Attachment 1 - PLN19/0007 - 200 / 658 Church Street Cremorne - Subject Land

Subject Land: 200/658 Church Street, Richmond

⇧ North

Subject site

Consulting Engineer

Dr Richard Dluzniak
Consulting Engineer
6 Locksley Avenue, Kew
Victoria 3101 Australia
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REPORT ON OBTRUSIVE LIGHT
Proposed 7-Eleven Illuminated Sign
200/658 Church Street
Cremorne. Vic. 3121

1 Summary

An analysis has been made on the obtrusive light (spill light) emanating from the proposed 7-Eleven roof top signs located at the above address. The analysis has considered the light spill impacts in relation to residential buildings at 50 Claremont Street, 633 Church Street, 85 Alexandra Avenue and 8 Howard Street.

The critical parameter affecting residents is the spill light falling on residential boundaries and dwelling windows. This spill light is the vertical plane illuminance (Ev) as defined in the Australian Standard AS 4282- 2018 : Control of the Obtrusive Effects of Outdoor Lighting.

The critical values are summarised below:

Operating Time	**Max Ev in residential areas with light surrounds**
Pre-curfew hours	10 lux (max) on residential property boundary
Curfew hours (11pm to 6am)	2 lux (max) on residential window

The analysis has shown that the 10 lux vertical plane illuminance only extends 30m from the 7-Eleven sign and does not encroach on any residential property during pre-curfew times. Furthermore, the 2 lux vertical plane illuminance which extends to 66m from the sign during curfew times also does not encroach on any residential window.

Hence the sign complies with the Australian Standard for obtrusive light spill.

2 Lighting Source and Sign Parameters

The proposed sign is internally illuminated by strips of LED lights outlining the 7-Eleven logo. The sign and lighting system have the following characteristics:

Light Source Parameters and Lighting Calculations	
Light source	LED strip lights
Length of strips	75m
LED output lumens/m	840 lumen/m
transmittance of sign acrylic material	0.7

Coeff of utilisation of sign enclosure	0.9
Reflectance of acrylic material	0.7
Total sign area	4.5 x 4.5m = 20.2m2
Equivalent lit area (A)	8.0 m2 (40% of total area)
Total internal flux in sign	75m x 894lm/m = 63,000 lumen
Transmitted flux to outside of sign	63,000 x 0.7 x 0.9 = 39,700 lumen
Illuminance on sign (E)	39,700/8.0 = 4960 lux
Luminance of sign (L)	L= ρ x E / π = 0.7x4960 / 3.14 = 1105 cd/m2
Luminous intensity of sign	I = L x A = 1105 x 8 = 8840 cd
Mean height of sign above road	32.5 m

Refer to **Attachment 1** for details of the sign.

3 Obtrusive Light Analysis

The analysis for the obtrusive light can be based on the sign being a point source of illumination with max intensity Imax = 8840 cd (as determined above). The point source analysis is appropriate providing:

1 The distances from the point source are large compare to the size of the source. Distances approx 8-10 times the source dimensions are considered appropriate.

2 The point source acts as a perfect diffuser with distribution $I\theta = Imax * \sin(\theta)$

Note: Spill light at distances less than 25m from the sign cannot be calculated accurately using point source formula. For accurate results close to the sign very complicated line and area source formulae is required.

Attachment 2 shows the light distribution of the sign assuming a perfect diffuser. Light emanates from the sign for all angles greater than 0 deg and less than 180 deg. The light intensity at an angle Θ to the sign is given by

$$I\theta = 8840 \sin(\theta) \quad (cd)$$

Attachment 3 shows the application of the Inverse Square Law to determine the vertical illuminance at any point in the horizontal plane of the sign. The illuminance at any point is given by

$$Ev = I\theta / d^2 \quad (lux)$$

or, for a given value of Ev the distance is given by

$$d = SQRT(I\theta / Ev) \quad (m)$$

Attachment 4 shows the vertical illuminances in the horizontal plane of the sign (that is, at 32.5m above ground level) spreading forward towards the Yarra River. The contours show the vertical illuminances for each side of the sign – the resultant illuminances where the contours intercept close to the sign are not shown for clarity. They do not affect the final result.

The following observations are made concerning the vertical illuminances :

1 The maximum vertical illuminances are at this level. Illuminances at other levels, particularly at ground level will be much lower.

2 There is negligible spill light behind, and on each side, of the sign as shown by the lighting contours. This is because the sign has low luminous intensities in these directions.

3 The critical spill light values of 10 lux (and 2 lux during curfew hours) do not impinge on any residential property or dwelling window in the vicinity of the sign.

Note that the 7-Eleven sign is not a LED Billboard which emits light over its entire surface but is substantially an empty LED billboard where only the outline of the 7-Eleven logo is illuminated. The sign luminance of 1105 cd/m2 is relatively low (compare to billboard values) hence the low obtrusive light levels.

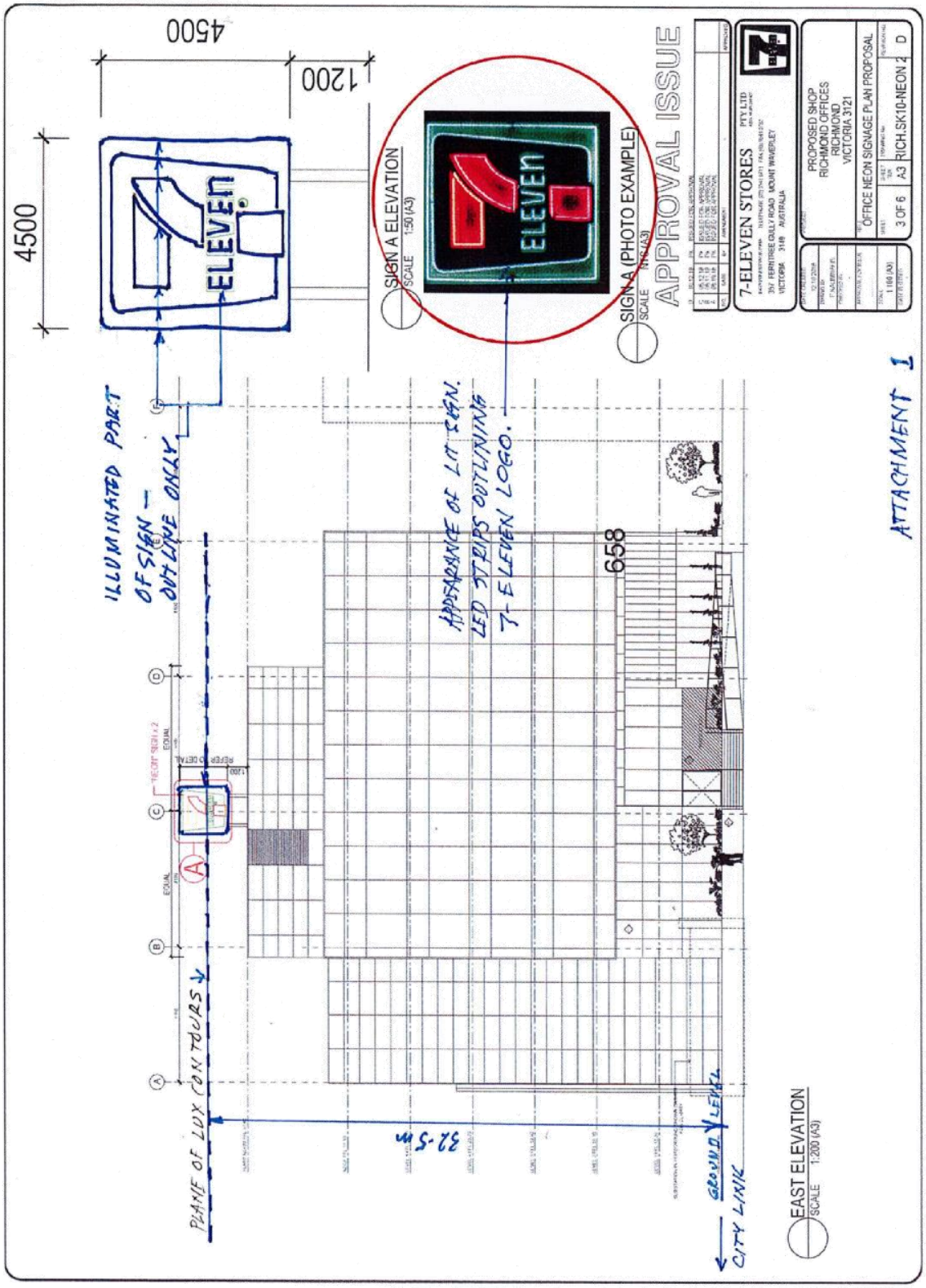
Hence the sign does not create an obtrusive light problem on any adjoining residential property or dwelling window (including 50 Claremont Street, 633 Church Street, 85 Alexandra Avenue and 8 Howard Street) and completely satisfies the Australian Obtrusive Light Code.

