WCTRS World Conference on Transport Research Society

Second Online Workshop on Arterial Coordination Signal Control

26 Jan 2021

Signal Coordination Control Practices down under (Australia)

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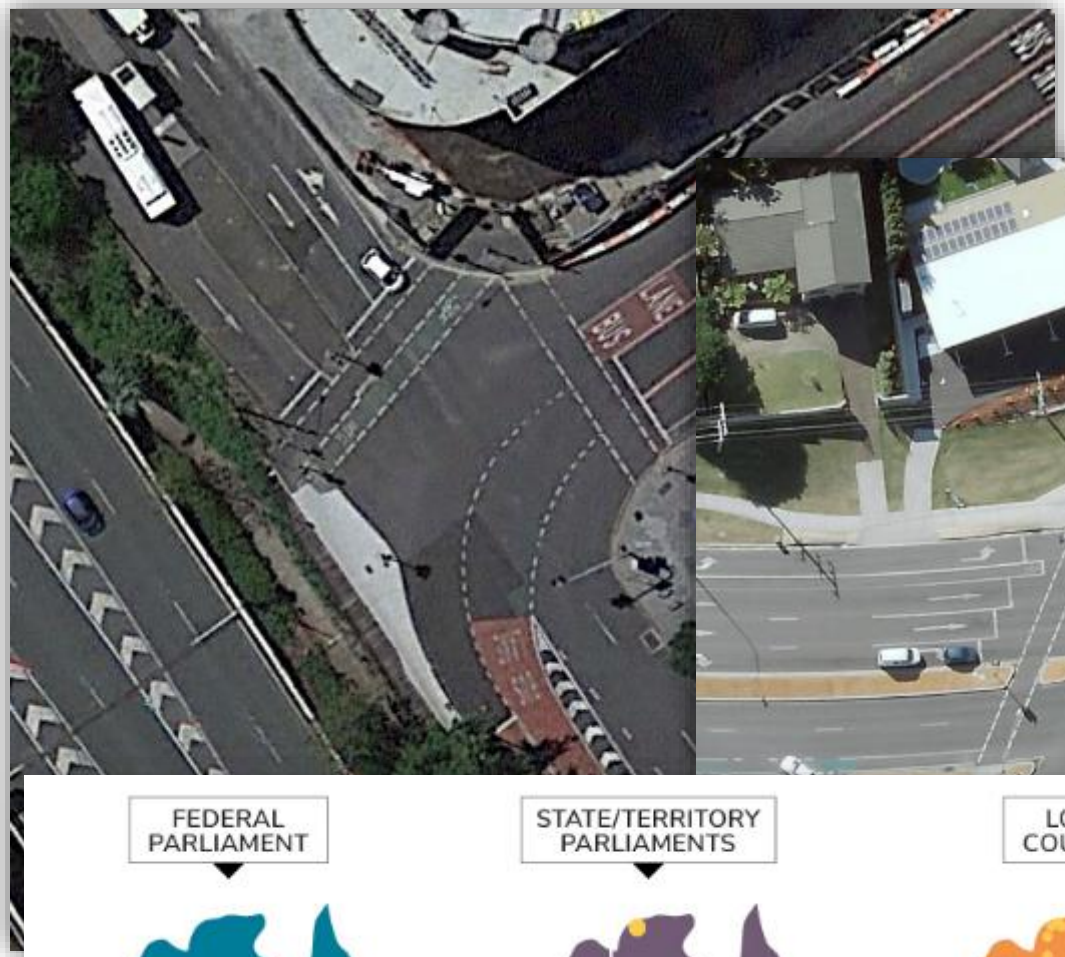
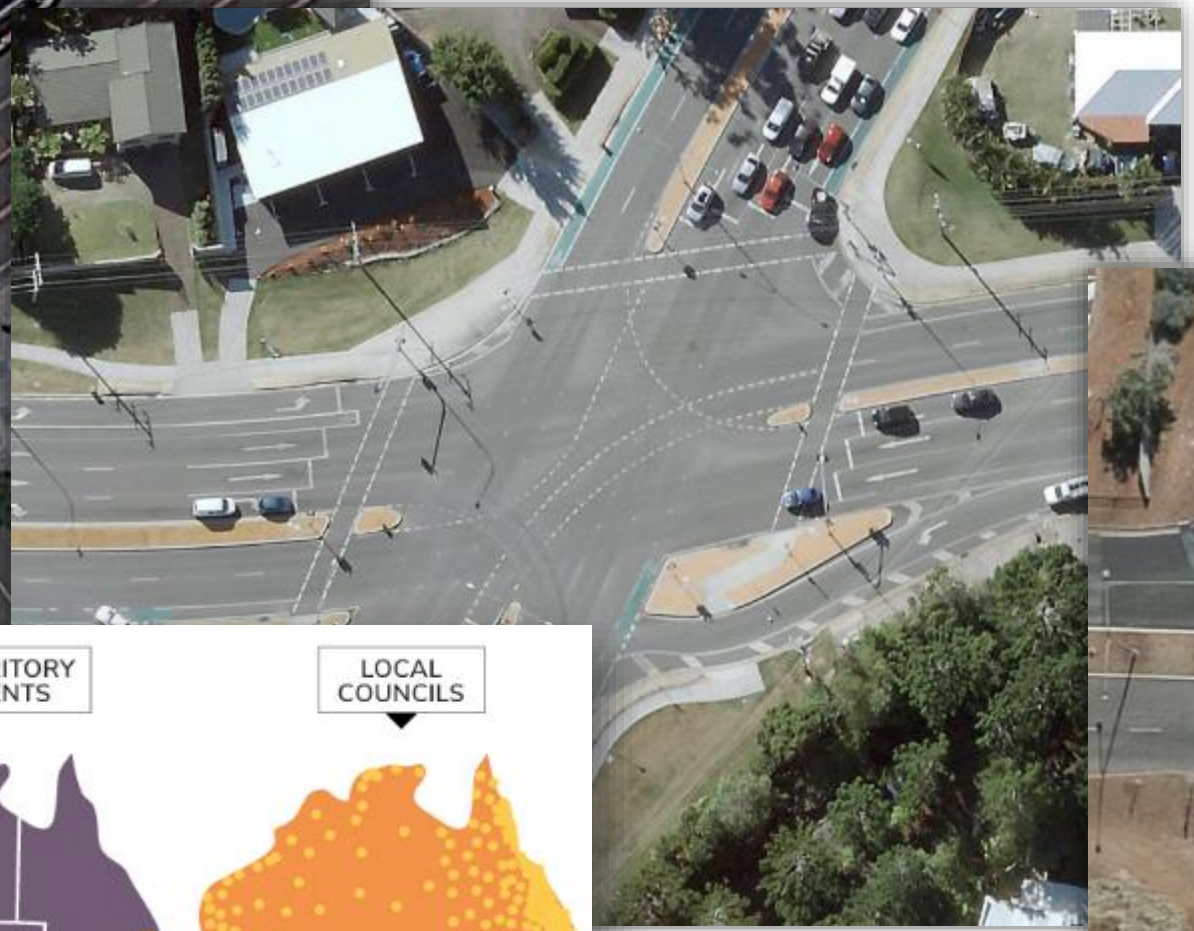
Context - Australia

