In the matter of the Resource Management Act 1991

And

In the matter of an application for Resource Consents by Lumo Digital Limited to construct a digital billboard display at 399 Lincoln Road.

STATEMENT OF EVIDENCE OF MICHAEL CHRISTOPHER ROSSITER FOR LUMO DIGITAL LIMITED

11 November 2020

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INTRODUCTION

1 My full name is Michael Christopher Rossiter. I hold the position of Principal Transportation Engineer at Stantec New Zealand Limited (Stantec). I have been in this position since 2013 and have been employed at Stantec (and TDG prior to its incorporation with Stantec) since 2006.

2 I hold the academic qualifications of Bachelor of Science from the University of Exeter and Bachelor of Arts (Open) from the Open University.

3 I am registered as a Chartered Engineer with Engineering New Zealand. I have over 35 years engineering experience including 14 years' transportation engineering in New Zealand on a wide range of projects involving transportation engineering, transportation planning and assessment, analytical investigations and road safety audits.

4 Prior to joining TDG (now part of Stantec) in 2006, I was employed as a Principal Systems Engineer and Technical Manager with BAE Systems in England. This included seven years (1999-2006) working on European research projects to improve global Air Traffic Management practices by developing standards and systems for new technology, Automatic Dependent Surveillance Broadcast (ADS-B), to ensure safe aircraft separation. My employment also included 14 years (1985-1999) designing and developing sonobuoy data analysis and display systems.

CODE OF CONDUCT

5 While this is a Council Hearing, I acknowledge that I have read and am familiar with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014, and agree to comply with it. I confirm that this evidence is within my area of expertise, except where I state that this evidence is given in reliance on another person's evidence. I have considered all material facts that are known to me that might alter or detract from the opinions I express in this evidence.

6 I have been engaged by Lumo Digital Limited to prepare this evidence.

SCOPE OF EVIDENCE

7 I prepared the Integrated Transport Assessment report (ITA) that accompanied the application[1]. I also prepared the response on transport matters to the Council's Request for Further Information (RFI)[2].

8 My evidence does not re-traverse matters which are already addressed there, other than noting any changes to the local environment.

9 This evidence will build on the Assessment of Environmental Effects report (AEE), in response to:

9.1 Issues raised by Submitters;

9.2 Comments and issues from the Christchurch City Council's Reporting Officers Section 42A Report (the s42A report); and

9.3 Feedback on consent conditions.

EXECUTIVE SUMMARY

10 My key observations and conclusions are:

10.1 The concerns raised by Ms Gregory in her peer review of the application appear to be largely based on the perception that an advertising sign will automatically distract drivers to the extent that it will cause adverse road safety effects. No evidence has been provided to support this.

10.2 My review of research into the effects on driver behaviour of digital billboards at signalised intersections indicates that drivers are more focused on driving demands at complex intersections than external factors such as advertising.

10.3 My analysis of crashes involving driver distraction found that 0.3% of such crashes were attributed to advertising or signage. Of these, the majority were associated with road signs such as road works signage, diversion signs, speed limit signs and direction signs rather than advertising. I was only able to identify one crash since 2015 where an advertising billboard

[1] Integrated Transport Assessment, 399 Lincoln Road, 5 March 2020
[2] Lincoln Road Billboard CCC RFI, 3 August 2020

was explicitly identified as the cause of distraction and only twelve crashes in total that could be directly linked with advertising rather than signage with five of these being business related signage on buildings or structures. For comparison, distraction by cell phones, passengers or other traffic each separately accounted for 10% of crashes with distraction as a contributing factor.

10.4 Although the proposed location of the digital billboard is less than 50m from the Moorhouse Avenue / Lincoln Road intersection, I have found no evidence to suggest that this will adversely affect road safety at the intersection.

EVIDENCE

Driver Distraction

11 Since the primary purpose of advertising is draw attention to a product or service, there have many investigations into the effects of road-side advertising on driver behaviour. The ViaStrada report prepared by Ms Gregory for Council makes several references to a report by Shane Turner that was issued in February 2016. Many of the recommendations made in that report were adopted by Christchurch City Council in the development of their rules for digital advertising.

12 The Turner report was based on a literature review of research published prior to 2015. This established guidelines for display update rates, display brightness controls, transitions and types of image and controls. I understand that similar guidelines and the associated resource consent conditions have been applied to other digital billboards within the district.

