Submission No 20

INQUIRY INTO IMPACT OF THE WESTERN HARBOUR TUNNEL AND BEACHES LINK

Name: Mr William Holliday

Date Received: 29 April 2021

Submission to the NSW Parliamentary Enquiry

on the Western Harbour Tunnel, 2021

Submission from

William Holliday

Terms of reference (b) and (m) of the Inquiry are:

(b) the adequacy of the consideration of alternative options
(m) any other related matter.

Consideration of an extension and improvement of the exiting city rail network was glossed over in the original justification of Westconnex in the EIS for the M4 East. Any adequate comparison of city rail with city tollway would have to acknowledge that rail has at least twelve times the people-carrying capacity as road, the justification for which figure is shown below.

Other advantages of rail include a greatly reduced accident rate, reduced parking pressure on scarce city real estate and the ability of rail passengers to work while travelling, none of which have been properly considered in the choice of the Westconnex tollway.

How many cars per hour can travel along a lane of expressway
and

Why are roads so inefficient compared to rail?

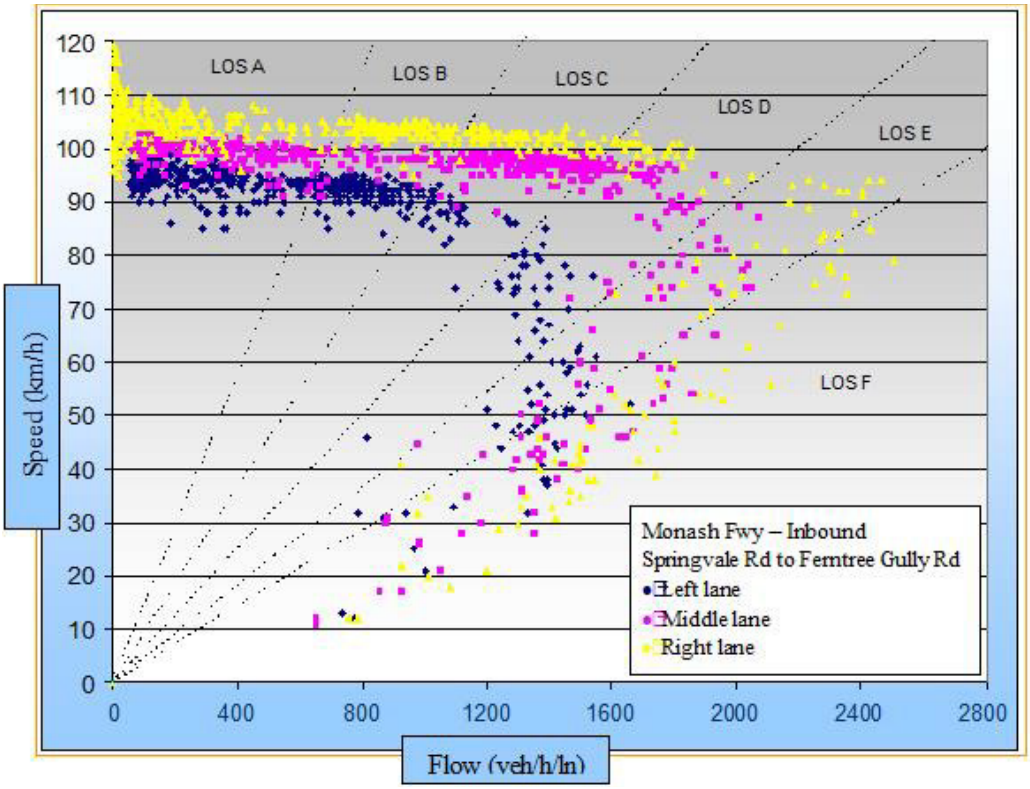

Figure 1 : Monash freeway, flow rate (all vehicles) near an entry ramp merge [1]

Traffic flow from minute to minute

Figure 1 shows actual data points recorded on the Monash Freeway. Traffic starts as uncongested flow at the top left of the diagram at LOS A (Level of Service A), initially maintaining a constant traffic speed as traffic flow builds in LOS B to LOS C. Speeds start to drop however in region LOS D, when the time gaps between vehicles approach the drivers' reaction time.

Flow breakdown

Eventually some event such as over-braking by a single vehicle, vehicles changing lanes or a change in road gradient causes vehicles to suddenly bunch up (LOS E), slowing down to some point on the lower section of the curve in region LOS F.

Flow eventually re-established

Once stability has been regained at the lower speed, the lead vehicles in the queue can accelerate into the empty space in front of them and eventually re-establish the upper uncongested mode.

