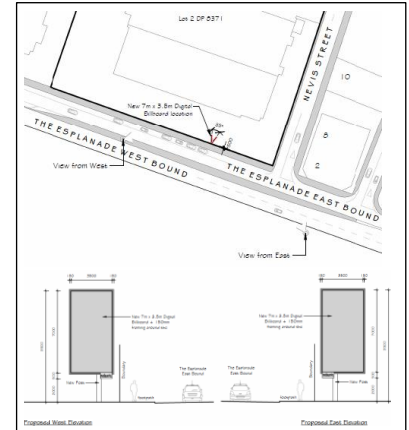
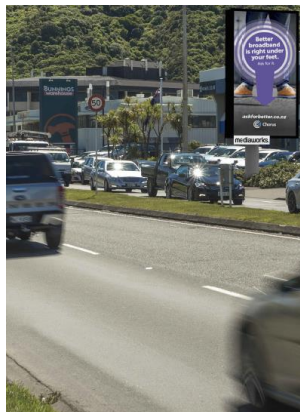


REPORT TO:	Oliver Clausen [31/5/22; 3/11/22]	CC:	
FROM:	David K. Wanty, Wanty Transportation Consultancy; CPEng, M.ITE		
RM220088:	47 The Esplanade Petone, Bunnings billboard		
ISSUE DATE:	20/6/2022	REVISED: 4/11/22	SITE VISIT(S): yes

1. Background

The Applicant wishes to install an electronic billboard within the Bunning site. The following relevant documents were received:

- AEE 47 The Esplanade, Petone Billboard 33p, Mt Hobson Group, 3/2022
- Appendix 2 - Billboard Plans 5p, d sol design solutions, 17/12/21
- Appendix 3 - Traffic Report 27p, Stantec, 21/1/22



2. Traffic and Safety review

The Council assigned planner requested: *"In particular, ... address the High Trip Generator [HTG] Thresholds of the ODP and comment on the suitability of the roading network to accommodate the proposed vehicle movements. ... access arrangements in terms of road safety and performance?"*

2.1. Access

Extracts from the Regional Council decision (left – cited drawing is unavailable) and AEE (right) are given below.

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| <p>34. Prior to undertaking works in accordance with this consent, the Consent Holder shall undertake the following to ensure that dust generation from the site is kept to a practicable minimum, to the satisfaction of the <i>Manager</i>:</p> <p>a) Form an access road as shown on drawing S14-0218-26, Revision B (submitted as further information to the application received via email 31 July 2018). At least the first 15 metres of the access road from the boundary shall be sealed, and the unsealed section of the access road shall be covered in such a manner as to allow it to be wet-swept.</p> | <p>21. The hours of operation will be as follows. The cleanfill staff will arrive at 7.00 am and leave at 6.00 pm. The first truck will be accepted at 7.00 am and the last truck will leave by 5.30 pm. The cleanfill will operate 6 days per week, with work generally finishing at 2.00 pm on Saturdays.</p> <p>22. The average number of truck movements required to transport the imported cleanfill over various timeframes is shown in Table 3 below. There would be several additional vehicle movements involving staff vehicles but they would amount to no more than 10 vehicle movements per day. Table 3 shows that even if fill was imported at an accelerated rate within a year, the required truck movements would be well within the permitted activity High Trip Generator standard of 500 vehicle movements per day.</p> |
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2.2. Billboard Specifications

The AEE states in 4.8 as follows

The sign will incorporate changing messages, and will be managed in accordance with the following parameters:

- Each message will be displayed for a minimum of 8 seconds
- Each message will transition to the next message by way of a 0.5 second 'cross-fade',
- Each message will be static, and will not incorporate animation or movement,
- The billboard display will be illuminated to a maximum level of 5,000 candelas/m² during daylight hours, and to a maximum level of 250 candelas/m² during hours of darkness, and
- The luminance of the billboard display will be automatically adjusted at all times to vary according to the ambient light conditions.