13 Turner provides some discussion about billboard positions with respect to driver cone of visibility (COV) because this has the potential to affect the duration of a glance at a sign. Signs located outside the COV will typically increase the duration of glances when these occur. In instances, where there is a perceived conflict with signals, Turner suggested that consent conditions include a monitoring condition that required a review of crashes at specified times after the installation to identify any adverse effects of the signage. I have undertaken one such crash review for a digital sign on the Blenheim Road overbridge which was subject to this type of monitoring condition. While this sign was located on a mid-block, it is located on a high-volume road with extensive queuing at peak times. My review of crashes for that sign found no evidence for an increase in crashes following installation of the sign.

14 Turner also noted that the effects of digital signage on road safety is an area of ongoing research and he recommended that Council regularly reviewed its rules on digital signage to reflect the latest research. I am not aware of any Council review of the digital sign regulation since 2016. However, I am aware of other more recent research on this subject that have come to different conclusions and I describe these below.

15 Carriageway Consulting Limited has investigated crash records at 14 signalised intersections in New Zealand with digital billboards located within 50m of an intersection, and in five cases with the billboards located directly behind traffic signal heads[3]. The report notes that both of these factors are commonly mentioned as presenting a particular road safety risk when resource consent applications are made for new digital billboards. While there is a perception that crash rates would rise following the installation of digital billboards, this is not reflected in the crash records and the Carriageway investigation found lower crash rates following the installation. The Carriageway report concluded that there was no evidence that the operation of a digital billboard gives rise to an increase in the number of crashes.

16 A research paper by Samsa Consulting in 2015[4] used eye tracking technology to understand where drivers were looking and for how long as they drove through complex road environments with digital signs on the roadside. The study found that the average fixation duration for all signage types was below 0.75 seconds which was considered to be minimum perception-reaction time to an unexpected event. The study found no significant difference in the observed headways with different sign types (i.e. between digital billboards, static billboards, and on-premise signs). There was also evidence to suggest that the presence of digital signs affected drivers lateral positioning within traffic lanes.

17 The Australian Road Research Board (ARRB) published some research on the "On road evaluation of the driving performance impact of digital billboards at intersections" in November 2018. The focus of this research was to determine whether and to what extent digital signage would distract drivers in complex, cognitively demanding locations such as intersections or high traffic environments. The research used video to analyse vehicle movements through two intersections with closely proximate digital billboards, and found that

[3] Digital Billboard Installations: Assessment of Road Safety Records. Carriageway Consulting Ltd, May 2016.
[4] Digital Billboards 'down under": are they distracting to drivers and can industry and regulators work together for a successful road safety outcome. Samsa 2015

"contrary to an hypothesis that digital billboards at demanding locations will inevitably create enough distraction to negatively affect vehicle control performance, the current evaluation found that, at all dwell times, vehicle lateral control performance either improved or was unaffected by the digital billboards presence".

18 Overall, while there is a perception that any advertising signage located close to a road or a complex intersection will adversely affect road safety, this does not appear to be the case in practice. The research that I have reviewed suggests that drivers manage their driving tasks in accordance with the demands of the environment and that this is not affected by the presence of, any potential distraction by an external factor such as advertising.

19 Since the Carriageway analysis was completed in 2016, I have used the Waka Kotahi Crash Analysis System (CAS) to investigate the number of crashes caused by different sources of driver distraction in New Zealand in recent years. There have been over 200,000 crashes reported since the beginning of 2015. Driver distraction was identified as a contributing factor in about 14,000 crashes, about 7% of all crashes.

20 Table 1 provides a summary of the different types of distraction that are identified within CAS and the numbers of crashes where these factors have been explicitly identified. Cell phones account for the greatest single source of distraction. Other internal factors such as passengers, in-vehicle technologies, food and beverages account for about 30% of crashes where distraction is an identified contributing factor. External factors such as traffic, scenery, people, animals and advertising account for 22% of crashes. It is likely that all of these contributing factors are underestimates because there is a large proportion of all crashes (35%) which do not have an explicitly identified distraction factor.

21 Distraction by advertising or signs accounts for the smallest number of crashes; less than one percent of all crashes where distraction has been identified as a contributing factor and is a very small percentage of all crashes, about 0.02%.