Prepared by

Dr Richard Dluzniak
Consulting Engineer
DipEE, BSc, MSc, PhD (Elec Eng)
MIE Aust, MIES, CPEng

3 September 2019

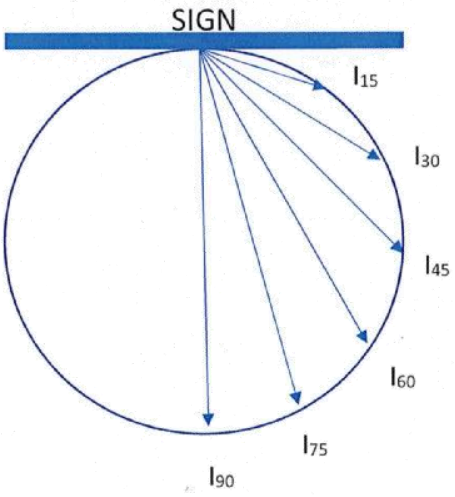
Attachment 2 - PLN19/0007 - 200 / 658 Church Street Cremorne - Obtrusive light assessment



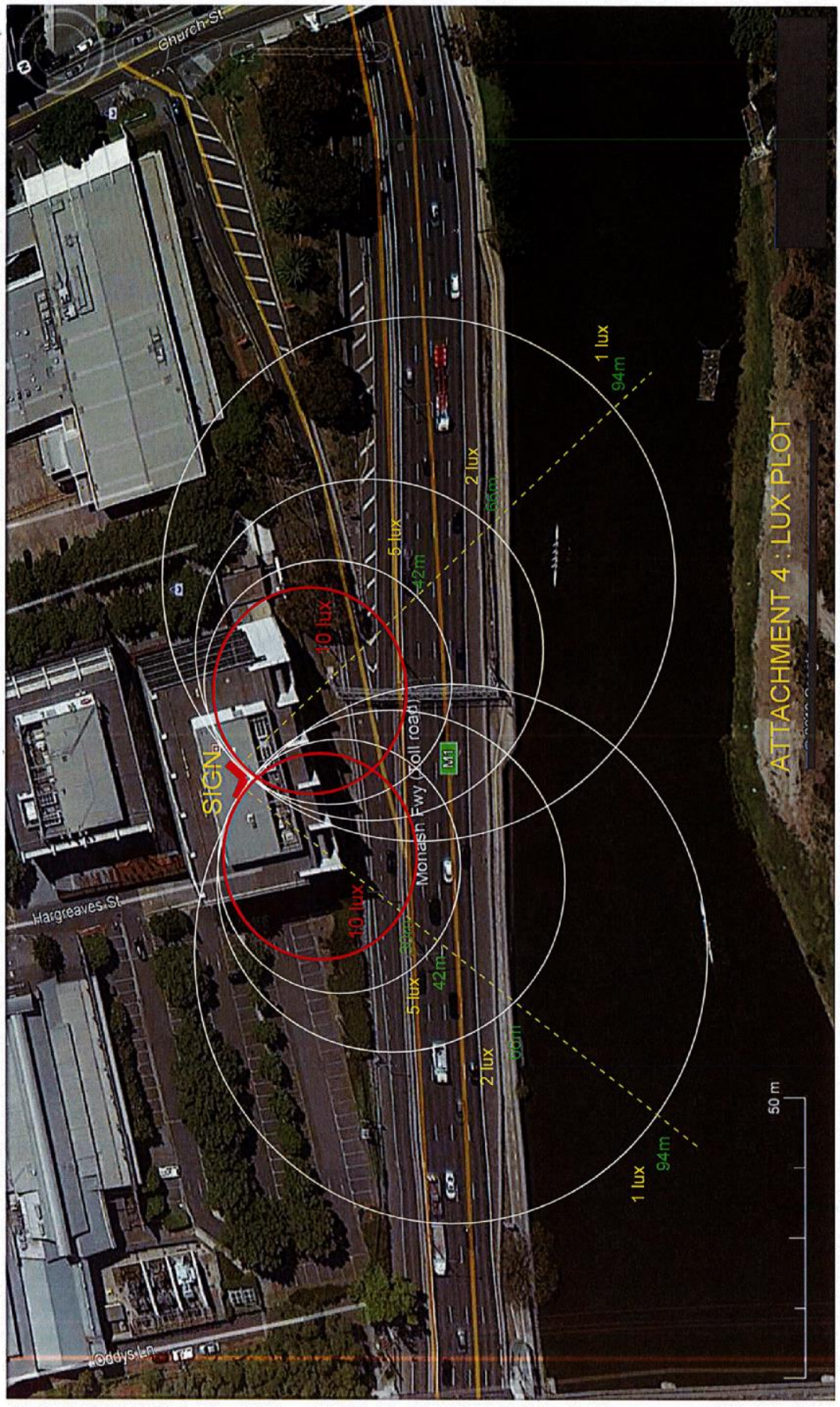
ATTACHMENT 2

7-Eleven Sign - luminous intensity distribution

Angle Θ (deg)	Intensity I_Θ (cd)
0	0
15	2290
30	4420
45	6250
60	7650
75	8540
90	8840



Attachment 2 - PLN19/0007 - 200 / 658 Church Street Cremorne - Obtrusive light assessment



ATTACHMENT 3

7-Eleven Sign – lux values at various distances

Angle Θ	Intensity I_Θ	Ev =10 lux	Ev=5 lux	Ev=2 lux	Ev=1 lux
0 deg	0 cd	0m	0m	0m	0m
15 deg	2290 cd	15m	21m	34m	48m
30 deg	4420 cd	21m	30m	47m	66m
45 deg	6250 cd	25m	35m	56m	79m
60 deg	7650 cd	28m	39m	62m	87m
75 deg	8540 cd	29m	41m	65m	92m
90 deg	8840 cd	30m	42m	66m	94m

The Table shows the distances (d) from the sign at various angles (Θ) to produce the vertical illuminance Ev (lux) according to the formula

$$d = SQRT (I_\Theta / E_V)$$

Attachment 3 - PLN19/0007 - 200 / 658 Church Street Cremorne - VicRoads - Section 52 - Suggested Conditions

vicroads
ABN 61 760 960 480

Yarra City Council
182 St Georges Road
Fitzroy VIC 3065
Attention: Daniel Goode

16 July 2019

Dear Sir/Madam

PLANNING APPLICATION NO.: PLN19/0007
VICROADS REFERENCE NO: PPR 30053/19
PROPERTY ADDRESS: 200/658 CHURCH STREET, CREMORNE 3121

Section 52 – Suggested conditions

Thank you for forwarding planning permit application PLN19/0007 pursuant to Section 52 of the Planning and Environment Act 1987.

The application is for DISPLAY OF INTERNALLY ILLUMINATED SKY bSIGNAGE.

VicRoads notes while the proposed development is not without some merit, there are a

Accordingly, VicRoads would not objects to the proposal in its current form.

