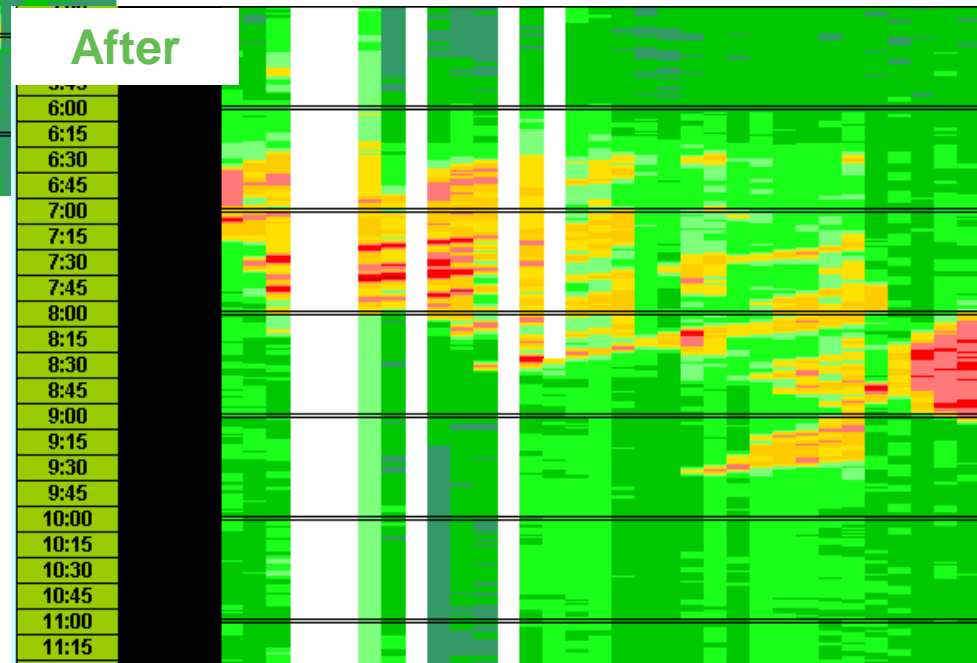
HERO ramp signals typical day/speed contour plot



Before and After Speed Contour Plot



With more upstream & downstream ramp signals further improvement is possible



THRU LANE SPEED RANGES in KM/HR

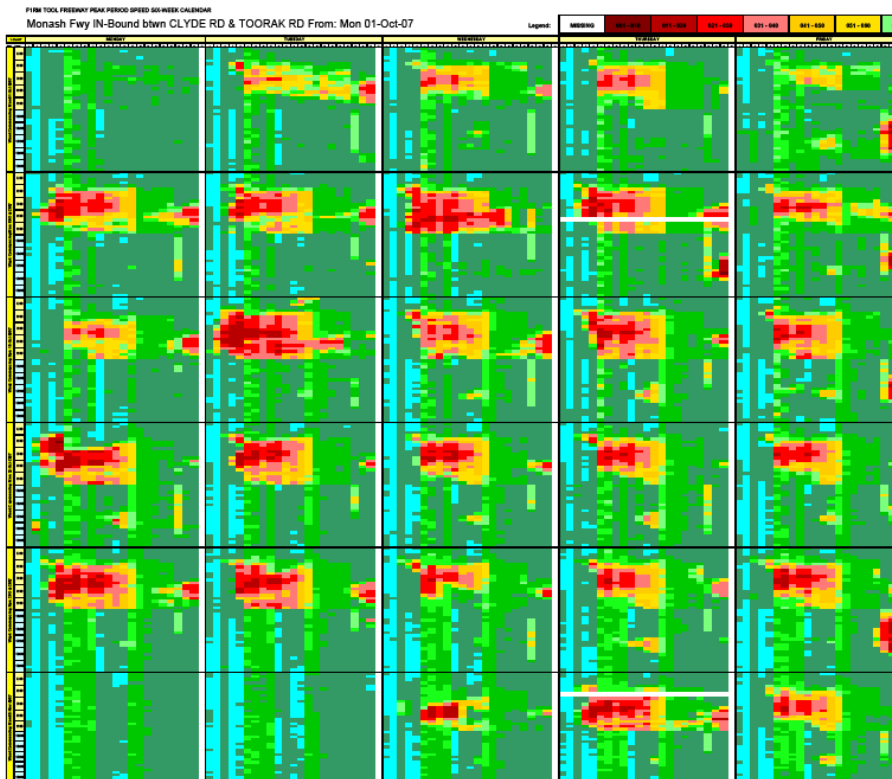
BIN	Low	High	LEGEND	INDEX
1	1	10	001 - 010	17
2	11	20	011 - 020	18
3	21	30	021 - 030	19
4	31	40	031 - 040	20
5	41	50	041 - 050	21
6	51	60	051 - 060	22
7	61	70	061 - 070	23
8	71	80	071 - 080	24
9	81	90	081 - 090	25
10	91	100	091 - 100	26
11	101	110	101 - 110	27
12	111	999	111 - 999	28

Before and After Results

M1 Freeway Inbound

Jacksons Rd to Toorak Rd

October 2007



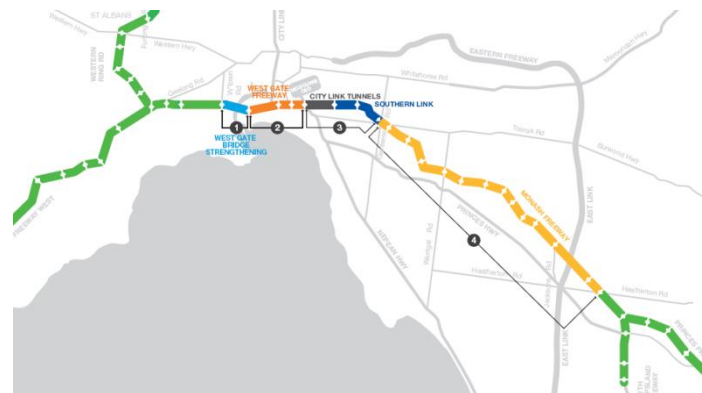
October 2008



Evaluation of Pilot Project Jacksons Rd to High St (6:00 AM to 9:00 AM) – 15 Kilometres

Performance Indicators	Values		Improvements
	Fixed Time	HERO	HERO
Average Flow (pcu/h/lane)	1731	1816	+5.0%
Travel Speed (km/h)	48.9	66	+35.0%
Average Delay (min/km)	0.49	0.17	-65.0%

Community Benefits



Section	Travel Speed		Travel Time Savings		Casualty Accident Decrease
	AM Peak Inbound	PM Peak Outbound	AM Peak Inbound	PM Peak Outbound	
Monash Freeway from Toorak Rd to Warrigal Rd	60%	55%	38%	38%	7%
Monash Freeway from Warrigal Rd to Jacksons Rd	70%	98%	38%	50%	44%
Southern Link from Tunnel to Toorak Road	4%	24%	7%	13%	44%
West Gate Freeway from Kingsway to Todd Road	95%	58%	44%	30%	47%

Since the Upgrade

Media Reports regularly describe the M1Freeway as:

- Its flying along
- Bubbling along
- No problems
- Easy run
- Behaving itself
- Running Smoothly
- No hic-ups
- Nothing to report





23rd World Congress on Intelligent Transport Systems

“ITS – Enhancing Livable Cities and Communities”

www.itsworldcongress2016.com

10 -14 October, 2016

Melbourne Convention & Exhibition Centre