Distraction	Number of Crashes	Percentage
Cell phone	1,709	12.3%
Passengers	1,473	10.6%
Other traffic	1,450	10.5%
Food, cigarettes, beverage	1,226	8.8%
Scenery or people	1,052	7.6%
Console	835	6.0%
Animal	471	3.4%
Navigation device	402	2.9%
Finding intersection	340	2.5%
Advertising or signs	33	0.3%
Other	4,891	35.3%

Table 1: Causes of Driver Distraction (2015-2020)

22 I have examined the police reports for crashes where advertising or signs were identified as a contributing factor. Road signage was identified as a factor in 17 crashes, for example, diversion signs, road works signs, speed signs or directional signs. Street name signs were identified as a cause of distraction in three of the crashes. Building related signage such as a brand name or fuel price was identified in five crashes. Advertising signs were only identified as a factor in twelve crashes. While the descriptions are vague, my interpretation of the descriptions was that the many of the distracting signs were either temporary or small road-side signs such as a sandwich board. I found only one crash where an advertising billboard was explicitly mentioned in the police report. The other reports did not explicitly describe the source of distraction. Overall, my analysis of the police reports indicates that advertising signage of any form accounts for about 0.1% of crashes attributed to driver distraction and less than 0.01% of all crashes.

23 Table 2 provides a summary of crash numbers if the crash reports with distraction as a contributing factor are filtered to include only those crashes that occurred at intersections. While cell phones were still a major source of distraction, other vehicles and passengers were identified as the leading causes of distraction. Distraction due to advertising or signs still represents the smallest category.

Distraction	Number of Crashes	Percentage
Cell phone	341	9.5%
Passengers	456	12.6%
Other traffic	552	15.3%
Food, cigarettes, beverage	217	6.0%
Scenery or people	248	6.9%
Console	118	3.3%
Animal	63	1.7%
Navigation device	184	5.1%
Finding intersection	158	4.4%
Advertising or signs	12	0.3%
Other	1,258	34.9%

Table 2: Causes of Driver Distraction at Intersections (2015-2020)

24 Figure 1 shows the annual number of crashes with distraction by advertising or signs identified as a contributing factor since 2015. While the number of digital advertising signs has been increasing in recent years, this does not appear to be contributing to an increase in the number of crashes associated with advertising which could be expected if these were more distracting than other forms of advertising.

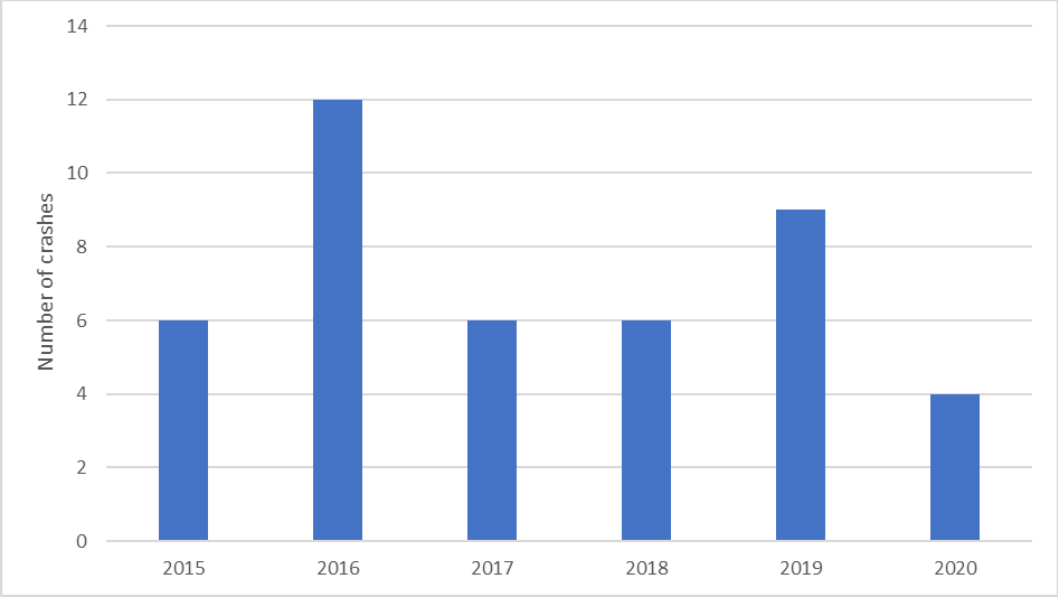


Figure 1: Number of crashes with advertising as a contributing factor

Transport Environment

25 Following the preparation of the ITA, a digital advertising sign has been installed on the side of the building on the corner of Hagley Avenue and Moorhouse Avenue. The digital sign replaced a static billboard and is aligned to provide maximum visibility to

drivers approaching the intersection on Lincoln Road. Signal Pole 4 which supports the secondary signal aspects for the Lincoln Road approach is visually located directly in front of the billboard as drivers approach the intersection from about 50m before the limit line up to the limit line. The sign is also visible to drivers approaching from the west on Moorhouse Avenue although it is partially obscured by trees but is not directly visible to westbound drivers.