If Council regards the proposed development favourably, VicRoads suggests that the following conditions be included if Council were inclined to issue a Notice of Decision to issue a Planning Permit:

1. *The luminance of the advertising sign must be such that it does not give a veiling luminance to the driver, of greater than 0.25 cd/m^2, throughout the driver's approach to the advertising sign.*

2. *The control of the internally illuminated sign must be in accordance with the submitted lighting reports, which must form part of any issued Planning Permit:*

    a) *Report on Motorist Glare of 7-Eleven Illuminated Sign at 200/658 Church Street, Cremorne by Dr. Richard Dluzniak Consulting Engineering, dated 30 May 2019*

3. *The sign and any displayed advertisement must not include ancillary extension, embellishment or accessorisation within or outside the permitted advertising area, unless VicRoads has agreed in writing, prior to installation.*

4. *The sign must not be flashing, scrolling or intermittent light.*

5. *The sign must remain static at all times.*

Should you have any enquiries regarding this matter, please contact Mariham Tadros on 9313-1294 or mariham.tadros@roads.vic.gov.au.

Yours sincerely

Mariham Tadros.

Mariham Tadros
SIGNAGE OFFICER/ ENGINEER

Attachment 3 - PLN19/0007 - 200 / 658 Church Street Cremorne - VicRoads - Section 52 - Suggested Conditions

vicroads
ABN 61 760 960 480

ON BEHALF OF
ALAN KING
STATUTORY SIGNAGE OFFICER
Cc Anna Thang, SJB Planning

Attachment 4 - PLN19/0007 - 200 / 658 Church Street Cremorne - Lighting Report

Dr Richard Dluzniak
Consulting Engineer
6 Locksley Avenue, Kew
Victoria 3101 Australia
T 03 9817 6677 :M 0409 968603
Email dluzniak@bigpond.net.au

30 May 2019

Mr Peter Kalimnakis
Senior Planner
7-Eleven Stores
357 Ferntree Gully Road
Mount Waverley. 3146

Dear Peter

Re: **Planning Application 19/0007 (Roof Sign)**
200/658 Church Street Cremorne – Hold (330768)

COMPLIANCE STATEMENT FOR VICROADS

This is to confirm that a study has been carried out on the lighting effects of the proposed illuminated sign and the following has been determined:

- The maximum veiling luminance (Lv) to a driver, driving west along City Link, Cremorne, is 0.014 cd/m^2 throughout the driver's approach to the sign. This value is below the VicRoads limit of 0.25 cd/m^2.

- The analysis has been performed as per the formulation in Australian Standard AS/NZS 1158.2:2005 – Part 2 Computer procedures for calculation of light technical parameters for Category V and Category P lighting.

Although the illuminated sign is large, the veiling luminance is low because the sign is mounted at very high 40m above the road. The driver's line of sight is always taken as being along the road hence the sign is in his peripheral vision - causing negligible glare and hence low veiling luminance.

Thus the sign fully complies with VicRoads requirements. Refer to attached Report, Attachments and Computations for full lighting analysis.

Yours sincerely

R. Dluzniak

Dr Richard Dluzniak
Consulting Engineer
DipEE, BSc, MSc, PhD (Elec Eng)
MIE Aust, MIES, CPEng

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Email dluzniak@bigpond.net.au

REPORT ON MOTORIST GLARE

Proposed 7-Eleven Illuminated Sign
200/658 Church Street
Cremorne. Vic. 3121

1 Summary

An analysis has been made as per the formulation in Australian Standard AS/NZS 1158.2:2005 – Part 2 Computer procedures for calculation of light technical parameters for Category V and Category P lighting for the veiling luminance from the proposed roof top sign to motorists travelling along City Link, Cremorne 3121.

The critical parameter affecting driver performance in the field of view of glare objects (illuminated signs) is the veiling luminance (Lv). The max value of veiling luminance that a driver can be subjected to is 0.25 cd/m^2 as stipulated by VicRoads. This max value of glare can be tolerated by a motorist before his vision is impaired and his driving performance compromised.

Analysis of the proposed sign shows that the maximum veiling luminance to a driver, throughout the driver's approach along City Link (heading West) towards the sign is 0.014 cd/m^2 which is below the VicRoads limit of 0.25 cd/m^2.

Hence the sign complies with VicRoads requirements.

2 Lighting Source and Sign Parameters

The proposed sign is internally illuminated by strips of LED lights outlining the 7-Eleven logo. The sign and lighting system have the following characteristics:

Light Source Parameters and Lighting Calculations	
Light source	LED strip lights
Length of strips	75m
LED output lumens/m	840 lumen/m
transmittance of sign acrylic material	0.7
Coeff of utilisation of sign enclosure	0.9
Reflectance of acrylic material	0.7
Total sign area	4.5 x 4.5m = 20.2m2
Equivalent lit area (A)	8.0 m2 (40% of total area)

Total internal flux in sign	75m x 894lm/m = 63,000 lumen
Transmitted flux to outside of sign	63,000 x 0.7 x 0.9 = 39,700 lumen
Illuminance on sign (E)	39,700/8.0 = 4960 lux
Luminance of sign (L)	L= ρ x E / π = 0.7x4960 / 3.14 = 1100 cd/m2
Average luminous intensity of sign (I)	I = L / A = 1100/8 = 8840 cd

Sign Physical Parameters

Mean height of sign above road	40 m
Mean offset of sign from road	40 m

Refer to **Attachment 1** for the site plan
Refer to **Attachment 2** for location of sign
Refer to **Attachment 3** for the sign details

3 Glare Analysis

The glare analysis is based on simulating a motorist approaching the sign from a long distance away right up to the sign and at each point calculating the glare in his eyes.

In general, if the driver is far from the sign the inverse square law prevails and the glare is low. On the other hand, if the driver is very close to the sign the angle between the sign and the motorist's normal direction of view is large and the glare is also low.

Somewhere in between the motorist being far away and very close to the sign the glare will be a maximum.

Refer to **Attachment 4** for the veiling luminance analysis

The driver is first placed 50m from the sign along City Link travelling West and is positioned further away by varying increments until he is 600m from the sign.

The graph of the Veiling Luminance (Lv) vs distance shows that the max Lv is when the driver is between 200-250m from the sign. At this locations the veiling luminance is 0.014 cd/m^2. Before and after this distance the veiling luminance is lower.