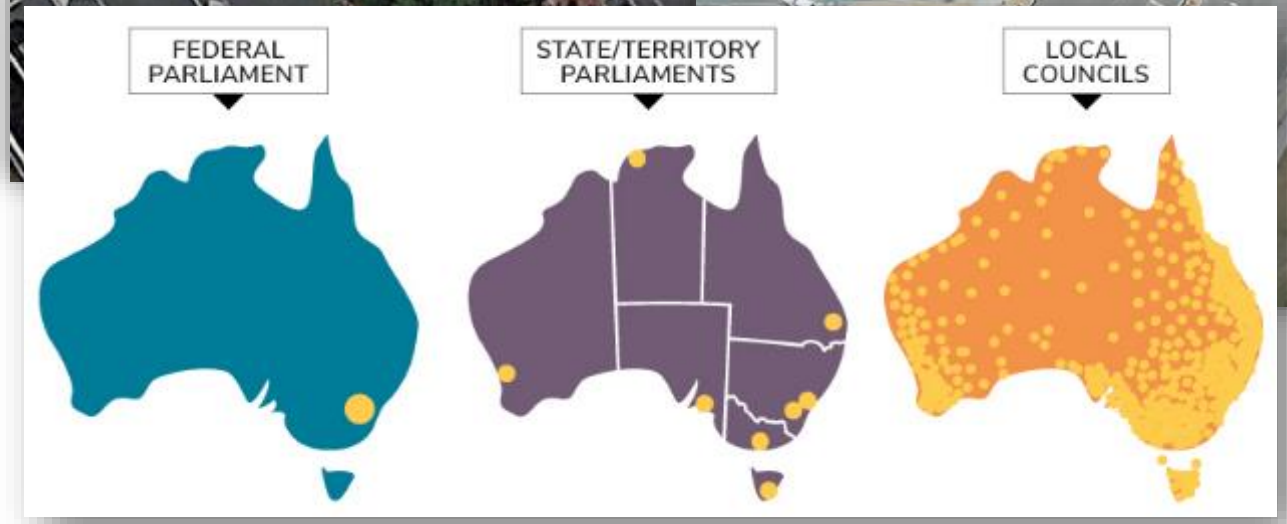
scats™ STREAMS® arterials

No of Signals ≈ 14,000

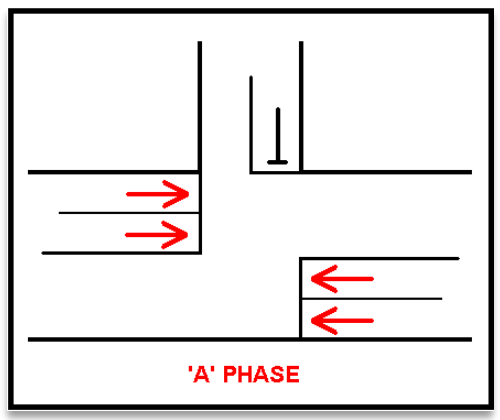
Pop ≈ 25.5M

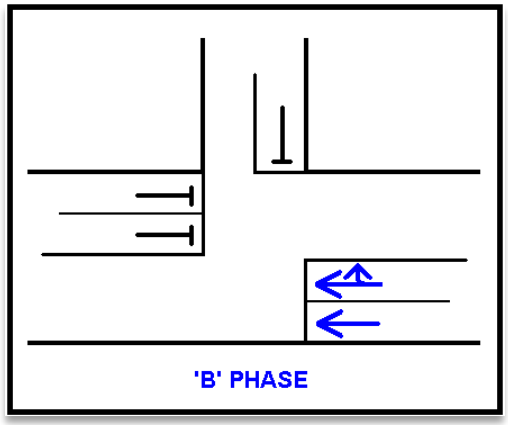


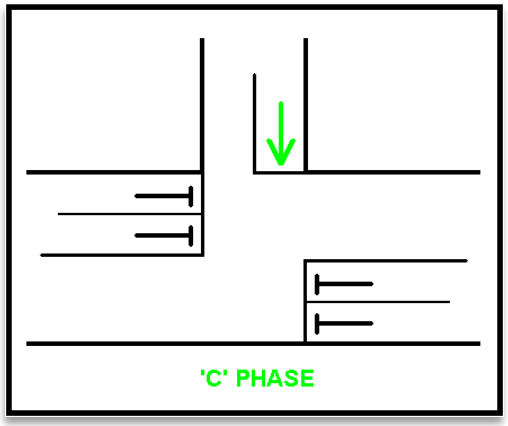




Context – Naming Conventions



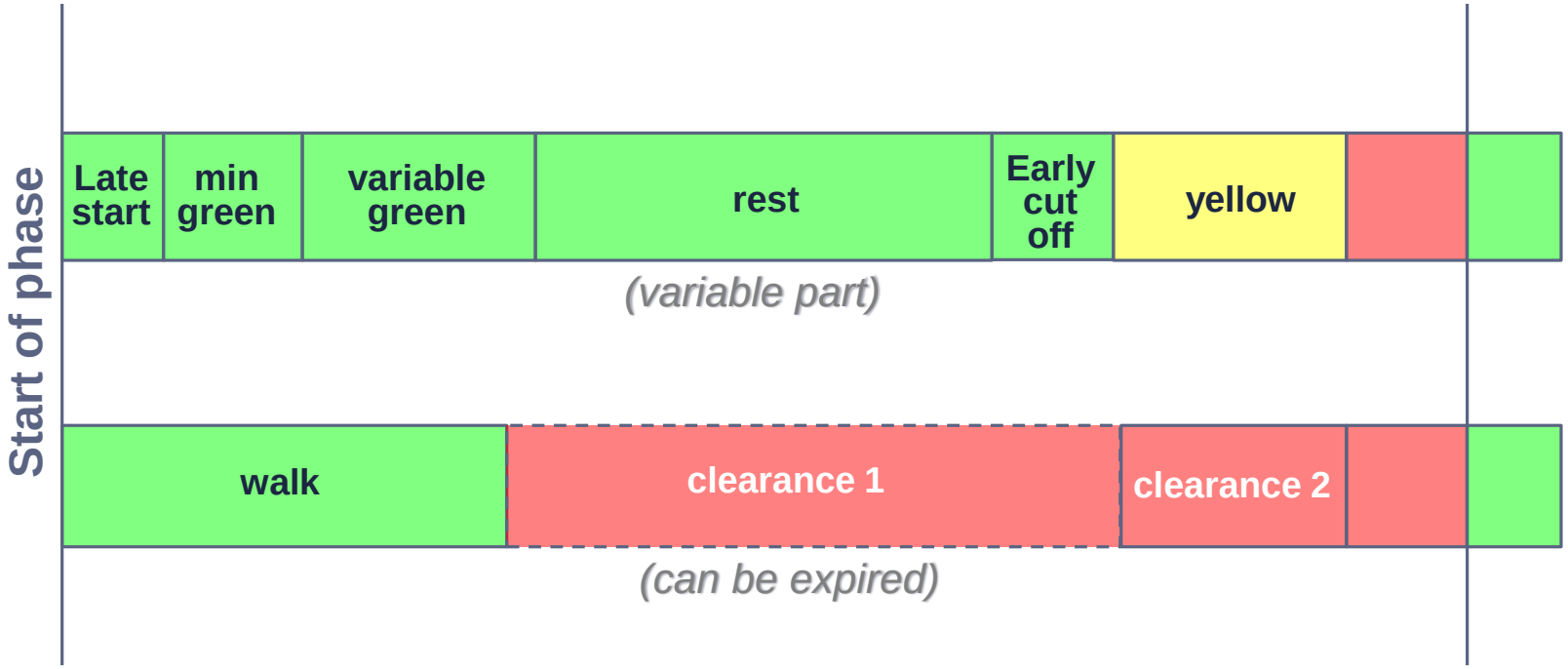




- Phase (stage) not movement based*
- Personalities – NGEN™
- Phase split, cycle time and offset