26 Another digital billboard has been installed on the western side of the driveway at 26 Moorhouse Avenue, about 150m west of the Lincoln Road intersection. This billboard is visible to drivers approaching the Moorhouse Avenue / Lincoln Road intersection from the east. Although the perceived position of the primary signal pole (pole 10) for the westbound through movement does track across the billboard, this occurs in advance of the critical decision zone[5]. The separation between the signal pole and the digital sign also means that there is less potential for driver distraction because the sign is too distant to be legible.

27 I have used the Waka Kotahi CAS to identify any crashes that have occurred at the intersection since the ITA was prepared. There have been three crashes reported in 2020 with none of these resulting in injury. All three crashes involved westbound vehicles: two occurred at night-time with one crash attributed to excess alcohol and one to overtaking on the left without due care. The third crash occurred in the late afternoon and was attributed to the driver following the vehicle in front too closely.

28 The recent installation of the other digital signs in the area does not affect the conclusions I made in the response to the Council RFI, that is: while the projected position of the green signal aspects may track across the corner of the billboard from the typical eye height of a truck driver, this will not be the case for car drivers. With the billboard being some 60m downstream of the signals, I do not expect the presence of the billboard to have any adverse effects on road safety because:

(a) The likelihood of the billboard image changing as drivers traverse the critical decision zone is low.

(b) The billboard does not conflict with signal aspects for car drivers which account for 95% of vehicle movements.

[5] The Critical Decision Zone represents that section of the approach to a signal where a driver will make a decision on whether to stop or proceed through the intersection.

(c) Since the surrounding backing board of the signal aspects is black, the visibility of the aspect is unlikely to be confused with the content of the billboard.

Issues raised by Submitters

29 Two submitters[6] have raised driver distraction as concerns. I have reviewed the reported crashes at the Moorhouse Avenue / Lincoln Road intersection for the last ten-year period. There have been two crashes where diverted attention was identified as a contributing factor to crashes; one was attributed to a cellphone and the other to people or scenery. Both of these crashes occurred on the westbound carriageway of Moorhouse Avenue west of the intersection.

30 I consider that the issue of driver distraction is similar to those raised by Council which I discuss in more detail below. While there is a perception that advertising signs adversely affect road safety, there is no evidence to support this view.

Section 42A report

31 I have reviewed the memoranda[7],[8] prepared by Megan Gregory on behalf of Council and have the following comments on matters raised.

32 Ms Gregory has stated "*ViaStrada considers that the introduction of new digital billboards in the vicinity of the intersection will increase the opportunity for driver distraction and therefore intensify this crash trend.*" I disagree with this statement because my analysis of the crash records does not show any evidence of crashes at this intersection where advertising or signs have been identified as a contributing factor, and there is no evidence from the NZ-wide crash data that digital billboards are having any adverse effect on safety, including at and proximate to signalised intersections.

33 The ITA only documented the vehicle movements at the intersection as these were considered to be critical to the assessment. I agree that there are high volumes of pedestrians and cyclists particularly during the peak commuter periods but as the position of the proposed billboard does not affect the crossings, this was not included in the assessment.

[6] Cooper and Apse
[7] Peer Review of Digital Billboard RMA/2020/702 – 399 Lincoln Road, Addington. 2 June 2020, ViaStrada
[8] Addendum 1 to Peer Review of Digital Billboard RMA/2020/702 – 399 Lincoln Road, Addington. 4 November 2020, ViaStrada

34 Ms Gregory places considerable reliance on the report prepared by Mr Turner that was prepared in 2016. The recent research into the effects of digital signs that I have reviewed has not identified anything that demonstrates a real, as distinct from perceived, safety concern regarding their operations. Based on the research papers that I have seen (and cited above), there is no evidence for a worsening in driver behaviour or driver performance such as lane following, red-light jumping or more crashes in locations with digital signage. The largest sources of distraction for drivers remain cell phones, passengers, in-vehicle technologies, and other traffic.