2.3. Road Safety issues

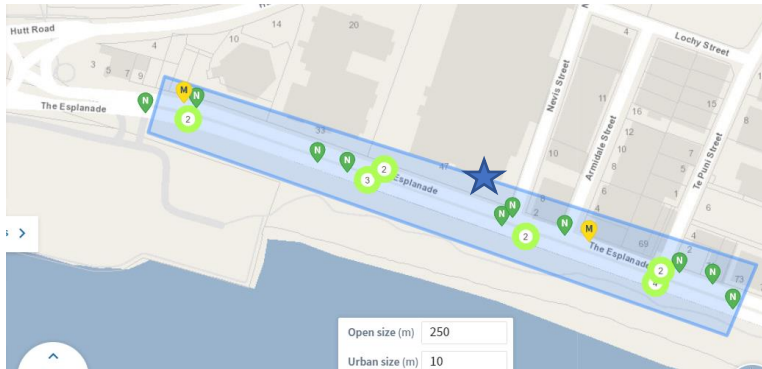
The AEE Appendix C traffic assessment states in 2.3 Road Safety as follows

A search of the Waka Kotahi Crash Analysis System (CAS) has been undertaken for the five-year period from 1 October 2016 to 1 October 2021, for all reported crashes that occurred within a 100m either side of the proposed billboard location. The search revealed a total of four crashes.

A wider search area was conducted as shown below, with the coded listing sorted by direction and by easting. In the eastbound approach direction this resulted in 1 minor injury crash approx. 250 m from Nevis St, 3 non-injury crashes approx. 100 m west of Nevis Street and 1 crash at Nevis St.

In the westbound approach direction this resulted in 5 non-injury crashes at Te Puni St, 1 non-injury crash approx. 40 m west of Te Puni St, 1 non-injury crash approx. 70 m west of Te Puni St, 2 non-injury crashes approx. 100 m west of Te Puni St and 1 non-injury crash approx. 120 m west of Te Puni St.

None of the crashes had “attention diverted by ... Advertising or signs” (factor code 356) but one had “attention diverted by ... Other – attention diverted (inside or outside vehicle)” which involved a motorcyclist travelling too closely with eyes down not noticing the car in front had slowed/stopped just west of Te Puni St.



In the queried area for crashes from 1/1/2015 to the present (as at 7/6/2022) there were no severe and only two minor injury crashes of the 27 reported crashes (none in 2022). None involved pedestrians or cyclists.

The majority of westbound crashes involved overtaking/lane change (movement AA, AO) while the eastbound crashes were a mix (3 of the 9 involving motorcyclists).

Based on the reported crash records examined, with no severe crashes occurring and only one minor injury crash a long way from Nevis Street, and with no factors involving signs, the proposed billboard if operated well should not of itself lead to safety issues.

However the conditions do not mention minimum lettering size – a condition should be that in this aspect it complies with the Waka Kotahi Traffic Control Device manual or HCC, whichever is the greater. Furthermore the Application states in the Appendix 3 Traffic Report section 4.2 Dwell time that “*As noted, a minimum image dwell time of 8 seconds is proposed in this case, this being the industry-accepted dwell time that is typically adopted in New Zealand*”. This statement is incorrect in that 8 seconds is the accepted minimum dwell time but many billboard signs have conditions requiring a longer dwell time based on research which Stantec are aware but take more recent research into account. Their footnote reference 4 relates to where the sign is not off the side of the road, as stated below.

For example, Schieber et al. (2014) placed the billboard off to the side of the road under conditions that encouraged drivers to take their eyes off the forward roadway. By contrast, in the current evaluation, the billboards were straight ahead for the assessed drivers. As a result, the billboards did not require drivers to move their eyes from the forward roadway in order to apprehend the content of the billboards.

Stantec also state that: *Overall then, it is apparent that the need in this case for a dwell time that extends beyond the proposed 8-seconds would be an overly conservative response for a billboard at this location.* However it is not readily apparent and so in the context of a highly trafficked route and based on earlier research showing crashes increasing with reduced dwell times, recognising the Road to Zero crashes goals it is considered appropriate to adopt (conservative) dwell times as a condition (note also that very recently electronic billboards have been declined for SH2 between Ngauranga and Petone).

