Cleveland Street / Regent Street, Chippendale

Proposed Inbound Digital Sign Traffic Safety Assessment

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The assessment team has undertaken assessments of similar digital advertising sign proposals elsewhere in NSW and Australia. In addition to the use of NSW guidelines, our assessments are founded on road safety auditing principles and traffic safety risk assessments. Where a significant change in road safety risk has been identified due to the proposal, potential treatment measures to mitigate the change in risk have been suggested. However, the adoption of any or all the treatment measures does not warrant that the site is absolutely safe from incidents in the future whether they be related or unrelated to the proposed digital sign.

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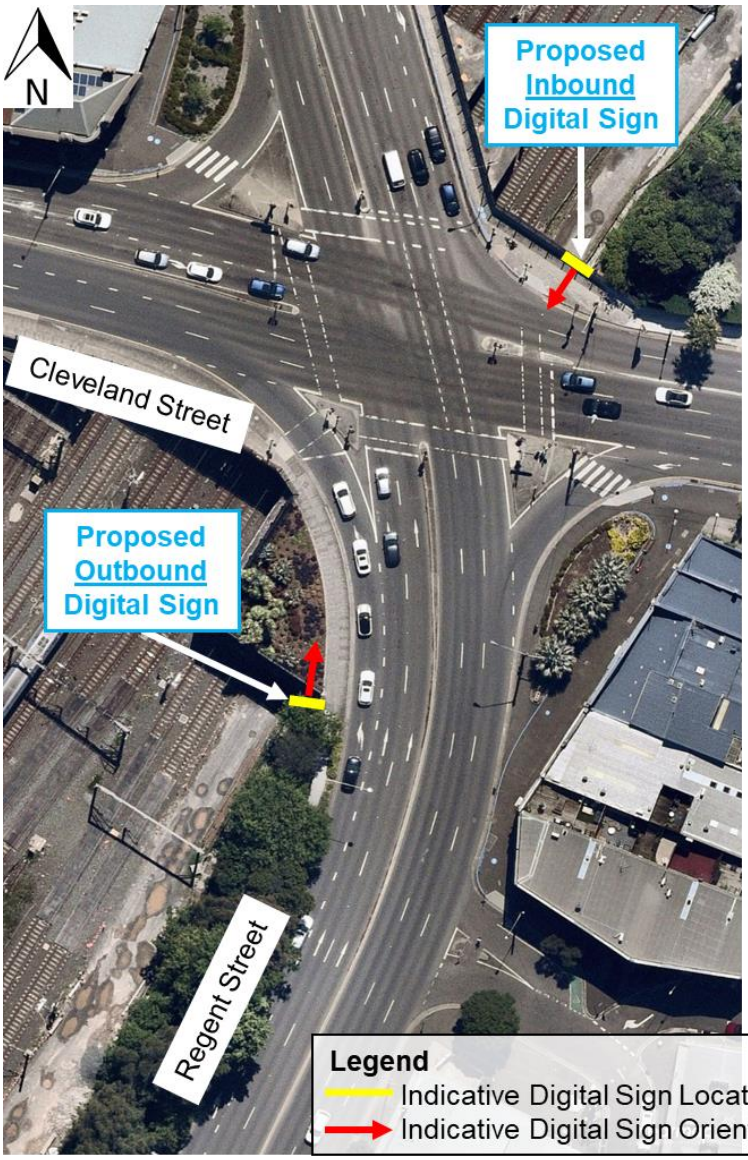
1. INTRODUCTION

1.1 Background

JCDecaux is seeking development approval for the installation of a digital LED advertising sign. The sign is proposed to be located on the north-eastern corner of the Cleveland Street/Regent Street signalised intersection in Chippendale. This addendum to the *Cleveland Street / Regent Street, Redfern Proposed Outbound Digital Sign Traffic Safety Assessment*, dated 2 December 2022) has been prepared by Bitzios Consulting to provide an assessment of the cumulative traffic safety impacts for the following two separate Development Applications for JCDecaux:

- **Portal Application Number – 225209:** Which seeks consent for the installation of a new third-party digital advertising signage at the south-western corner of the intersection of Cleveland Street and Regent Street, Redfern (referred to as **Cleveland Street – Outbound site**)
- **Portal Application Number – 281781:** Which seeks consent for the installation of a new third-party digital advertising signage at the north-eastern corner of the intersection of Cleveland Street and Regent Street, Chippendale (referred to as **Cleveland Street – Inbound site**) ***(this report)***.

The two proposed digital sign locations are shown in Figure 1.1.



**Sign locations are indicative.*
Adapted from Nearmap

Figure 1.1: Locations of the Proposed Digital Signs

1.2 Methodology

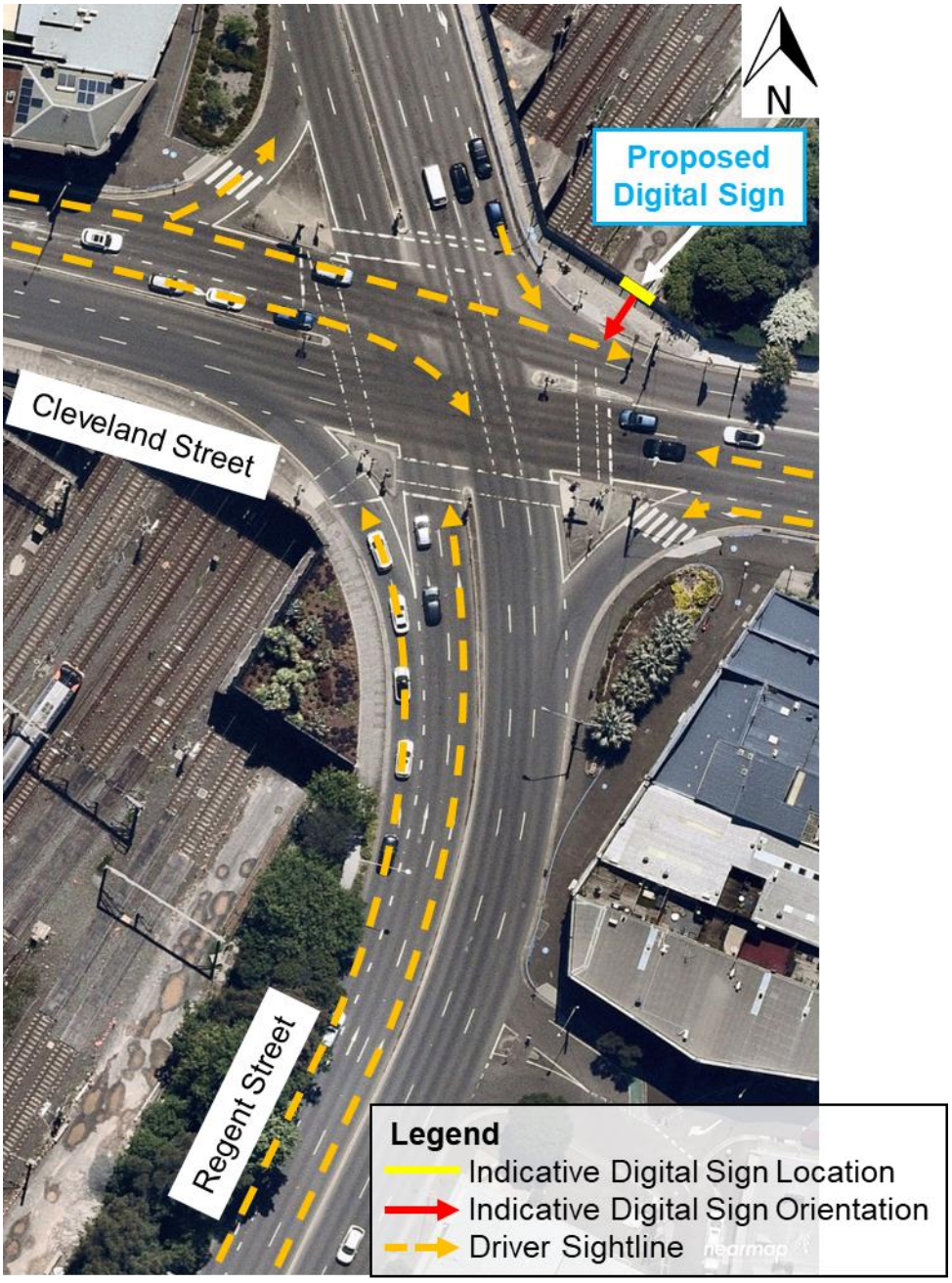
The process used to assess the impact of the proposal involved:

- A review of the viewing locations and sightlines to the proposed digital sign to define the geographical scope of the assessment
- A review of the proposed digital sign specifications
- A review of relevant research and case study examples of the effects of digital signs on driver distraction in different driving circumstances
- A site inspection during day conditions to understand the road user's perspective of the sign, then a driver sightline assessment using images captured from in-vehicle video recordings
- A first-principles safety assessment of the proposed digital sign, including reviewing road approaches, driver sightlines, surrounding environment and proximity of intersections
- A cumulative safety assessment from the proposed inbound and outbound digital signs
- A review of the most recently available five years of crash data in proximity to the sign
- An assessment of the proposed digital sign against:
  - State Environmental Planning Policy (Industry and Employment) 2021 (Industry and Employment SEPP)
  - The Transport for NSW Advertising Sign Safety Assessment Matrix
  - The *Transport Corridor Outdoor Advertising and Signage Guidelines: Assessing development applications under SEPP 64 (Department of Planning and Environment, November 2017)* (*Signage Guidelines*).