Vehicle Group

Pedestrian Group



Context - Hardware

AS2144

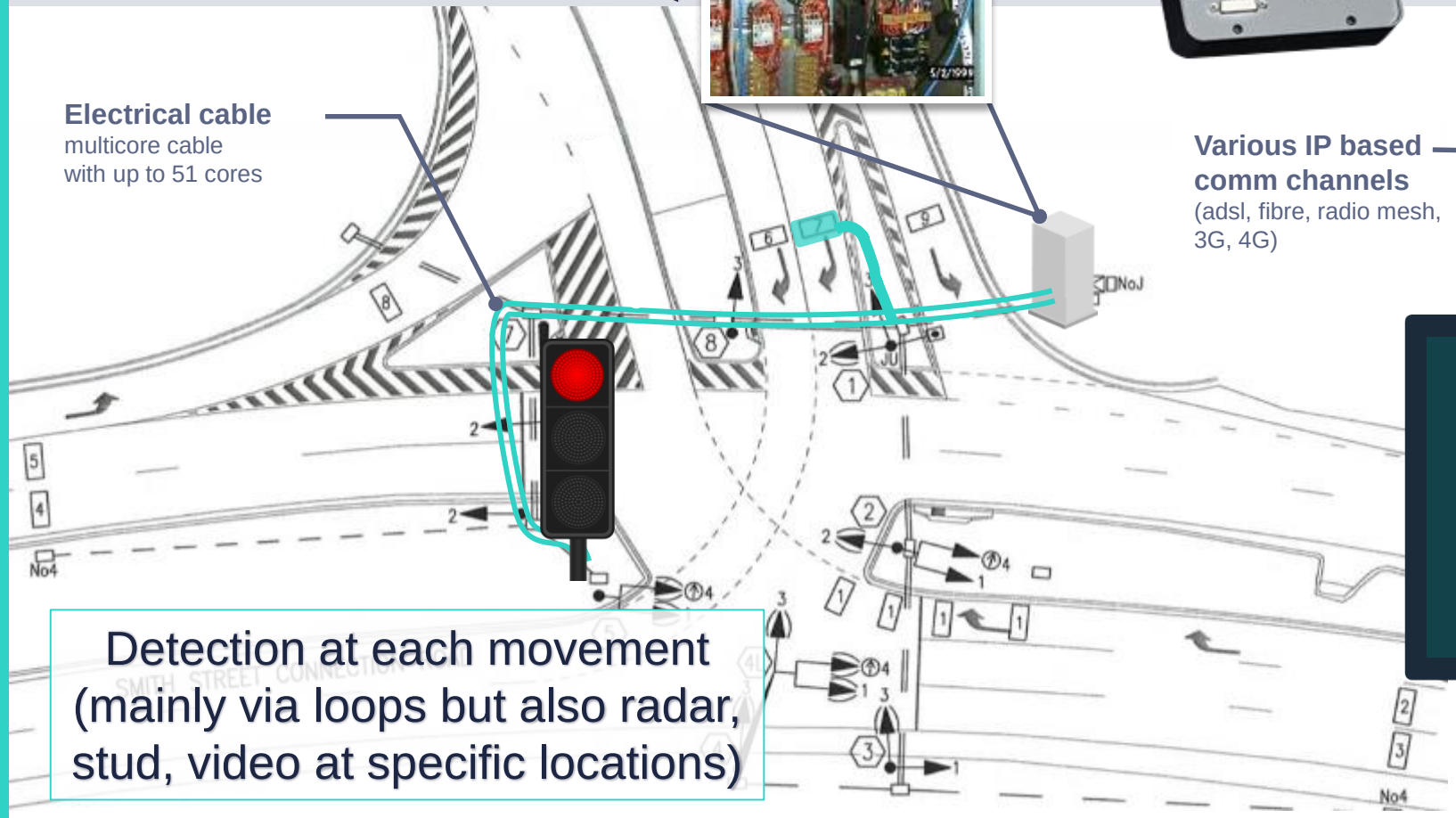
RS232 comms
all inside the cabinet,
very short cable

ITS Network

Various IP based comm channels
(adsl, fibre, radio mesh, 3G, 4G)

Application Server

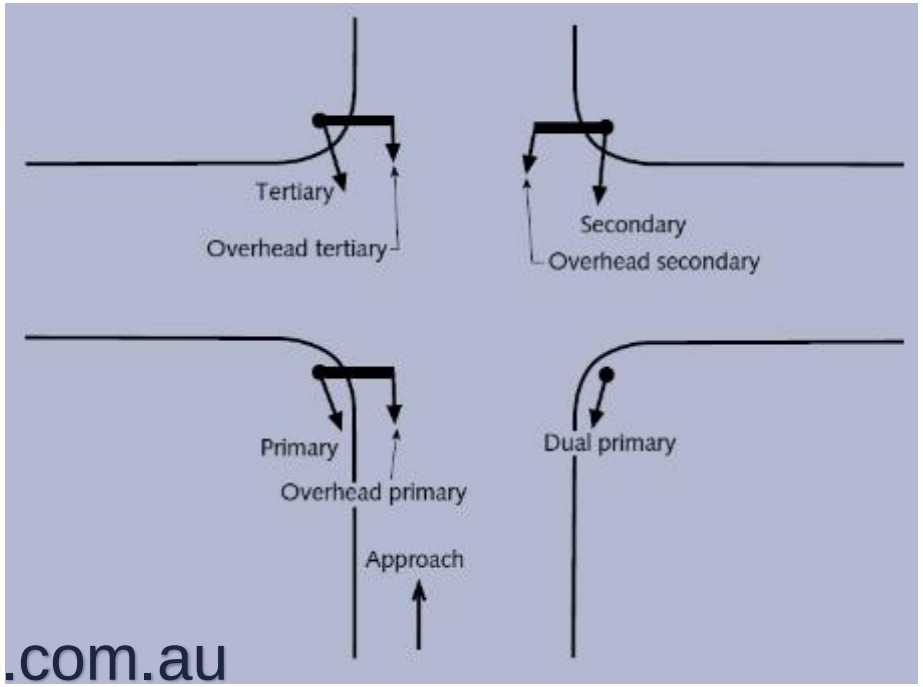
Electrical cable
multicore cable
with up to 51 cores

