Urbsol

Case Study Project: Mitchell Freeway Economic Evaluation

Client: Main Roads Western Australia

Overview

Analysis was required by MRWA to justify the widening of the northern Freeway in Perth. The Mitchell Freeway forms a critical part of the Perth road network, carrying significant traffic flows during both peak and off-peak periods.

As the city has continued to expand into the northern suburbs, the demand for this infrastructure has likewise increased.

The Study

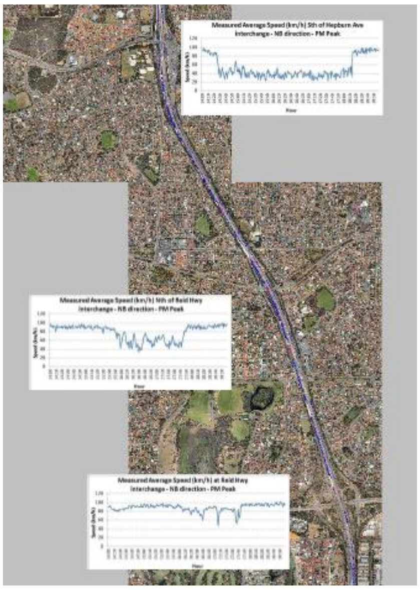
The section candidate for widening lies between Hepburn Avenue and Hodges Drive.

A variety of project options were assessed, being:

- Widening of the northbound carriageway
- Widening of the southbound carriageway
- Widening of both carriageways

Traditionally economic evaluation is carried out using strategic models capable of capturing network wide effects of road infrastructure benefits. Simulation in this case was better suited to isolating the delay saving benefits for motorists on the new infrastructure itself and for its ability to evaluate freeway decongestion effects more accurately.

The approach here was to blend the results from available strategic models with simulation results using the *AUSTROADS Guidelines to Project Evaluation* to evaluate VHT saving values.



Project study area with existing speed profiles

Simulation

Simulation in this work was used to accurately measure delay savings to motorists.

The work required estimation of a series of demand matrices for the scenarios that covered an extensive enough period of time to capture the appropriate delay savings – this meant peak hour spreading needed to be considered and methodologies developed to achieve this.

The modelled network covered over 15 km of freeway infrastructure and required detailed consideration of merging and diverging behaviour to ensure realistic delay savings could be calculated.

Section of modelled network

VISSIM was chosen as the most suitable tool for this work for a number of reasons:

- Realism of freeway merge/diverge behaviour
- Accuracy of delay per vehicle modelling.
- Robust data collection and extraction.

The work resulted in positive BCR results for all options and allowed for the sensitivity testing of key input assumptions to ensure results were tolerant to any potential misspecification of input assumptions.

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Simulation time from 0.0 to 18000.0.

 Parameter                                                        ;       Value;
 Average delay time per vehicle [s], All Vehicle Types            ;     212.088;
 Average number of stops per vehicles, All Vehicle Types          ;       7.222;
 Average speed [km/h], All Vehicle Types                          ;      64.162;
 Average stopped delay per vehicle [s], All Vehicle Types         ;      28.313;
 Total delay time [h], All Vehicle Types                          ;    2584.053;
 Total Distance Traveled [km], All Vehicle Types                  ;  426436.004;
 Latent delay time [h], All Vehicle Types                         ;     524.865;
 Latent demand, All Vehicle Types                                 ;         57;
 Number of Stops, All Vehicle Types                               ;     316774;
 Number of vehicles in the network, All Vehicle Types             ;        787;
 Number of vehicles that have left the network, All Vehicle Types ;      43075;
 Total stopped delay [h], All Vehicle Types                       ;     344.966;
 Total travel time [h], All Vehicle Types                         ;    6646.250;
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VISSIM sample data output