Section 4.2 Dwell Time of The Waka Kotahi “DIGITAL BILLBOARD GUIDANCE - ADDENDUM TO TCDM-3” (version 1, 24/3/22) provides a manner of calculating the dwell time based on the length over which the sign is visible and the travelling speed. The former I consider may be approx. 220 m in each direction (more than the Applicant has used) and the latter can be very low during congested times but assuming 30 km/h gives 44 s, while 50 km/h gives 26.4 sec.

2.4. June 14 2022 Conclusion

I conclude that the minimum dwell time for the proposed billboard should be set as 45 seconds during the daytime hours and 25-30 seconds during the night-time. A condition regarding the minimum size height of letters needs also to be included (TCDM-3 Table 6.2) and that no dynamic (video) images will be displayed.

Council could also request a certificate of correct installation from a suitably qualified electrician, and should check what conditions it has applied to other electronic billboard recently approved by Council.

Council should consider requesting a small amount of free advertising time for road safety messages, a matter for discussion with the Applicant (for example this could apply during the road safety week held every May). I recommend that after 12 months of operations that a review of the road safety record and any instances reported to Council relating to the proposed sign be conducted as a condition of consent (some Councils such as KDCDC make such conditions of consent).

CRASH ROAD	FEICRASH DIST	INTNS SIDE ROAD OR FEATURE	SIDE ROAD DIRN	CRASH ID	CRASH SEVERITY	CRASH DATE	CRASH TIME	MM/MT	VEH TYPE	VEH CLS1	VEH CLS2	VEH CLS3	VEH CLS4	VEH CLS5	VEH CLS6	VEH CLS7	VEH CLS8	VEH CLS9	VEH CLS10	VEH CLS11	VEH CLS12	VEH CLS13	VEH CLS14	VEH CLS15	VEH CLS16	VEH CLS17	VEH CLS18	VEH CLS19	VEH CLS20	VEH CLS21	VEH CLS22	VEH CLS23	VEH CLS24	VEH CLS25	VEH CLS26	VEH CLS27	VEH CLS28	VEH CLS29	VEH CLS30	VEH CLS31	VEH CLS32	VEH CLS33	VEH CLS34	VEH CLS35	VEH CLS36	VEH CLS37	VEH CLS38	VEH CLS39	VEH CLS40	VEH CLS41	VEH CLS42	VEH CLS43	VEH CLS44	VEH CLS45	VEH CLS46	VEH CLS47	VEH CLS48	VEH CLS49	VEH CLS50	VEH CLS51	VEH CLS52	VEH CLS53	VEH CLS54	VEH CLS55	VEH CLS56	VEH CLS57	VEH CLS58	VEH CLS59	VEH CLS60	VEH CLS61	VEH CLS62	VEH CLS63	VEH CLS64	VEH CLS65	VEH CLS66	VEH CLS67	VEH CLS68	VEH CLS69	VEH CLS70	VEH CLS71	VEH CLS72	VEH CLS73	VEH CLS74	VEH CLS75	VEH CLS76	VEH CLS77	VEH CLS78	VEH CLS79	VEH CLS80	VEH CLS81	VEH CLS82	VEH CLS83	VEH CLS84	VEH CLS85	VEH CLS86	VEH CLS87	VEH CLS88	VEH