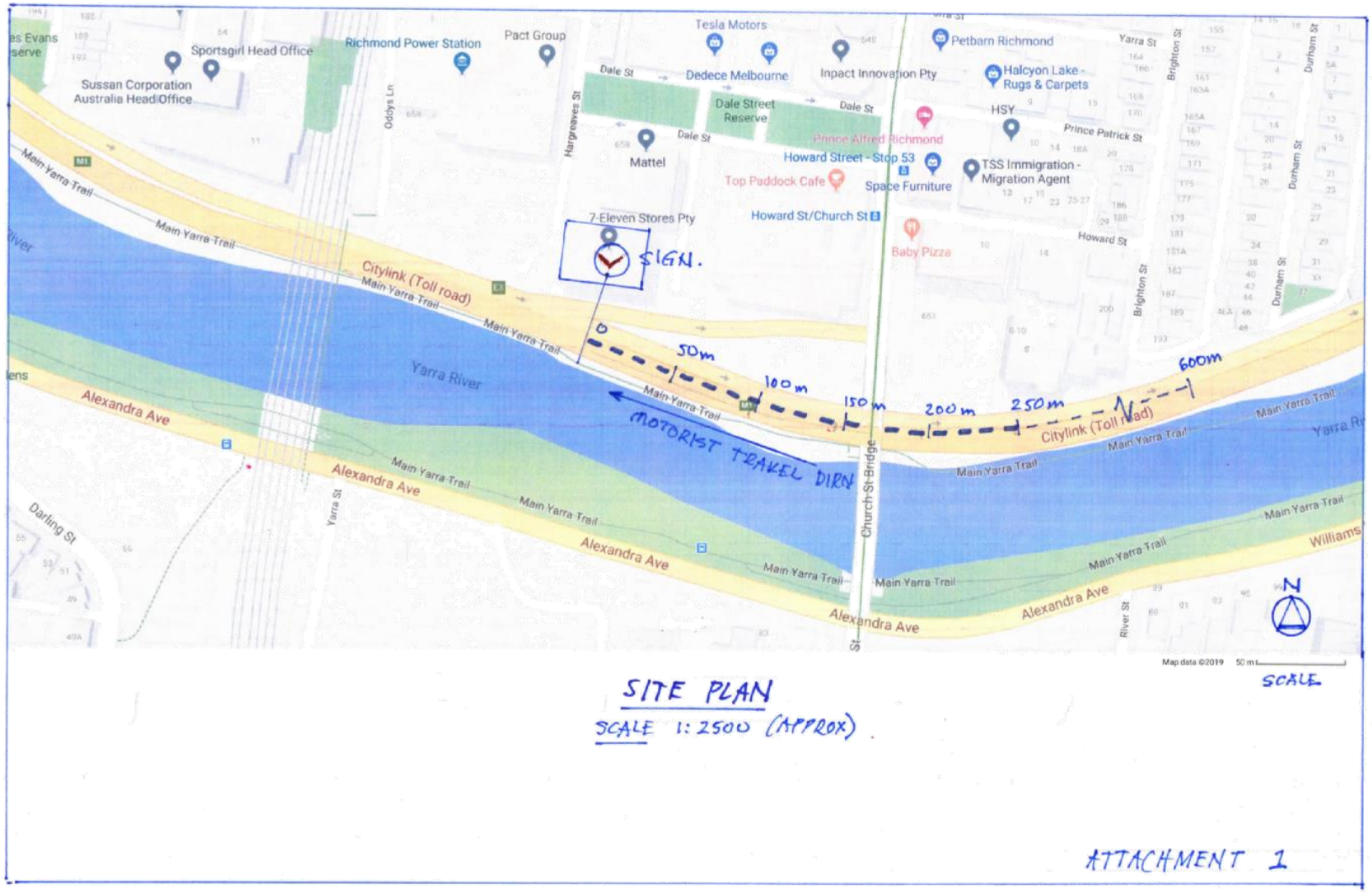
Travelling West along City Link is the worst situation for glare to motorists. If travelling East there are more obstructions between the driver and the sign (trees, railway bridge, concrete walls, etc) while travelling along Alexandra Avenue the glare is negligible because the sign is too fat away.

Prepared by

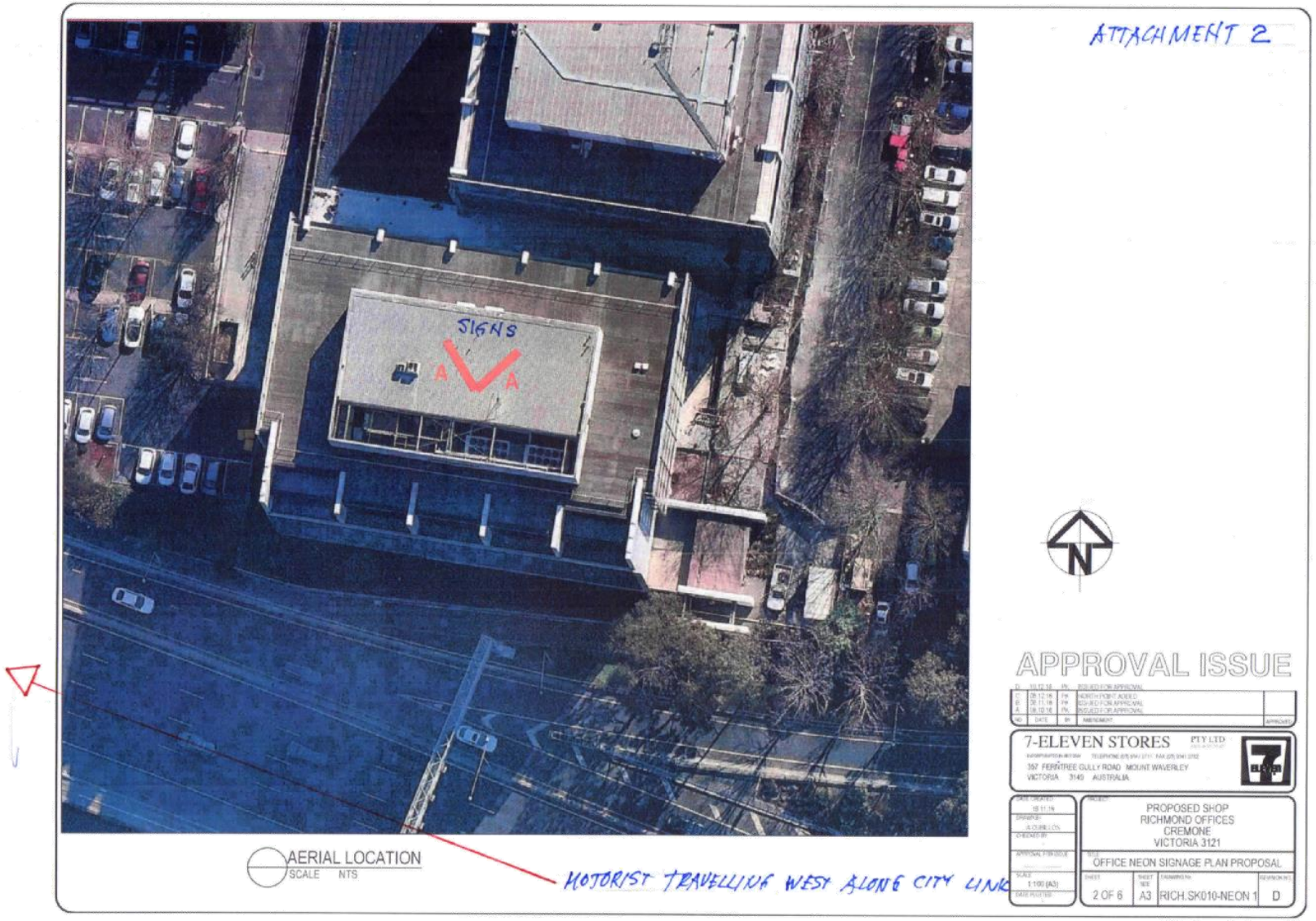
Dr Richard Dluzniak
Consulting Engineer
DipEE, BSc, MSc, PhD (Elec Eng)
MIE Aust, MIES, CPEng

