oOh! Media
Ref: 1308.92

LIGHTING IMPACT ASSESSMENT
EXTERNALLY ILLUMINATED SIGNAGE AT PRINCES HIGHWAY, HEATHCOTE, NSW

DATE	REV	COMMENT	PREPARED BY	CHECKED BY
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1. INTRODUCTION

Electrolight have been appointed by oOh! Media on behalf of TfNSW to undertake a Lighting Impact Assessment on the existing double sided externally illuminated signage (**externally illuminated signage**) at Princes Highway, Heathcote, NSW. The objective of the assessment is to report on compliance with the State Environmental Planning Policy (Industry and Employment) 2021, NSW Transport Corridor Outdoor Advertising and Signage Guidelines, and AS/NZS 4282:2023 Control of the Obtrusive Effects of Outdoor Lighting.

2. DEFINITIONS

2.1 Illuminance

The physical measure of illumination is illuminance. It is the luminous flux arriving at a surface divided by the area of the illuminated surface. Unit: lux (lx); 1 lx = 1 lm/m2.

(a) Horizontal illuminance (Eh) The value of illuminance on a designated horizontal plane
(b) Vertical illuminance (Ev) The value of illuminance on a designated vertical plane

Where the vertical illuminance is considered in the situation of potentially obtrusive light at a property boundary it can be referred to as environmental vertical illuminance (Eve).

2.2 Luminance

The physical quantity corresponding to the brightness of a surface (e.g. a lamp, luminaire or reflecting material such as the road surface) when viewed from a specified direction. SI Unit: candela per square metre (cd/m2) – also referred to as “nits”.

2.3 Luminous Intensity

The concentration of luminous flux (perceived light power) emitted in a specified direction. Unit: candela (cd).

2.4 Dynamic content

Where the luminous image, pattern, colour or direction of light changes over an interval of less than 60 seconds.

2.5 Obtrusive Light

Spill light which, because of quantitative or directional attributes, gives rise to annoyance, discomfort, distraction, or a reduction in ability to see essential information such as transport signals.
Note: Obtrusive light includes the impact on humans and environmental receivers.

2.6 Threshold Increment

The measure of disability glare expressed as the percentage increase in luminance contrast threshold required between an object and its background for it to be seen equally well with a source of glare present.
Note: The required value is a maximum for compliance of the lighting scheme.

2.7 Environmentally Sensitive Area (ESA)

Area of ecological value including, bushland, waterways and marine and coastal areas.

2.8 AGI32 Light Simulation Software

AGI32 (by U.S. company Lighting Analysts/Revalize) is an industry standard lighting simulation software package that can accurately model and predict the amount of light reaching a designated surface or workplane. AGi32 has been independently tested against the International Commission On Illumination (CIE) benchmark, CIE 171:2006, Test Cases to Assess the Accuracy of Lighting Computer Programs.

2.9 Upward Light Ratio Luminaire (ULR_L)

The ratio of the luminous flux of a luminaire that is emitted, at and above the horizontal, divided by the total luminaire flux when the luminaire is mounted in its designed position, and excluding reflected light from surfaces or obstructions.

2.10 Environmental Receiver

Any identified living species (plants, animals and other organisms) and their locations indicated, that may be impacted by the proposed lighting system.

3. SITE DESCRIPTION AND SCOPE

The existing signage is located at Princes Highway (near Dalley Rd). The signage is comprised of two back-to-back externally illuminated sign faces, Face A and Face B. Face A is oriented towards the southbound traffic approach on Princes Highway, and Face B is oriented towards the northbound traffic approach on Princes Highway. The total active display (illuminated) area of the each sign face is 42.41 m2. Refer to Appendix A for the signage location plan, elevations and photomontages.

Each face of the signage is illuminated using three 120W LED floodlights mounted on a bracket arm located 1.4m above and 2.5m out from the sign. Refer Appendix B for further luminaire specification details. The luminaires are currently aimed 40 degrees (from vertical) towards the sign face (i.e. directed away from the normal traffic viewing direction). However, to comply with the requirements of this assessment, the luminaire aiming is to be modified to 45 degrees from vertical. The signage lighting operates all night and is switched off during the day. The signage lighting is not dimmable.

The signage floodlights shall be fitted with custom baffles which mitigate upward waste light, resulting in an Upward Light Ratio (ULR_L) of not more than 0.02*, as stated in AS/NZS 4282:2023 Control of the Obtrusive Effects of Outdoor Lighting - refer Appendix E for details.

Environmental impact assessments, including the management of artificial light for the protection of specific entities protected by environmental legislation, is beyond the scope of this assessment.

*The signage supplier and/or operator is responsible for complying with the Upward Light Ratio. Electrolight take no responsibility for compliance with this requirement.

4. DESIGN GUIDELINES AND STANDARDS

The Lighting Impact Assessment will review the existing externally illuminated signage against the following Criteria, Design Guidelines and Standards.

- State Environmental Planning Policy (Industry and Employment) 2021 (**SEPP Industry and Employment**)
- Transport Corridor Outdoor Advertising & Signage Guidelines 2017 (**Transport Guidelines**)
- AS/NZS 4282:2023 Control of the Obtrusive Effects of Outdoor Lighting (**AS4282**)

5. LUMINANCE ASSESSMENT

Face A Assessment

The maximum permissible night time luminance of the externally illuminated signage (Face A) is determined by the existing lighting and land use zoning environment of its surroundings. AS4282 outlines maximum average luminances for different Environmental Zones as shown in Table 1 below:

TABLE 1 - AS4282 MAXIMUM AVERAGE NIGHT TIME LUMINANCE FOR SIGNAGE		
	Description	Max Average Luminance (cd/m2)
A4	High district brightness e.g. Town and city centres and other commercial areas, residential areas abutting commercial areas, industrial and Port areas and Transport Interchanges	350
A3	Medium district brightness e.g. Suburban areas in towns and cities, generally roadways with streetlighting through suburban, rural or semi-rural areas	250
A2	Low district brightness e.g. Sparsely inhabited rural and semi-rural areas, generally roadways without streetlighting through suburban, rural or semi-rural areas other than intersections	150
A1	Dark e.g. Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas), generally roadways without streetlighting through rural areas	50
A0	Intrinsically Dark e.g. UNESCO Starlight Reserve, IDA: Dark Sky Parks, Reserves or Sanctuaries, major optical observatories, other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ecosystem protection, lighting for safe access may be required	0.1

Based on an assessment of the surrounding environment, the signage is located within Environmental Zone A3 under AS4282, therefore, the maximum night time luminance is 250cd/m2.

AS4282 does not include limits for daytime operation of illuminated signage. However, the Transport Guidelines outlines maximum permissible luminance limits for various lighting conditions, including daytime. The signage is classified as being within Zone 4, which is described as an area with generally low levels of off-street ambient lighting e.g. most rural areas, or areas that have residential properties nearby. Under the Guidelines, the maximum night time luminance for illuminated signs within Zone 4, with an area over 10m2, is 100 cd/m2 (taken to be 25% of the maximum daytime limit of 400 cd/m2 as per the previous revision of the Guidelines).

Table 2 below outlines the maximum luminance levels to comply with AS4282 and the Transport Guidelines for the various lighting conditions listed below:

TABLE 2 - LUMINANCE LEVELS FOR EXTERNALLY ILLUMINATED ADVERTISEMENTS FACE A (SOUTHBOUND)		
Lighting Condition	Max Permissible Luminance (cd/m2)	Compliant
Day	N/A (OFF)	✓
Night Time	100	✓

Photometric data for the luminaires illuminating the sign was provided by the lighting manufacturer* and was used for calculation purposes. The average luminance of Face A of the sign was found to be 47 cd/m2, less than the maximum allowance 100 cd/m2 - refer Appendix D for details. Face A of the signage therefore complies with the luminance limits outlined in AS4282 and the Transport Corridor Outdoor Advertising & Signage Guidelines.