CLS89	VEH CLS90	VEH CLS91	VEH CLS92	VEH CLS93	VEH CLS94	VEH CLS95	VEH CLS96	VEH CLS97	VEH CLS98	VEH CLS99	VEH CLS100	VEH CLS101	VEH CLS102	VEH CLS103	VEH CLS104	VEH CLS105	VEH CLS106	VEH CLS107	VEH CLS108	VEH CLS109	VEH CLS110	VEH CLS111	VEH CLS112	VEH CLS113	VEH CLS114	VEH CLS115	VEH CLS116	VEH CLS117	VEH CLS118	VEH CLS119	VEH CLS120	VEH CLS121	VEH CLS122	VEH CLS123	VEH CLS124	VEH CLS125	VEH CLS126	VEH CLS127	VEH CLS128	VEH CLS129	VEH CLS130	VEH CLS131	VEH CLS132	VEH CLS133	VEH CLS134	VEH CLS135	VEH CLS136	VEH CLS137	VEH CLS138	VEH CLS139	VEH CLS140	VEH CLS141	VEH CLS142	VEH CLS143	VEH CLS144	VEH CLS145	VEH CLS146	VEH CLS147	VEH CLS148	VEH CLS149	VEH CLS150	VEH CLS151	VEH CLS152	VEH CLS153	VEH CLS154	VEH CLS155	VEH CLS156	VEH CLS157	VEH CLS158	VEH CLS159	VEH CLS160	VEH CLS161	VEH CLS162	VEH CLS163	VEH CLS164	VEH CLS165	VEH CLS166	VEH CLS167	VEH CLS168	VEH CLS169	VEH CLS170	VEH CLS171	VEH CLS172	VEH CLS173	VEH CLS174	VEH CLS175	VEH CLS176	VEH CLS177	VEH CLS178	VEH CLS179	VEH CLS180	VEH CLS181	VEH CLS182	VEH CLS183	VEH CLS184	VEH CLS185	VEH CLS186	VEH CLS187	VEH CLS188	VEH CLS189	VEH CLS190	VEH CLS191	VEH CLS192	VEH CLS193	VEH CLS194	VEH CLS195	VEH CLS196	VEH CLS197	VEH CLS198	VEH CLS199	VEH CLS200	VEH CLS201	VEH CLS202	VEH CLS203	VEH CLS204	VEH CLS205	VEH CLS206	VEH CLS207	VEH CLS208	VEH CLS209	VEH CLS210	VEH CLS211	VEH CLS212	VEH CLS213	VEH CLS214	VEH CLS215	VEH CLS216	VEH CLS217	VEH CLS218	VEH CLS219	VEH CLS220	VEH CLS221	VEH CLS222	VEH CLS223	VEH CLS224	VEH CLS225	VEH CLS226	VEH CLS227	VEH CLS228	VEH CLS229	VEH CLS230	VEH CLS231	VEH CLS232	VEH CLS233	VEH CLS234	VEH CLS235	VEH CLS236	VEH CLS237	VEH CLS238	VEH CLS239	VEH CLS240	VEH CLS241	VEH CLS242	VEH CLS243	VEH CLS244	VEH CLS245	VEH CLS246	VEH CLS247	VEH CLS248	VEH CLS249	VEH CLS250	VEH CLS251	VEH CLS252	VEH CLS253	VEH CLS254	VEH CLS255	VEH CLS256	VEH CLS257	VEH CLS258	VEH CLS259	VEH CLS260	VEH CLS261	VEH CLS262	VEH CLS263	VEH CLS264	VEH CLS265	VEH CLS266	VEH CLS267	VEH CLS268	VEH CLS269	VEH CLS270	VEH CLS271	VEH CLS272	VEH CLS273	VEH CLS274	VEH CLS275	VEH CLS276	VEH CLS277	VEH CLS278	VEH CLS279	VEH CLS280	VEH CLS281	VEH CLS282	VEH CLS283	VEH CLS284	VEH CLS285	VEH CLS286	VEH CLS287	VEH CLS288	VEH CLS289	VEH CLS290	VEH CLS291	VEH CLS292	VEH CLS293	VEH CLS294	VEH CLS295	VEH CLS296	VEH CLS297	VEH CLS298	VEH CLS299	VEH CLS300	VEH CLS301	VEH CLS302	VEH CLS303	VEH CLS304	VEH CLS305	VEH CLS306	VEH CLS307	VEH CLS308	VEH CLS309	VEH CLS310	VEH CLS311	VEH CLS312	VEH CLS313	VEH CLS314	VEH CLS315	VEH CLS316	