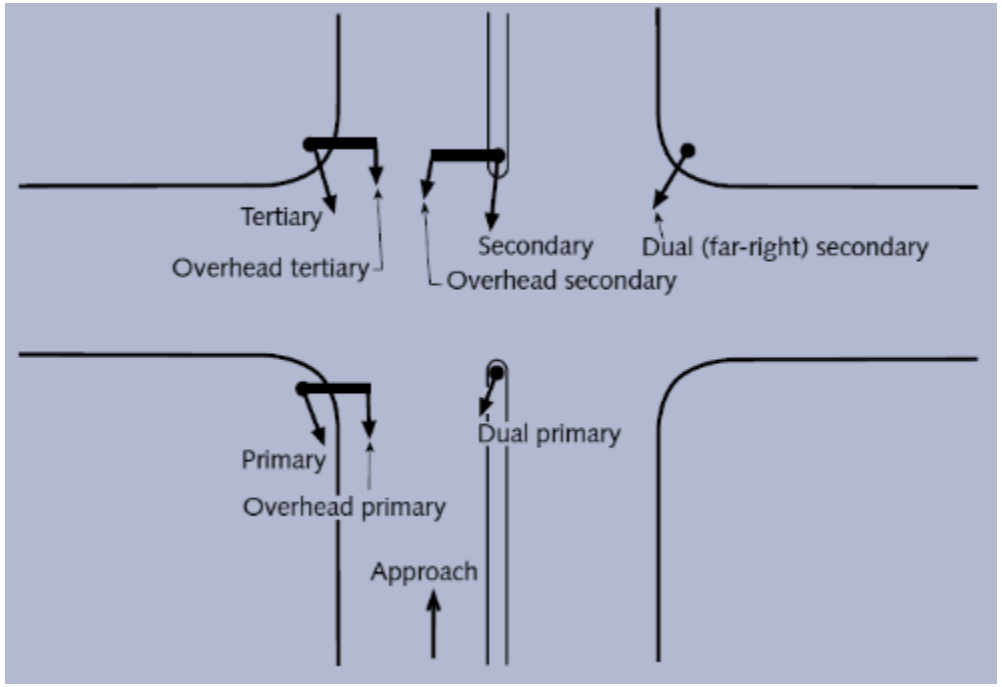


Detection at each movement
(mainly via loops but also radar, stud, video at specific locations)

Context - Hardware

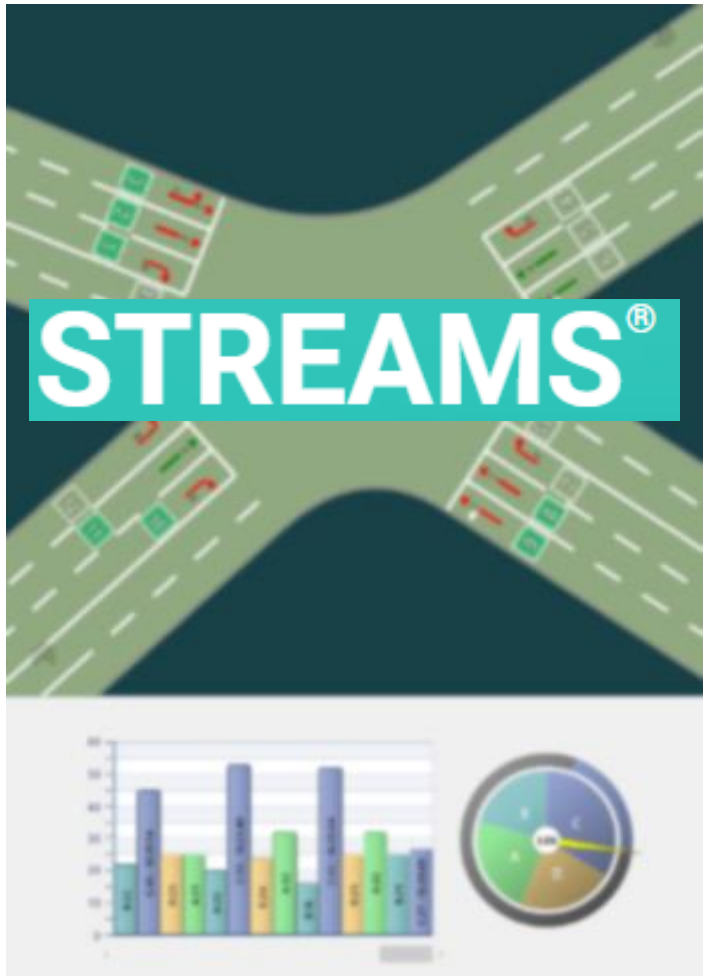
Safety drives most design & policy decisions
(very conservative when it comes to safety)





From austroads.com.au

Coordination – Actuated / Fixed

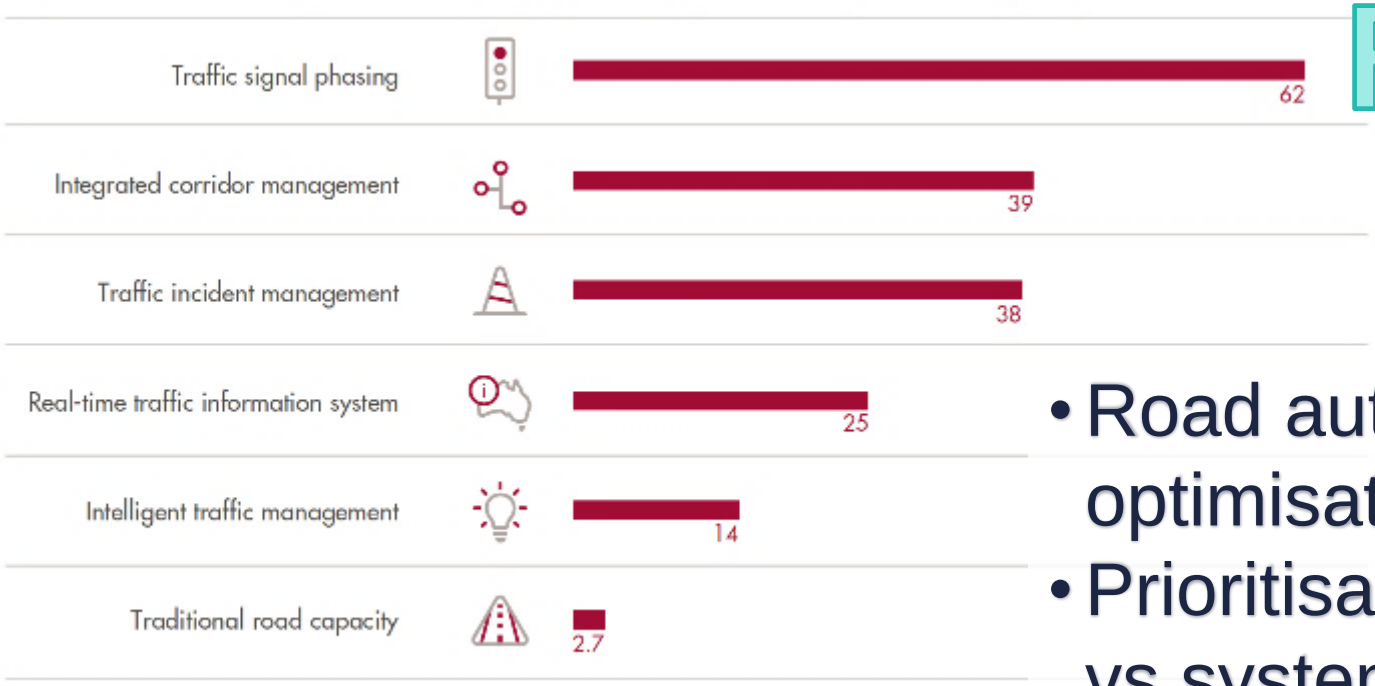


- User created plans with unused time transfer allowed
- Selection of plans via *Time of Day*, *Dynamic Plan Selection*
- Powerful ‘if’ statements*
- Scheduler to manage wide range of situations