Face B Assessment

The maximum permissible night time luminance of the externally illuminated signage (Face B) is determined by the existing lighting and land use zoning environment of its surroundings. AS4282 outlines maximum average luminances for different Environmental Zones as shown in Table 3 below:

TABLE 3 - AS4282 MAXIMUM AVERAGE NIGHT TIME LUMINANCE FOR SIGNAGE

	Description	Max Average Luminance (cd/m2)
A4	High district brightness e.g. Town and city centres and other commercial areas, residential areas abutting commercial areas, industrial and Port areas and Transport Interchanges	350
A3	Medium district brightness e.g. Suburban areas in towns and cities, generally roadways with streetlighting through suburban, rural or semi-rural areas	250
A2	Low district brightness e.g. Sparsely inhabited rural and semi-rural areas, generally roadways without streetlighting through suburban, rural or semi-rural areas other than intersections	150
A1	Dark e.g. Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas), generally roadways without streetlighting through rural areas	50
A0	Intrinsically Dark e.g. UNESCO Starlight Reserve, IDA: Dark Sky Parks, Reserves or Sanctuaries, major optical observatories, other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ecosystem protection, lighting for safe access may be required	0.1

Based on an assessment of the surrounding environment, the signage is located within Environmental Zone A3 under AS4282, therefore, the maximum night time luminance is 250cd/m2.

AS4282 does not include limits for daytime operation of illuminated signage. However, the Transport Guidelines outlines maximum permissible luminance limits for various lighting conditions, including daytime. The signage is classified as being within Zone 4, which is described as an area with generally low levels of off-street ambient lighting e.g. most rural areas, or areas that have residential properties nearby. Under the Guidelines, the maximum night time luminance for illuminated signs within Zone 4, with an area over 10m2, is 100 cd/m2 (taken to be 25% of the maximum daytime limit of 400 cd/m2 as per the previous revision of the Guidelines).

* Electrolight takes no responsibility for the accuracy of third party provided photometric data.

Table 4 below outlines the maximum luminance levels to comply with AS4282 and the Transport Guidelines for the various lighting conditions listed below:

TABLE 4 - LUMINANCE LEVELS FOR EXTERNALLY ILLUMINATED ADVERTISEMENTS FACE B (NORTHBOUND)		
Lighting Condition	Max Permissible Luminance (cd/m2)	Compliant
Day	N/A (OFF)	✓
Night Time	100	✓

Photometric data for the luminaires illuminating the sign was provided by the lighting manufacturer* and was used for calculation purposes. The average luminance of Face B of the sign was found to be 47 cd/m2, less than the maximum allowance 100 cd/m2 - refer Appendix D for details. Face B of the signage therefore complies with the luminance limits outlined in AS4282 and the Transport Corridor Outdoor Advertising & Signage Guidelines.

* Electrolight takes no responsibility for the accuracy of third party provided photometric data.

6. AS4282 ASSESSMENT

The externally illuminated signage has been assessed against the lighting criteria and requirements outlined in AS4282.

AS4282 provides limits for different obtrusive factors associated with dark hours (night time) operation of outdoor lighting systems. Two sets of limiting values for spill light are given based on whether the lighting is operating before a curfew (known as "pre-curfew" operation) or operating after a curfew (known as post-curfew or curfewed operation). Pre-curfew spill lighting limits are higher than post-curfew values, on the understanding that spill light is more obtrusive late at night when residents are trying to sleep. Under AS4282, the post-curfew period is taken to be between 11pm and 6am daily. As the signage operates all night, it will be assessed against the more stringent post-curfew limits.

Spill light to any adjacent Environmentally Sensitive Areas are also assessed against the more stringent post-curfew limits, as outlined in Clause 3.2.1 of AS4282.

Illuminance Assessment - Face A & Face B

The AS4282 assessment includes a review of nearby residential dwellings and Environmentally Sensitive Areas and calculation of the amount of vertical illuminance (measured in Lux) that they are likely to receive from the signage during night time operation.

The acceptable level of vertical illuminance will in part be determined by the night time lighting environment around the dwellings. AS4282 categorises the night time environment into different zones with maximum lighting limits as shown in Table 5 below:

TABLE 5 - AS4282 MAXIMUM VALUES OF VERTICAL ILLUMINANCE

	Max Vertical Illuminance (lx)		Description
	Pre-curfew	Post-curfew	
A4	25	5	High district brightness e.g. Town and city centres and other commercial areas, residential areas abutting commercial areas, industrial and Port areas and Transport Interchanges
A3	10	2	Medium district brightness e.g. Suburban areas in towns and cities, generally roadways with streetlighting through suburban, rural or semi-rural areas
A2	5	1	Low district brightness e.g. Sparsely inhabited rural and semi-rural areas, generally roadways without streetlighting through suburban, rural or semi-rural areas other than intersections
A1	2	0.1	Dark e.g. Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas), generally roadways without streetlighting through rural areas
A0	0	0	Intrinsically Dark e.g. UNESCO Starlight Reserve, IDA: Dark Sky Parks, Reserves or Sanctuaries, major optical observatories, other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ecosystem protection, lighting for safe access may be required

Residential Dwellings

Based on an assessment of the surrounding area, the nearest dwellings with potential views to the signage are at the following locations:

Address	Zone	Within 100m	Address	Zone	Within 100m
1 Dalley Rd	A3		18 Jane Pl	A3	
2 Dalley Rd	A3		1269 Princes Hwy	A3	
4 Dalley Rd	A3		1271 Princes Hwy	A3	
6 Dalley Rd	A3		1273 Princes Hwy	A3	
6 Jane Pl	A3		1275 Princes Hwy	A3	
8 Jane Pl	A3		1277 Princes Hwy	A3	
10 Jane Pl	A3		1279 Princes Hwy	A3	
12 Jane Pl	A3		1289 Princes Hwy	A3	
14 Jane Pl	A3		15 The Avenue	A3	
16 Jane Pl	A3				

As such, the dwellings above will form the focus of the illuminance assessment.

The signage (and surrounding environment) was modeled in lighting calculation program AGI32 to determine the effect (if any) of the light spill from the existing signage. Photometric data for the luminaires was provided by the lighting manufacturer* and light baffles were included in the calculations as shown in Appendix E. The results of the calculations are shown in Appendix D.

Under AS4282, the maximum allowable illuminance to dwellings in Zone A3 is 2 Lux (as outlined in Table 5). It can be seen from the lighting model that the maximum illuminance to dwellings in Zone A3 is 0.4 lux at 1271 Princes Highway.

The externally illuminated signage therefore complies with the relevant illuminance limits for nearby residential dwellings.

* Electrolight takes no responsibility for the accuracy of third party provided photometric data.

Environmentally Sensitive Areas

The following Environmentally Sensitive Area/s with potential views to the sign were also assessed:

Address	Zone
ESA- East of Princes Highway	A3

It can be seen from the lighting model that the maximum illuminance to the Environmentally Sensitive Areas in Zone A3 is 0.76 lux at Princes Highway. This illuminance level above complies with the maximum AS4282 limit of 2 lux for Zone A3. There are no Environmentally Sensitive Areas identified in any other zones.

