

**PROPOSED BUNNINGS
DEVELOPMENT**
728 – 750 PRINCES HIGHWAY, TEMPE
***Assessment of Traffic and
Parking Implications***

October 2017
(Rev E)

Reference 17053

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1. INTRODUCTION

This revised report has been prepared to supplement a Development Application which has been submitted to Inner West Council for a proposed Bunnings development on the corner of Princes Highway and Smith Street at Tempe (Figure 1).

The development site has excellent access to the arterial road system as well as public transport services and is strategically located to serve the inner southern part of the Metropolitan Area in conjunction with other existing Bunnings at Alexandria, Mascot and East Gardens.

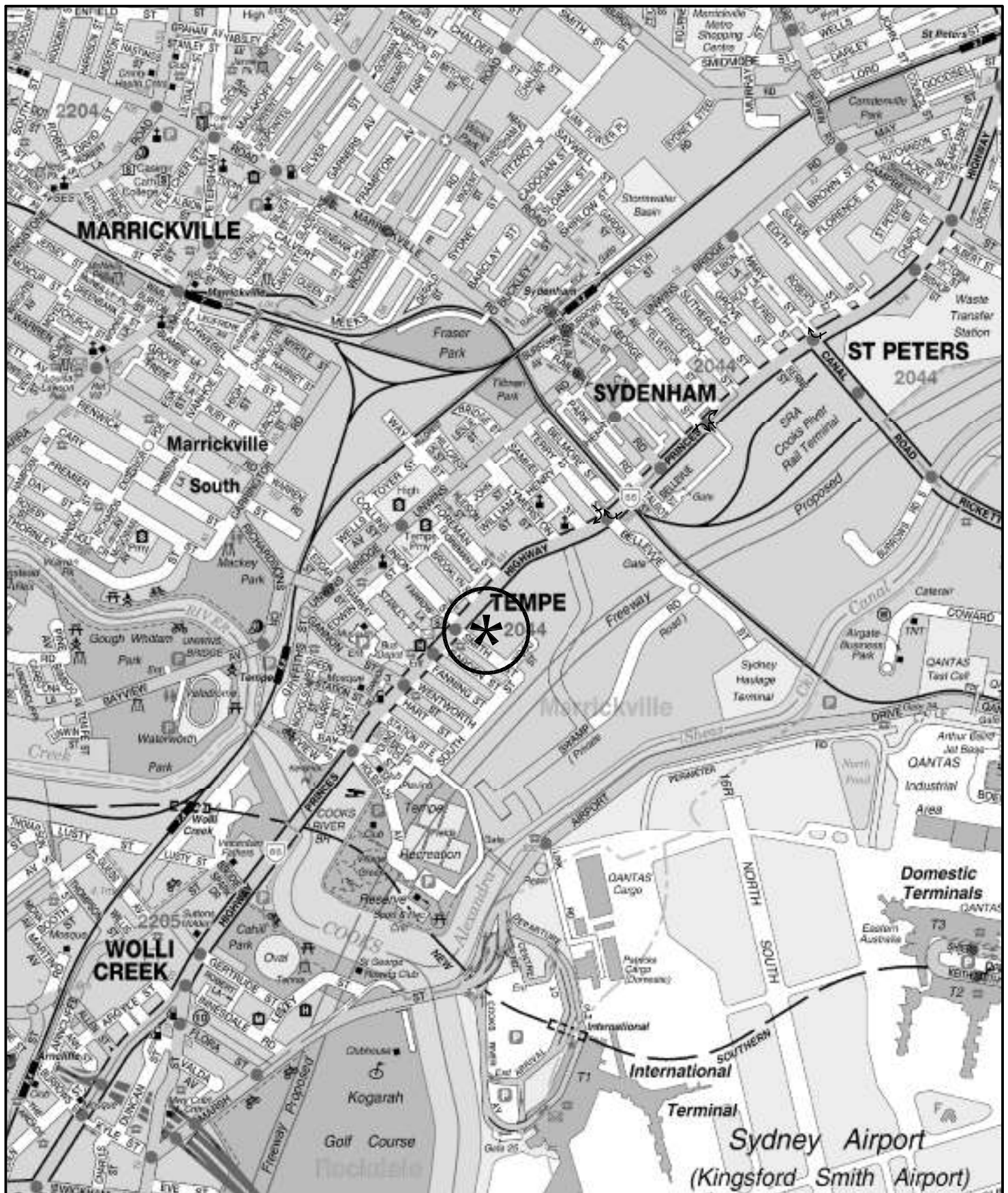
A Development Application for a Bunnings on the site was submitted in July 2015, however, this application was subsequently withdrawn to enable resolution of vehicle access issues with RMS and Council. RMS has concurred with the proposed provision of direct right turn ingress and left turn egress on the Highway frontage but have advised that this access should not have traffic signal control.

