Our Ref: 20406

17 June 2021

Ethos Urban
173 Sussex Street
SYDNEY NSW 2000

Attention: Mr Gareth Bird

Dear Gareth,

RE: DIGITAL SIGNAGE – M2 MOTORWAY, EPPING
RESPONSE TO FURTHER SUBMISSIONS BY CITY OF PARRAMATTA COUNCIL

As requested, please find herein The Transport Planning Partnership (TTPP)'s response to further submissions to road safety queries made by City of Parramatta for the proposed digital signage on the M2 Motorway in Epping.

Background

Sydney Trains is seeking approval to install two new digital sign boards off the sides of the existing overhead railway bridge above the M2 Motorway in Epping. The proposed digital signage is to be located on both sides of the rail bridge, facing eastbound and westbound travel lanes on the M2 Motorway.

A Development Application for the proposal has been submitted previously, and submissions were received during the public exhibition phase. Submissions were received from City of Parramatta Council (Council) dated 12 February 2021 and Transport for NSW (TfNSW) dated 31 January 2021. Submission from Hornsby Shire Council was received dated 5 February 2021 and made no additional comments on the proposal. TTPP has reviewed the submissions and prepared a letter responding to the submissions dated 14 April 2021.

Additional submissions were made by Council dated 11 May 2021 in response to TTPP's Response to Submissions letter dated 14 April 2021. TTPP has reviewed the submissions and provides the following responses.

The Transport Planning Partnership
Suite 402, 22 Atchison Street
ST LEONARDS NSW 2065

Further Submissions by City of Parramatta Council

Submission 1: The Merge Point of the M2 On-Ramp

- ***The TTPP Traffic Response compared an existing similar situation in Homebush for the M4 Motorway at Centenary Drive where a digital advertising sign was installed in July 2016 and demonstrated that there has not been an increase in crashes since the installation. The assessment is rejected by Council on the following grounds:***
    - ***The M4 Motorway in this location has been subject to significant construction activity since the installation of the digital advertising signs which is shown in the Nearmap screenshots below [provided in Attachment One]. This would mean that there are many be other variables in play such as reduced speed limits, more engaged drivers during the on-going road works and overall safety improvements following completion of the road works. As such, this example should not be used to draw a conclusion that is contrary to accepted standards and guidelines.***

Council's comments on the M4 Motorway being under construction are acknowledged. Notwithstanding, TTPP maintains its position that the M4 Motorway is a comparable example for the following reasons:

- During the construction period of the M4 Motorway upgrade, the roadworks speed limit was 80 km/h (see Figure 1) which is similar to the usual speed limit on the M4 Motorway post-construction i.e. 90 km/h. Therefore, a slightly reduced speed limit would have a minor influence on the number of crashes in this context.