Threshold Increment Assessment

The Threshold Increment was also calculated for the northbound and southbound traffic approaches on Cowpasture Road. The calculation grids were located at 1.5m above ground level, with a viewing distance of between 10m to 200m from the signage and a windscreen cutoff angle of 20 degrees (as outlined in AS1158). The calculation results show that the Threshold Increment does not exceed 7.11% for any traffic approach (the allowable maximum under the standard is 20%).

Upward Waste Light Assesment

In order to reduce light pollution and associated environmental impacts, AS4282 includes requirements that limit upward waste light into the night sky from signage. AS4282 states that externally illuminated signage shall have an Upward Waste Light Ratio (ULR_L) of not more than 0.02. The supplier shall ensure that baffles are installed, as outlined in Appendix E, to meet this requirement.

Luminous Intensity

AS4282 nominates Luminous Intensity limits where a light source (such as a floodlight) can be directly viewed from a residential dwelling or Environmentally Sensitive Area, shown in Table 6 below:

TABLE 6 - MAXIMUM LUMINOUS INTENSITIES PER LUMINAIRE FOR EXTERNALLY ILLUMINATED SIGNAGE			
Environmental Zone	Non-Curfew L1 luminous intensity (cd)	Non-Curfew L2 luminous intensity (cd)	Curfew luminous intensity (cd)
A0	As close to 0 as possible, without impacting safety	As close to 0 as possible, without impacting safety	0
A1	2500	5000	500
A2	7500	12500	1000
A3	12500	25000	2500
A4	25000	50000	2500

It can be seen from the lighting model that the maximum luminance intensity to dwellings in Zone A3 is 0 cd and the maximum luminance intensity to Environmentally Sensitive Areas is 0 cd. The signage therefore complies with the maximum A3 AS4282 luminous intensities limit of 2500 cd for curfew operation.

AS4282 Assessment Summary

It can therefore be seen that the existing externally illuminated signage complies with all relevant requirements of AS4282.

7. SEPP ASSESSMENT

Table 7 below outlines the illumination assessment criteria from the SEPP Industry and Employment Schedule 5 - Clause 7 Illumination. While the SEPP only applies to sites located on classified roads, this assessment references the guidelines for all sites as a best practice document in New South Wales. In addition to the criteria, responses have been included demonstrating that the existing externally illuminated signage is in compliance (where relevant).

TABLE 7
7. ILLUMINATION ASSESSMENT CRITERIA

Assessment Criteria	Response	Compliant?
Would illumination result in unacceptable glare?	The existing signage complies with the Threshold Increment limits of AS4282, demonstrating that the illumination will not cause unacceptable glare.	✓
Would illumination affect safety for pedestrians, vehicles or aircraft?	The existing signage complies with the Threshold Increment limits of AS4282, demonstrating that the illumination will not cause unacceptable glare. The floodlights are to be fitted with baffles which limit upward light that is viewable by aircraft.	✓
Would illumination detract from the amenity of any residence or other form of accommodation?	The existing signage, when installed according to this report, complies with the illuminance (spill lighting) limits of AS4282, demonstrating that the illumination will not detract form the amenity of any residence or other form of accommodation	✓
Can the intensity of the illumination be adjusted, if necessary?	The existing signage is not dimmable, however the luminance of the signage is significantly lower than the allowable maximum limit and is approaching the minimum acceptable luminance for visibility. Dimming is therefore not deemed required.	N/A
Is the illumination subject to a curfew?	The existing advertising signage, when installed according to this report, complies with the limits required during curfewed operation under AS4282 (nominally between the hours of 11pm and 6am). This means that a curfew is not required.	N/A

8. SUMMARY

- The existing signage (Face A) at Princes Highway, Heathcote, NSW, shall not exceed the following maximum luminances:

LUMINANCE LEVELS FOR EXTERNALLY ILLUMINATED ADVERTISEMENTS FACE A (SOUTHBOUND)		
Lighting Condition	Max Permissible Luminance (cd/m2)	Compliant
Day	N/A (OFF)	✓
Night Time	100	✓

- The existing signage (Face B) at Princes Highway, Heathcote, NSW, shall not exceed the following maximum luminances:

LUMINANCE LEVELS FOR EXTERNALLY ILLUMINATED ADVERTISEMENTS FACE B (NORTHBOUND)		
Lighting Condition	Max Permissible Luminance (cd/m2)	Compliant
Day	N/A (OFF)	✓
Night Time	100	✓

- The signage shall be fitted with baffles as shown in Appendix E in order to comply with the requirements outlined in this assessment.
- The existing externally illuminated signage has been found to comply with all relevant requirements of AS4282, the Transport Guidelines and SEPP Industry and Employment.
- In complying with the above requirements, the existing signage shall not result in unacceptable glare nor shall it adversely impact the safety of pedestrians, residents or vehicular traffic. Additionally, the signage shall not cause any unacceptable amenity impacts to nearby residential dwellings or accommodation or environmental receivers.

9. DESIGN CERTIFICATION

The existing externally illuminated signage at Princes Highway, Heathcote, NSW, if commissioned according to this report, complies with the following criteria, guidelines and standards:

- State Environmental Planning Policy (Industry and Employment) 2021
- Transport Corridor Outdoor Advertising & Signage Guidelines 2017
- AS/NZS 4282:2023 Control of the Obtrusive Effects of Outdoor Lighting