35 The current configuration of the Moorhouse Avenue / Lincoln Road intersection has been in place for more than five years. There are no reported crashes involving the type of action identified by Ms Gregory with drivers at the limit line making a false start. In my opinion, this reflects the way that the signal phases operate. During the B and B1 phases, all aspects controlling the westbound movement and left turn into Lincoln Road will clearly show red. When the B1 phase operates, there are normally sufficient cyclists and or pedestrians crossing the road that it would be clear to a driver that they do not have a right to progress through the intersection. In the C phase, either the pedestrian crossing or the left turn is active. If the left turn arrows turned green, it would only happen once the P2 pedestrian crossing was clear and so the potential for a crash involving a pedestrian would be very low unless a pedestrian crossed after the P2 aspects had turned red. In my opinion, the installation of the advertising billboard would not affect the behaviour of drivers because any cyclists or pedestrians using the crossings will be positioned within 20m of the limit line and at some points, in front of the proposed billboard which will be more than 60m from the limit line.

36 Ms Gregory has raised concerns about the potential effects of the billboard on vehicle tracking as they turn left from Moorhouse Avenue into Lincoln Road. I am aware that this is a common problem where cycle lanes are located on the inside of a bend because many drivers short-cut the corner. Green paint is typically used to encourage better driver behaviour but is not always successful and I am aware of locations in Christchurch where flexi-poles have also been installed to prevent this behaviour. In my experience, this type of driver behaviour is less likely when there are cyclists in the cycle lane because most drivers will actively avoid the cyclists. In my opinion, this is an issue with driver behaviour and is unrelated to advertising signage. Based on the research that I have been able to review, there is no evidence that advertising signage affects the lane following performance of drivers.

37 Ms Gregory considers that the effects of installing the digital sign will be at least minor. I disagree with this assessment. While I acknowledge that any crash involving

a pedestrian or cyclist is likely to result in minor or serious injuries, there have been no crashes at the intersection since 2015 that involved pedestrians or cyclists. Since my analysis of crashes involving distraction does not indicate that advertising is a significant source of distraction compared with other sources of distraction such as cell phones and passengers and there is no evidence for an increase in crash rates in locations with digital adverting, I consider that the effects of the proposed digital sign will be negligible.

38 Ms Gregory has described a proposed scheme to address the concerns with vehicle tracking and the potential conflict point with cyclists rejoining the road. Regardless of whether or not the digital billboard is approved, I would not support the design unless more substantial protection was provided for cyclists in the form of a kerb extension so that they could rejoin the carriageway without risk of collision from a motor vehicle.

Conditions

39 I consider that the proposed resource consent conditions to ensure compliance with the Christchurch City District Plan rules for digital signs in relation to content, transitions and brightness are appropriate, that is:

39.1 The billboard shall generate no more than 10lux light spill of light when measured 2m from any arterial or collector road.

39.2 No live or broadcast images shall be displayed. Only still images shall be displayed with a minimum duration of 16 seconds.

39.3 There shall be no movement or animation of images displayed on the screen.

39.4 The material displayed on the screen shall not contain any flashing images and the screen itself shall not contain any retroreflective material.

39.5 There shall be no transitions between images apart from cross-dissolve of maximum duration of 0.5 seconds.

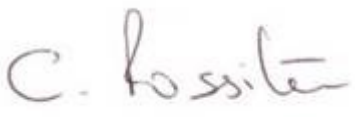
39.6 There shall be no sound associated with the screen and no sound equipment is to be installed as part of the screen.

39.7 The screen shall incorporate lighting controls to adjust brightness in line with ambient light conditions.

SUMMARY AND CONCLUSION

40 I have reviewed the concerns raised by Ms Gregory in her peer review of the applications and also those raised in submissions. In my opinion, these are based on the perception that the presence of roadside advertising will have a direct effect on road safety because drivers' attention will be focussed on the signs rather than the road. However, no empirical evidence has been presented to support these views.

41 Based on my review of recent research and crash records involving driver distraction, I consider that the views of the submitters and Ms Gregory are unfounded. Although the proposed location of the digital billboard is less than 50m from the Moorhouse Avenue / Lincoln Road intersection, I have found no evidence to suggest that this will adversely affect road safety at the intersection. Accordingly, I can confirm that subject to the implementation of the conditions referred to above, there is no traffic operations or road safety reason to preclude acceptance of this digital billboard proposal.



Chris Rossiter
11 November 2020