VEH CLS317	VEH CLS318	VEH CLS319	VEH CLS320	VEH CLS321	VEH CLS322	VEH CLS323	VEH CLS324	VEH CLS325	VEH CLS326	VEH CLS327	VEH CLS328	VEH CLS329	VEH CLS330	VEH CLS331	VEH CLS332	VEH CLS333	VEH CLS334	VEH CLS335	VEH CLS336	VEH CLS337	VEH CLS338	VEH CLS339	VEH CLS340	VEH CLS341	VEH CLS342	VEH CLS343	VEH CLS344	VEH CLS345	VEH CLS346	VEH CLS347	VEH CLS348	VEH CLS349	VEH CLS350	VEH CLS351	VEH CLS352	VEH CLS353	VEH CLS354	VEH CLS355	VEH CLS356	VEH CLS357	VEH CLS358	VEH CLS359	VEH CLS360	VEH CLS361	VEH CLS362	VEH CLS363	VEH CLS364	VEH CLS365	VEH CLS366	VEH CLS367	VEH CLS368	VEH CLS369	VEH CLS370	VEH CLS371	VEH CLS372	VEH CLS373	VEH CLS374	VEH CLS375	VEH CLS376	VEH CLS377	VEH CLS378	VEH CLS379	VEH CLS380	VEH CLS381	VEH CLS382	VEH CLS383	VEH CLS384	VEH CLS385	VEH CLS386	VEH CLS387	VEH CLS388	VEH CLS389	VEH CLS390	VEH CLS391	VEH CLS392	VEH CLS393	VEH CLS394	VEH CLS395	VEH CLS396	VEH CLS397	VEH CLS398	VEH CLS399	VEH CLS400	VEH CLS401	VEH CLS402	VEH CLS403	VEH CLS404	VEH CLS405	VEH CLS406	VEH CLS407	VEH CLS408	VEH CLS409	VEH CLS410	VEH CLS411	VEH CLS412	VEH CLS413	VEH CLS414	VEH CLS415	VEH CLS416	VEH CLS417	VEH CLS418	VEH CLS419	VEH CLS420	VEH CLS421	VEH CLS422	VEH CLS423	VEH CLS424	VEH CLS425	VEH CLS426	VEH CLS427	VEH CLS428	VEH CLS429	VEH CLS430	VEH CLS431	VEH CLS432	VEH CLS433	VEH CLS434	VEH CLS435	VEH CLS436	VEH CLS437	VEH CLS438	VEH CLS439	VEH CLS440	VEH CLS441	VEH CLS442	VEH CLS443	VEH CLS444	VEH CLS445	VEH CLS446	VEH CLS447	VEH CLS448	VEH CLS449	VEH CLS450	VEH CLS451	VEH CLS452	VEH 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CLS726	VEH CLS727	VEH CLS728	VEH CLS729	VEH CLS730	VEH CLS731	VEH CLS732	VEH CLS733	VEH CLS734	VEH CLS735	VEH CLS736	VEH CLS737	VEH CLS738	VEH CLS739	VEH CLS740	VEH CLS741	VEH CLS742	VEH CLS743	VEH CLS744	VEH CLS745	VEH CLS746	VEH CLS747	VEH CLS748	VEH CLS749	VEH CLS750	VEH CLS751	VEH CLS752	VEH CLS753	VEH CLS754	VEH CLS755	VEH CLS756	VEH CLS757	VEH CLS758	VEH CLS759	VEH CLS760	VEH CLS761	VEH CLS762	VEH CLS763	VEH CLS764	VEH CLS765	VEH CLS766	VEH CLS767	VEH CLS768	VEH CLS769	VEH CLS770	VEH CLS771	VEH CLS772	VEH CLS773	VEH CLS774	VEH CLS775	VEH CLS776	VEH CLS777	VEH CLS778	VEH CLS779	VEH CLS780	VEH CLS781	VEH CLS782	VEH CLS783	VEH CLS784	VEH CLS785	VEH CLS786	VEH CLS787	VEH CLS788	VEH CLS789	VEH CLS790	VEH CLS791	VEH CLS792	VEH CLS793	VEH CLS794	VEH CLS795	VEH CLS796	VEH CLS797	VEH CLS798	VEH CLS799	VEH CLS800	VEH CLS801	VEH CLS802	VEH CLS803	VEH CLS804	VEH CLS805	VEH CLS806	VEH CLS807	VEH CLS808	VEH CLS809	VEH CLS810	VEH CLS811	