Flow breakdown - the nemesis of traffic flow

The flow rates at the bottom edge of the diagram show that traffic flow is never more than 2400 and rarely more than 1800 vehicles per hour per lane. The lower flow rates in the left-most lanes could be due to more heavy vehicles in those lanes. These figures are consistent with data from freeways in other parts of Australia and elsewhere.

Roads work well until the volume of traffic reaches the point where orderly flow collapses. Major traffic delays occur if more traffic attempts to enter the network. Due to this instability at high flow rates, average long term traffic flow cannot exceed a maximum of about 1800 cars/hour/lane [2].

Why is rail so efficient compared to road?

Roadways and railways operate quite differently. Trains can carry enormous numbers of people (1200 people per Waratah eight car set [3]), have their own right of way, generally run to a timetable and so never have to queue.

Rail moves 24,000 per hour

The delay at each station is set by how long it takes to unload and load passengers which depends on passenger demand and on the number of doors per carriage. Sydney trains can be run at 3 minute intervals [4], and so the capacity of a rail line is 24,000 people per hour [5].

Roads move 2000 per hour

A reasonable maximum value for road traffic capacity is 1800 cars per hour per lane [2]. In peak hour, passenger cars carry an average of 1.1 people per car so the stable capacity of an expressway lane is 1800 x 1.1 = 2,000 people per hour.

A single rail track equals a 12 lane expressway.

Road and rail corridors are much the same width. A lane of expressway is 3.5m wide [6] and Sydney train track centres are about 3.7m apart [7]. Hence, in much the same real estate, a rail track moves 24,000 / 2,000 = 12 times more people than a lane of road. A single rail track could replace a twelve lane expressway.

Road lanes freed up for vans and utes.

If one lane of a three lane Westconnex tollway were replaced by a rail track, overall people moving capacity would increase by 14/3 = 4.7 times. The remaining road lanes would be freed for trucks, delivery vans and tradey utes [8].

Freight haulage

A similar efficiency comparison could be made for freight haulage. For instance a single coal train of 48 wagons each carrying 80t, would need 160 semi trailers to replace it.

Implications for city transport

Where large numbers of commuters need to be moved, the operational advantage of rail is overwhelming. Add to this that rail offers land use efficiency, a guaranteed journey time, the ability to be productive and travel to work at the same time and an extremely low accident rate and it follows that a high speed road network can have no place within the centre of a city.

REFERENCES

[1] Figure 7.5, Guide to Traffic Management Part 2: Traffic Theory, Austroads AGTM02-15 second edition, October 2015
https://austroads.com.au/publications/traffic-management/agtm02

[2] Capacity of Unmanaged Motorways in Table 4: Operational capacities for basic motorway segments, Motorway Design Guide - Capacity and Flow Analysis (RMS April 2017)
https://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/motorway-design/motorway-design-guide-capacity-flow-analysis.pdf

[3] "Between 8am and 9am on weekdays most trains are at 185 per cent capacity...The benchmark used by transport officials to indicate "overcrowding" sits at a load of 135 per cent (100 per cent is all seats filled, no one standing)." A Waratah train carries 896 people seated so 135% of capacity indicates a total of 1210 passengers.

A 135% overcrowded train with 39 people standing per carriage may be a poor comparison with road transport except that Sydney rail passengers regularly put up with 185% capacity (95 people standing), presumably because the road alternative is worse.
https://www.smh.com.au/national/nsw/passenger-crowding-on-sydney-trains-worsens-as-demand-soars-20180523-p4zh2y.html

[4] Morning peak hour Chatswood to the City services, after the opening of the NW Metro Rail.
https://transportnsw.info/documents/timetables/93-T1-North-Shore-Line-20210228-20210611.pdf

[5] This figure is also stated in a letter from Gladys Berijiklian when she was Minister for Transport, 20/2/13

[6] Table 5-4, M4-M5 Environmental Impact Statement
https://majorprojects.accelo.com/public/c12dc60a1801fc21646f67294e802024/01.%20M4-M5%20EIS_Vol%201A%20_Chapters%201-8.pdf

[7] from Google Earth measurement across four tracks of the T3 Bankstown line near Erskineville.

[8] Passenger cars represent 75% of vehicles (NSW 2020), so replacing a lane of Westconnex each way with rail track provides more than enough room for the remaining delivery vans, trucks and tradies.
https://www.abs.gov.au/statistics/industry/tourism-and-transport/motor-vehicle-census-australia/31-jan-2020/93090do001_2020.xls