Ryan Shamier MIES

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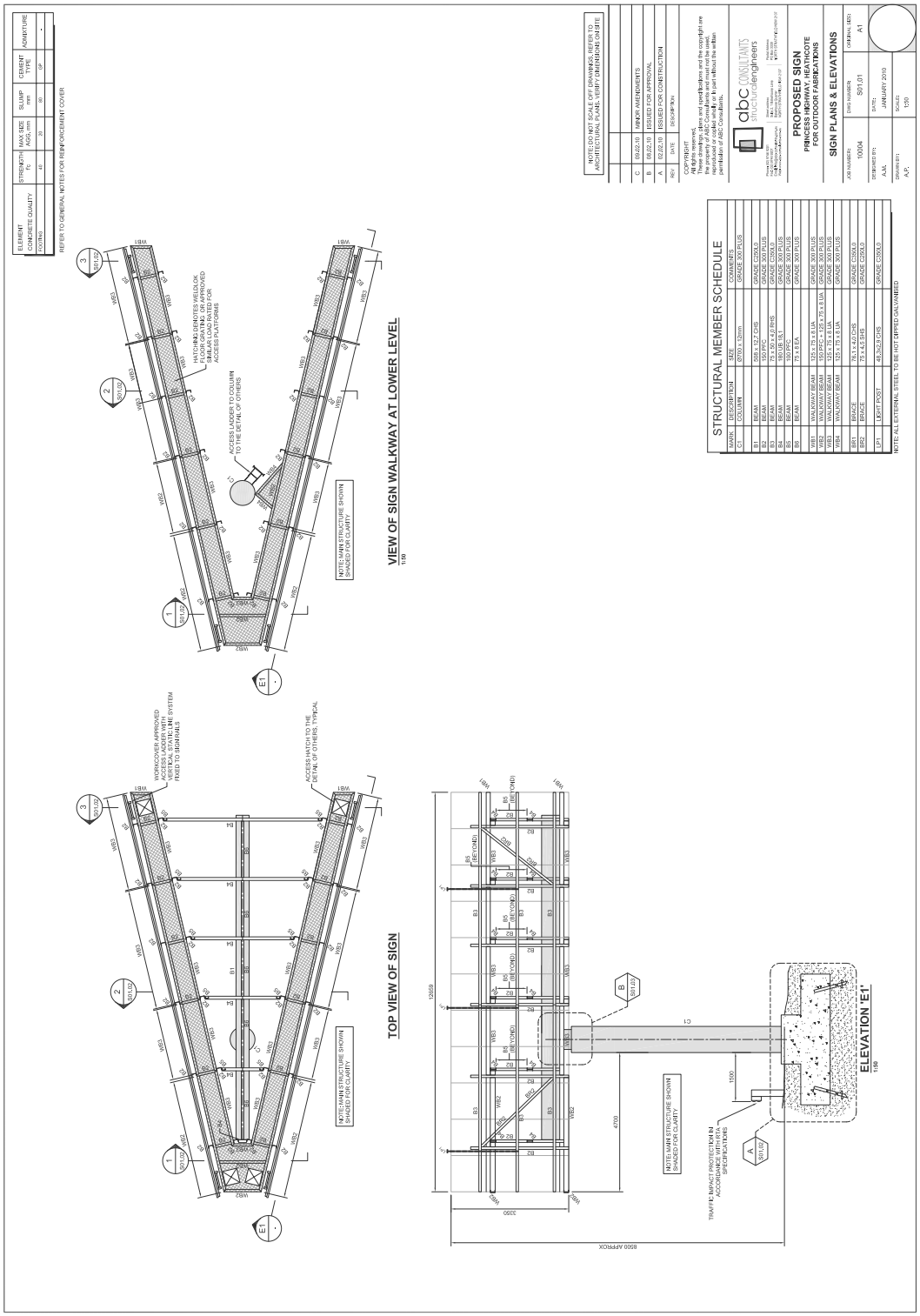
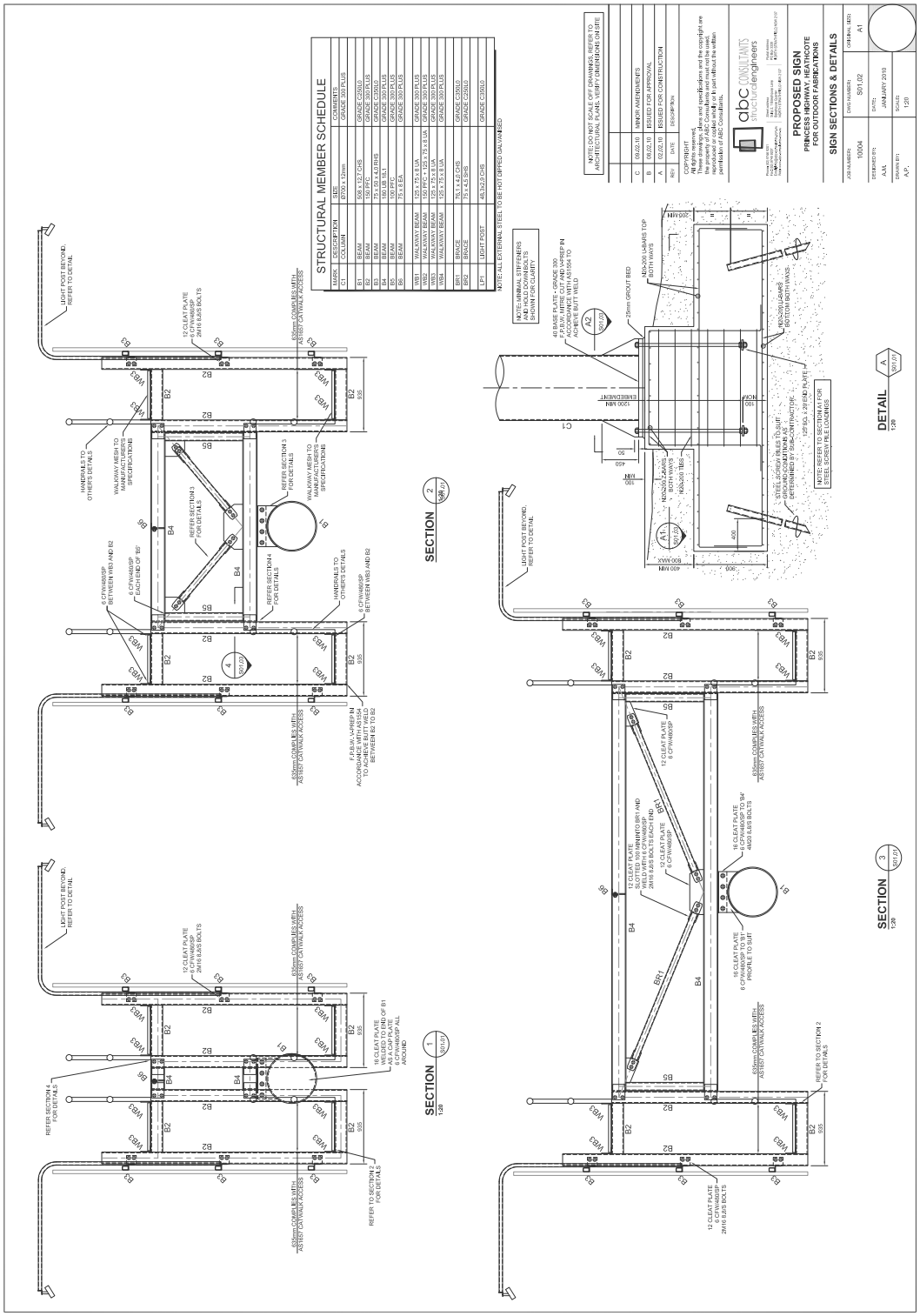
Senior Lighting Designer
Electrolight Sydney
28/02/24

