

Capturing Travel Time Information

A quick snapshot

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Overview



- Technology
 - How we used to do it
 - What happens now
 - The Good vs. The Bad (my own view)
- Applications
 - AT Network Performance Scorecard
 - Project based examples
 - City Rail Link monitoring (under development)

Traditionally (5-7 years ago)...

- Floating Vehicle Survey (FVS)
 - First used in late 1920s
 - Dedicated drivers along pre-defined routes
 - Planned on specific days to mimic typical day travel times



The Good about FVS



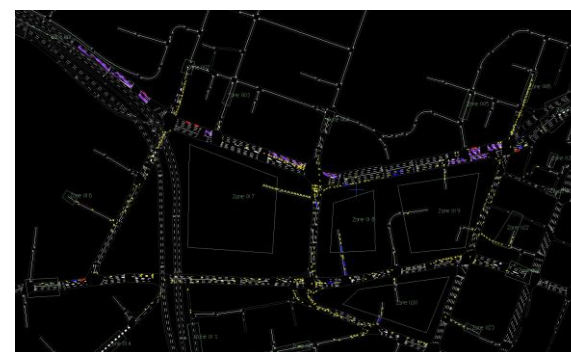
Calibrating Other Technologies



Accurate Data



Perfect for Single Route or Small Scale Network



Traffic Model Validation



The Bad about FVS

Floating Vehicle Survey		
Route	Sample Size	Time
Dominion Road	3	07:45
		08:20
		08:55

Small Data Sample



Only on selected routes



Limited to the Survey Date



High Labour Cost



Weather + incident



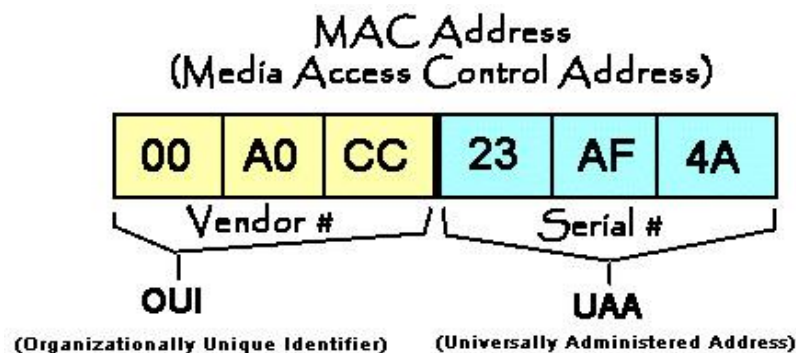
Human error

Nowadays...

- **Matching vs. Tracking**
 - Both can easily cover wider network
 - Achieving regular monitoring
 - Potential to go back in time for data
- **Not covered**
 - Spot speed detection (Radar, loops)
 - mathematical algorithms

Matching Technology

- Match unique ID in vehicle (re-identification)



- Normally requires permanent or temporary infrastructure for detection
- Higher data sample size (comparing to Tracking)
- Hard to tell what happened between matching points

Tracking Technology

- Constantly/Periodically track vehicles or device in vehicles
- Examples:
 - GPS Tracking
 - Mobile data tracking
- Unlike Matching, Tracking provide full vehicle travel trail – easily filter out “outliers”
- Considered smaller sample size (on quieter roads)
- “Canyon effect”

Type	Technology	Notes
Traditional	<ul style="list-style-type: none"> Floating Vehicle Surveys 	<ul style="list-style-type: none"> Deemed highly accurately Small data sample size “Typicality” highly relies on weather, network condition during the survey period Can’t track monthly/seasonal variation High operational cost More used as a validation method
Matching	<ul style="list-style-type: none"> ANPR (number plate) Bluetooth or Wi-Fi (MAC address) 	<ul style="list-style-type: none"> Typically, larger data sample size than Tracking Normally requires permanent or temporary infrastructure installation. Upfront cost for setup and on-going maintenance. Not be able to tell what happened in between matching points – however less significant if data sample size is large enough
Tracking	<ul style="list-style-type: none"> GPS Mobile phone data 	<ul style="list-style-type: none"> Could apply filtering algorithm to easily take out outliers, data accuracy higher Normally purchase services from third party. May struggle with data sample size Canyon effect in high rise surroundings, also tunnels
Others	Loops//radar + calculation algorithms	<ul style="list-style-type: none"> Not discussed in this paper