- Equisaturation on each approach (*Degree Of Saturation*: current flow vs best flow)
- Variable splits, cycle time, semi variable offset (low to high offset)
- Powerful ‘if’ statements
- Scheduler to manage wide range of situations

Timing Process

Figure 1.2: Possible benefit-cost ratios of ITS projects compared to building new road capacity



Source: McKinsey Global Institute, 2013 [8]

Route Managers

- Road authorities now focusing more on optimisation
- Prioritisation process – public concerns vs systematic process
- Coordination philosophies range from *movement and place* to *squeaky wheel*

Movement and Place

Timing Process

First Principles

- Limited data review - greater focus on driving the corridor
- Cycle length derived from Space Time Diagrams and on-site observations
- Splits based upon volumes / capacity (and observations)
- Offsets based upon Space Time Diagram (and observations)
- Plans developed and refined on-site

Modelling

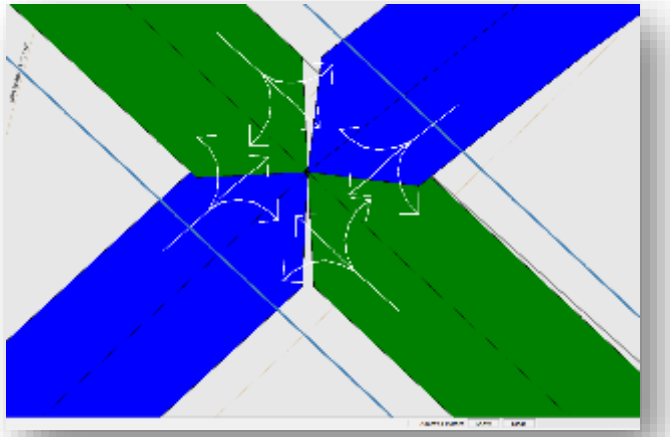
- Configuration & data audit
- Data review as well as driving the corridor
- Modelling packages used to develop calibrated models (Sidra™ - Transyt™ - Linsig™)
- Timing plans created via model output
- Tested / tweaked on street
- Data collection to verify results (automatic / manual)

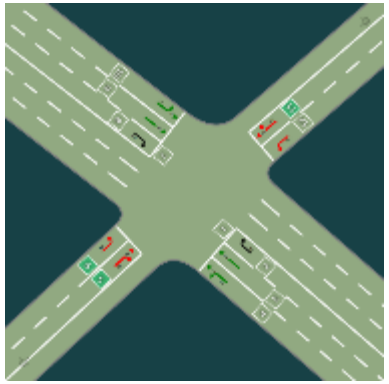
Modelling: data intensive, time consuming + garbage in / garbage out (used for mature networks) – produces best results

First Principles: can be very quick but needs experience / expertise (80/20 rule)