30 May 2019

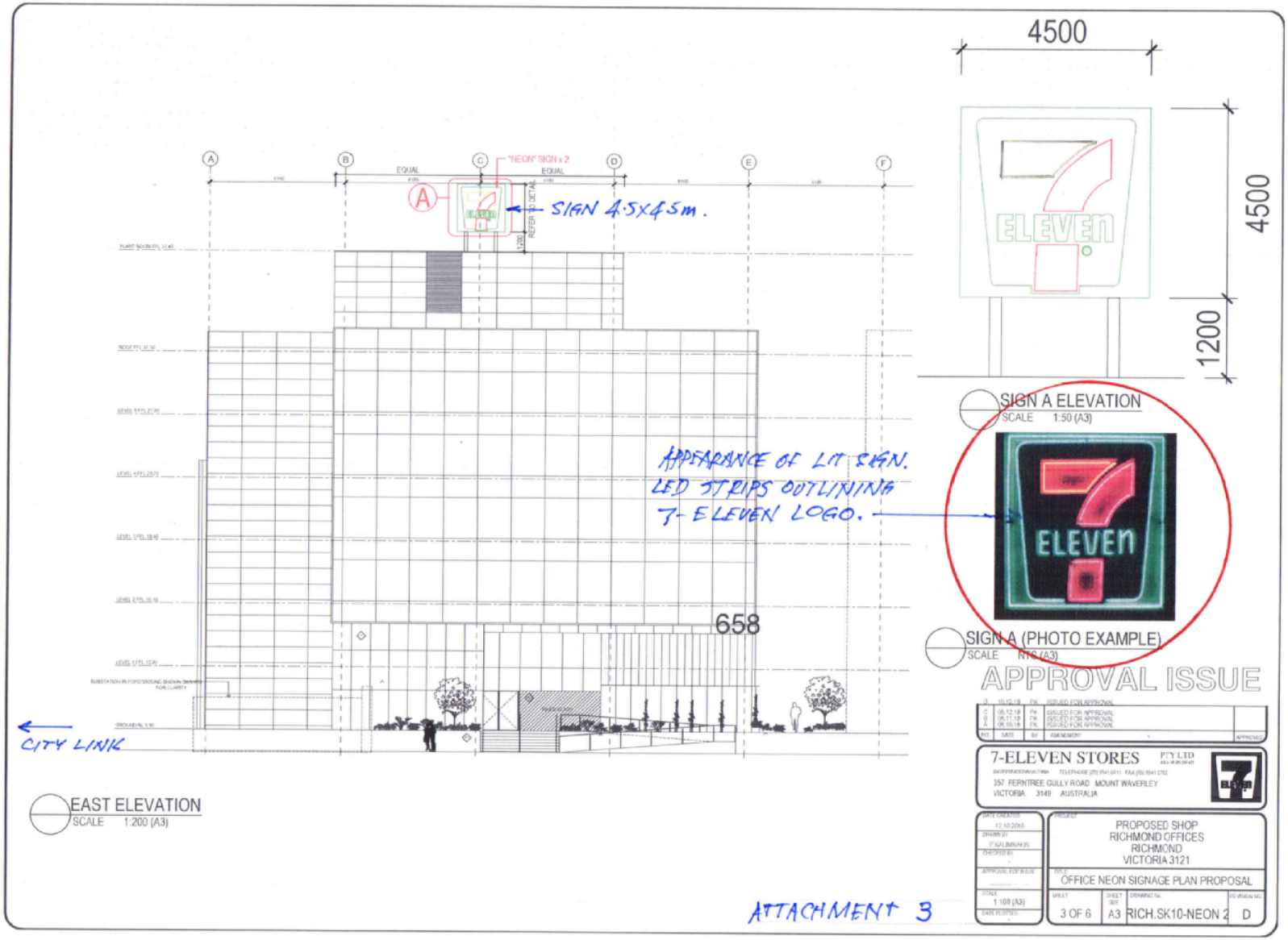
Attachment 4 - PLN19/0007 - 200 / 658 Church Street Cremorne - Lighting Report



Attachment 4 - PLN19/0007 - 200 / 658 Church Street Cremorne - Lighting Report



Attachment 4 - PLN19/0007 - 200 / 658 Church Street Cremorne - Lighting Report



Attachment 4 - PLN19/0007 - 200 / 658 Church Street Cremorne - Lighting Report

GLARE FROM ILLUMINATED SIGN : 7-ELEVEN LED SIGN, CREMORNE 3121

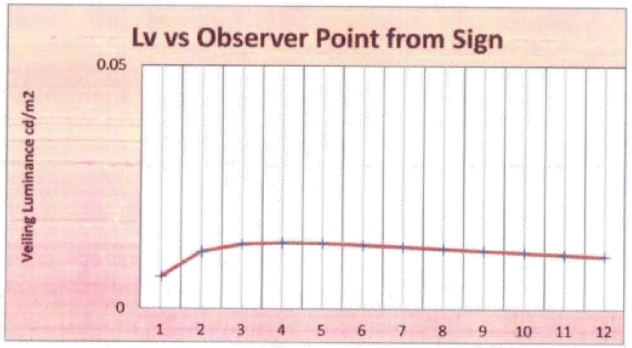
VEILING LUMINANCE ASSESSMENT : MOTORIST DRIVING WEST ALONG CITY LINK

ATTACHMENT 4

INPUT DATA

Observer Point	1	2	3	4	5	6	7	8	9	10	11	12
Height of Sign above road	40	40	40	40	40	40	40	40	40	40	40	40
Observer distance from Sign	50	100	150	200	250	300	350	400	450	500	550	600
Sign offset from road	40	40	40	40	40	40	40	40	40	40	40	40
Candela 1 : Lumin 1 x Area 1	8840	8840	8840	8840	8840	8840	8840	8840	8840	8840	8840	8840
Candela 2 : Lumin 2 x Area 2	0	0	0	0	0	0	0	0	0	0	0	0
Candela 3 : lumin 3 x Area 3	0	0	0	0	0	0	0	0	0	0	0	0
Angle of Sign to road	0	0	0	0	0	0	0	0	0	0	0	0
SITE GEOMETRY CALCS												
Alpha (rad)	0.541	0.343	0.243	0.187	0.151	0.127	0.109	0.095	0.085	0.077	0.070	0.064
Beta (rad)	0.675	0.381	0.261	0.197	0.159	0.133	0.114	0.100	0.089	0.080	0.073	0.067
Theta (rad)	0.559	0.361	0.261	0.204	0.168	0.144	0.126	0.113	0.102	0.094	0.087	0.081
D^2 (m)	5582	13082	25582	43082	65582	93082	125582	163082	205582	253082	305582	363082
I Theta (Cd)	5916	7729	8290	8518	8630	8692	8731	8756	8773	8786	8795	8802
E Theta (lux)	0.70	0.51	0.30	0.19	0.13	0.09	0.07	0.05	0.04	0.03	0.03	0.02
Lv (cd/m2)	0.007	0.012	0.013	0.014 MAXIMUM	0.014 MAXIMUM	0.013	0.013	0.012	0.012	0.012	0.011	0.011
TI (%)	0.4	0.8	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7

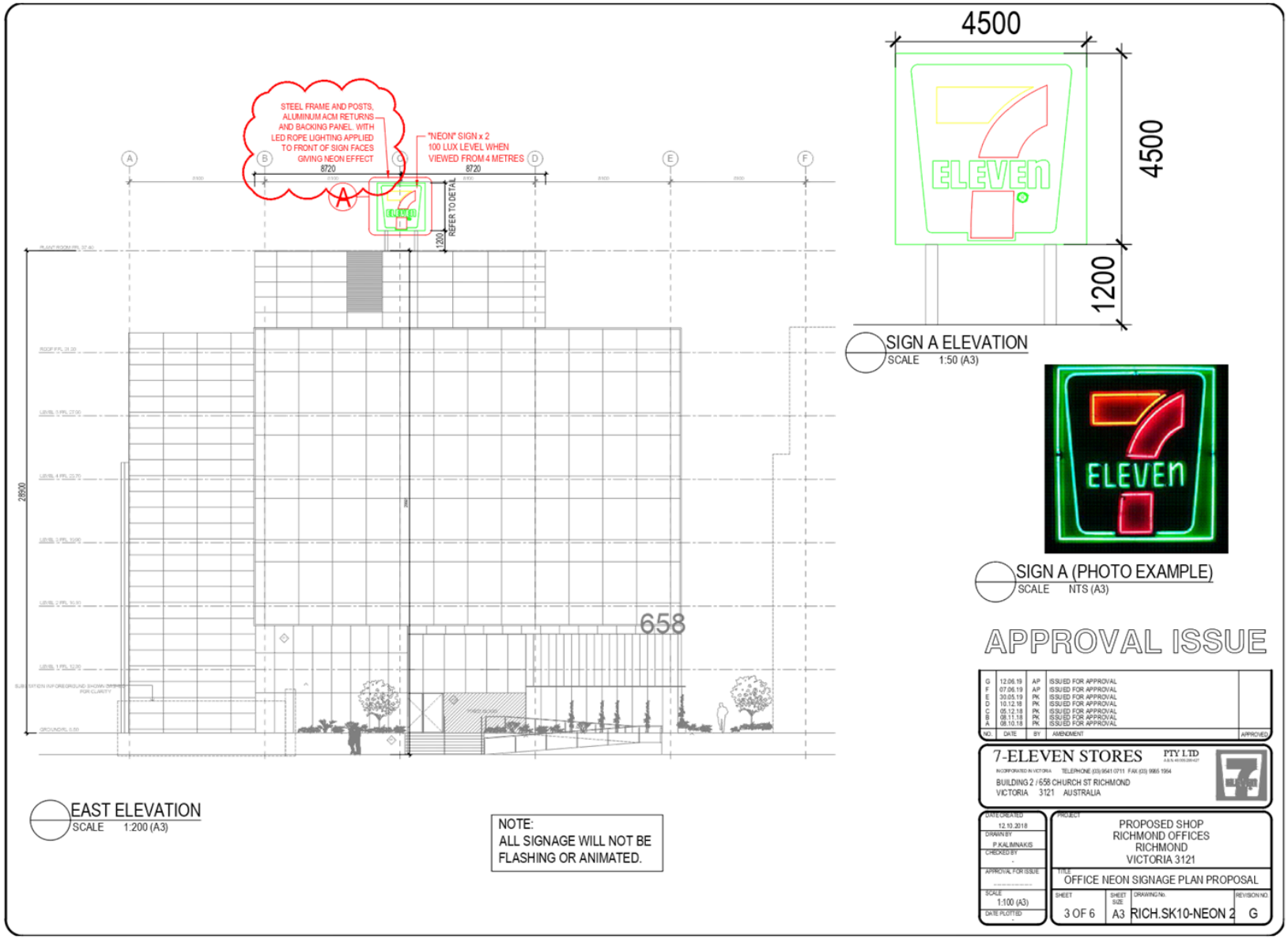
(based on road luminance of 1.0 cd/m2)