2. SIGN VIEWING LOCATIONS

2.1 Viewing Approaches

The digital sign will face south-west towards and be potentially visible to drivers from all directions at the Cleveland Street/Regent Street signalised intersection, though it will be mostly visible to northbound drivers on Regent Street and eastbound drivers on Cleveland Street. The driver sightlines to the sign from each approach are illustrated in Figure 2.1.



**Sign location is indicative.*
Adapted from Nearmap

Figure 2.1: Driver Sightlines to the Proposed Sign

2.2 Driver Views

2.2.1 Regent Street northbound lane 1

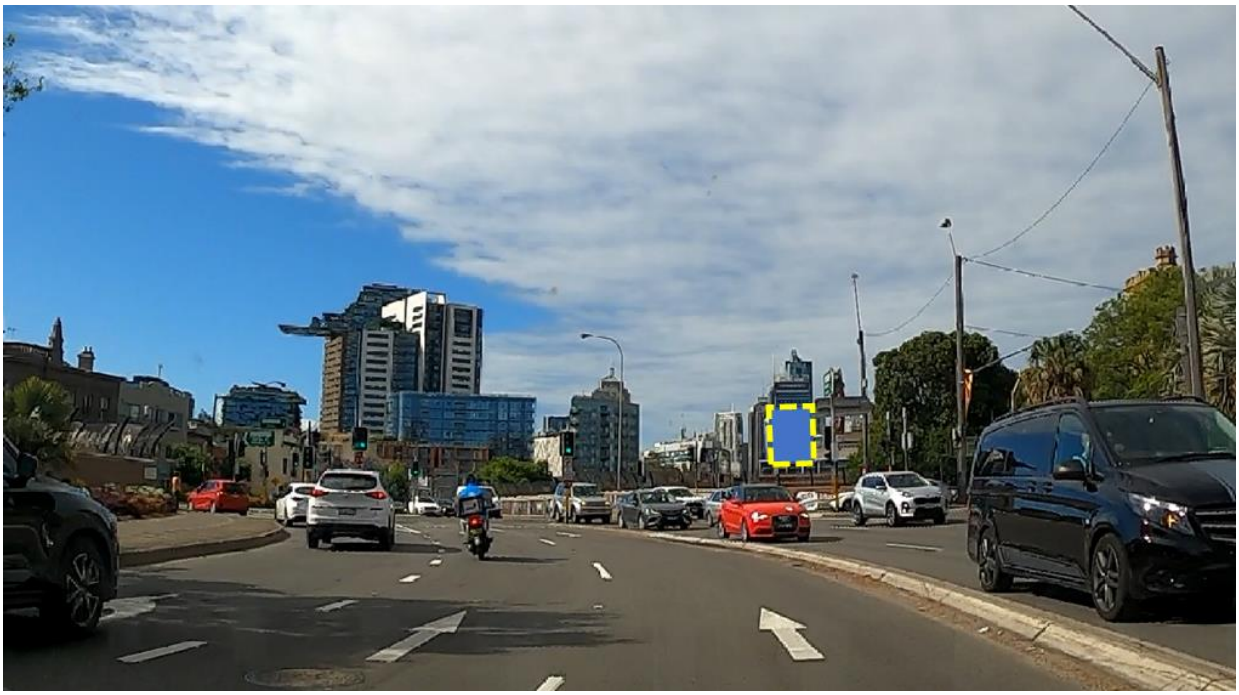
The northbound sign view from Regent Street (lane 1) during the day-time period is shown in Figure 2.2.

**Sign location is indicative, not to scale and for illustration purposes only.*

Figure 2.2: Daytime view from Regent Street northbound lane 1

2.2.2 Regent Street northbound lane 3

The northbound sign view from Regent Street (lane 3) during the day-time period is shown in Figure 2.3.



**Sign location is indicative, not to scale and for illustration purposes only.*

Figure 2.3: Daytime view from Regent Street northbound lane 3

2.2.3 Cleveland Street eastbound lane 1

The eastbound sign view from Cleveland Street (lane 1) during the day-time period is shown in Figure 2.4.

**Sign location is indicative, not to scale and for illustration purposes only.*

Figure 2.4: Daytime view from Cleveland Street eastbound lane 1

2.2.4 Cleveland Street eastbound lane 2

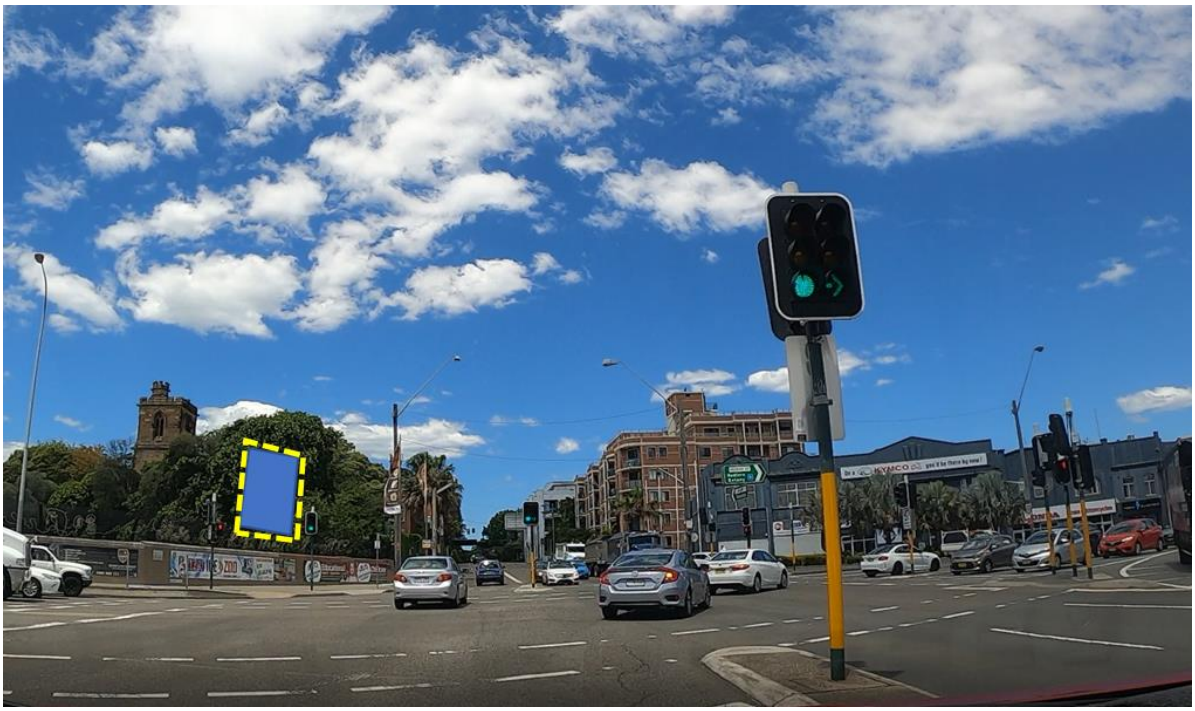
The eastbound sign view from Cleveland Street (lane 2) during the day-time period is shown in Figure 2.5.

**Sign location is indicative, not to scale and for illustration purposes only.*

Figure 2.5: Daytime view from Cleveland Street eastbound lane 2

2.2.5 Cleveland Street eastbound lane 4

The eastbound sign view from Cleveland Street (lane 4) during the day-time period is shown in Figure 2.6.



**Sign location is indicative, not to scale and for illustration purposes only.*

Figure 2.6: Daytime view from Cleveland Street eastbound lane 4

3. DIGITAL SIGN SPECIFICATIONS

The specifications for the proposed digital sign, as well as other relevant site information, are summarised in Table 3.1. The proposed development plan is provided in **Appendix A**.

Table 3.1: Specifications and Site Information for the Digital Sign

Attribute	Details
Location	North-eastern corner of the Cleveland Street/Regent Street signalised intersection, Chippendale, NSW
Local Government Area	Sydney
Land use zoning	SP2 Infrastructure
Proposed facing direction	South-west
Proposed type of advertisement/sign	Monopole advertisement – portrait 50
Proposed display format	Internally illuminated digital (LED)
Proposed visual screen size	3.072m x 4.608m = 14.16m^2
Visual screen size greater than 20m^2?	No
Visual screen size greater than 45m^2?	No
Structure higher than 8m above the ground?	No
Is the site located within 250m of and visible from a classified road under the *Roads Act 1993*?	Yes
Consent authority	NSW Minister for Planning
Does the sign contain moving parts?	No
Is it a Variable Message Sign?	No
Does it have any flashing or flickering content?	No

4. LITERATURE REVIEW

4.1 Context

Crashes directly related to digital signs would typically fall into two categories:

- Crashes due to the collision of a vehicle with the mounting structure of a digital sign where the sign in placed in a location where there is a reasonable risk of this occurring
- Crashes which occur as a consequence of a driver being distracted by a digital sign.

The available *Digital Signage Guidelines* generally provide well-researched information on the location of 'clear zones' and other areas where there is a reasonable risk of an object being collided with by an errant vehicle. The linkages between driver distraction due to digital signs and crashes is less well dealt with in the available *Digital Signage Guidelines* and many of the criteria used have no direct relevance of the risk of distraction in time and in space on approach to digital signs located in different parts of the visual driving environment and in different driving environments.