Figure 1: Construction Roadworks Speed Limit on M4 Motorway

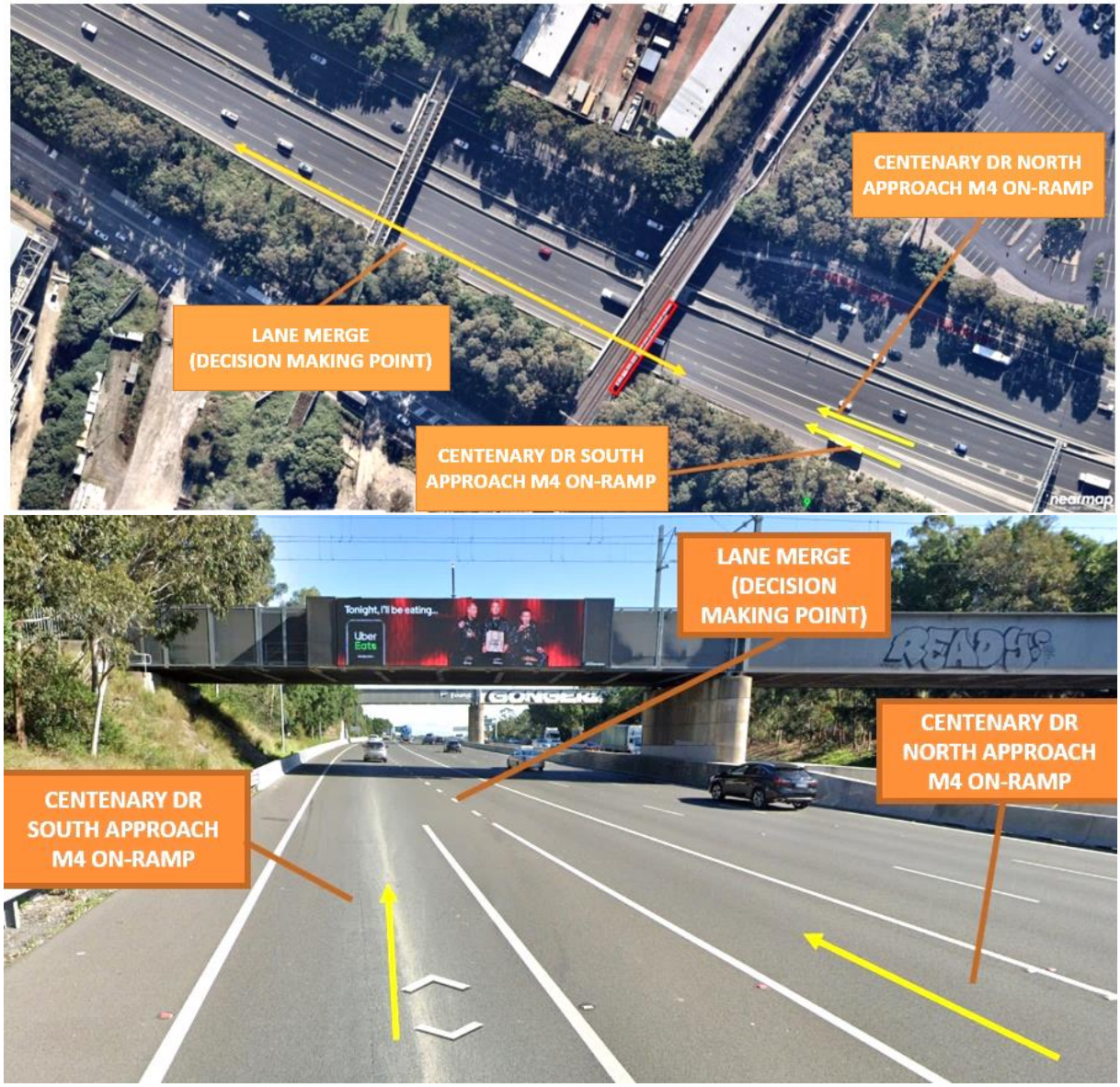
- Roadworks or changes to traffic conditions have the potential to distract motorists, drawing their attention away from the road or vehicle ahead as drivers look at the roadside works. From Figure 1, it can be seen that there is a 0.8-0.9m concrete barrier of which motorists can see above and into the construction works area adjacent to the travel lanes (As per Austroads, driver eye height is 1.1m above ground level). Therefore, in construction roadwork conditions drivers could be less attentive to the road ahead.

- **The merge point in the M4 example is between the two on-ramps for the vehicles coming from different directions in Centenary Drive. Where the on-ramp actually joins the M4 motorway, the on-ramp becomes an added lane rather than a merge point.**

Council's comment on the added travel lane further downstream is acknowledged. However, the point being made here is that there is a merge between the two M4 Motorway on-ramp lanes (from Centenary Drive). The digital signage is located within the length of this merge, and therefore, it is located within a "decision making point" as per the Transport Corridor Outdoor Advertising and Signage Guidelines.

The location of the signage in the M4 Motorway example within the merge length is clearly illustrated in Figure 2 below.

Figure 2: M2 Motorway Merge Location



- ***The location where the digital advertising sign was installed on the M4 Motorway had an advertising sign prior to 2016 which would also be a distraction. Accordingly, this example does not demonstrate the pre and post conditions similar to the M2 Motorway.***

Council's comment on the former static signage in place of the now digital sign on M4 Motorway is acknowledged. However, a driver can view the digital signage (or former static sign) and the road ahead within their peripheral vision. Therefore, such a sign is not considered to be a "distraction" since a distraction is when a driver's attention is taken away from the driving task at hand.

Historic crash data within the visible distance of the digital signage on the M4 Motorway post installation) indicates two crashes in a space of five years (see Table 1). This is a low number of incidents and is below the number of crashes which warrants a crash "blackspot" investigation (i.e. three or more crashes). Furthermore, these incidents are categorised as "non-casualty (tow-away)" crash types which is the lowest crash severity rating.