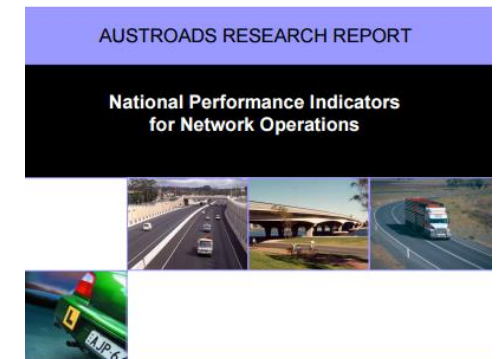
Applications

- Transport Planning and Strategy
- Operational Performance Reporting
- Operational Deficiency Analysis
- BCR assessment for project post-implementation
- Providing customer with better and more accurate Information
- All data aggregated to satisfy Privacy Act 1993

Network Performance Scorecard

- Deployed GPS Tracking with local service provider six years ago
- Ability to cover the whole Auckland network, data back to 2010
- KPI defined based on AUSTROADS
- Monthly snapshot as well as ad-hoc

AP-R305/07



Network Performance Scorecard

Arterial network performance

June 2015

Morning peak

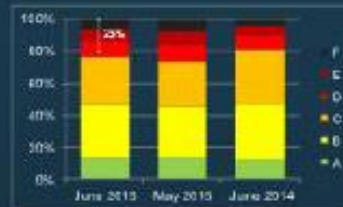
Travel speeds

36 km/h

is the average traffic flow speed on the network. The average weighted speed limit on the network is 54 km/h.



Level of service



23% of the network is considered congested.

Hotspots

The dotted routes below are the hotspots in LOS F, and being ranked by the length and the lowest speed. See those hotspot locations refer to the map.

Ranking by Length	
No.	Ranking by Length
1	Blockhouse Bay Road
2	Ti Parau Dr
3	Freight - Alberts Highway
4	Barrowfield Rd
5	Mt Wellington Highway / Great South Rd
Ranking by Lowest Speed	
No.	Ranking by Lowest Speed
1	Gossamer Dr
2	Mt Wellington Highway / Orcutt South
3	Lake Rd Northcote
4	Wairau / Birnie Point
5	Tristram Avenue

9 km/h

or slower is the average speed observed at the locations highlighted on the map.

Delay & reliability



55% extra time is added to each journey due to congestion and signal phasing, compared with a typical journey time is within 35% of the mean journey time.



Congestion on all Defined Routes (Time)
AM Peak Hour: 7:30-8:30



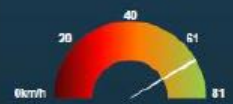
Scorecard (cont.)

Freight route performance

June 2015

Travel speeds

67 km/h*
is the median speed on the freight network.



Major freight locations are highlighted on the adjacent map.

Hot Spots

The listed routes below are the hotspots with LOS E or F. Freight hot spots are highlighted on the adjacent map.

LOS	Hot spots
F	Rosebank Road*
F	Inner Epsom
F	Upper Harbour Motorway
F	North-Western Motorway*
E	Nelson Street*
E	Clark Street*
E	Central Park Drive*
E	Highbrook
E	Walsley Road*
E	Southern Motorway*

* Segments longer than 0.6km

21 km/h

is the average speed observed at the locations highlighted on the map.

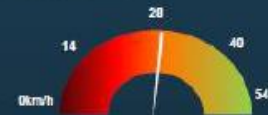
Inter-peak

Morning Peak Bus Performance

March 2015

Travel speeds

28 km/h
is the average bus travel speed on the arterial network. The weighted average speed limit on the network is 62 km/h



Hotspots

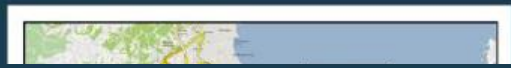
The listed segments below are the hotspots in LOS F, with the lowest travel speeds. See these hotspot locations refer in the map.