The chain of events that is required to link a digital sign to increased crash rates is that:

- *A driver is aware of an external event (i.e. outside the vehicle) which is a digital sign display change and that the event distracts a driver sufficiently to lead to involuntary driver inattention which then leads to driver error at a critical time in a driving environment and driving circumstance that leads to a crash.*

As there is no body of research that links the installation of a digital sign or the conversion of a static sign to a digital sign to increased crash rates, the available research has been disaggregated into:

- The relationship between distractions (generally) and crashes
- The relationship between digital signs and distractions
- Studies which have attempted to interpret before v after installation crash statistics to see if there is a correlation of digital signs with crash rates (without defining a causal relationship).

Research on each of these topics is summarised below.

4.2 Relationships between Distraction and Crashes

It is important to note that distraction from digital or static billboards did not feature in the top 15 causes of driver distraction. As such, this data further validates the research consensus that there is no valid link between roadside advertising and increased crash risk. 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 4.1. The most common cause of crashes was a combination of driver inattention and driver distraction. Distraction and inattention may occur separately. That is, a driver may be distracted but still attentive.

Table 4.1: Causes of Vehicle Crashes in NSW and Victoria

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

Source: http://www.keepyoureyesontheroad.org.au/pages/Accident-statistics-Cont

Austroads (2013) provides a comprehensive review of research on the effect of roadside advertising on road crashes. It found from its extensive literature review that *"while looking at an external object appears to be quite risky behaviour when it is engaged in, it is not a frequent cause of crashes overall"*.

Many studies have been undertaken to determine the main causes of both driver distraction and driver inattention, and how they contribute to an increase in crashes. Regan et al. (2011, p.1771) describes driver distraction as a *"diversion of the mind, attention, etc., from a particular object or course; the fact of having one's attention or concentration disturbed by something"*. This includes objects brought into the vehicle, vehicle systems, vehicle occupants, moving objects or animals in the vehicle, internalised activity, and external objects, events or activities (Perez & Bertola 2011). A broader definition of driver inattention is defined as *"when the driver's mind has wandered from the driving task for some non-compelling reason"* (Regan et al. 2011, p.1772).

4.3 Relationships between Digital Sign Glances and Distraction

Samsa (2015) conducted a study that used eye tracking technology to track participant's natural eye movements and prioritisation behaviour whilst driving. Participants were each instructed to drive a single loop of the study route (14.6km section of a road through Brisbane and its surrounding suburbs to Woolloongabba) between 11am and 2pm. This study found that participants prioritised tasks based on the complexity of the driving demands, which was particularly evident during heavy traffic in AM and PM peak hours. The research found that in demanding driving environments, drivers will prioritise focussing on "on-road" factors such as the rate of cars braking and on pedestrian and cyclist movements over off-road factors such as billboards. Moreover, Samsa (2015) found no significant difference in driver prioritisation when comparing static billboards, digital billboards and on-premises signs. This research concluded that there is a smaller chance of driver distraction from digital billboards whilst driving in demanding environments.

The Samsa (2015) finding supported the US Department of Transport and Federal Highway Administration research (2012) which found that drivers look at the forward roadway between 73% and 85% of the time depending on the demands of the driving task. This study also found that where billboards are introduced, drivers may substitute saccades / glance fixations from other things towards billboard glances but the percentage of time fixating on the forward roadway is consistent.

Victor et al. (2005) revealed similar results when they undertook a much larger study that examined eye glance movement on the road during both light and heavy traffic flows. Data was collected via the EU project HASTE, which used "in vehicle information systems" (S-IVIS). Data was sourced from 119 participants across three separate experiments, from four separate driving routes. The study included an examination of auditory and visual tasks to test driver glance behaviour. The results showed that as driving tasks became more difficult, drivers increased their viewing time in the road centre, rather than on other visual tasks (such as observing signs) off-road.

Also, there are general misconceptions that drivers "stare" at digital billboards, that changing messages on digital billboards draw a driver's attention to them and that these influences alone lead to crashes. The literature suggests that instead of "staring" at billboards, drivers "glance" at billboards. The US Department of Transport and Federal Highway Administration (2012) found that the average glance duration to an electronic billboard was 0.335 seconds with a maximum of 1.335 seconds, well below the 2.0-second distraction time threshold that Austroads research (and other research) suggests as the critical time for increased crash risk. Smiley et. al. (2005) found an average glance length of 0.5 seconds for electronic billboards and that viewings of the electronic billboard were undertaken by up to 50% of drivers.

The research of Decker et al. (2015) supported the glance time findings of other studies. This research summarised the results of 8 studies and concluded that the "*range of mean glance durations was 0.27 to 0.953 s (mean, 0.51) for passive billboards and 0.27 to 1.0 s (mean, 0.54) for active billboards*". This research did note "*strong evidence of substantial variability among individual billboards in each category"*.

Participant's glance behaviour was recorded and analysed in terms of the number of fixations and the duration of these fixations to both static and digital billboards in the work of Samsa (2015). Out of a total of 144 fixations toward four digital billboards, the average fixation duration was below 0.75 seconds. This is considered to be *"the equivalent minimum-perception reaction time to the slowing of a vehicle ahead"* (Samsa 2015, p.8). Less than 1% of the records presented an average fixation duration of above 0.75 seconds. This average was apparent for both static and digital sign types. Furthermore, Samsa's (2015) results showed that participants that fixated on a digital billboard for longer than 0.75 seconds tended to do so when travelling conditions were relaxed (i.e. car was stationary, or traffic was minimal).

Samsa's (2015) results followed those of Perez and Bertola (2011) which also used eye-tracking technology to survey driver behaviour when glancing to digital billboards. Perez and Bertola (2011) also found that the maximum glance duration off the centre of the road was 0.75 seconds and claimed that that these small glances away from the road generally occur when there is low demand from the road network, and that these glances are not likely to result in adverse or critical events. Overall, a number of studies have concluded that drivers glance at digital billboards at a mean rate of 0.5 seconds and almost all are less than 1.0 seconds.

The available literature confirms that:

- External sources have a minimal effect on driver distraction that led to crashes
- Driver distraction in general reduces as the driving environment becomes more complex because drivers prioritise their attention effort to higher risk tasks
- The number and duration of glances due to digital billboards that result in driver inattention to the scale that might influence the series of events that would lead to a crash is immeasurably small.

4.4 The Relationship between Digital Signs and Crashes

4.4.1 International Examples

Due to the relatively short time digital billboards have been present in Australia and the relatively few locations that they have been present (until recent years), there is limited before and after installation crash data in Australia that specifically targets identifying a relationship between digital signs and crash rates and under what conditions. A selection of international research is presented below.

Hawkins, Kuo and Lord (2012) was based on 135 "on-premises digital sign" locations and undertook statistical analysis of crash data for before and after each sign installation. The signs were located in California, North Carolina, Ohio, and Washington. This study concluded "that the installation of digital on-premises signs does not lead to a statistically significant increase in crashes on major roads".

Tantala and Tantala (2010) was based on "26 existing, non-accessory, advertising digital billboards along routes with periods of comparison as long as 8 years in the greater Reading area, Berks County, Pennsylvania". This research looked at both temporal and spatial crash details around the electronic signs and compared the data to 51 non-electronic signs. The digital signs had message duration times of 6, 8 or 10 seconds. This research concluded that:

- *"The before and after rates of accidents near the twenty digital billboards show an 11.1% decrease within 0.5 miles of all digital billboards over eight years near twenty locations. Similar decreases and trends in both averages and peaks are observed for both smaller and larger vicinity ranges, and for specific groups of locations by duration time."*
- *"The accident statistics and metrics remain consistent, exhibiting statistically insignificant variations at each of the digital billboards. The metrics include the total number of accidents in any given month, the average number of accidents, the peak number of accidents in any given month, and the number of accident-free months. These conclusions account for variations in traffic-volume and other metrics."*
- *"The statistical evaluation of the Empirical Bayes method and actual versus predicted results show that the total number of accidents is comparable to what would be statistically expected with or without the introduction of digital technology and that the safety near these locations is consistent with the model benchmarked by 77 locations within Berks County."*

Pandey and Shafizadeh (2011) reviewed a range of traffic flow parameters upstream of electronic billboards on Highway 50 near Sacramento. The study concluded that *"the presence of the electronic billboard does not appear to have a significant negative impact in traffic performance (flow, speed, and lane occupancy) or incidents in the study section of the freeway"*.

4.4.2 Local Examples

Constitution Hill

Bitzios Consulting reviewed available crash data on the Cumberland Highway, Constitution Hill (see Figure 4.1), where a digital sign was installed in February 2017. The installation of a digital sign did not result in an increase in crash rates at that site. The crash data for both pre- and post-installation of the digital sign was compared as shown in Table 4.2 to confirm the findings of the available research. It is to be noted that the crash comparison data is available only up to 2017 and 2018.