APPENDIX A
PROPOSED SIGNAGE LOCATION, ELEVATIONS & PHOTOMONTAGES



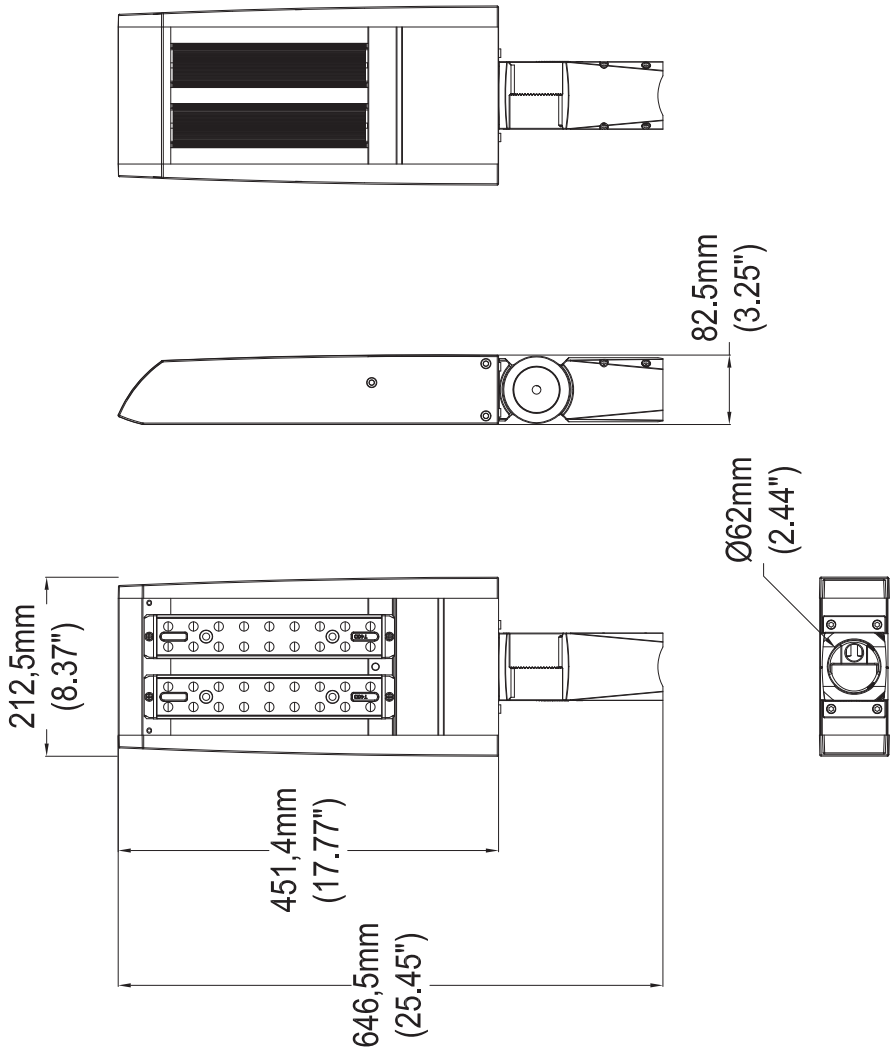
APPENDIX A
PROPOSED SIGNAGE LOCATION, ELEVATIONS & PHOTOMONTAGES



APPENDIX A
PROPOSED SIGNAGE LOCATION, ELEVATIONS & PHOTOMONTAGES

APPENDIX B

DIGITAL SIGNAGE SPECIFICATION



tigerlight HIGH-PERFORMANCE INDUSTRIAL LIGHTING	1300 184 437 info@tigerlight.com.au www.tigerlight.com.au	NAME: MEGAFLOOD FLOODLIGHT 80W/120W L-BRACKET	MODEL: FLC080-L FLD120-L	WEIGHT: 5.8kg 6.6kg

APPENDIX B

DIGITAL SIGNAGE SPECIFICATION

tigerlight | HIGH-PERFORMANCE INDUSTRIAL LIGHTING

MEGA FLOOD

LED FLOOD / AREA LIGHT

MEGA Floods

120W 180W 240W 300W 360W

120W	15,504 lm	180W	23,291 lm	240W	30,275 lm	300W	38,111 lm	360W	45,762 lm

~140 LUMENS PER WATT	50,000+ HOURS	IP67 RATING	MULTIPLE LENS OPTIONS	RA >70 CRI 5000K	MOUNTING OPTIONS	5 YEAR WARRANTY

HIGH-PERFORMANCE COMPONENTS IN MODULAR DESIGN

High output floods - 15,504 to 45,762 lm
Open modular design for optimum heat managment. Operating temps of -40 to +50°C
Rated IP67 and IK10. Polycarbonate lenses.

BUILT TO YOUR SPECIFICATION

11 optical lenses, 4 CCT options, housing colours, 3 bracket options, 2 voltages 277VAC & 415VAC, dimmable 1-10VDC and DALI.

APPLICATIONS

- Indoor & outdoor flood, security and task lighting
- Heavy industry, mining, coolrooms, storage areas, loading bays, yards, perimeters and carparks
- Architectural illumination, museums
- Advertising billboards and signage on walls.

Tigerlight High-performance industrial lighting

MEGA FLOODS Flood/Area Lights

APPENDIX C

State Environmental Planning Policy (Industry and Employment) 2021

Schedule 5 Assessment criteria

(Clauses 8, 13 and 17)

1. Character of the area

- Is the proposal compatible with the existing or desired future character of the area or locality in which it is proposed to be located?
- Is the proposal consistent with a particular theme for outdoor advertising in the area or locality?

2. Special areas

- Does the proposal detract from the amenity or visual quality of any environmentally sensitive areas, heritage areas, natural or other conservation areas, open space areas, waterways, rural landscapes or residential areas?

3. Views and vistas

- Does the proposal obscure or compromise important views?
- Does the proposal dominate the skyline and reduce the quality of vistas?
- Does the proposal respect the viewing rights of other advertisers?
-

4. Streetscape, setting or landscape

- Is the scale, proportion and form of the proposal appropriate for the streetscape, setting or landscape?
- Does the proposal contribute to the visual interest of the streetscape, setting or landscape?
- Does the proposal reduce clutter by rationalising and simplifying existing advertising?
- Does the proposal screen unsightliness?
- Does the proposal protrude above buildings, structures or tree canopies in the area or locality?
- Does the proposal require ongoing vegetation management?

5. Site and building

- Is the proposal compatible with the scale, proportion and other characteristics of the site or building, or both, on which the proposed signage is to be located?
- Does the proposal respect important features of the site or building, or both?
- Does the proposal show innovation and imagination in its relationship to the site or building, or both?

6. Associated devices and logos with advertisements and advertising structures

- Have any safety devices, platforms, lighting devices or logos been designed as an integral part of the signage or structure on which it is to be displayed?

7. Illumination

- Would illumination result in unacceptable glare?
- Would illumination affect safety for pedestrians, vehicles or aircraft?
- Would illumination detract from the amenity of any residence or other form of accommodation?
- Can the intensity of the illumination be adjusted, if necessary?
- Is the illumination subject to a curfew?

8. Safety

- Would the proposal reduce the safety for any public road?
- Would the proposal reduce the safety for pedestrians or bicyclists?
- Would the proposal reduce the safety for pedestrians, particularly children, by obscuring sightlines from public areas?

APPENDIX D

OBTRUSIVE LIGHTING CALCULATIONS - DIRECT CONTRIBUTION FROM FLOODLIGHTS*

Calculation Summary			
Project: Obtrusive			
Label	CalcType	Units	Max
8 Jane Pl_Ill_Seg4	Obtrusive - Ill	Lux	0.0
8 Jane Pl_Ill_Seg3	Obtrusive - Ill	Lux	0.0
8 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
8 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0
6 Jane Pl_Ill_Seg4	Obtrusive - Ill	Lux	0.0
6 Jane Pl_Ill_Seg3	Obtrusive - Ill	Lux	0.0
6 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
6 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg6	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg5	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg4	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg3	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg2	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg1	Obtrusive - Ill	Lux	0.0
4 Dalley Rd_Ill_Seg4	Obtrusive - Ill	Lux	0.0
4 Dalley Rd_Ill_Seg3	Obtrusive - Ill	Lux	0.0
4 Dalley Rd_Ill_Seg2	Obtrusive - Ill	Lux	0.0
4 Dalley Rd_Ill_Seg1	Obtrusive - Ill	Lux	0.0
2 Dalley Rd_Ill_Seg2	Obtrusive - Ill	Lux	0.0
2 Dalley Rd_Ill_Seg1	Obtrusive - Ill	Lux	0.0
18 Jane Pl_Ill_Seg3	Obtrusive - Ill	Lux	0.0
18 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
18 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0
16 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
16 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg6	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg5	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg4	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg3	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_5_Ill_Seg6	Obtrusive - Ill	Lux	0.0
15 The Avenue_5_Ill_Seg5	Obtrusive - Ill	Lux	0.0
15 The Avenue_5_Ill_Seg4	Obtrusive - Ill	Lux	0.0
15 The Avenue_5_Ill_Seg3	Obtrusive - Ill	Lux	0.0
15 The Avenue_5_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_5_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg9	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg8	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg7	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg6	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg5	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg4	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg3	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg10	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg6	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg5	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg4	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg3	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg6	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg5	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg4	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg3	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_1_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_1_Ill_Seg1	Obtrusive - Ill	Lux	0.0
14 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
14 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0
1289 Princes Hwy_Ill_Seg4	Obtrusive - Ill	Lux	0.0
1289 Princes Hwy_Ill_Seg3	Obtrusive - Ill	Lux	0.0
1289 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1289 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.0
1279 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1279 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.0
1277 Princes Hwy_Ill_Seg4	Obtrusive - Ill	Lux	0.0
1277 Princes Hwy_Ill_Seg3	Obtrusive - Ill	Lux	0.0
1277 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1277 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.0
1275 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1275 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.0
1273 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1273 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.0
1271 Princes Hwy_Ill_Seg7	Obtrusive - Ill	Lux	0.0
1271 Princes Hwy_Ill_Seg6	Obtrusive - Ill	Lux	0.0
1271 Princes Hwy_Ill_Seg5	Obtrusive - Ill	Lux	0.0
1271 Princes Hwy_Ill_Seg4	Obtrusive - Ill	Lux	0.0
1271 Princes Hwy_Ill_Seg3	Obtrusive - Ill	Lux	0.0
1271 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1271 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.0
1269 Princes Hwy_Ill_Seg4	Obtrusive - Ill	Lux	0.0
1269 Princes Hwy_Ill_Seg3	Obtrusive - Ill	Lux	0.0
1269 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1269 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.0
12 Jane Pl_Ill_Seg3	Obtrusive - Ill	Lux	0.0
12 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
12 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0
10 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
10 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0
1 Dalley Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1 Dalley Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0