VEH CLS812	VEH CLS813	VEH CLS814	VEH CLS815	VEH CLS816	VEH CLS817	VEH CLS818	VEH CLS819	VEH CLS820	VEH CLS821	VEH CLS822	VEH CLS823	VEH CLS824	VEH CLS825	VEH CLS826	VEH CLS827	VEH CLS828	VEH CLS829	VEH CLS830	VEH CLS831	VEH CLS832	VEH CLS833	VEH CLS834	VEH CLS835	VEH CLS836	VEH CLS837	VEH CLS838	VEH CLS839	VEH CLS840	VEH CLS841	VEH CLS842	VEH CLS843	VEH CLS844	VEH CLS845	VEH CLS846	VEH CLS847	VEH CLS848	VEH CLS849	VEH CLS850	VEH CLS851	VEH CLS852	VEH CLS853	VEH CLS854	VEH CLS855	VEH CLS856	VEH CLS857	VEH CLS858	VEH CLS859	VEH CLS860	VEH CLS861	VEH CLS862	VEH CLS863	VEH CLS864	VEH CLS865	VEH CLS866	VEH CLS867	VEH CLS868	VEH CLS869	VEH CLS870	VEH CLS871	VEH CLS872	VEH CLS873	VEH CLS874	VEH CLS875	VEH CLS876	VEH CLS877	VEH CLS878	VEH CLS879	VEH CLS880	VEH CLS881	VEH CLS882	VEH CLS883	VEH CLS884	VEH CLS885	VEH CLS886	VEH CLS887	VEH CLS888	VEH CLS889	VEH CLS890	VEH CLS891	VEH CLS892	VEH CLS893	VEH CLS894	VEH CLS895	VEH CLS896	VEH CLS897	VEH CLS898	VEH CLS899	VEH CLS900	VEH CLS901	VEH CLS902	VEH CLS903	VEH CLS904	VEH CLS905	VEH CLS906	VEH CLS907	VEH CLS908	VEH CLS909	VEH CLS910	VEH CLS911	VEH CLS912	VEH CLS913	VEH CLS914	VEH CLS915	VEH CLS916	VEH CLS917	VEH CLS918	VEH CLS919	VEH CLS920	VEH CLS921	VEH CLS922	VEH CLS923	VEH CLS924	VEH CLS925	VEH CLS926	VEH CLS927	VEH CLS928	VEH CLS929	VEH CLS930	VEH CLS931	VEH CLS932	VEH CLS933	VEH CLS934	VEH CLS935	VEH CLS936	VEH CLS937	VEH CLS938	VEH CLS939	VEH CLS940	VEH CLS941	VEH CLS942	VEH CLS943	VEH CLS944	VEH CLS945	VEH CLS946	VEH CLS947	VEH CLS948	VEH CLS949	VEH CLS950	VEH CLS951	VEH CLS952	VEH CLS953	VEH CLS954	VEH CLS955	VEH CLS956	VEH CLS957	VEH CLS958	VEH CLS959	VEH CLS960	VEH CLS961	VEH CLS962	VEH CLS963	VEH CLS964	VEH CLS965	VEH CLS966	VEH CLS967	VEH CLS968	VEH CLS969	VEH CLS970	VEH CLS971	VEH CLS972	VEH CLS973	VEH CLS974	VEH CLS975	VEH CLS976	VEH CLS977	VEH CLS978	VEH CLS979	VEH CLS980	VEH CLS981	VEH CLS982	VEH CLS983	VEH CLS984	VEH CLS985	VEH CLS986	VEH CLS987	VEH CLS988	VEH CLS989	VEH CLS990	VEH CLS991	VEH CLS992	VEH CLS993	VEH CLS994	VEH CLS995	VEH CLS996	VEH CLS997	VEH CLS998	VEH CLS999	VEH CLS1000	VEH CLS1001	VEH CLS1002	VEH CLS1003	VEH CLS1004	VEH CLS1005	VEH CLS1006	VEH CLS1007	VEH CLS1008	VEH CLS1009	VEH CLS1010	VEH CLS1011	VEH CLS1012	VEH CLS1013	VEH CLS1014	VEH CLS1015	VEH CLS1016	VEH CLS1017	VEH CLS1018	VEH CLS1019
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Reliance is thus based on what was originally provided in the TER which concluded its Appendix A Research Basis of Assessments:

Overall, the emerging body of practical, empirically-based research that is now emerging, is increasingly confirming that digital billboards are little different from any other sort of advertising including on-premise signage; that they are not inherently distracting to drivers to the extent that they creating any observable adverse road safety effects; and that they are not inherently hazardous to the traffic environment even in complex traffic situations such as at signalised intersections.

This outlined four research papers namely:

- 6 Samsa, C. (2015) "Digital billboards 'down under': are they distracting to drivers and can industry and regulators work together for a successful road safety outcome?" Proceedings of the 2015 Australasian Road Safety Conference 14 – 16 October, Gold Coast, Australia
- 7 Young K.L., Stephens A.N., Logan D.B., Lenne M.G. "An On-Road Study of the Effect of Roadside Advertising on Driving Performance and Situation Awareness", Proceedings of the 4th International Driver Distraction and Inattention Conference, Sydney, Australia, 2015
- 8 Bridget RD Burdett, Samuel G Charlton, Nicola J Starkey "Mind wandering during everyday driving: An on-road study", Accident Analysis and Prevention, 2018 [Vol 122, January 2019, pp 76-84]
- 9 Goodsell R, Dr Roberts. P "On-Road evaluation of the driving performance impact of digital billboards at Intersections" Project No. PRS17074 - ARRB

The most relevant appear to be the Samsa paper and that by Burdett *et al.* The Samsa "study only sampled middle-aged drivers, so the results may not be able to be generalised to younger and older drivers" and was the first of its type in Australasia. It did not consider the dwell (duration) time of billboard signs, only the length of time glancing at them compared to static signs and driver performance re effect on following.

The Burdett *et al* AAP paper is not freely available and related to mind wandering thoughts and driver focussing. A 2016 AAP similar paper by the same authors¹ stated that "Drivers who reported relatively more mind wandering were younger".

A 2017 Open Access research article on mind wandering² concluded

"Our study is the first to show the combined role of mind wandering trait and acute disturbing thoughts in the risk of road traffic crashes. The mind wandering phenomenon, through a potential attributable risk regarding car crashes around 10%, appears to be of utmost importance in the context of road safety. Engagement in the driving task may be heavily threatened by disturbing thoughts."

However one would hope that the billboard images displayed would not lead to disturbing thoughts and the finding that as the driving situation gets more complex drivers focus more on the driving task at hand applies. Nevertheless the earlier work relating crash risk with image dwell time has not been disproven in the literature and no equivalent more recent research has been demonstrated, while the fact remains that many billboards in New Zealand are operating at more than the industry default minimum of 8 second dwell time. Accordingly it is reasonable as a Road Controlling Authority and as a Local Body Council tasked with helping to achieve the Government policy and quintessential goal of Waka Kotahi of Road to Zero, to apply as a condition a duration longer than the minimum used.

In contrast, the TER did example the reported crash database for 2012-2020 finding no evidence of billboard associated crashes and very little related to static advertising signs, where cause factor 356 was identified. This would not necessarily identify 'secondary' following crashes arising from a distracted motorist in front, if the distracted driver's vehicle was not hit from behind, and not all injury crashes are reported (non-injury crashes do not legally need to be reported).

But to effectively ensure that the large billboard, especially that facing westbound traffic meets 14A Policy 4.2 *Land use, subdivision and development should not cause significant adverse effects on the connectivity, accessibility and safety of the transport network*, the dwell time should be such so that no more than one change of image is discernibly observed by a motorist. Based on the Traffic response risk table provided, a minimum dwell time of 15-20 seconds should be applied during the off-peak (when speeds are likely to be nearer the 50.0 km/h adopted in deriving the table probabilities – sight visibility (m) / speed (m/s) = 7.20 s) and 30 seconds during daytime. However the latter would mainly relate to the westbound direction in the morning peak whereby the sign is less easily viewed so applying the same 15-20 second minimum dwell time might be tolerable.

¹ Bridget RD Burdett, Samuel G Charlton, Nicola J Starkey "Not all minds wander equally: The influence of traits, states and road environment factors on self-reported mind wandering during everyday driving", Accident Analysis and Prevention, 2016 Vol 95A pp1-7

² Gil-Jardiné C, Née M, Lagarde E, Schooler J, Contrand B, Orriols L, Galera C. The distracted mind on the wheel: Overall propensity to mind wandering is associated with road crash responsibility. PLoS One. 2017 Aug 3;12(8):e0181327. doi: 10.1371/journal.pone.0181327. PMID: 28771623; PMCID: PMC5542598.