Adapted from Nearmap

Figure 4.1: Location of an Existing Digital Sign in Constitution Hill

Table 4.2: Crash Comparison Pre and Post-installation – Constitution Hill (2013-2017)*

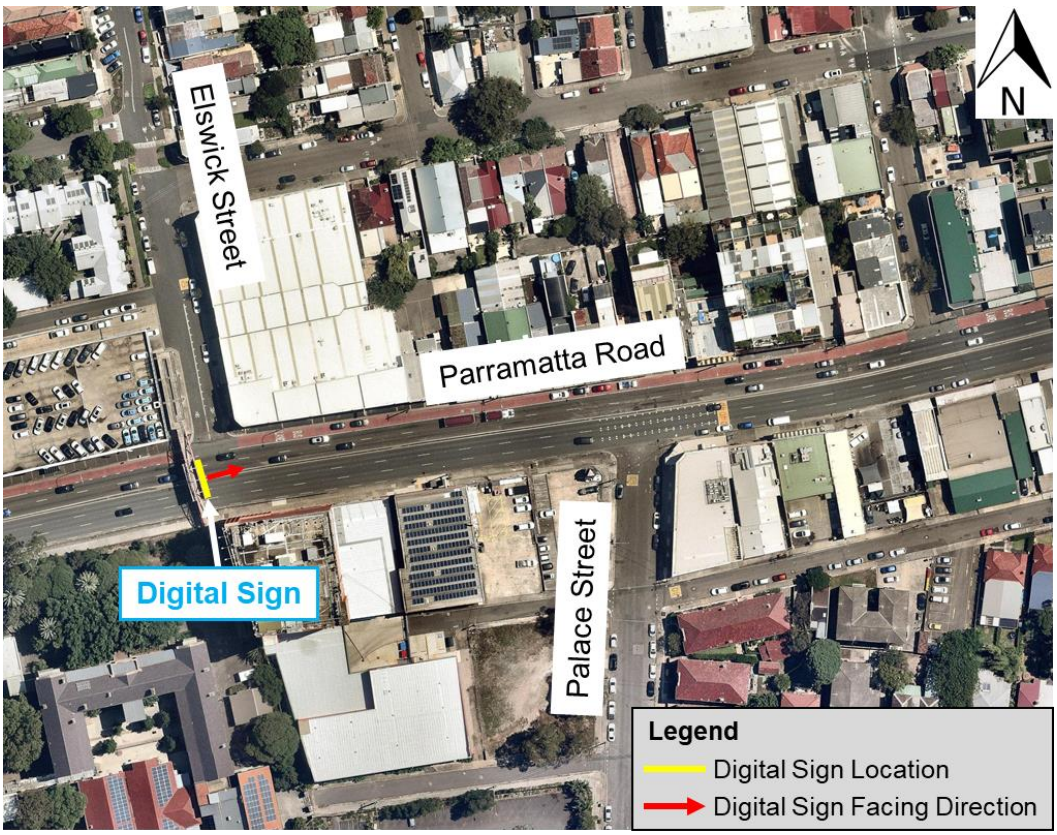
Year	Crash Severity					Total
	Fatal	Serious Injury	Moderate Injury	Minor/Other Injury	Non-casualty (towaway)	
Pre-installation						
2013	-	1	1	1	3	6
2014	-	-	1	1	2	4
2015	-	-	2	-	-	2
2016	-	-	-	3	-	3
Total	**-**	**1**	**4**	**5**	**5**	**15**
Post-installation						
2017	-	1	-	2	1	4

**2018-2020 crash data not available.*

The above table shows no increase in crash rate after the installation of the digital sign. Whilst based on a limited sample, this data further supports the research of the absence of a link between roadside digital advertising signage and crashes.

Petersham

Bitzios Consulting reviewed available crash data on Parramatta Road, Petersham (see Figure 4.2), where a digital sign was installed in May 2017. The crash data both pre- and post-installation of the digital sign was compared as shown in Table 4.3 to confirm the findings of the available research.



Adapted from Nearmap

Figure 4.2: Location of an Existing Digital Sign in Petersham

Table 4.3: Crash Comparison Pre and Post-installation – Petersham (2013-2017)*

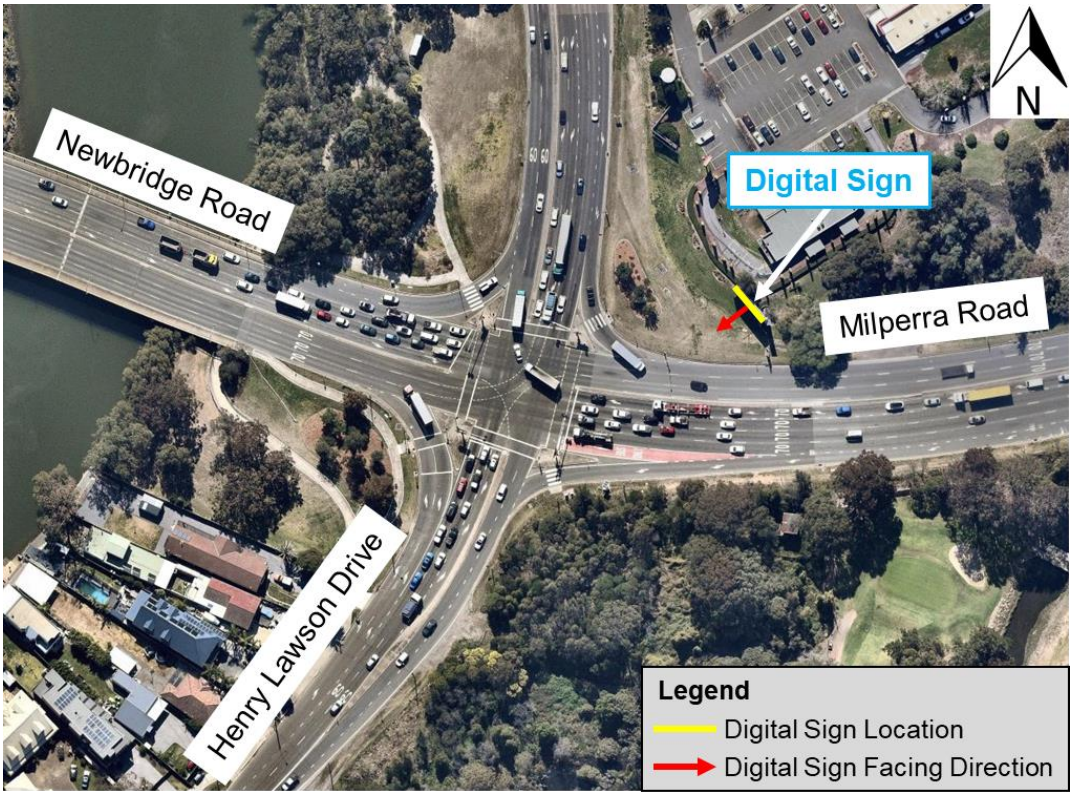
Year	Crash Severity					Total
	Fatal	Serious Injury	Moderate Injury	Minor/Other Injury	Non-casualty (towaway)	
Pre-installation						
2013	-	-	-	-	1	1
2014	-	-	1	-	1	2
2015	-	-	-	-	-	-
2016	-	1	2	-	-	3
2017	-	-	-	-	-	-
Total	**-**	**1**	**3**	**-**	**2**	**6**
Post-installation						
2017	-	1	1	-	-	2

**2018-2020 crash data not available.*

The above table shows no increase in crash rate after the installation of the digital sign. Whilst based on a limited sample, this data further supports the research of the absence of a link between roadside digital advertising signage and crashes.

Milperra

Bitzios Consulting reviewed available crash data near the corner of Milperra Road, Newbridge Road and Henry Lawson Drive, Milperra (see Figure 4.3), where a digital sign was installed in August 2018. The crash data both pre- and post-installation of the digital sign was compared as shown in Table 4.4 to confirm the findings of the available research.



Adapted from Nearmap

Figure 4.3: Location of an Existing Digital Sign in Milperra

Table 4.4: Crash Comparison Pre and Post-installation – Milperra (2014-2018)

Year	Crash Severity					Total
	Fatal	Serious Injury	Moderate Injury	Minor/Other Injury	Non-casualty (towaway)	
Pre-installation						
2014	-	3	1	3	3	10
2015	-	2	2	3	3	10
2016	-	1	1	4	1	7
2017	-	1	5	5	1	12
2018*	-	-	-	3	-	3
Total	**-**	**7**	**9**	**18**	**8**	**42**
Post-installation						
2018*	-	-	1	1	1	3

**Only preliminary data was available at the time of this assessment.*

The above table shows no increase in crash rate after the installation of the digital sign. Whilst based on a limited sample, this data further supports the research of the absence of a link between roadside digital advertising signage and crashes.

4.5 Recent Rulings by the Court

4.5.1 Planning and Environment Court of Queensland – Gold Coast

In May 2015, the Planning and Environment Court of Queensland upheld an appeal against refusal of a digital sign on Bundall Road, an urban arterial road near a signalised intersection on the Gold Coast on the basis that there was insufficient evidence to support the link between digital signs and road safety risk changes. The case is cited in *Malchada Pty Ltd v Gold Coast City Council [2015] QPEC 21*. The court ruled that the appeal be allowed, subject to operating conditions. The Commissioner concluded that:

- In terms of the intersection between Bundall Road and Ashmore Road, *"I note that …. there is only one accident for about every two million vehicles which pass through it and that it was performing 'pretty safely' "*.
- *"A detailed analysis of the intersection failed to convince me that it was dangerous."*
- *"On the evidence before me, I am satisfied that the proposed development is safe from a traffic perspective."*

4.5.2 Land and Environment Court of NSW Ruling – Kogarah

In April 2017, Outdoor Systems Pty Ltd (the applicant) sought approval from the Land and Environment Court of NSW to allow for a 15 second dwell time for a new digital sign on the Princes Highway, Kogarah. In assessing the application, Transport for NSW was concerned that the dwell time proposed for the sign did not address SEPP 64 Schedule 1 and did not comply with its *2015 Draft Guidelines*. Transport for NSW's position was that the sign should remain as a static sign and recommended that Georges River Council refuse the application. An appeal was lodged, and the case is cited in *Outdoor Systems Pty Ltd v Georges River Council and Roads and Maritime Services [2017] NSWLEC 1505*.