Table 1: Crash History Summary on M4 Motorway, Homebush

Crash Type	Crash Severity (No. of Crashes)				
	Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Pre-Installation (18 February 2012 - 24 July 2016)					
Rear End (RUM CODE 30)				1	7
Accident or Broken Down (RUM CODE 62)		1			
Struck Object (RUM CODE 66)			1		
Load or Missile Struck Vehicle (RUM CODE 91)					1
Sub-total	**0**	**1**	**1**	**1**	**8**
Total	**11**				
Operational Period (25 July 2016 – 31 December 2020)					
Rear End (RUM CODE 30)					1
Other Same Direction (RUM CODE 39)					1
Sub-total	**0**	**0**	**0**	**0**	**2**
Total	**2**				

A Digital Sign Traffic Safety Assessment was prepared by Bitzios Consulting for a digital signage application on Pacific Highway in Gordon, which was recently approved and installed. The Safety Assessment reports on relationships between distraction and crashes, namely:

"There is consensus in the literature that the majority of crashes which occur in urban areas are due to driver error. Victor et al. (2005) highlights that human error is the cause of up to 92.6 percent of accidents on the road. In order to minimise the risk of crashes drivers need to: be aware of external environmental influences, interpret the risks associated with these external environmental influences, make decisions, and carry out actions (Perez & Bertola 2011).

Even though human error is the cause of most crashes, Lam (2002) reviewed NSW crash data and found that out of 414,136 crashes, distraction was a factor in 15,059 (3.6%) of them. Distractions coming from outside the vehicle were determined to be a factor in only 2.5% of all crashes. This low influence of external distractions to crashes was reinforced by the Monash University Accident Research Centre (MUARC) carried out a study on crashes in Victoria and NSW between 2000 and 2011, and found the most common causes of crashes as summarised in Table 6.1."

Percentage of Crashes	Cause
13.5%	Intoxication
11.8%	Fell asleep
10.9%	Fatigued
3.2%	Failed to look
3.2%	Passenger interaction
2.6%	Fell ill
2.6%	Blacked out
1.8%	Feeling stressed
1.5%	Looked but failed to see
1.4%	Animal or insect in vehicle
0.9%	Using a mobile phone
0.9%	Changing CD/cassette/radio
0.9%	Adjusting vehicle systems
0.9%	Looking at vehicle systems
0.3%	Searching for objects

From the above list, it is evident that driver distraction due to the presence of billboards/ advertising signage is not a common cause of crashes.

- ***The TTPP Traffic Response further referenced a 2015 paper by Carolyn Samsa to demonstrate that a digital advertising sign will not create a significant safety hazard. The conclusions drawn by TTPP from this study are disputed on the following grounds:***

    - ***The 2015 Samsa study recommended that further joint research between regulators and the industry to further explore the significance of their study. They did not recommend changes to any standards or guidelines made by regulators.***

Noted. However, the findings of the study still stand that digital billboard do not draw driver's attention away from the road for dangerously long periods of time, and drivers maintained a safe average vehicle headway in the presence of such signs.

    - ***The study was limited to daylight hours and not night time where a digital advertising sign will have higher contrast compared to other traffic control signage and would stand out to drivers more.***

Noted. However, there are regulatory luminance levels for such digital signs so that signage contrast and luminance are at a safe level for motorists in night-time (and daytime) conditions. The proposed digital signage would operate in accordance with the luminance levels as stipulated in Table 6 of the Transport Corridor Advertising and Signage Guidelines.

    - ***The study was limited to people aged 25-54 whereas other studies have shown that young and senior drivers are more likely to be affected by roadside advertising (see Oscar Oveido-Trespalcios, Verity Truelove, Barry Watson, Jane A. Hinton 2019, 'The impact of road advertising signs on driver behaviour and implications for road safety: A critical systematic review', Journal of Transportation Research, No. 122 pp. 85-98 (94)).***

Noted. However, potential for these signs to cause distraction is low as identified in the study undertaken by Samsa Consulting. Furthermore, historically such signs have not been a common cause for crashes as identified by research undertaken by the Monash University Accident Research Centre (as reported in the Digital Sign Traffic Safety Assessment prepared by Bitzios Consulting for a digital signage application on Pacific Highway, Gordon).