* The total illuminance shown in the report is a sum of the direct light from the floodlight and the indirect light reflected from the signage surface.

APPENDIX D

OBTRUSIVE LIGHTING CALCULATIONS - REFLECTED CONTRIBUTION FROM FLOODLIGHT OFF SIGNAGE SURFACE*

Calculation Summary			
Project: Obtrusive			
Label	CalcType	Units	Max
8 Jane Pl_Ill_Seg4	Obtrusive - Ill	Lux	0.1
8 Jane Pl_Ill_Seg3	Obtrusive - Ill	Lux	0.2
8 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
8 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.2
6 Jane Pl_Ill_Seg4	Obtrusive - Ill	Lux	0.1
6 Jane Pl_Ill_Seg3	Obtrusive - Ill	Lux	0.2
6 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.2
6 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.1
6 Dalley Rd_Ill_Seg6	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg5	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg4	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg3	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg2	Obtrusive - Ill	Lux	0.0
6 Dalley Rd_Ill_Seg1	Obtrusive - Ill	Lux	0.0
4 Dalley Rd_Ill_Seg4	Obtrusive - Ill	Lux	0.0
4 Dalley Rd_Ill_Seg3	Obtrusive - Ill	Lux	0.0
4 Dalley Rd_Ill_Seg2	Obtrusive - Ill	Lux	0.1
4 Dalley Rd_Ill_Seg1	Obtrusive - Ill	Lux	0.1
2 Dalley Rd_Ill_Seg2	Obtrusive - Ill	Lux	0.0
2 Dalley Rd_Ill_Seg1	Obtrusive - Ill	Lux	0.1
18 Jane Pl_Ill_Seg3	Obtrusive - Ill	Lux	0.0
18 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.1
18 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.1
16 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
16 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg6	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg5	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg4	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg3	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_5_Ill_Seg6	Obtrusive - Ill	Lux	0.1
15 The Avenue_5_Ill_Seg5	Obtrusive - Ill	Lux	0.0
15 The Avenue_5_Ill_Seg4	Obtrusive - Ill	Lux	0.1
15 The Avenue_5_Ill_Seg3	Obtrusive - Ill	Lux	0.1
15 The Avenue_5_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_5_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg9	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg8	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg7	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg6	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg5	Obtrusive - Ill	Lux	0.1
15 The Avenue_4_Ill_Seg4	Obtrusive - Ill	Lux	0.1
15 The Avenue_4_Ill_Seg3	Obtrusive - Ill	Lux	0.1
15 The Avenue_4_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg10	Obtrusive - Ill	Lux	0.0
15 The Avenue_4_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg6	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg5	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg4	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg3	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_3_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg6	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg5	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg4	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg3	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_2_Ill_Seg1	Obtrusive - Ill	Lux	0.0
15 The Avenue_1_Ill_Seg2	Obtrusive - Ill	Lux	0.0
15 The Avenue_1_Ill_Seg1	Obtrusive - Ill	Lux	0.1
14 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.1
14 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0
1289 Princes Hwy_Ill_Seg4	Obtrusive - Ill	Lux	0.0
1289 Princes Hwy_Ill_Seg3	Obtrusive - Ill	Lux	0.1
1289 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1289 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.1
1279 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.1
1279 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.3
1277 Princes Hwy_Ill_Seg4	Obtrusive - Ill	Lux	0.2
1277 Princes Hwy_Ill_Seg3	Obtrusive - Ill	Lux	0.0
1277 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.2
1277 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.3
1275 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.3
1275 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.2
1273 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.3
1273 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.1
1271 Princes Hwy_Ill_Seg7	Obtrusive - Ill	Lux	0.3
1271 Princes Hwy_Ill_Seg6	Obtrusive - Ill	Lux	0.1
1271 Princes Hwy_Ill_Seg5	Obtrusive - Ill	Lux	0.3
1271 Princes Hwy_Ill_Seg4	Obtrusive - Ill	Lux	0.1
1271 Princes Hwy_Ill_Seg3	Obtrusive - Ill	Lux	0.3
1271 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.1
1271 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.4
1269 Princes Hwy_Ill_Seg4	Obtrusive - Ill	Lux	0.1
1269 Princes Hwy_Ill_Seg3	Obtrusive - Ill	Lux	0.4
1269 Princes Hwy_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1269 Princes Hwy_Ill_Seg1	Obtrusive - Ill	Lux	0.3
12 Jane Pl_Ill_Seg3	Obtrusive - Ill	Lux	0.0
12 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
12 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0
10 Jane Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
10 Jane Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.2
1 Dalley Pl_Ill_Seg2	Obtrusive - Ill	Lux	0.0
1 Dalley Pl_Ill_Seg1	Obtrusive - Ill	Lux	0.0

* The total illuminance shown in the report is a sum of the direct light from the floodlight and the indirect light reflected from the signage surface.

APPENDIX D
OBTRUSIVE LIGHTING CALCULATIONS

Calculation Summary			
Project: ESA Reflected From Signage Surface			
Label	CalcType	Units	Max
ESA Princes Highway_Ill_Seg1	Obtrusive - Ill	Lux	0.76

Calculation Summary			
Project: ESA Direct From Floodlights			
Label	CalcType	Units	Max
ESA Princes Highway_Ill_Seg1	Obtrusive - Ill	Lux	0.00

APPENDIX D

THRESHOLD INCREMENT LIGHTING CALCULATIONS*

Calculation Summary			
Project: Ti Direct From Floodlights			
Label	CalcType	Units	Max
Heathcote Rd to Princes Hwy (S)	Obtrusive - TI	%	0.00
Princes Hwy (northbound)	Obtrusive - TI	%	0.00
Princes Hwy (southbound)	Obtrusive - TI	%	0.00
Train (N)	Obtrusive - TI	%	0.00
Train (S)	Obtrusive - TI	%	0.00
Train_1 (N)	Obtrusive - TI	%	0.00
Train_1 (S)	Obtrusive - TI	%	0.00

Calculation Summary			
Project: Ti - Reflected From Signage Surface			
Label	CalcType	Units	Max
Heathcote Rd to Princes Hwy (S)	Obtrusive - TI	%	0.52
Princes Hwy (northbound)	Obtrusive - TI	%	7.11
Princes Hwy (southbound)	Obtrusive - TI	%	2.24
Train (N)	Obtrusive - TI	%	0.95
Train (S)	Obtrusive - TI	%	0.70
Train_1 (N)	Obtrusive - TI	%	0.73
Train_1 (S)	Obtrusive - TI	%	0.54

* Note: The total Threshold Increment is the sum of the direct contribution from the floodlights and the reflected light from the signage surface.