The Commissioner found that in this case there was no evidence that digital signs contribute to crashes. Key statements included that:

- *"After careful consideration of all of the evidence I must agree with Ms Samra's assessment that the scientific literature is vastly inconclusive of any direct evidence that digital billboards contribute to crashes."*
- *"While billboards are clearly designed to attract attention there is no satisfactory evidence before me to conclude that there is a significant difference in average fixation durations between digital and static billboards."*

In reaching his determination, the Commissioner noted the importance of considering each case on its merit.

4.5.3 Environment, Resources and Development Court of South Australia – Adelaide

In August 2017, the Environment, Resources and Development Court of South Australia upheld an appeal, subject to operating conditions, against refusal of a digital sign replacement of an existing static sign adjacent to a signalised intersection in North Adelaide. The case is cited in *oOh! media Pty Ltd v The Corporation of the City of Adelaide [2016] ERDC 297*. The Commissioner considered that *"the change to an LED sign as proposed is unlikely to materially change the risk factors nor will it put into jeopardy the safety of the public at this intersection"*.

4.6 Research Interpretation

The chain of events that is required to link a digital sign to increased crash rates is: *a driver is aware of an external event (i.e. outside the vehicle) which is a digital sign display change and that the event distracts a driver sufficiently to lead to involuntary driver inattention which then leads to driver error in a driving environment at a critical instance in time that leads to a crash"*.

The combination of probabilities of these events would be extremely difficult to quantity and aligns with the absence of a comprehensive body of research that links digital signs (to driver distraction leading to driver inattention leading to driver error) leading to an increased rate of crashes.

The literature review presented in this chapter has established an absence of a causal relationship between digital signs and driver distraction to the level that creates additional crashes.

Furthermore, there is also an absence of any correlation between new digital signs and increasing crash rates. There are currently over 2,000 digital roadside advertising signs in Australia and there has not been a single claim, as far as the industry is aware, of a digital sign being blamed for a crash.

Based on traffic crash risk management principles however, the criteria where digital signs should be considered with greater scrutiny are:

- Locations that are highly unusual in their configuration complexity, or
- Locations that are inherently unsafe anyway, based on crash records.

The proposed sign location does not meet either of the above criteria and is considered to be a very low risk to driver distraction, based on the summary of the research.

5. TRAFFIC SAFETY ASSESSMENT

5.1 Key Assumptions

The assessment of the proposed digital sign was undertaken on the basis that:

- There is currently no advertising sign at the subject site. As such, only an estimation of traffic impacts, site conditions and driver sightlines could be observed where the digital sign will be installed
- The display of content will be static for a minimum dwell time of 10 seconds with a transition time of no more than 0.1 seconds based on the *Signage Guidelines* criteria
- Illumination/lighting levels for the digital sign will comply with the *Signage Guidelines* and maintain lighting levels to match the surrounding environment at the site.

5.2 Site Inspections

Site inspections were undertaken on Tuesday, 2 and Monday, 15 November 2021 during day-time hours (around 4:15pm and 1:30pm respectively). The weather was clear and traffic conditions were moderate on both occasions. In-vehicle video recordings were taken for further analysis and for use in compiling photo montages of the driver's perspective on the approaches to the site.

The photo montages can be found in **Appendix B**.

5.3 Review of Crash Data

Crash data for the relevant sections of Regent Street and Cleveland Street was obtained from Transport for NSW and used to assess the crash history in proximity to the subject site. The most recent five years of crash data at the time of the data request was for 2016-2020. Crashes involving vehicles travelling in the direction of and in view of the sign were used for the assessment. The viewing areas of the proposed digital sign are from approximately 140m south along Regent Street and 70m west along Cleveland Street.

As per Rule 287 (3) of the Australian Road Rules, crashes are only recorded if they are reported to the police and when one of the following occurs:

- Any person is killed or injured
- Drivers involved in the crash do not exchange particulars
- When a vehicle involved in the crash is towed away.

The crash data was provided in the following severity categories:

- **Fatal –** a crash in which at least one person was killed
- **Serious injury –** a crash involving at least one person identified in a police report and matched to a health record indicating a hospital stay due to injuries sustained in a crash, or is identified as an iCare (Lifetime Care) participant AND no one was killed in the crash
- **Moderate injury –** a crash involving at least one person identified in a police report who is matched to a health record that indicates that they were treated at an emergency department but were not admitted for a hospital stay, or is matched to a CTP claim indicating a moderate or higher injury AND no one was killed or seriously injured
- **Minor/Other injury –** a crash involving at least one person identified as an injury in a police report who is not matched to a health record that indicates the level of injury severity, or is matched to a minor injury CTP claim AND no one was killed, seriously injured or moderately injured

- **Non-casualty (towaway) –** a crash in which no one was killed or injured but at least one motor vehicle was towed away.

The crash data was mapped using GIS software and is presented in **Appendix C** along with a detailed record list. The crash maps are presented in terms of severity and type (road user movement describing the first impact of the crash), with a severity summary provided in Table 5.1.

Table 5.1: Crash Severity Summary on Approach to the Site (2016-2020)

Year	Crash Severity					Total
	Fatal	Serious Injury	Moderate Injury	Minor/Other Injury	Non-casualty (towaway)	
2016	-	-	-	1	-	1
2017	-	-	-	1	-	1
2018	-	-	-	2	-	2
2019	-	-	-	-	1	1
2020	-	-	1	2	-	3
Total	**-**	**-**	**1**	**6**	**1**	**8**

Key findings from the assessment of 8 reported crashes between January 2016 and December 2020 are that:

- No fatalities were reported
- No serious injuries were reported
- No pedestrians were involved
- 7 of the crashes occurred at the Cleveland Street/Regent Street intersection, including:
  - 5 by a northbound driver on Regent Street, of which 2 were 'rear end', 1 was 'reversing into object, 1 was 'from footpath' and 1 was 'off road left into object'
  - 2 by an eastbound driver on Cleveland Street of which 1 was a 'right rear' and 1 was a 'lane side swipe'.

The site reveals a low crash rate based on an average of 2 crashes per year and when considering the high traffic volumes through this area and its congestion. The crash severity was mostly minor, suggesting slow speed crashes. The data highlights that this is not an inherently unsafe location. Furthermore, the analysis of the crash records suggests that a digital sign where proposed is not likely to influence the future crash history in any way.

5.4 Approach Sightline Assessments

Process

In-vehicle observations were undertaken to assess the subject site considering intersection points and other traffic control devices. An assessment of still images taken from the driver's perspective with a windscreen-mounted camera is presented in the following section. It should be noted that the assessment was undertaken based on a standard passenger car and as such a driver's eye height may vary for larger and smaller vehicles.

The premise of the assessment is to ensure that the proposed location of the digital sign maintains a driver's sightline to intersections and traffic control devices and is not located as such that it may be confused with or confuse the interpretation of these traffic control devices.

The cognitive load within the driving environment on approach to the proposed sign is also considered. The locations where digital signs could influence crash risk are locations where rapid, complex, multi-factor decision making is required.

5.4.1 Regent Street northbound

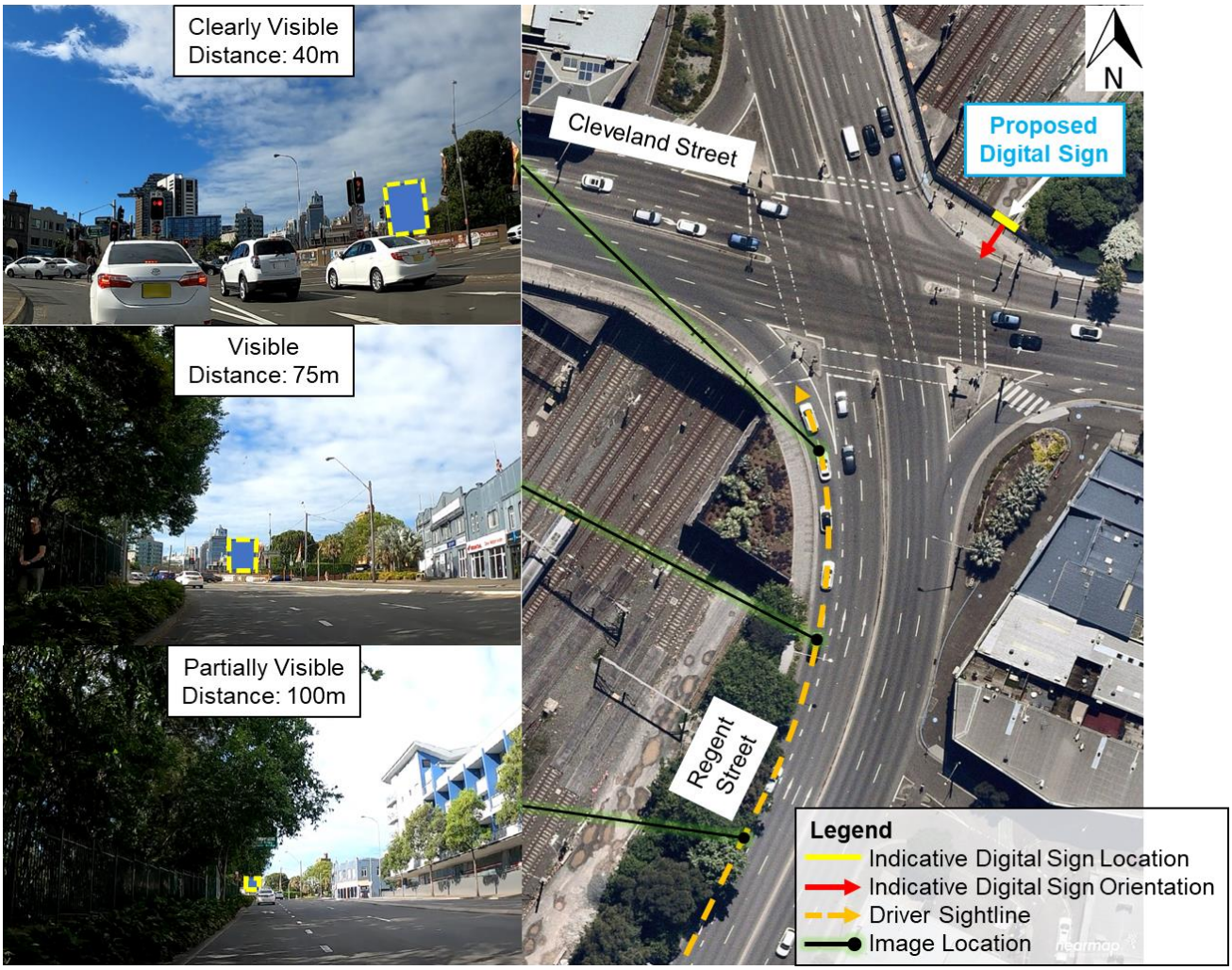
The northbound approach in proximity to the proposed sign is described in Table 5.2.