Submission 2: Cyclists Crossing Point

- ***In regards to the Cyclist Crossing Point, the first point raised by the TTPP Traffic Response was that cyclists are required to give way to motorists. Though this may be true, it does not take away from the duty of care expected of any reasonable motorists to use caution at points of conflict whether they have the right of way or not. The advertising sign will be a distracting factory causing the driver to divert attention away from their duty of care. Furthermore, this line of argument contradicts with the 'Safe System Approach' advocated with Austroads Guidelines for Road Design and Traffic Management where the road needs to be designed to allow for road user mistakes.***

The study undertaken by Samsa Consulting identified that the average eye fixation on digital signage is less than one third of the minimum perception-reaction time to an unexpected event on the road. As such, motorists entering the M2 Motorway from Beecroft Road on-ramp would have the cognitive ability to react to a cyclist crossing the travel lane with a digital signage in the distance.

Notwithstanding the above, the road geometry of the M2 Motorway on-ramp entry from Beecroft Road is straight with clear view of the cycle crossing from the moment a motorist turns onto the on-ramp. In addition, there is advanced warning signage on both sides of the on-ramp to advise motorists of the upcoming cycle crossing, as shown in Figure 3. As such, there are multiple measures to ensure motorists are aware of the potential of cyclists crossing at this location regardless that cyclists are required to find suitable gaps in traffic.

Figure 3: Existing Cycle Crossing Warning Signs

Source: *The Transport Planning Partnership, date captured 13/11/2020*

Also, it is important to understand the type of riders who are cycling on the M2 Motorway and who would use this crossing. Cyclists travelling on the M2 Motorway typically include experienced commuters (or recreation/sports riders) who are of an "advanced rider level" as classified in the Austroads Cycling Aspects Guidelines. Experienced riders have the ability to observe and make safe judgement of distance (and speed) of oncoming traffic. A cyclist at this location needs to make a judgement on when it is safe to cross, and an experienced cyclist is unlikely to enter the travel lane where there is an approaching vehicle within close proximity of the crossing point. Given the sufficient sight lines between the crossing point and an oncoming vehicle on the on-ramp, a cyclist is able to make this judgement safely without compromising their own safety (see Figure 4). Also, a motorist's sight line to the crossing is sufficient (as shown in Figure 3), and therefore, a driver is able to make a safe judgement should they need to react to a cyclist crossing the travel lane ahead of them.

Figure 4: Rider's View Towards On-Ramp Traffic Flow

Source: Google Street View, imagery dated November 2020

- ***The second point raised by the TTPP Traffic Response was that the digital sign is located after the cyclist crossing point and therefore complies with the Guidelines. As commented in the previous Council submission, the crossing point is only 40m away from the proposed signs and therefore will be in view of drivers and be within safe sight distance away as per the guidelines. As such, the proposed sign could still distract drivers and cause them to fail to detect any cyclists that may be crossing the road. This is shown in Figure 2 below [provided in Attachment Two] which shows a number of critical points that a driver must navigate while within the zone where they could be distracted by the digital advertising signs.***

The Transport Corridor Outdoor Advertising and Signage Guidelines Section 3.2.3 states:

"*a.* ***The sign should not be located:***

i. less than the safe sight distance from an intersection, merge point, exit ramp, traffic control signal or sharp curves

ii. ***less than the safe stopping sight distance from a*** *marked foot crossing, pedestrian crossing, pedestrian refuge,* ***cycle crossing****, cycleway facility or hazard within the road environment*

iii. so that it is visible from the stem of a T-intersection."

The Guidelines stipulate the placement of the signage infrastructure, and advise that it is to be located outside of the safe sight distance on approach to the crossing point in this instance. Therefore, the design is compliant with the Guidelines.

Stopping sight distance is the distance to enable a driver to perceive, react and brake to a stop before reaching a hazard on the road ahead. A cyclist that is travelling in the shoulder lane of the main carriageway is within the peripheral vision of a motorist travelling on the on-ramp from a distance of approximately 165m before the cycle crossing point. The driving view at this point is shown in Figure 5. When there is a cyclist approaching the crossing point, a driver on the on-ramp would notice the cyclist and would be prepared to react appropriately. A cyclist appearing at the crossing point would not be unexpected or sudden for a driver entering the motorway since the driver would be able to see the cyclist approaching from some distance away and would anticipate a cyclist approaching the crossing point.

Furthermore, the proposed signage is not considered to be a distraction for motorists since a driver can view the digital signage and the road ahead within their peripheral vision without the driver's attention being taken away from the driving task at hand.