No.	Hot Spots
1	Te Atatu Rd (conversion - Aorangi)
2	New Windsor Rd (Merton - Mairori)
3	Tiverton Rd (Whitby - New Windsor)
4	Wellesley Rd (Hobson - Mack)
5	Green Lane (Wintuarua - Great Okeana)
6	Te Atatu Rd (Papakura - Otara) *
7	Te Atatu Rd (Aurora - SH16)
8	St Lukes Rd (Morning Star - Rangway)
9	Archers Rd (Papanui - Mairori)
10	Wellesley Rd (Queen - Princes)

* segment length longer than 500m

5 km/h

or slower is the average speed observed at the locations highlighted on the map.



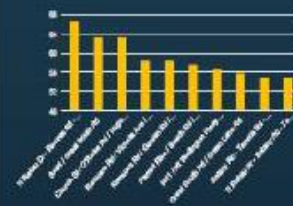
Pedestrian crossing performance

June 2015

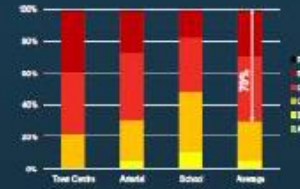
Inter-peak

Worst Intersection

Ti Rakau / Reeves Rd
is the worst intersection for Pedestrians on the network.



Level of service



70%
of the network is operating below desired LOS for pedestrians.

Town Centre Performance

67 seconds

is the average pedestrian delay on Pakuranga town centre, the worst performing town centre in Auckland.

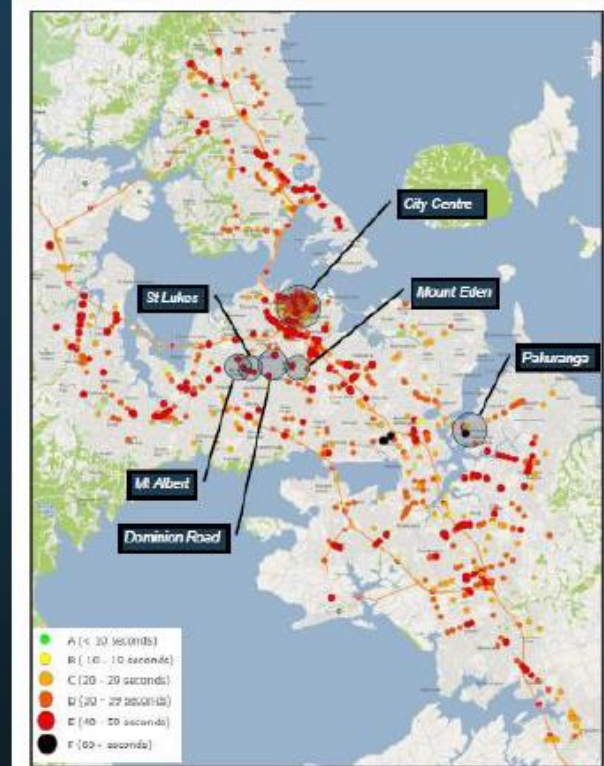


Pedestrian Delay



35.4 seconds

of average delay is added to each pedestrian journey due to congestion and signal phasing at the intersection, compared with free flow conditions.



Pedestrian LOS Map — June 2015
Inter-Peak Hours: 9:00 – 16:00



Project Based Examples



2.2.4 Public transport

As the study corridor lies at the edge of the central urban, it is served by mainly the tail end of central city bus services. One local town service between New Lynn and Onehunga/Sylvia Park travels along the Donovan/White Swan Road segment. Services terminate at Waiwaka Park and both Lynfield and Hillsborough Day Shops. There are bus repositioning and lay over facilities at each of these termination points. There are no bus services along Kororoa Street.

The frequency of buses serving the study area are relatively high both on and off-peak. Bus congestion maps in Figure 2.4 and Figure 2.5 show the LoS experienced by buses travelling along the corridor during peak periods. Bus LoS drops to E along White Swan Road and

Donovan Street eastbound during the morning peak and Liff F westbound in the afternoon peak. The peak eastbound Donovan Street bus lane provides bus priority in the morning reducing the delay experienced by buses.

Auckland Transport HOF card data reiterates the level of congestion between Blockhouse Bay Road and Hillsborough Road. Approximately 1.5km in length, a trip along this section takes 3 minutes on average in decreasing to up to 7 minutes in the afternoon peak.



Corridor Management Plan



Traffic Signal Optimisation

Project Based Examples (Cont.)



Before - LOS F

After - LOS D

Efficiency Improvement Project – Parnell Road Bus Lane
Project Initiation and Justification

Project Based Examples (Cont.)