Table 5.2: Approach Attributes – Regent Street northbound

Attribute	Details
Posted speed limit	50km/h
Decision points within view of the site	Cleveland Street signalised intersection (located adjacent to the proposed sign)
Approach arrangement	At Cleveland Street: 1 signalised left turn slip lane (lane 1) and 2 through lanes (lanes 2 and 3)
Sight length	From approximately 140m south of the sign
Minimum duration of visibility	11s at free-flow speed

The northbound approach along Regent Street has a left-hand bend with a slight uphill grade towards the Cleveland Street intersection and proposed sign. Across the three lanes, the sign would first be visible from approximately 100m away, though the view from lane 1 is more obscured (75m) due to vehicles in front. Drivers on this approach require a simple glance appreciation to view the proposed digital sign and are likely to do so in proximity to the intersection as it would be in their periphery. However, this would not distract their focus to the traffic signals, considering they are located in close proximity to the site and adjacent to the intersection and the left-hand bend 70m towards the stop line.

The in-vehicle sightlines from Regent Street northbound lanes 1 and 3 are shown in Figure 5.1 and Figure 5.2 respectively.



[1]*Sign location is indicative, not to scale and for illustration purposes only.*
[2]*Distances measured in Nearmap.*

Figure 5.1: In-vehicle sightlines along Regent Street northbound lane 1 towards the inbound sign

[1]*Sign location is indicative, not to scale and for illustration purposes only.*
[2]*Distances measured in Nearmap.*

Figure 5.2: In-vehicle sightlines along Regent Street northbound lane 3 towards the inbound sign

5.4.2 Cleveland Street eastbound

The eastbound approach in proximity to the proposed sign is described in Table 5.3.

Table 5.3: Approach Attributes – Cleveland Street eastbound

Attribute	Details
Posted speed limit	50km/h
Decision points within view of the site	Regent Street signalised intersection (located adjacent to the proposed sign)
Approach arrangement	1 left turn at any time with care slip lane (lane 1), 2 through lanes (lanes 2 and 3) and 1 right turn lane (lane 4)
Sight length	From approximately 70m west of the sign
Minimum duration of visibility	11s at free-flow speed

The eastbound approach along Cleveland Street is straight with a moderate uphill grade towards the Regent Street intersection, approximately 70m before the proposed sign and where it would first be visible to drivers. The sign would not be visually prominent until the top of the hill near the stop line by which drivers would have already reacted to signal changes or pedestrians at the left turn slip lane zebra crossing.

The in-vehicle sightlines from Cleveland Street eastbound lanes 1, 2 and 4 are shown in Figure 5.3 to Figure 5.5.

[1]*Sign location is indicative, not to scale and for illustration purposes only.*
[2]*Distances measured in Nearmap.*

Figure 5.3: In-vehicle sightlines along Cleveland Street eastbound lane 1 towards the inbound sign

[1]*Sign location is indicative, not to scale and for illustration purposes only.*
[2]*Distances measured in Nearmap.*

Figure 5.4: In-vehicle sightlines along Cleveland Street eastbound lane 2 towards the inbound sign

[1]*Sign location is indicative, not to scale and for illustration purposes only.*
[2]*Distances measured in Nearmap.*

Figure 5.5: In-vehicle sightlines along Cleveland Street eastbound lane 4 towards the inbound sign

5.5 Cumulative Traffic Safety Assessment

The outbound digital sign will face north towards southbound drivers on Regent Street. The advertising content will not face northbound drivers on Regent Street looking towards the subject inbound digital sign. Only the back of the structure (made up of perforated silver metal panels and a black aluminium frame) will be visible to northbound drivers.

The in-vehicle sightline from Regent Street northbound are shown in Figure 5.6, clearly demonstrating that there are no cumulative traffic safety impacts from the inbound and outbound digital signs.

**Sign locations are indicative, not to scale and for illustration purposes only.*

Figure 5.6: In-vehicle sightline along Regent Street northbound towards the outbound sign

No part of the structure will face eastbound drivers on Cleveland Street.

5.6 Compliance Assessment

5.6.1 Industry and Employment SEPP Schedule 5

The assessment against Industry and Employment SEPP Schedule 5 is provided in Table 5.4. Whilst the criteria are quite generic, the basis for the responses to each criterion is provided next to them.

Table 5.4: Assessment against Industry and Employment SEPP Schedule 5

Section	Criteria	Response
8. Safety	Would the proposal reduce the safety for any public road?	**No –** The proposal would not reduce the safety to the public road because there are no on-road-related risks apparent in the crash data.
	Would the proposal reduce the safety for pedestrians or bicyclists?	**No –** There are very few on-road cyclists in this area, and off-road pedestrians and cyclists are protected by the kerb. In any event, the change in pedestrian and cyclist safety risk associated with a digital sign installation is considered to be negligible.
	Would the proposal reduce the safety for pedestrians, particularly children, by obscuring sightlines from public areas?	**No –** No sightlines for pedestrians and children are obscured by the proposal as the sign will be located on the roadside.

5.6.2 Transport for NSW Advertising Sign Safety Assessment Matrix

Table 5.5 details the assessment against the Transport for NSW Advertising Sign Safety Assessment Matrix.

Table 5.5: Assessment against the Transport for NSW Advertising Sign Assessment Matrix

Consideration	Response	Risk Rating	Risk Level
A. It obscures a view of an object/vehicle/pedestrian that creates a hazard	The proposed sign will be located behind all surrounding objects/vehicles/pedestrians etc.	1	Low
B. Sign positioning relative to travel direction	The proposed sign will be positioned so that only glance appreciation is required. Additionally, drivers would not need to turn/raise their head to fully observe the sign. The sign will be visually prominent northbound and eastbound.	2	Low
C. It distracts a driver at a critical time	The proposed sign will be located near the congested, multi-lane Cleveland Street/Regent Street signalised intersection and by the time drivers are in viewing distance of the sign, they would have already reacted to signal changes or pedestrians at the left turn slip lane zebra crossing.	3	Low
D. It interferes with the effectiveness and safety of a traffic control device (e.g., traffic signs, traffic signals or other traffic control devices)	The proposed sign is unlikely to noticeably obstruct or interfere with any traffic control devices.	1	Low
E. Sign clutter	A north-facing digital sign is proposed on the south-western corner of the Cleveland Street/Regent Street intersection, though it will not be seen simultaneously. As such, no other advertising sign is visible when a driver is in view of the subject site.	1	Low

5.6.3 Transport Corridor Outdoor Advertising and Signage Guidelines Table 3

Table 5.6 details the assessment against the digital sign criteria in Table 3 of the *Signage Guidelines*.

Table 5.6: Assessment against the Signage Guidelines Digital Sign Criteria

Criteria	Response
a. Each advertisement must be displayed in a completely static manner, without any motion, for the approved dwell time as per criterion (d) below.	Conditions can be imposed by the consent authority to ensure that the sign is completely static for the specified dwell time.
b. Message sequencing designed to make a driver anticipate the next message is prohibited across images presented on a single sign and across a series of signs.	Conditions can be imposed by the consent authority to ensure there is no message sequencing that creates driver anticipation for the next message on the proposed sign or with any other signs.
c. The image must not be capable of being mistaken: i. for a prescribed traffic control device because it has, for example, red, amber or green circles, octagons, crosses or triangles or shapes or patterns that may result in the advertisement being mistaken for a prescribed traffic control device ii. as text providing driving instructions to drivers.	Conditions can be imposed by the consent authority to ensure that sign content, design, imagery and messages neither replicate nor can be mistaken for a prescribed traffic control device or instruction to drivers. For example, advertisements must not instruct drivers to perform an action such as 'Stop'.