Figure 5: Rider's View Towards On-Ramp Traffic Flow

Submission 3: Variable Speed Limit Signs

- ***The Traffic Consultant for the applicant argues that only the secondary Variable Speed Limit Signs (VSLS) are affected by the proposed advertising sign. Furthermore, they argue there will be minimal overlap with the VSLS in the foreground to be obscured by the digital sign. This point is disputed considering the VSLS is located only 35m from the proposed sign meaning that both signs will be in view of the driver for essentially the entire approach. This point is demonstrated in figure 2 above [provided in Attachment Two].***

To clarify, the Digital Signage Safety Assessment report and RTS letters refer to the primary VSLS as the first set of variable speed limit signs the motorists would see on approach to the signs. This first set of VSLS is located approximately 355m west of the proposed digital signage. The secondary VSLS is the second set of variable speed limit signs located approximately 35m west of the proposed digital signage. The location of the primary and secondary VSLS are shown in Figure 6.

Figure 6: Primary and Secondary Variable Speed Limit Signage

Map Source: Google Maps

On approach to the primary VSLS, the digital signage would be further in the distance and a driver would not be able to read/ interpret signage display. Therefore, a driver would not look at the digital signage at this point, rather drivers would have full unobstructed view of the primary VSLS (see Figure 7).

Figure 7: Primary Variable Speed Sign

It is noted that the secondary VSLS may be, at times, positioned in front of the proposed digital signage. However, the speed signs would not be obstructed by the digital signage and the VSLS would be visible to motorists at all times (see Figure 8). The earlier M4 Motorway example demonstrates how variable speed limit signs can be located prior to a digital signage without causing visual impediment (see Figure 9).

Figure 8: Digital Signage and Variable Speed Signs on M4 Motorway

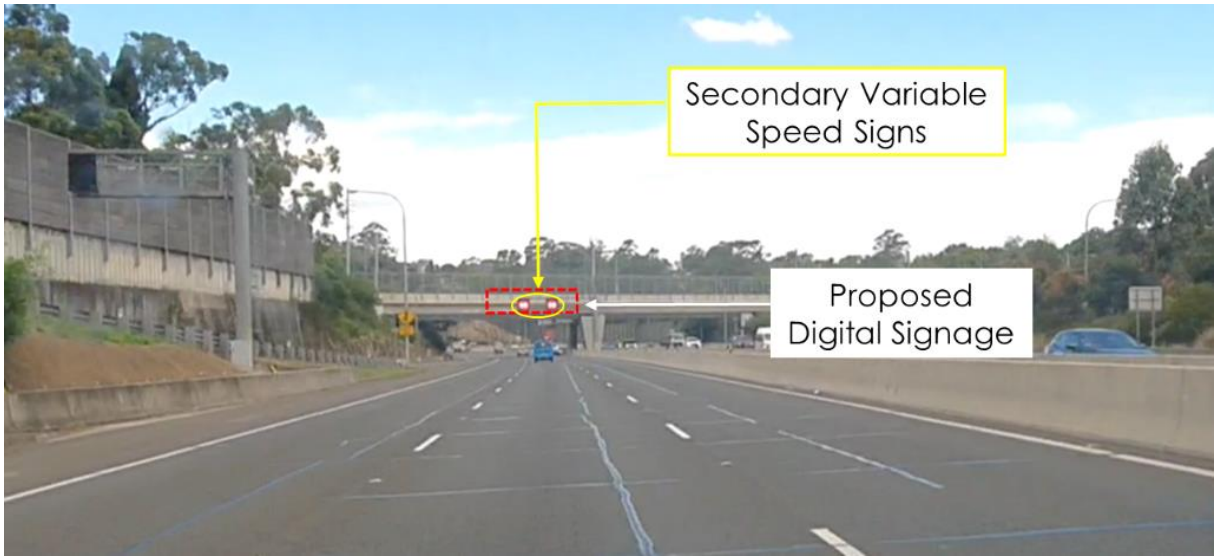


Figure 9: Digital Signage and Variable Speed Signs on M4 Motorway

In addition to the above, the proposed digital signage would not display colours and shapes which could be mistaken for the variable speed limit signs in accordance with the Transport Corridor Outdoor Advertising and Signage Guidelines.