AM Peak



Multi-modal data directly feeding into Network Operating Plan

City Rail Link (CRL) Monitoring

- Bluetooth tracking in CBD
- Additional to the GPS tracking – canyon effect
- Currently cover six routes – plan to expand
- Traffic snapshot before vs. during construction
- Ability for real time reporting
- Regular reporting as well as ad hoc enquiry
- On going development

CRL Monitoring (Cont.)

HMI Araflow Traffic Monitoring

Welcome Bill Qu (BillQu)

[logout](#)

[< back](#) > [Map](#) | [Route](#) | [Routes Report](#)

Auckland City Centre / 003 - 012 Hobson St

Location A: S003 Fanshawe St/Hobson St
Location B: S012 Victoria St W/Hobson St

Distance	418m	74% and over	14km/h and over
Speedlimit	50km/h	49%.. 75%	10km/h.. 13km/h
std. Journey Time	1m23s	19%.. 50%	4km/h.. 9km/h
std. Journey Speed	18km/h	below 20%	below 3km/h

Type: Direction: A => B B => A From: 06/03/2016 To: 07/03/2016

Date/Time	Journey Time	Journey Speed	Matches	Count
06/03 00:00	1m06s	22km/h	33	86
06/03 01:00	0m52s	28km/h	33	98
06/03 02:00	0m58s	25km/h	27	80
06/03 03:00	0m44s	34km/h	26	93
06/03 04:00	1m02s	24km/h	19	86
06/03 05:00	0m46s	32km/h	18	54

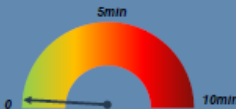
CBD Travel Time Monitoring Dashboard - January 2016

Key CRL Affected Routes

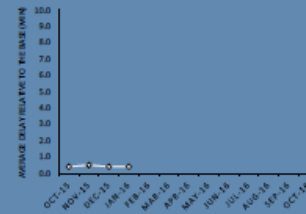


Average Delay relative to the base time

0.4 minute (24 seconds)
 Is the average delay across the 6 key CBD routes during the peak hours compared to the base time.



MONTHLY AVERAGE DELAY

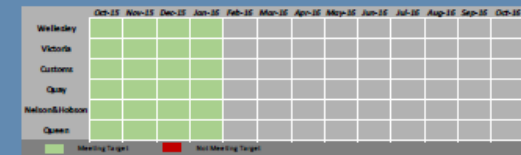


Delay relative to the base time

Routes	Travel Time Delay above Base Time (min)						Acceptable Delay Threshold (min)	*Delay Lower than Target
	AM	PM	PM	PM	PM	PM		
Wellesley St	0.4	0.2	0.2	0.2	0.2	0.2	10	✓
Victoria St	0.2	0.2	0.2	0.2	0.2	0.2	10	✓
Customs St	1.6	0.8	1.3	0.7	1.4	0.8	10	✓
Quay St	2.0	0.3	1.3	0.4	1.3	1.3	10	✓
Nelson & Hobson	0	0	1.1	0.8	0	0	10	✓
Queen St	0	0	0	0	0	0	10	✓

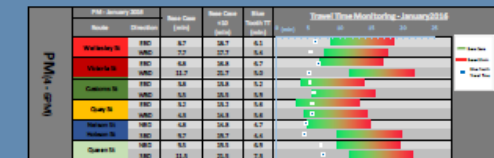
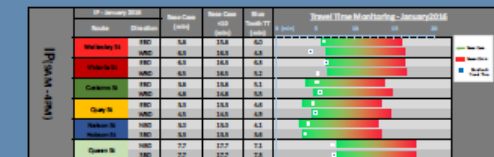
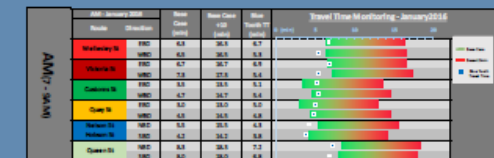
* Delay Lower than Target is met when delay in all periods and directions is below the 10min acceptable threshold.
 *0" denotes delay is lower than the base time.

Monthly Overview



Comments: From October 2015 to January 2016, all the key routes have met the target, with negligible or minor delays compared to the base time.

Travel Times Compared to Base Time and Base+10





THANK YOU