Criteria	Response
d. Dwell times for image display must not be less than: i. 10 seconds for areas where the speed limit is below 80km/h ii. 25 seconds for areas where the speed limit is 80km/h and over.	The minimum allowed dwell time is 10 seconds based on the posted speed limit of 50km/h. Conditions can be imposed by the consent authority to ensure this minimum dwell time.
e. The transition time between messages must be no longer than 0.1 seconds, and in the event of image failure, the default image must be a black screen.	Conditions can be imposed by the consent authority to ensure that the sign has a transition time of no more than 0.1 seconds and a black screen in the event of image failure.
f. Luminance levels must comply with the requirements in Section 3 below.	This area is Zone 3 as categorised in Section 3.3 of the *Signage Guidelines*. Acceptable luminance levels for this zone as specified in Table 6 of the *Signage Guidelines* are: no limit (full sun on face of signage), 6000cd/m^2 (daytime), 700cd/m^2 (twilight and inclement weather) and 350cd/m^2 (night-time). Conditions can be imposed by the consent authority specifying maximum allowable luminance levels.
g. The images displayed on the sign must not otherwise unreasonably dazzle or distract drivers without limitation to their colouring or contain flickering or flashing content.	Conditions can be imposed by the consent authority to ensure that the sign's images comply with requirements to not contain flickering or flashing content.
h. The amount of text and information supplied on a sign should be kept to a minimum (e.g., no more than a driver can read at a short glance).	Conditions can be imposed by the consent authority to ensure that minimal text and information is supplied on a sign no more than a driver can read at a short glance.
i. Any sign that is within 250m of a classified road and is visible from a school zone must be switched to a fixed display during school zone hours.	N/A – The sign is not visible from a school zone.
j. Each sign proposal must be assessed on a case-by-case basis including replacement of an existing fixed, scrolling or tri-vision sign with a digital sign, and in the instance of a sign being visible from each direction, both directions for each location must be assessed on their own merits.	All relevant traffic directions have been assessed on their own merits.
k. At any time, including where the speed limit in the area of the sign is changed, if detrimental effect is identified on road safety post installation of a digital sign, RMS reserves the right to re-assess the site using an independent RMS-accredited road safety auditor. Any safety issues identified by the auditor and options for rectifying the issues are to be discussed between RMS and the sign owner and operator.	Noted.

6. CONCLUSIONS

The key conclusions from the traffic safety assessment to enable the installation of the proposed digital sign on the north-eastern corner of the Cleveland Street/Regent Street signalised intersection in Chippendale are summarised as follows:

- There is currently no advertising sign at the site
- The proposed sign will not obstruct or interfere with the view of or restrict sight distances to any intersections, traffic control devices, vehicles, pedestrians, or cyclists given its location on the roadside
- The proposed sign is not expected to reduce the safety of any traffic, pedestrians or cyclist movements given its location on the roadside. It will be located within a driver's ordinary field of view when approaching northbound and eastbound and a glance to the sign will still permit co-incident recognition of signal changes, and vehicle, pedestrian and cyclist movements in the forward view
- The proposed structure of the sign will not impact the movement of trains along the railway corridor as the digital screen will not be visible to train drivers and therefore will not be a distraction. As such, the proposal is also deemed appropriate from a rail safety perspective
- A review of available five years of crash data within 140m of the site was undertaken as part of the traffic safety assessment. The crash data showed a low crash rate and did not identify an unusually high or inherently high crash risk on approach to the site that would not deem the proposed location unsuitable
- The proposed sign will not interfere with any primary traffic signals because the locations where the sign is behind the signals and are not critical locations in terms of decision making relative to the stop line at the intersection
- The proposed sign complies with the requirements of the Industry and Employment SEPP and Transport for NSW Advertising Sign Safety Assessment Matrix in terms of obscurity, positioning and sign clutter. The advertising content of the proposed outbound digital sign will not face northbound drivers on Regent Street while they are in view of the subject inbound digital sign. Therefore, there are no cumulative traffic safety impacts from the inbound and outbound signs
- The proposed digital sign should be conditioned to comply with the requirements of the *Signage Guidelines* in terms of display and operational requirements, including:
  - Message displays remaining static
  - Sequencing of displays or messaging
  - Minimum dwell time
  - Transition of displays
  - Luminance levels
  - The use of flickering, flashing, or moving content
  - Quantity/size of text used on message displays
  - A re-assessment of the digital sign should any detrimental effects on road safety be identified post-installation.

Given the above conclusions, the digital sign should be approved as proposed.

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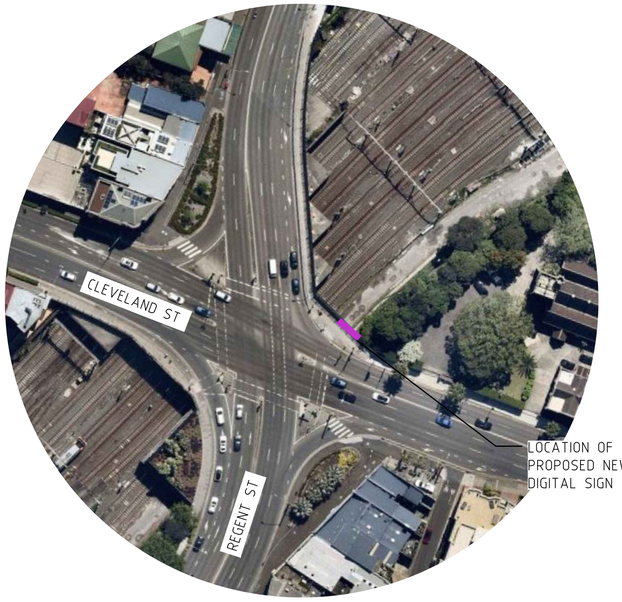
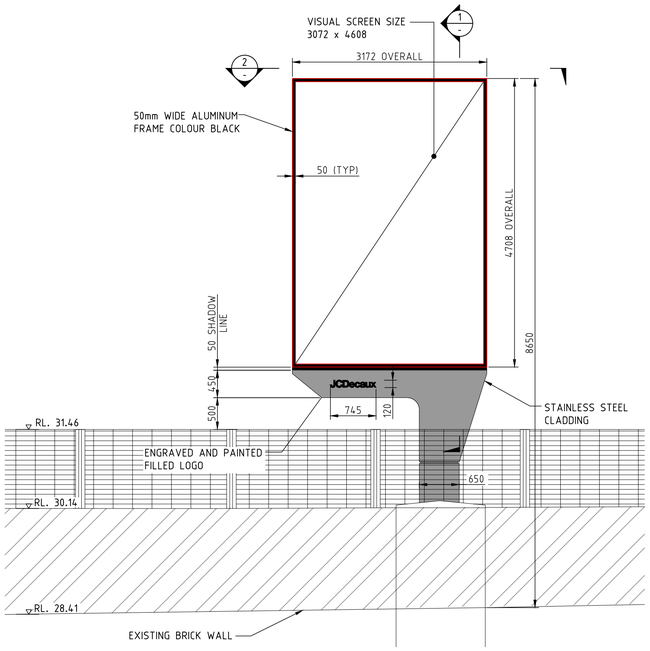
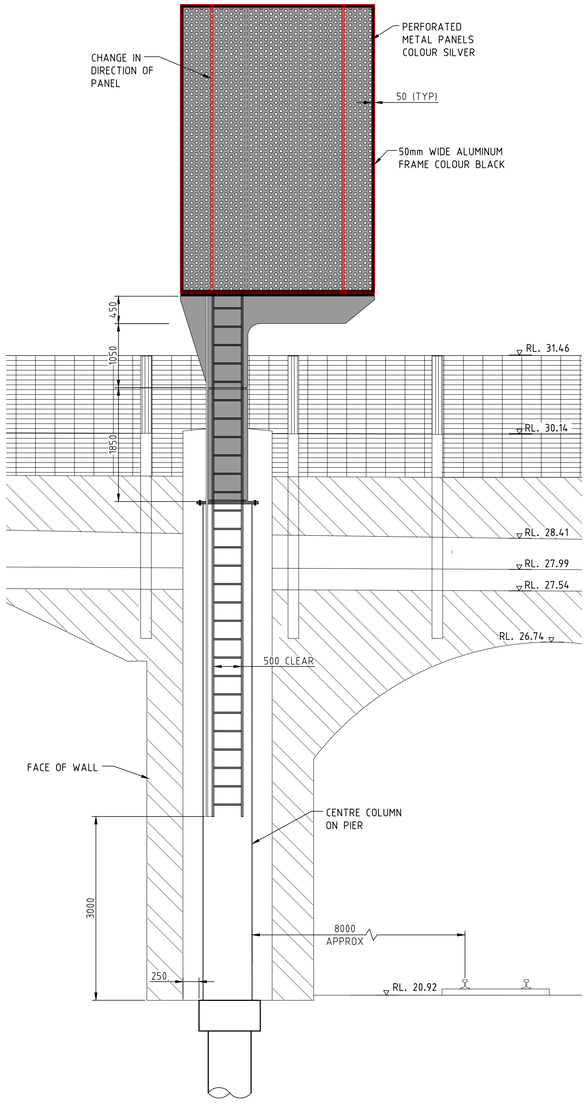
Appendix A: Proposed Development Plan