Submission 4: M2 Exit Ramp

- ***Similar to the response to Submission 2, the TTPP report argues that the diverge point is located before the railway bridge where the advertising sign will be located. As stated previously in Council's response above, the exit ramp is located only approximately 120m away from the diverge point and is therefore in view of the drivers at key decision making points and within the safe sight distance. This point is demonstrated in figure 3 below [provided in Attachment Three].***

The Transport Corridor Outdoor Advertising and Signage Guidelines Section 3.2.3 states:

"*a.* ***The sign should not be located:***

i. ***less than the safe sight distance from*** *an intersection, merge point,* ***exit ramp****, traffic control signal or sharp curves*

ii. less than the safe stopping sight distance from a marked foot crossing, pedestrian crossing, pedestrian refuge, cycle crossing, cycleway facility or hazard within the road environment

iii. so that it is visible from the stem of a T-intersection."

Given that the proposed digital signage would be installed on the rail bridge that is located after the diverge point and exit ramp, the signage would not be located "less than the safe sight distance" which is in accordance with the Guidelines.

Also, there is a guidance sign prior to the tunnel showing the Beecroft Road exit (see Figure 10). This directional sign would inform motorists of the upcoming motorway exit well in advance of the exit lane.

Figure 10: Advance Guidance Sign for Beecroft Road Exit

The end of the exit lane/ diverge point is located approximately 120m away from the proposed digital signage. However, as observed during the site inspection, motorists enter the exit lane much earlier than this point.

Submission 5: Cyclist Crossing Point

- ***The TTPP Traffic Response provided similar justifications to that for Submission 2. As stated already, these are refuted by Council. Figure 3 above demonstrates how the cyclists crossing point is at a location where a motorist will have clear view of the advertising sign.***

Motorists approaching the Beecroft Road exit have a clear view of the cycle crossing point. In addition, there is a bicycle warning sign provided on the south side of the off-ramp to Beecroft Road, as shown in Figure 11. This signage provides advance warning to motorists to be aware of cyclists in the vicinity.

Figure 11: Existing Bicycle Warning Signage

There are adequate sight lines between the crossing point and an oncoming vehicle on the off-ramp, and therefore, a cyclist is able to make a judgement as to when it would be safe to cross the travel lane (see Figure 12). Also, a motorist's sight line to the crossing is sufficient (as shown in Figure 11), and therefore, a driver is also able to make a safe judgement should they need to react to a cyclist crossing the travel lane ahead of them.

Figure 12: Rider's View Towards Off-Ramp Traffic Flow

Submission 6: Interchange Sequence Signs

- ***The TTPP Traffic Response have referred to the study by Samsa (2015). As discussed already, the way this study has been used by TTPP is refuted.***

The potential for these signs to cause distraction is low as demonstrated throughout this RTS, previous RTS, additional sites crash study, and Road Safety Assessment prepared by TTPP, which are supported by research undertaken by Samsa Consulting and Monash University Accident Research Centre.

- ***The TTPP Traffic Response argues that the sign is off limited importance. However, such signs allow drivers to plan ahead and gradually merge to the left lane when safe should their exit/destination be approaching, particularly for those drivers that may find motorway driving stressful such as seniors. As noted previously, studies have shown that seniors are more likely to be affected by advertising signs and are a demography that was not covered in the study quoted by the within the TTPP Traffic Response.***

As per TfNSW's Guide Signposting guidelines, this purpose of this sign is as follows:

"REASSURANCE DIRECTION (G4-1) signs, reassure road users that they have made the correct turns at any intersections and are traveling towards their intended destination. They are placed beyond intersections that have been signposted with advance direction and intersection direction signs."

The reassurance direction sign displays distances to the next few suburbs/ areas (see Figure 13). It does not illustrate diagrammatic information, as would advance direction lane allocation signs and advance direction signs. Therefore, a reassurance direction sign typically requires less cognitive capacity to read and interpret. Given the simplicity in its messaging, the reassurance direction sign would remain visible to motorists and easily interpretable in the presence of the proposed digital signage.

Figure 13: Reassurance Direction Sign

Further to the above, there is a very similar example of an existing digital signage located on the M2 Motorway within close proximity to an interchange sequence sign. This arrangement is located at the Murray Farm Road overhead bridge approximately 1.6 km west of the proposed digital signage. As shown by the driving view in Figure 14 both signs are within the same line of sight yet do not cause information overload for motorists. Comparatively, the information displayed on this interchange sequence sign provides greater detail than the reassurance distance signage, and is placed at a location which could cause sudden merging by drivers trying to take the Pennant Hills Road exit that is 1km away. On the reassurance direction sign, the next exit is displayed as being 3km away which provides greater distance for drivers to merge into the left lane as required.