APPENDIX D
OBTRUSIVE AND THRESHOLD INCREMENT CALCULATIONS

Zone A3 - Medium District Brightness, Curfew

Filename: 1308.92 Princes Highway, Heathcote - Rev B - floodlight direct for Resi and TI
28/02/2024 12:35:59 PM

Illuminance
Maximum Allowable Value: 2 Lux

Calculations Tested (96):

Calculation Label	Test Results	Max. Illum.
15 The Avenue_III_Seg1	PASS	0.0
15 The Avenue_III_Seg2	PASS	0.0
15 The Avenue_III_Seg3	PASS	0.0
15 The Avenue_III_Seg4	PASS	0.0
15 The Avenue_III_Seg5	PASS	0.0
15 The Avenue_III_Seg6	PASS	0.0
15 The Avenue_1_III_Seg1	PASS	0.0
15 The Avenue_1_III_Seg2	PASS	0.0
15 The Avenue_2_III_Seg1	PASS	0.0
15 The Avenue_2_III_Seg2	PASS	0.0
15 The Avenue_2_III_Seg3	PASS	0.0
15 The Avenue_2_III_Seg4	PASS	0.0
15 The Avenue_2_III_Seg5	PASS	0.0
15 The Avenue_2_III_Seg6	PASS	0.0
15 The Avenue_3_III_Seg1	PASS	0.0
15 The Avenue_3_III_Seg2	PASS	0.0
15 The Avenue_3_III_Seg3	PASS	0.0
15 The Avenue_3_III_Seg4	PASS	0.0
15 The Avenue_3_III_Seg5	PASS	0.0
15 The Avenue_3_III_Seg6	PASS	0.0
15 The Avenue_4_III_Seg1	PASS	0.0
15 The Avenue_4_III_Seg2	PASS	0.0
15 The Avenue_4_III_Seg3	PASS	0.0
15 The Avenue_4_III_Seg4	PASS	0.0
15 The Avenue_4_III_Seg5	PASS	0.0
15 The Avenue_4_III_Seg6	PASS	0.0
15 The Avenue_4_III_Seg7	PASS	0.0
15 The Avenue_4_III_Seg8	PASS	0.0
15 The Avenue_4_III_Seg9	PASS	0.0
15 The Avenue_4_III_Seg10	PASS	0.0
15 The Avenue_5_III_Seg1	PASS	0.0
15 The Avenue_5_III_Seg2	PASS	0.0
15 The Avenue_5_III_Seg3	PASS	0.0
15 The Avenue_5_III_Seg4	PASS	0.0
15 The Avenue_5_III_Seg5	PASS	0.0
15 The Avenue_5_III_Seg6	PASS	0.0
6 Jane Pl_III_Seg1	PASS	0.0
6 Jane Pl_III_Seg2	PASS	0.0
6 Jane Pl_III_Seg3	PASS	0.0
6 Jane Pl_III_Seg4	PASS	0.0
8 Jane Pl_III_Seg1	PASS	0.0
8 Jane Pl_III_Seg2	PASS	0.0
8 Jane Pl_III_Seg3	PASS	0.0
8 Jane Pl_III_Seg4	PASS	0.0
10 Jane Pl_III_Seg1	PASS	0.0
10 Jane Pl_III_Seg2	PASS	0.0
12 Jane Pl_III_Seg1	PASS	0.0
12 Jane Pl_III_Seg2	PASS	0.0
12 Jane Pl_III_Seg3	PASS	0.0
14 Jane Pl_III_Seg1	PASS	0.0
14 Jane Pl_III_Seg2	PASS	0.0

APPENDIX D
OBTRUSIVE AND THRESHOLD INCREMENT CALCULATIONS

16 Jane Pl_III_Seg1	**PASS**	0.0
16 Jane Pl_III_Seg2	**PASS**	0.0
18 Jane Pl_III_Seg1	**PASS**	0.0
18 Jane Pl_III_Seg2	**PASS**	0.0
18 Jane Pl_III_Seg3	**PASS**	0.0
1 Dalley Pl_III_Seg1	**PASS**	0.0
1 Dalley Pl_III_Seg2	**PASS**	0.0
2 Dalley Rd_III_Seg1	**PASS**	0.0
2 Dalley Rd_III_Seg2	**PASS**	0.0
4 Dalley Rd_III_Seg1	**PASS**	0.0
4 Dalley Rd_III_Seg2	**PASS**	0.0
4 Dalley Rd_III_Seg3	**PASS**	0.0
4 Dalley Rd_III_Seg4	**PASS**	0.0
6 Dalley Rd_III_Seg1	**PASS**	0.0
6 Dalley Rd_III_Seg2	**PASS**	0.0
6 Dalley Rd_III_Seg3	**PASS**	0.0
6 Dalley Rd_III_Seg4	**PASS**	0.0
6 Dalley Rd_III_Seg5	**PASS**	0.0
6 Dalley Rd_III_Seg6	**PASS**	0.0
1271 Princes Hwy_III_Seg1	**PASS**	0.0
1271 Princes Hwy_III_Seg2	**PASS**	0.0
1271 Princes Hwy_III_Seg3	**PASS**	0.0
1271 Princes Hwy_III_Seg4	**PASS**	0.0
1271 Princes Hwy_III_Seg5	**PASS**	0.0
1271 Princes Hwy_III_Seg6	**PASS**	0.0
1271 Princes Hwy_III_Seg7	**PASS**	0.0
1269 Princes Hwy_III_Seg1	**PASS**	0.0
1269 Princes Hwy_III_Seg2	**PASS**	0.0
1269 Princes Hwy_III_Seg3	**PASS**	0.0
1269 Princes Hwy_III_Seg4	**PASS**	0.0
1273 Princes Hwy_III_Seg1	**PASS**	0.0
1273 Princes Hwy_III_Seg2	**PASS**	0.0
1275 Princes Hwy_III_Seg1	**PASS**	0.0
1275 Princes Hwy_III_Seg2	**PASS**	0.0
1277 Princes Hwy_III_Seg1	**PASS**	0.0
1277 Princes Hwy_III_Seg2	**PASS**	0.0
1277 Princes Hwy_III_Seg3	**PASS**	0.0
1277 Princes Hwy_III_Seg4	**PASS**	0.0
1279 Princes Hwy_III_Seg1	**PASS**	0.0
1279 Princes Hwy_III_Seg2	**PASS**	0.0
1289 Princes Hwy_III_Seg1	**PASS**	0.0
1289 Princes Hwy_III_Seg2	**PASS**	0.0
1289 Princes Hwy_III_Seg3	**PASS**	0.0
1289 Princes Hwy_III_Seg4	**PASS**	0.0
ESA Princes Highway_III_Seg1	**PASS**	0.00

Luminous Intensity (Cd) At Vertical Planes
Maximum Allowable Value: 2500 Cd

Calculations Tested (95):

Calculation Label	Test Results
15 The Avenue_Cd_Seg1	**PASS**
15 The Avenue_Cd_Seg2	**PASS**
15 The Avenue_Cd_Seg3	**PASS**
15 The Avenue_Cd_Seg4	**PASS**
15 The Avenue_Cd_Seg5	**PASS**
15 The Avenue_Cd_Seg6	**PASS**
15 The Avenue_1_Cd_Seg1	**PASS**
15 The Avenue_1_Cd_Seg2	**PASS**
15 The Avenue_2_Cd_Seg1	**PASS**