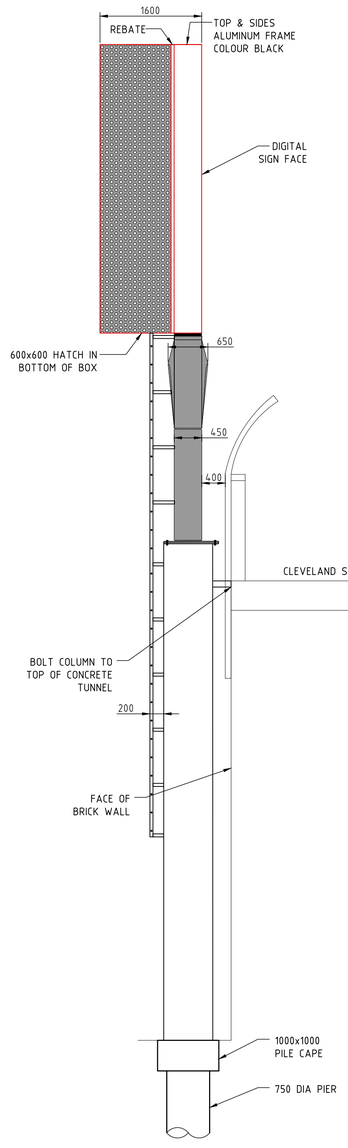
AERIAL PHOTO
NTS



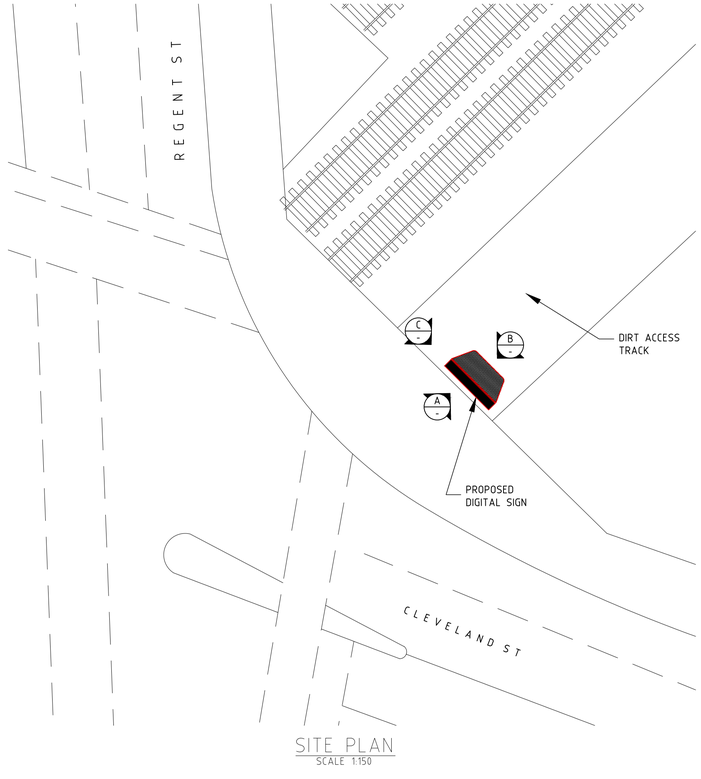
ELEVATION A
SCALE 1:50
(INBOUND)



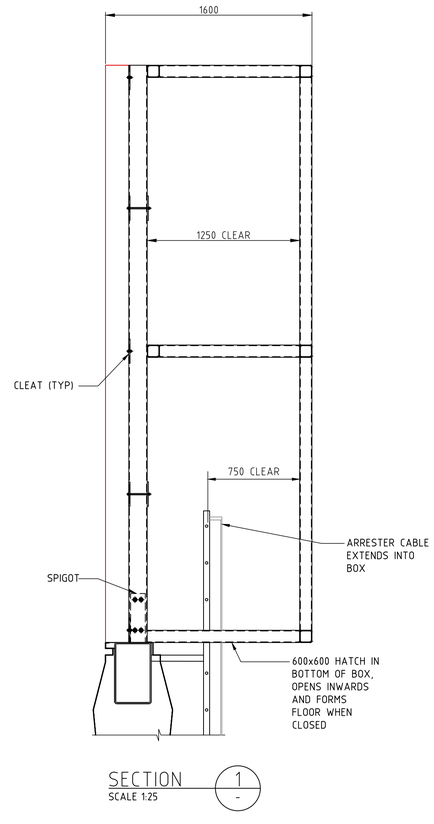
ELEVATION B
SCALE 1:50



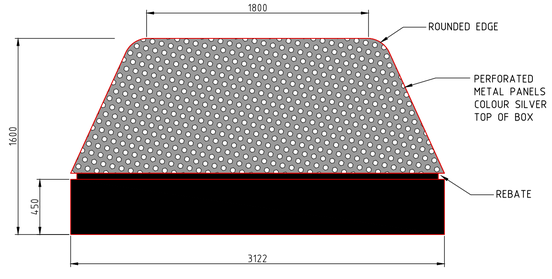
ELEVATION C
SCALE 1:50



SITE PLAN
SCALE 1:150



SECTION 1
SCALE 1:25



SECTION 2
SCALE 1:25

NOT FOR CONSTRUCTION

ISS	DATE	COMMENT
A	14/12/21	ISSUED FOR APPROVAL
B	28/02/22	ISSUED FOR APPROVAL
C	04/03/22	ISSUED FOR APPROVAL
D	14/03/22	ISSUED FOR APPROVAL
E	17/01/22	ISSUED FOR APPROVAL

DBCE Dennis Bunt Consulting Engineers Pty Ltd
Suite 1, Building 8, 49 Frenchs Forest Road East,
Frenchs Forest, NSW 2086
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Ph: 02 9451 3455 Fax: 02 9451 3466
Email: info@dbce.com.au
ABN 23 039 013 724

CLIENT: JCDecaux

PROJECT: CLEVELAND ST & REGENT ST, INBOUND
SURRY HILLS, NSW, PORTRAIT 50

TITLE: PROPOSED DIGITAL SIGN
GENERAL ARRANGEMENT &
SITE PLAN

DRAWN A.T	DESIGN J.L	DATE: OCT 21
JOB NO: 21246		DWG NO: DA02
SCALE @ A1: AS SHOWN		REV: E

Appendix B: Photo Montages

1. Regent Street northbound approach – Lane 1 (Day)

2. Regent Street northbound approach – Lane 3 (Day)

3. Cleveland Street eastbound approach – Lane 1 (Day)

4. Cleveland Street eastbound approach – Lane 2 (Day)

5. Cleveland Street eastbound approach – Lane 4 (Day)

Appendix C: Crash Data

Project Title: P5392 Sydney Trains Sites Digital Sign TSAs
Site: Cleveland Street/Regent Street inbound, Chippendale
Figure Title: Degree of Crashes – 2016 to 2020
Version: 002
Date: 2/12/2022
File Path: P:\P5392 Sydney Trains Sites Digital Sign TSAs\Technical Work\Mapping\Work Spaces\Chippendale - Cleveland St-Regent St IB

Project Title: P5392 Sydney Trains Sites Digital Sign TSAs
Site: Cleveland Street/Regent Street inbound, Chippendale
Figure Title: Type of Crashes by RUM Code Group – 2016 to 2020
Version: 002
Date: 2/12/2022
File Path: P:\P5392 Sydney Trains Sites Digital Sign TSAs\Technical Work\Mapping\Work Spaces\Chippendale - Cleveland St-Regent St IB

Crash ID	Degree of crash - detailed	RUM - code	RUM - description	Year of crash	Month of crash	Day of week of crash	Time of crash	Surface condition	Weather	Natural lighting	Street of crash	Street type	Distance	Direction	Identifying feature	Identifying feature type	Town	Type of location	Latitude	Longitude	Speeding involved in crash	Fatigue involved in crash	Key Traffic Unit direction of travel
1092028	Minor/Other Injury	46	Reversing into obj	2016	January	Tuesday	1200	Dry	Fine	Daylight	REGENT	ST	0	Right on the spot	CLEVELAND	ST	REDFERN	X-intersection	-33.889054	151.201600	No or unknown	No or unknown	North
1135833	Minor/Other Injury	32	Right rear	2017	April	Monday	1145	Wet	Overcast	Daylight	REGENT	ST	0	Right on the spot	CLEVELAND	ST	REDFERN	X-intersection	-33.889054	151.201600	No or unknown	No or unknown	East
1169527	Minor/Other Injury	48	From footpath	2018	March	Friday	1455	Dry	Fine	Daylight	REGENT	ST	0	Right on the spot	CLEVELAND	ST	REDFERN	X-intersection	-33.889054	151.201600	No or unknown	No or unknown	North
1172117	Minor/Other Injury	30	Rear end	2018	March	Thursday	2120	Dry	Fine	Darkness	REGENT	ST	100	South	CLEVELAND	ST	REDFERN	Divided road	-33.889922	151.201384	No or unknown	No or unknown	North
1195082	Non-casualty (towaway)	71	Off rd left => obj	2019	February	Wednesday	2330	Dry	Fine	Darkness	REGENT	ST	0	Right on the spot	CLEVELAND	ST	REDFERN	X-intersection	-33.889054	151.201600	No or unknown	No or unknown	North
1228862	Minor/Other Injury	33	Lane sideswipe	2020	February	Monday	0720	Dry	Fine	Daylight	REGENT	ST	0	Right on the spot	CLEVELAND	ST	REDFERN	X-intersection	-33.889054	151.201600	No or unknown	No or unknown	East
1229860	Minor/Other Injury	30	Rear end	2020	March	Tuesday	1900	Dry	Fine	Darkness	REGENT	ST	0	Right on the spot	CLEVELAND	ST	REDFERN	X-intersection	-33.889054	151.201600	No or unknown	No or unknown	North
1248546	Moderate Injury	30	Rear end	2020	November	Saturday	1638	Dry	Fine	Unknown	REGENT	ST	0	Right on the spot	CLEVELAND	ST	REDFERN	X-intersection	-33.889054	151.201600	No or unknown	No or unknown	North