# CONGESTION CALCULATOR

# METHODOLOGY FOR DETERMINING CONGESTION

The attached spread sheet is provided to assist practitioners, in particular designers of traffic management plans, in determining the level of congestion that would occur on a road where lanes are closed or speed limits reduced to accommodate roadworks. This is the spreadsheet mentioned in Main Roads’ policy document ‘Traffic Management at Roadworks on State Roads” in section 6.3 and appendix 4. www.mainroads.wa.gov.au then go to Building Roads > Standards and Technical > Road and Traffic Engineering > Traffic Management > Traffic Management at Roadworks on State Roads.

FORMULA:

**ProposedSL ≥ AnticipatedVHL \* ExistingSL / MaxVHL**

Where:

ProposedSL is the Proposed Speed Limit(in km/h)

AnticipatedVHL is the Anticipated Vehicle flow per Hour per Lane

ExistingSL is the Existing Speed Limit

MaxVHL is the Maximum recorded Vehicle flow per Hour per Lane

The purpose of the formula is to allow designers of traffic management plans to assess whether there are times of the day / week when they can either post a lower speed limit and/or close lanes to undertake higher risk activities.

The calculator formula is based on the premise that every road has a different traffic carrying capacity. Therefore, more accurate than a set of look up tables, the smart calculator can predict congestion specific to the site being assessed. This is made possible by using traffic counts on the road section being assessed.

EXAMPLES

The application of the above formula can be illustrated by the following example:

Supposing there is an existing road which has 3 lanes and a speed limit of 110 km/h. Traffic data from the site reveals that the maximum vehicle flow observed is 4500 vehicles per hour across the carriageway in the direction of the proposed works.

Following the guidelines provided in the policy document, the desirable option is to keep all lanes open and maintian a speed limit greater than or equal to 80km/h. However, the desginer of the Traffic Management Plan would like to know whether an application for a reduced speed limit of 60km/h will be looked on favourably during early hours of the day when the anticipated vehicle flow (across the carriageway) is 300 vehicles per hour.

Since the road has three lanes, the maximum vehicle flow per lane is 1500 per hour (4500 divided by the number of lanes). Similarly, during the early hours, the vehicle flow per lane is 100 vehicles per hour (300 divided by the number of lanes).

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| --- | --- |
| ProposedSL ≥ | AnticipatedVHL \* ExistingSL / MaxVHL |
| 60 ≥ | 100\*110/1500 |
| 60 ≥ | 7.3 |

Therefore,

The value ‘7.3’ is less than the proposed speed limit of 60km/h, indicating this scenario would not cause conjestion. Therefore the application would be looked upon favourably. Using the formula it can be calculated that a 60km/h speed limit would be looked on favourably up to an hourly vehicle flow of 818 vehicles per hour per lane, or 2454 vehicles per hour across the carriageway.

The desginer may then consider whether a lane could be closed. In this case, the anticipated vehicle flow per lane is 150 vehicles (as only 2 lanes will be open). Therefore, AnticipatedVHL \* ExistingSL / MaxVHL = 150\*110/1500 = 11. This is less than 80, but also less than 60. This means that the designer can apply for an 80km/h or 60km/h speed limit, with one lane closed, during times with this rate of traffic.

METHOD

In order to simplify application of the above, an Excel workbook has been prepared. This workbook contains two worksheets; one for a typical weekday and the other for a typical weekend day. The spreadsheet is embedded here:

**Spreadsheet**



There are three inputs required in the worksheets:

* The existing number of lanes
* The existing speed limit
* The hourly vehicle flow at the site (for a typical weekday or typical weekend day as appropriate) This is for all lanes combined (i.e. the carriageway flow)

The hourly vehicle flow should be that recorded at the site and amalgamated over a number of days so that uncharacteristic daily variations are smoothed.

Note: The Maximum recorded Vehicle flow per Hour per Lane is derived from the traffic data, however it has a minimum value of 1400 built in.

This methodology determines whether reducing the speed limit and/or closing lanes has the effect of exceeding the maximum carrying capacity of the road in question.

The worksheet uses the data to indicate to the designer whether or not an application for a speed limit, lower than the policy requires, will be looked at favourably and whether a lane closure can be considered.

Speed reduction and lane closure applications which show that adverse traffic conjestion would not occur may not necessarily result in approval. Other factors must be considered. Social, environmental and economic considerations such as travel time and whole of network impacts need to be weighed up in final determination.