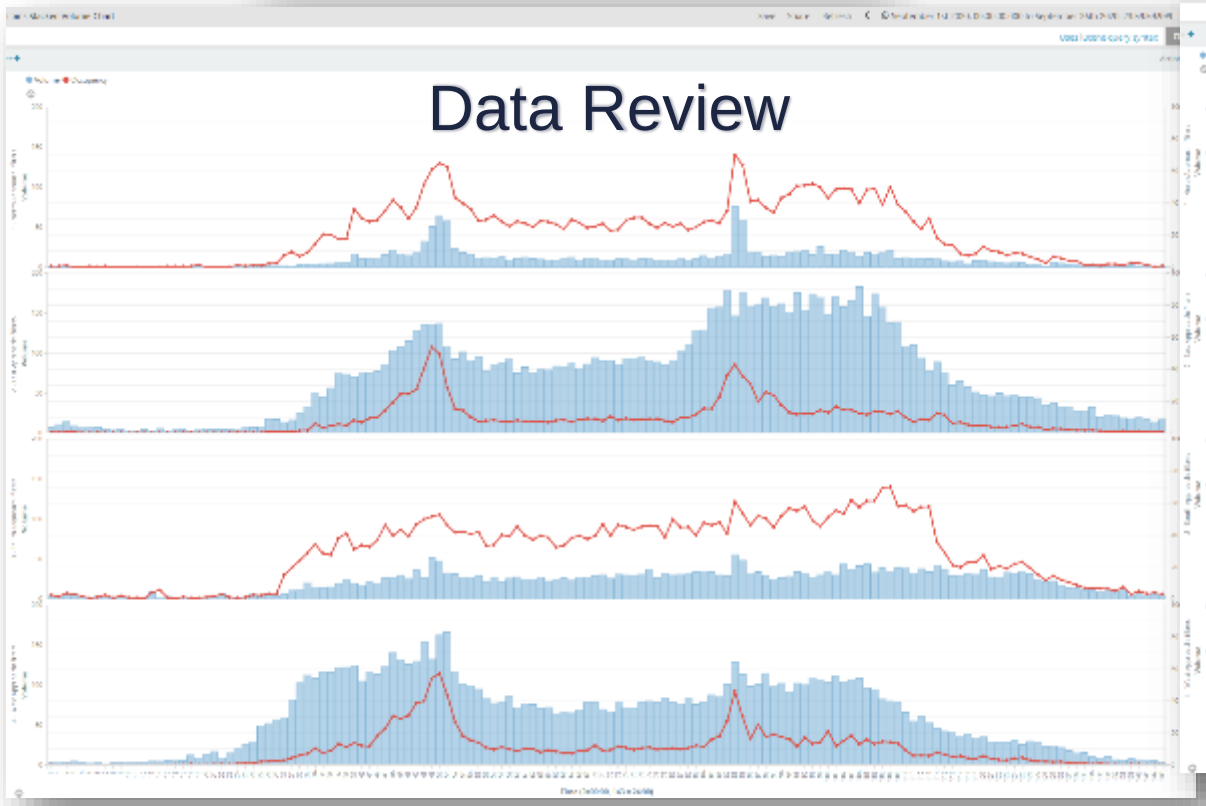
Example

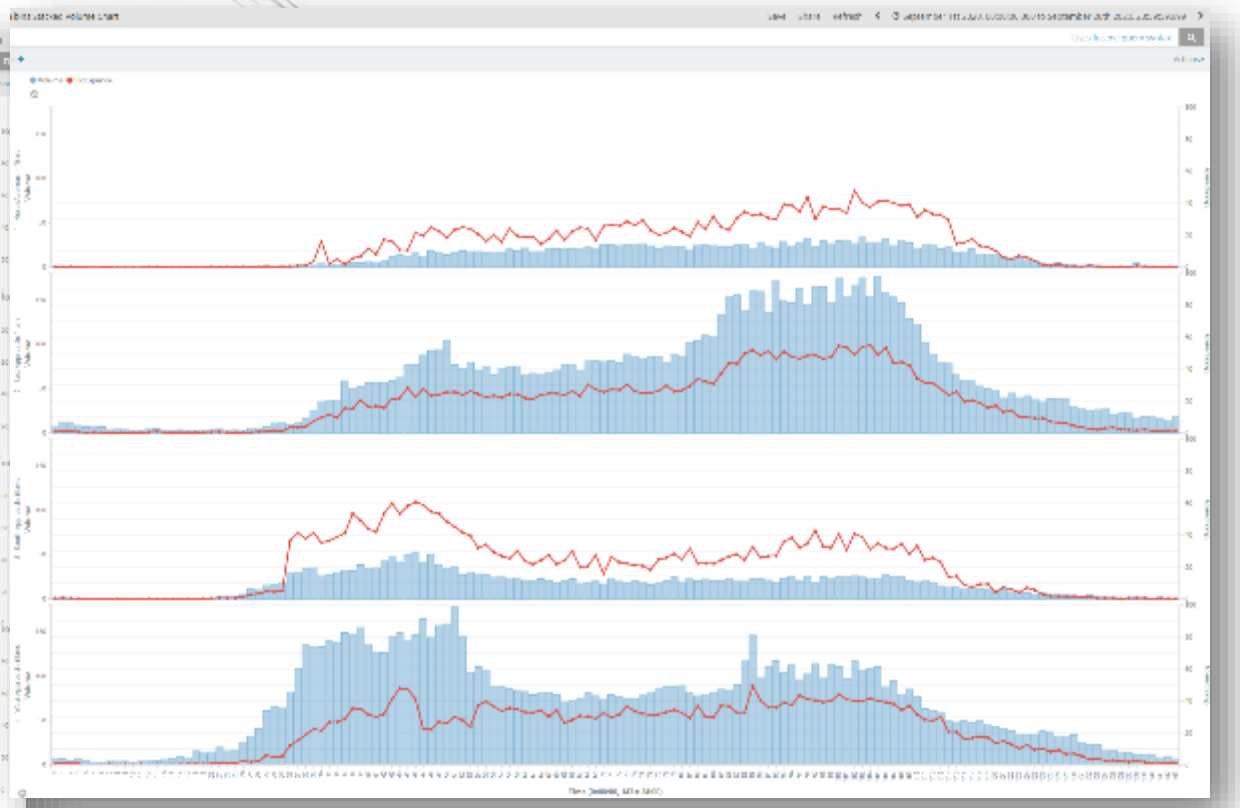
Data Audit





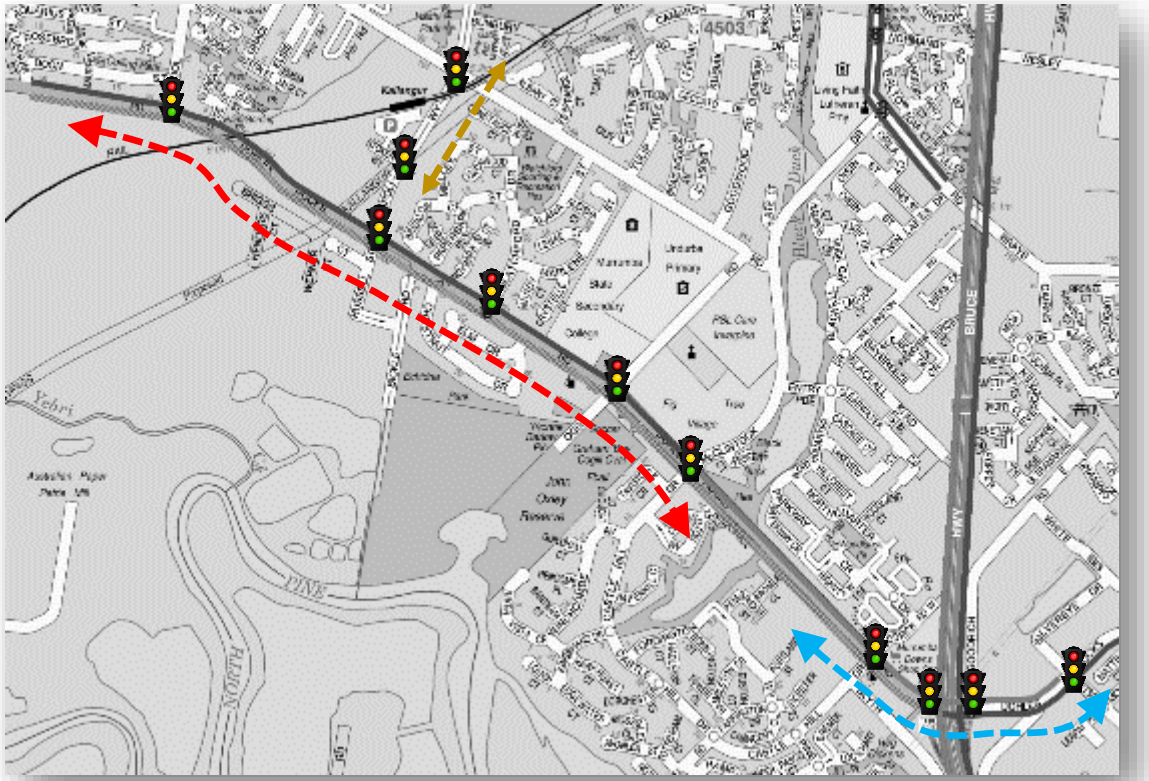
Data Review



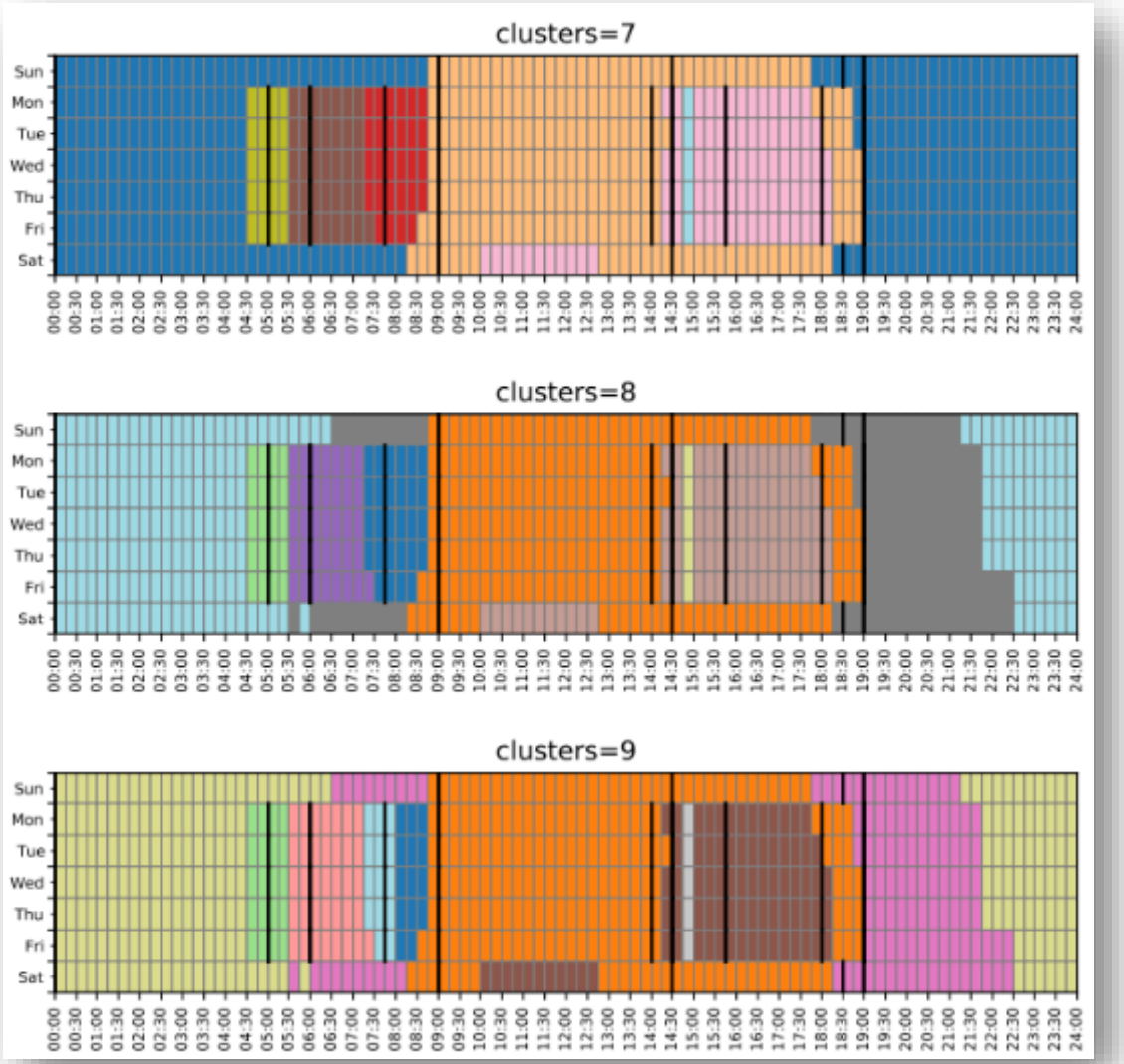


Example

Intersection Groupings

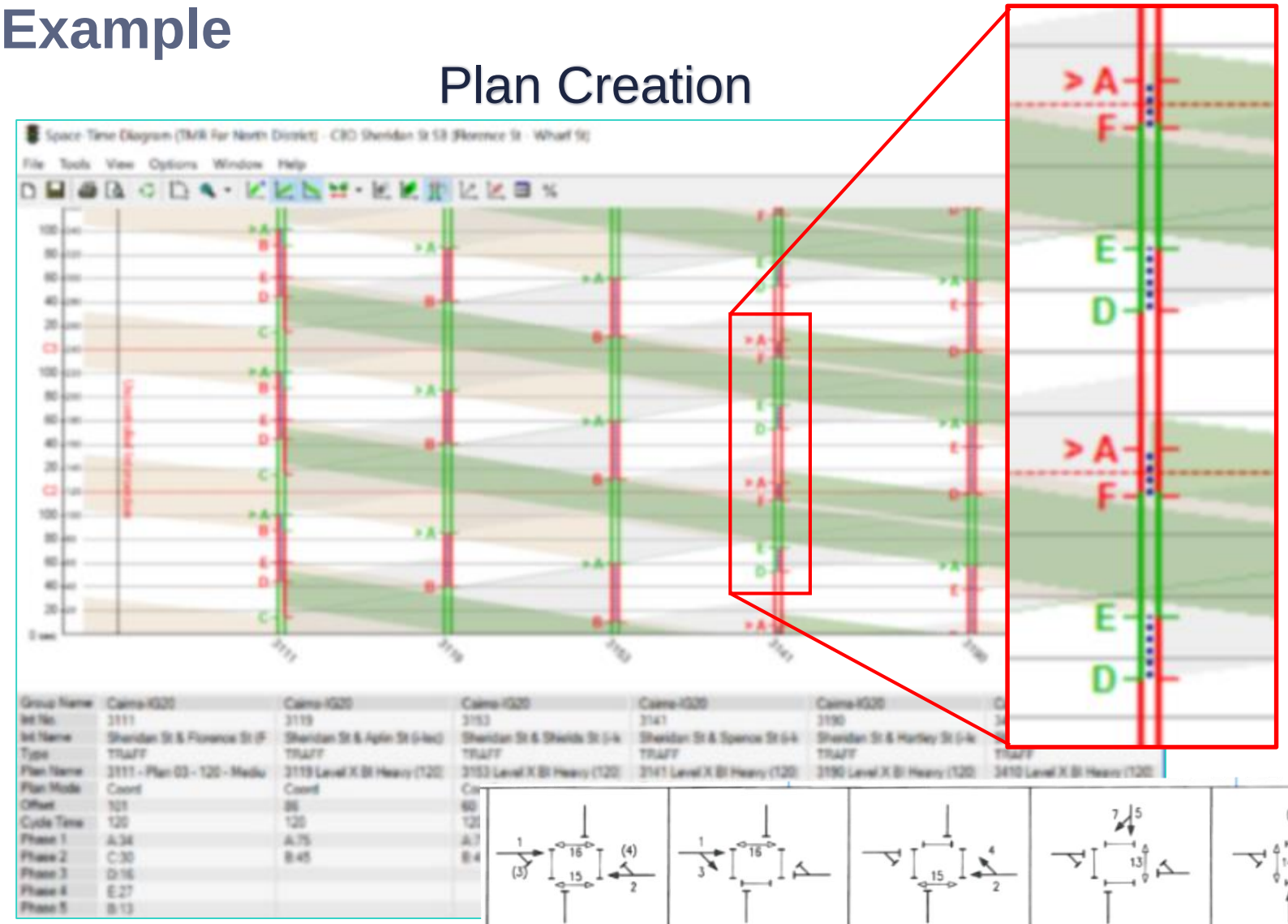