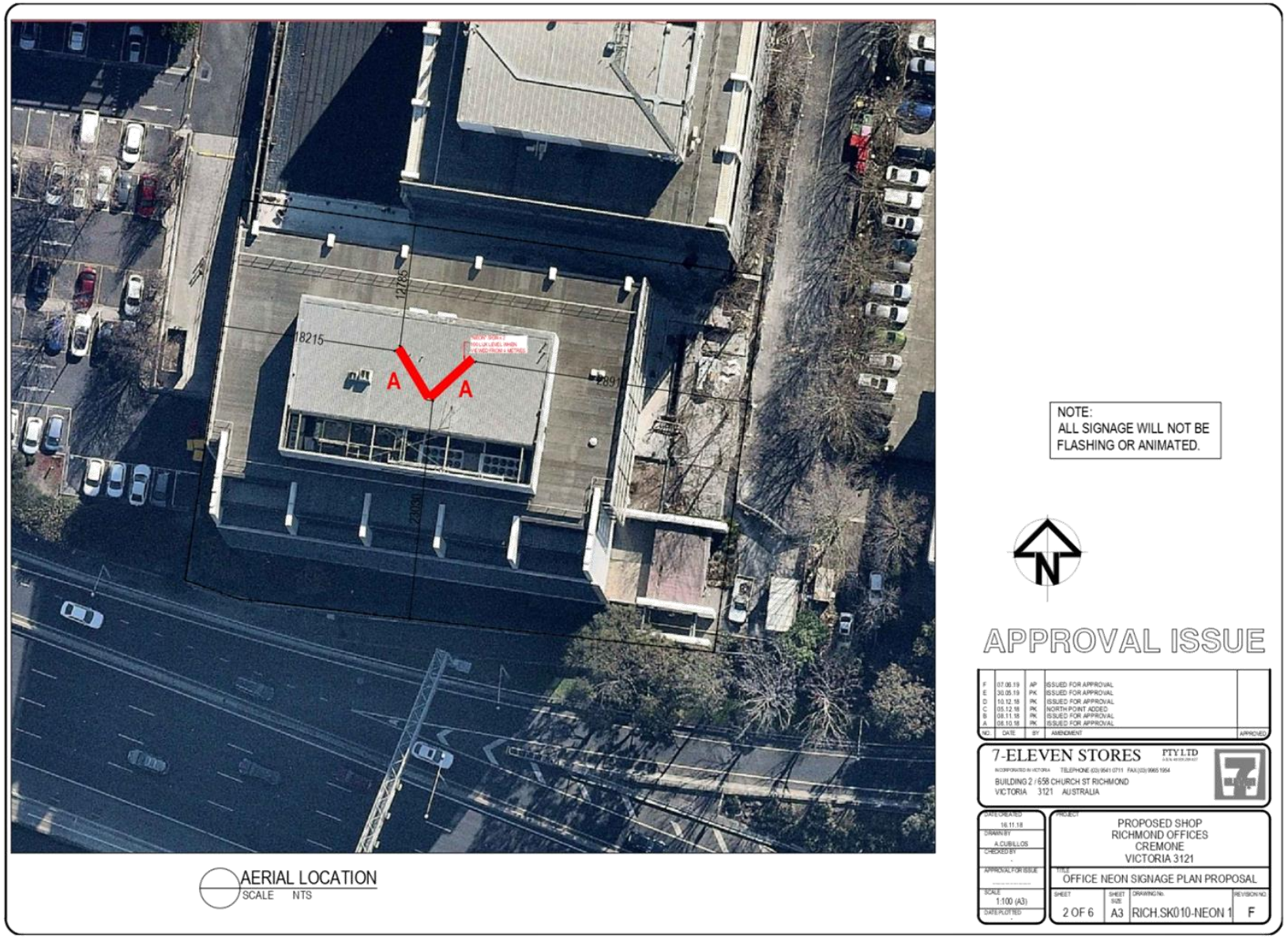
Observer Point	Distance (m)	L veiling (cd/m2)	maximum
1	50	0.007	
2	100	0.012	
3	150	0.013	
4	200	0.014	maximum
5	250	0.014	maximum
6	300	0.013	
7	350	0.013	
8	400	0.012	
9	450	0.012	
10	500	0.012	
11	550	0.011	
12	600	0.011	

Dr Richard Dluzniak Consulting Engineer May 2019

Attachment 5 - PLN19/0007 - 200 / 658 Church Street - Further Information Plans



Attachment 5 - PLN19/0007 - 200 / 658 Church Street - Further Information Plans



Attachment 5 - PLN19/0007 - 200 / 658 Church Street - Further Information Plans

NEON 00 FRONT COVER
NEON 01 AERIAL PHOTO
NEON 02 EAST ELEVATION
NEON 03 NORTH ELEVATION
NEON 04 WEST ELEVATION
NEON 05 SOUTH ELEVATION

NOTE:
ALL SIGNAGE WILL NOT BE FLASHING OR ANIMATED.

APPROVAL ISSUE

NO.	DATE	BY	AMENDMENT	APPROVED
E	30.05.19	PK	ISSUED FOR APPROVAL	
D	10.12.18	PK	ISSUED FOR APPROVAL	
C	05.12.18	PK	NORTH POINT ADDED	
B	09.11.18	PK	ISSUED FOR APPROVAL	
A	08.10.18	PK	ISSUED FOR APPROVAL	

7-ELEVEN STORES PTY LTD
INCORPORATED IN VICTORIA TELEPHONE (03) 9541 0711 FAX (03) 9965 1954
BUILDING 2 / 658 CHURCH ST RICHMOND
VICTORIA 3121 AUSTRALIA