APPENDIX D
OBTRUSIVE AND THRESHOLD INCREMENT CALCULATIONS

15 The Avenue_2_Cd_Seg2	**PASS**
15 The Avenue_2_Cd_Seg3	**PASS**
15 The Avenue_2_Cd_Seg4	**PASS**
15 The Avenue_2_Cd_Seg5	**PASS**
15 The Avenue_2_Cd_Seg6	**PASS**
15 The Avenue_3_Cd_Seg1	**PASS**
15 The Avenue_3_Cd_Seg2	**PASS**
15 The Avenue_3_Cd_Seg3	**PASS**
15 The Avenue_3_Cd_Seg4	**PASS**
15 The Avenue_3_Cd_Seg5	**PASS**
15 The Avenue_3_Cd_Seg6	**PASS**
15 The Avenue_4_Cd_Seg1	**PASS**
15 The Avenue_4_Cd_Seg2	**PASS**
15 The Avenue_4_Cd_Seg3	**PASS**
15 The Avenue_4_Cd_Seg4	**PASS**
15 The Avenue_4_Cd_Seg5	**PASS**
15 The Avenue_4_Cd_Seg6	**PASS**
15 The Avenue_4_Cd_Seg7	**PASS**
15 The Avenue_4_Cd_Seg8	**PASS**
15 The Avenue_4_Cd_Seg9	**PASS**
15 The Avenue_4_Cd_Seg10	**PASS**
15 The Avenue_5_Cd_Seg1	**PASS**
15 The Avenue_5_Cd_Seg2	**PASS**
15 The Avenue_5_Cd_Seg3	**PASS**
15 The Avenue_5_Cd_Seg4	**PASS**
15 The Avenue_5_Cd_Seg5	**PASS**
15 The Avenue_5_Cd_Seg6	**PASS**
6 Jane Pl_Cd_Seg1	**PASS**
6 Jane Pl_Cd_Seg2	**PASS**
6 Jane Pl_Cd_Seg3	**PASS**
6 Jane Pl_Cd_Seg4	**PASS**
8 Jane Pl_Cd_Seg1	**PASS**
8 Jane Pl_Cd_Seg2	**PASS**
8 Jane Pl_Cd_Seg3	**PASS**
8 Jane Pl_Cd_Seg4	**PASS**
10 Jane Pl_Cd_Seg1	**PASS**
10 Jane Pl_Cd_Seg2	**PASS**
12 Jane Pl_Cd_Seg1	**PASS**
12 Jane Pl_Cd_Seg2	**PASS**
12 Jane Pl_Cd_Seg3	**PASS**
14 Jane Pl_Cd_Seg1	**PASS**
14 Jane Pl_Cd_Seg2	**PASS**
16 Jane Pl_Cd_Seg1	**PASS**
16 Jane Pl_Cd_Seg2	**PASS**
18 Jane Pl_Cd_Seg1	**PASS**
18 Jane Pl_Cd_Seg2	**PASS**
18 Jane Pl_Cd_Seg3	**PASS**
1 Dalley Pl_Cd_Seg1	**PASS**
1 Dalley Pl_Cd_Seg2	**PASS**
2 Dalley Rd_Cd_Seg1	**PASS**
2 Dalley Rd_Cd_Seg2	**PASS**
4 Dalley Rd_Cd_Seg1	**PASS**
4 Dalley Rd_Cd_Seg2	**PASS**
4 Dalley Rd_Cd_Seg3	**PASS**
4 Dalley Rd_Cd_Seg4	**PASS**
6 Dalley Rd_Cd_Seg1	**PASS**
6 Dalley Rd_Cd_Seg2	**PASS**
6 Dalley Rd_Cd_Seg3	**PASS**
6 Dalley Rd_Cd_Seg4	**PASS**
6 Dalley Rd_Cd_Seg5	**PASS**
6 Dalley Rd_Cd_Seg6	**PASS**

APPENDIX D
OBTRUSIVE AND THRESHOLD INCREMENT CALCULATIONS

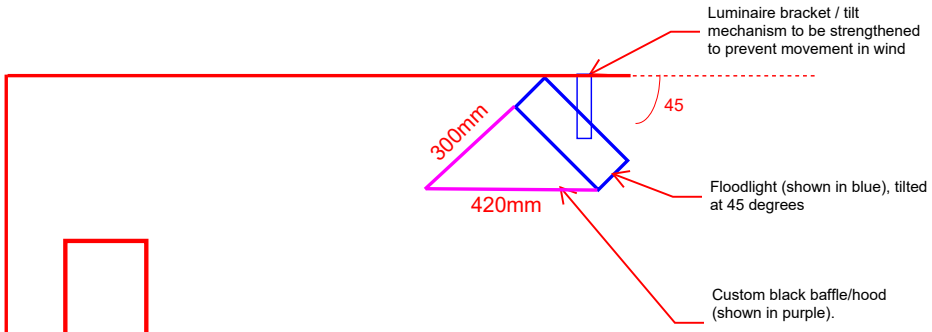
1271 Princes Hwy_Cd_Seg1	**PASS**
1271 Princes Hwy_Cd_Seg2	**PASS**
1271 Princes Hwy_Cd_Seg3	**PASS**
1271 Princes Hwy_Cd_Seg4	**PASS**
1271 Princes Hwy_Cd_Seg5	**PASS**
1271 Princes Hwy_Cd_Seg6	**PASS**
1271 Princes Hwy_Cd_Seg7	**PASS**
1269 Princes Hwy_Cd_Seg1	**PASS**
1269 Princes Hwy_Cd_Seg2	**PASS**
1269 Princes Hwy_Cd_Seg3	**PASS**
1269 Princes Hwy_Cd_Seg4	**PASS**
1273 Princes Hwy_Cd_Seg1	**PASS**
1273 Princes Hwy_Cd_Seg2	**PASS**
1275 Princes Hwy_Cd_Seg1	**PASS**
1275 Princes Hwy_Cd_Seg2	**PASS**
1277 Princes Hwy_Cd_Seg1	**PASS**
1277 Princes Hwy_Cd_Seg2	**PASS**
1277 Princes Hwy_Cd_Seg3	**PASS**
1277 Princes Hwy_Cd_Seg4	**PASS**
1279 Princes Hwy_Cd_Seg1	**PASS**
1279 Princes Hwy_Cd_Seg2	**PASS**
1289 Princes Hwy_Cd_Seg1	**PASS**
1289 Princes Hwy_Cd_Seg2	**PASS**
1289 Princes Hwy_Cd_Seg3	**PASS**
1289 Princes Hwy_Cd_Seg4	**PASS**

Threshold Increment (TI)
Maximum Allowable Value: 20 %

Calculations Tested (7):

Calculation Label	Adaptation Luminance	Test Results
Princes Hwy (southbound)	1	**PASS**
Princes Hwy (northbound)	1	**PASS**
Heathcote Rd to Princes Hwy (S)	1	**PASS**
Train (N)	0.2	**PASS**
Train_1 (N)	0.2	**PASS**
Train (S)	0.2	**PASS**
Train_1 (S)	0.2	**PASS**

APPENDIX E
LUMINAIRE BAFFLE DESIGN



Typical Signage Section

Conceptual Baffle/Hood Image

1308.92 - Indicative Floodlight Baffle Design
Electrolight RS 28/02/24