Cluster Analysis for traffic pattern identification



Example

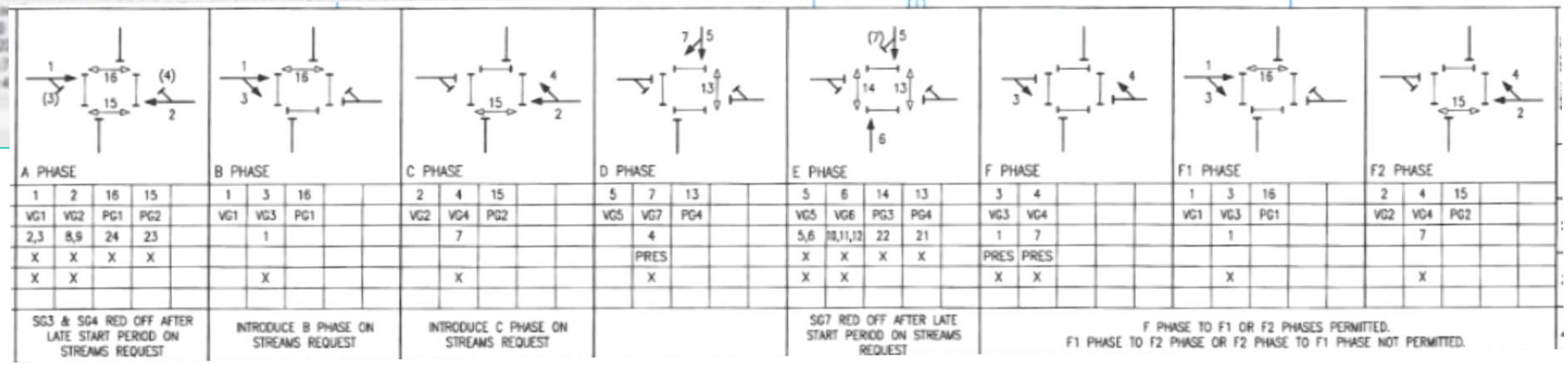
Plan Creation



Splits, cycle length, offsets & phase order

Special Features: (offramps, bus priority, school entries / exits, shopping malls)