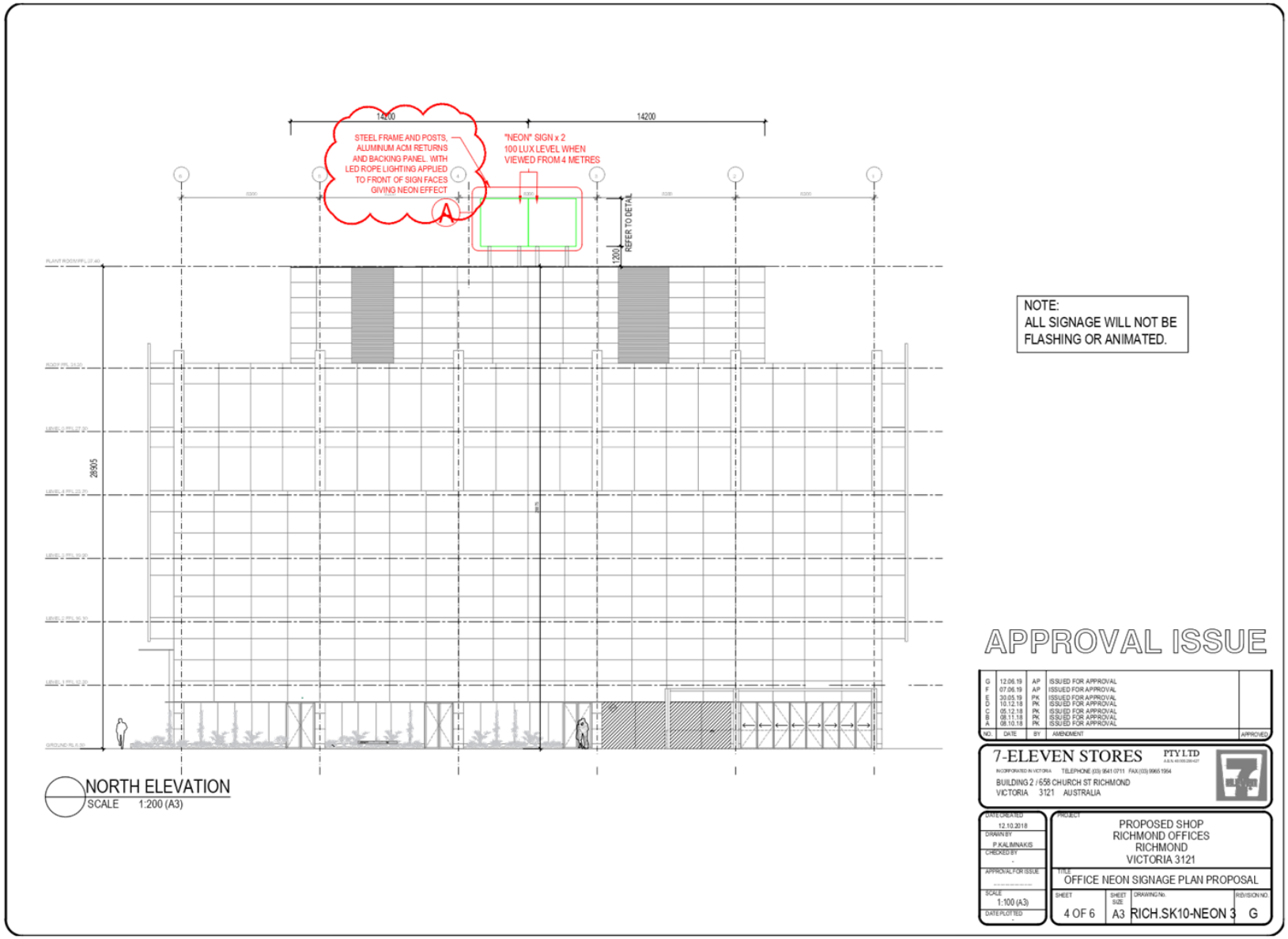
DATE CREATED: 12.10.2018
DRAWN BY: P.KALIMNAKIS
CHECKED BY: -
APPROVAL FOR ISSUE: -
SCALE: 1:100 (A3)
DATE PLOTTED: -

PROJECT: PROPOSED SHOP
RICHMOND OFFICES
RICHMOND
VICTORIA

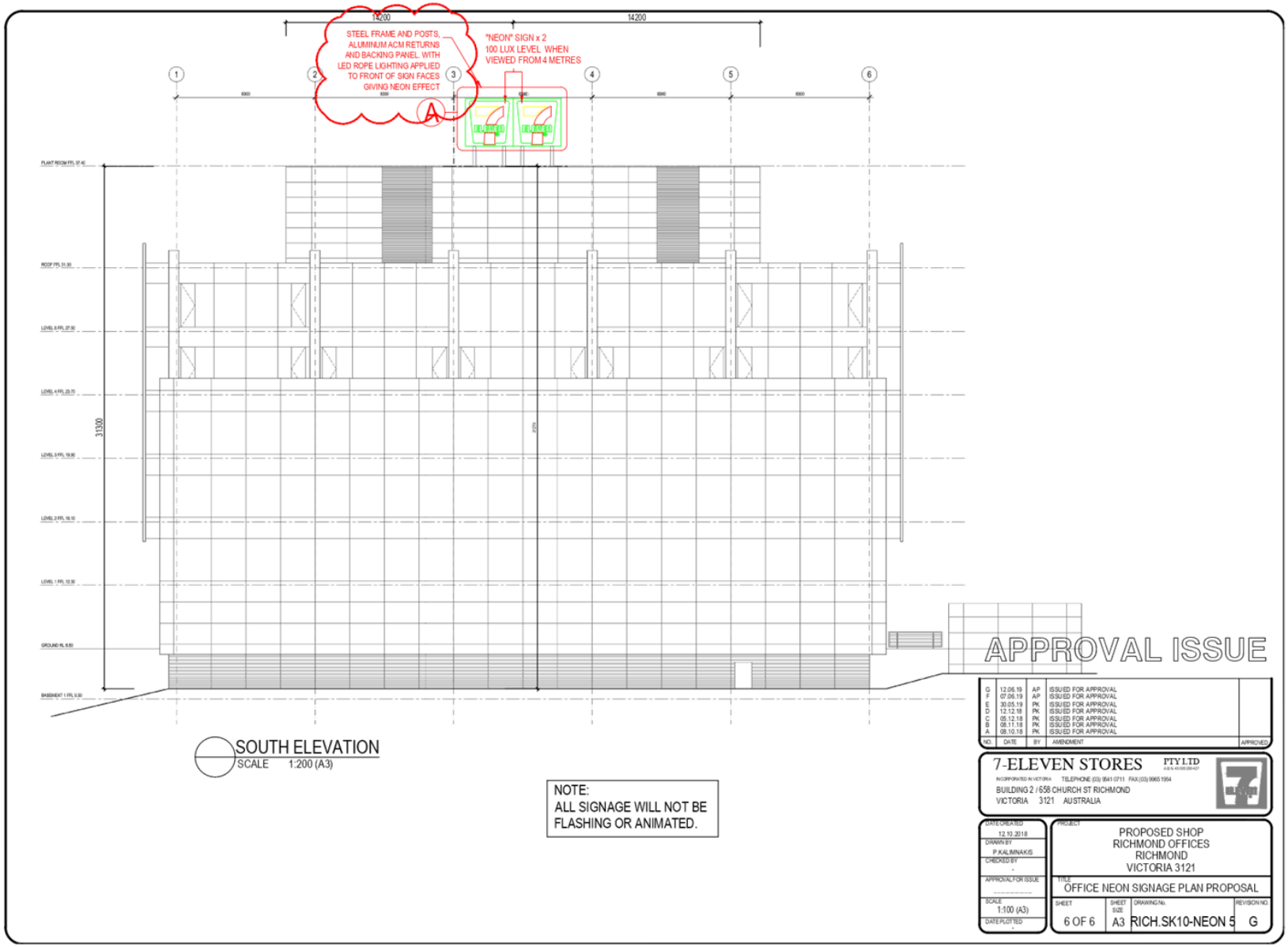
TITLE: OFFICE NEON SIGNAGE PLAN PROPOSAL