Figure 14: Existing Digital Signage and Interchange Sequence Sign on M2 Motorway

Other examples are located on Military Road in Neutral Bay and Mosman, where there are digital signs installed adjacent to lane directional sign as shown in Figure 15 and Figure 16. The digital signage and the directional sign are within the same line of sight without causing information overload for motorists.

Figure 15: Existing Digital Signage and Lane Directional Sign on Military Road, Neutral Bay

Figure 16: Existing Digital Signage and Lane Directional Sign on Military Road, Mosman

To the point of less confident drivers on motorways, such motorists travel in the left lane/s instinctively. Therefore, it is an unlikely situation where such a driver would have to quickly merge across multiple travel lanes to take an upcoming exit. Nonetheless, a digital signage at this location would not hinder a motorist from being able to safely merge across to the far left lane ahead of the next exit which is 3km away.

We trust the above is to your satisfaction. Should you have any queries regarding the above or require further information, please do not hesitate to contact the undersigned on 8437 7800.

Yours sincerely,

Wayne Johnson
Director

Attachment One

Figure 1: Nearmap Aerial Imagery to highlight the changes over time that have occurred on the M4 Motorway between 2015 and 2021

Attachment Two

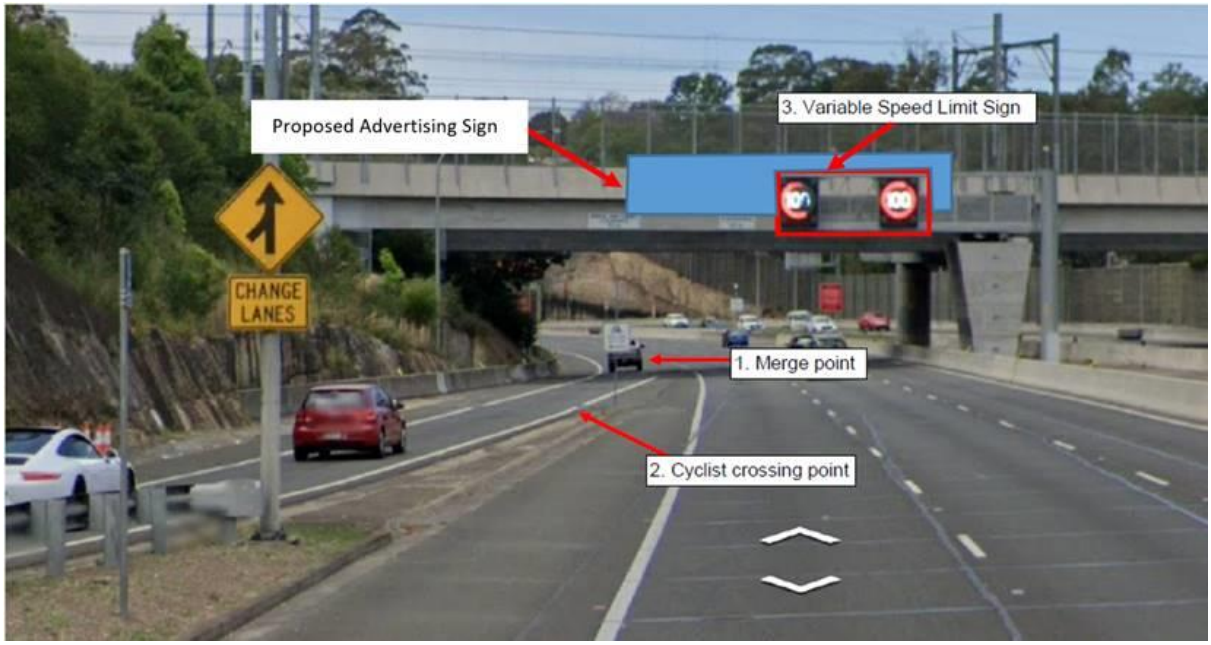


Figure 2: StreetView image of M2 Motorway Eastbound near the proposed advertising sign as well as the location of the critical points near the sign that are impacted by the proposal

Attachment Three

Figure 3: StreetView image of M2 Motorway westbound near the proposed advertising sign as well as the location of the critical points near the sign that are impacted by the proposal