I note that the quoted MegaMaps mean operating speeds of 46 and 49 km/h are from Road to Zero edition, based on the whole length of The Esplanade and not the busiest western section at congested times. Its ONF is stated to be an *Urban Connectors* with AADT of 12,950 eastbound (46 km/h) and 11,244 westbound (46 km/h); medium IRR band “medium”; “Medium” collective and personal risk eastbound and “Low Medium” collective and personal risk westbound; with Safe and Appropriate Speed of 50 km/h. While this does not suggest a serious or significant safety concern, it applies to all of The Esplanade (It should also be recollected that a former Police Commissioner was killed while riding their bicycle eastbound along The Esplanade toward the site, but to my knowledge no measures were ever undertaken to prevent the tragedy occurring again).

In summary, recognising its large size and visibility from well over 100 m, an adopted a minimum dwell time of 20 seconds is considered to be a reasonable condition with respect to maintaining road safety.

From Klauer et al, 2010 cited in the Canadian TAC 2015 Guide (but reference not given)

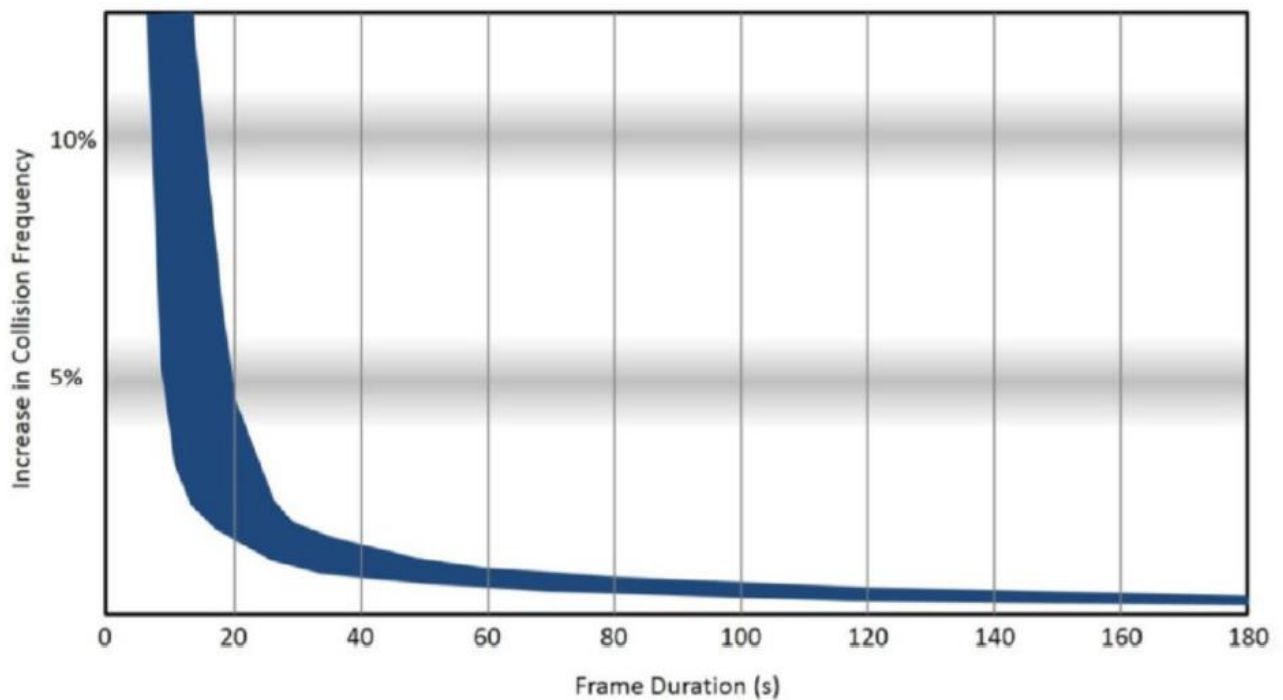


Figure 2-2: Change in collisions a function of frame duration for on-premise DPADs