SHEET	SHEET SIZE	DRAWING No.	REVISION NO.
1 OF 6	A3	RICH.SK10-NEON 00	E

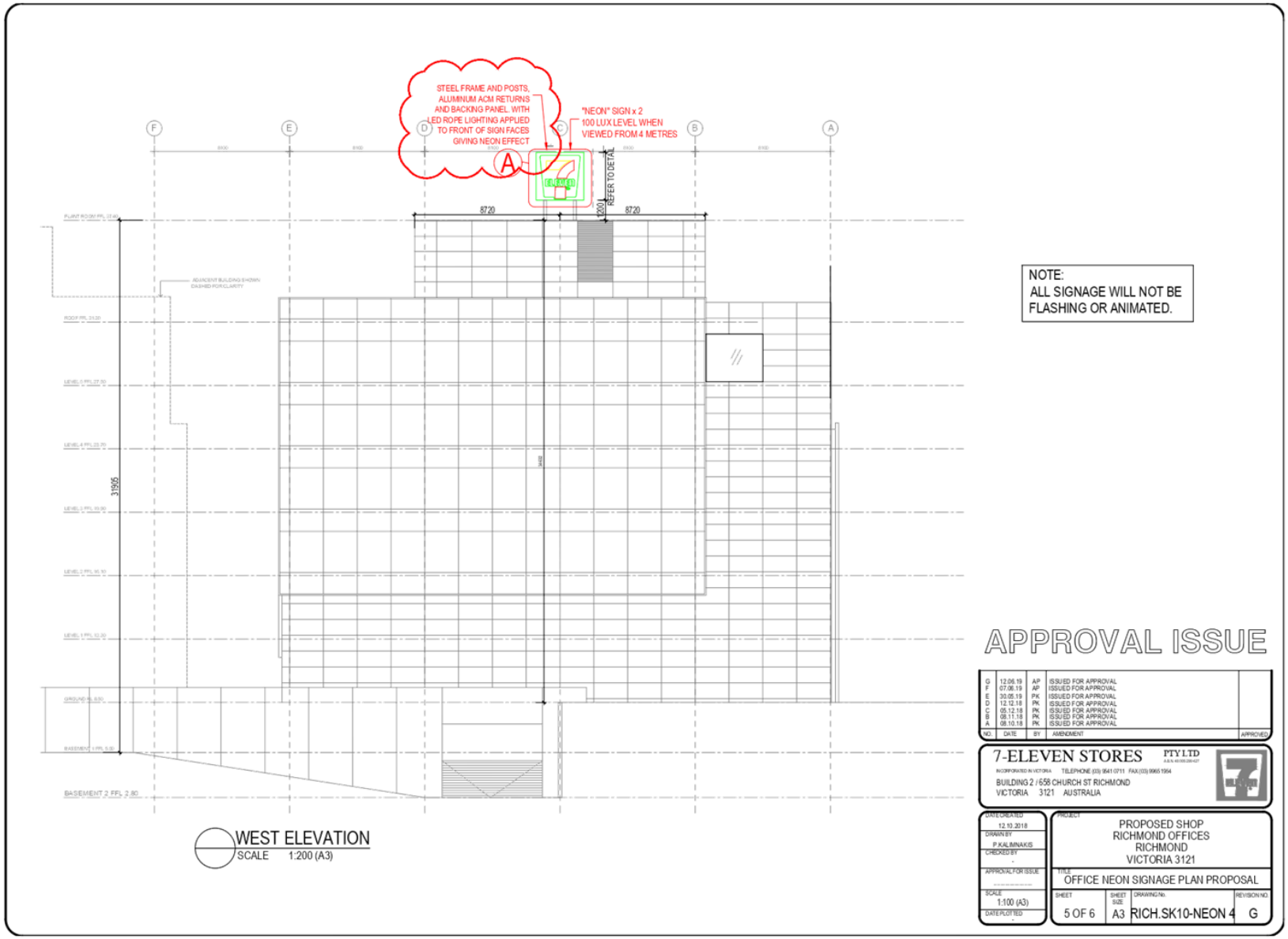
Attachment 5 - PLN19/0007 - 200 / 658 Church Street - Further Information Plans



Attachment 5 - PLN19/0007 - 200 / 658 Church Street - Further Information Plans

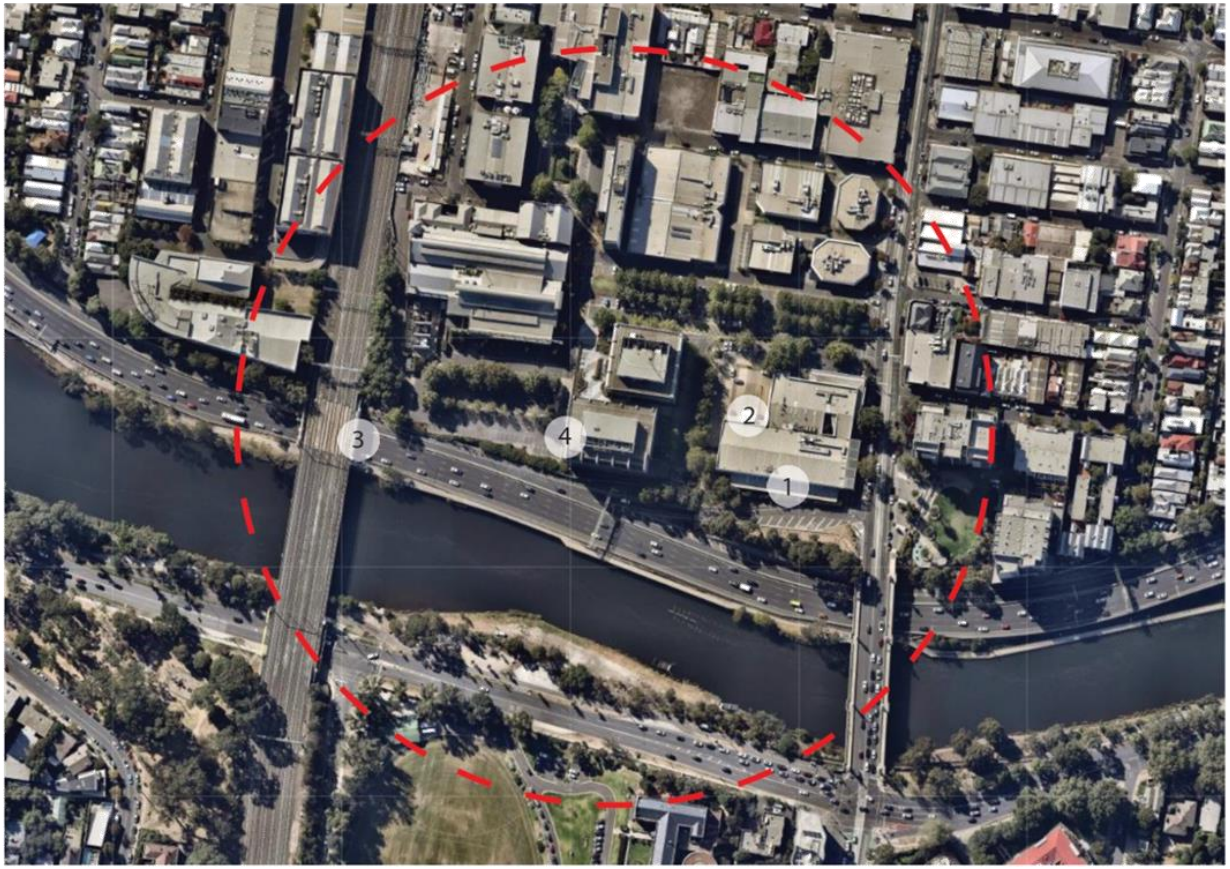


Attachment 5 - PLN19/0007 - 200 / 658 Church Street - Further Information Plans



Attachment 6 - PLN19/0007 - 200 / 658 Church Street Cremorne - 200m signage map

Surrounding Signage



Project	Job No.		Drawing	Revision	
200/658 Church Street Cremorne	330768	Location of signs over 18 square metres in area, or that are scrolling, electronic or animated within 200 metres	TP-0000	00 28.05.19	SJB Planning Level 1, 80 Dorcas Street Southbank VIC 3006 T 61 3 8648 3500 sjb.com.au