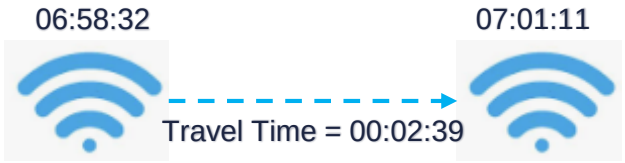
A D E F or A E D F

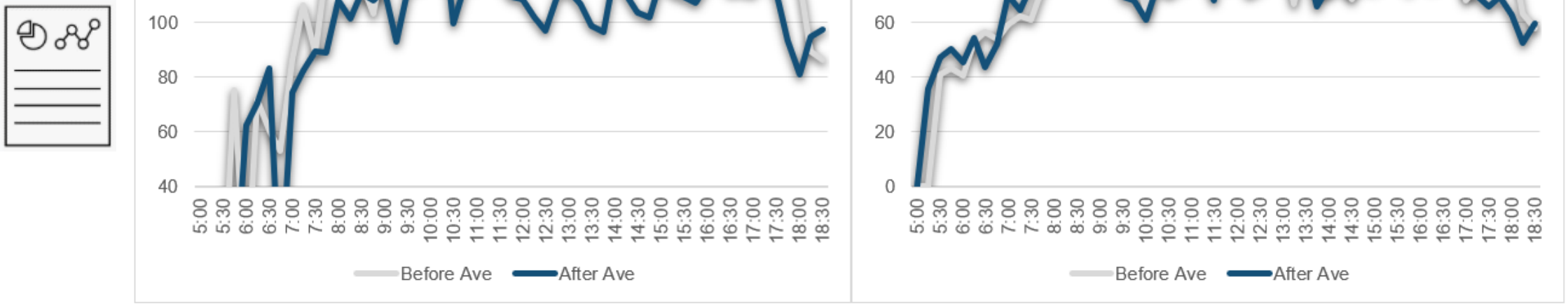


Example

Test and adjust on site

Benefits – Travel time via bluetooth readers (processed via Addinsight™)





Measure benefits in Community Costs saved (dollars)
i.e. delay = Lost GDP, travel time savings = community savings

Recommendation: Personality mods, line marking, minor works, parking alterations…

Special Considerations

Vehicle Priority (SCATS™ Priority Engine™ - STREAMS VPP™)
Light Rail Absolute Priority
Smart Pedestrian Crossings

-28.034195, 153.431042

-38.80124, 144.95719

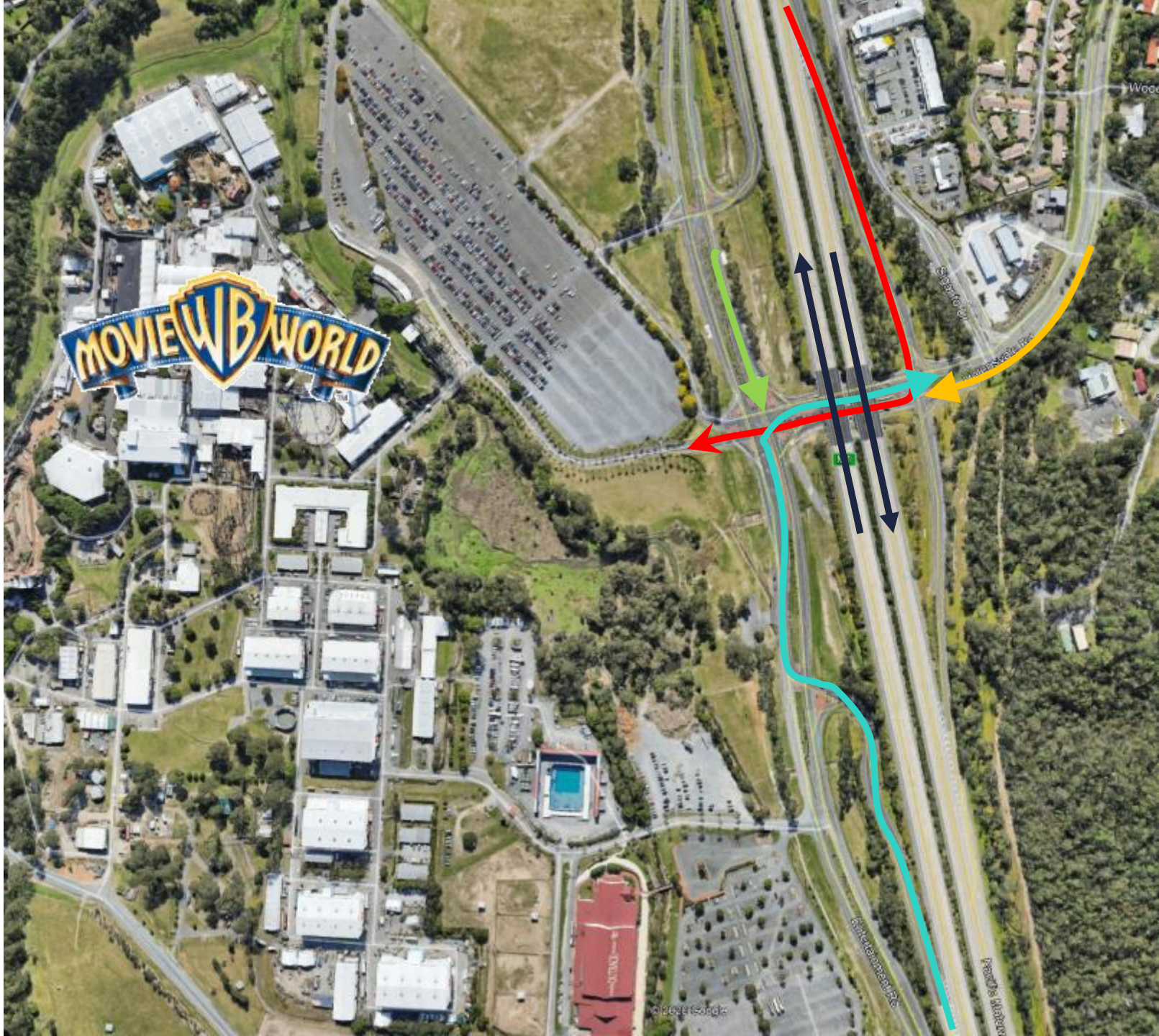
Special Considerations

Competing demands on both arterial and motorway networks

Decision Trees used to manage complex, competing priorities

Final Comments

- *More focus needed on signal optimisation*
- *Greater network awareness in our systems*
- *API needed to control signals*



TRANSMAX

Thank you

Questions

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