The proposed Bunnings development scheme, which has been revised to delete the proposed traffic signals on the Highway access, comprises:

Warehouse	14,103 m ²
Timber Trade	2,492 m ²
Nursery and Bagged Goods	3,218 m ²
Total Retail Area:	19,813 m²
BM & LSY	2,058 m ²

The purpose of this report is to:

- * describe the site, its context and the proposed development scheme including the resolved vehicle access issues
- * describe the road network serving the site and traffic conditions on that network
- * assess the proposed access arrangements and traffic potential implications of the development
- * assess the adequacy of the proposed parking provision
- * assess the proposed internal circulation and servicing arrangements



LEGEND



LOCATION

FIG 1

2. PROPOSED DEVELOPMENT SCHEME

2.1 SITE, CONTEXT AND EXISTING CIRCUMSTANCES

The site (Figure 2) is Lot 2 in DP 803493 occupying an area of some 2.04 ha with frontages of some 150m to the Princes Highway and some 117m to Smith Street. The site is adjoined by IKEA to the north and industrial buildings to the east.

The other nearby uses comprise:

- * the residential dwellings along the southern side of Smith Street
- * the mixed industrial, commercial and retail uses along the highway

The existing building complex on the site of has vehicle accesses on the Princes Highway and Smith Street frontages and the former uses comprised:

4,460 m ²	Pretty Office areas
3,010 m ²	Pretty Girl Warehouse areas
365 m ²	Linfox Office areas
5,225 m ²	Linfox Warehouse area
Total:	13,060 m²

The Pretty Girl operation involves a maximum of 160 staff and there are some 150 parking spaces in the frontage and rear areas as shown on the plans in Appendix A.

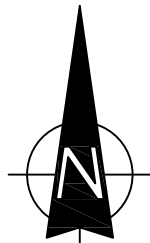
2.2 PREVIOUS DEVELOPMENT CONSENT

Consent was granted in August 2013 for DA 2012/528 which comprised a “bulky goods” complex with an assessed total floor area of some 22,000m² and some 300 parking spaces. The consent was subject to:

- road widening along the Smith Street frontage
- provision of a left turn deceleration lane along the highway frontage
- adjustment of the traffic signals at the Princes Highway and Smith Street intersection



LEGEND



SITE

FIG 2

2.3 PROPOSED DEVELOPMENT

It is proposed to demolish much of the existing building structure retaining the heritage western part along the highway frontage and excavate for undercroft carparking. The retained section of building will be extended over 2 levels towards the eastern boundary where a large loading dock area will be enveloped on the ground level.

The Nursery / Bagged Goods will be located on the western part while the Timber Trade area will be on the eastern part. The 2 level warehouse will occupy the central part with a travelator linkage to the carpark level below.

The proposed development comprises:

Warehouse	14,103 m ²
Timber Trade	2,492 m ²
Nursery & Bagged Loading	3,218 m ²
Total Retail Area:	19,813 m²
BM & LSY	2,129 m ²

For the purpose of “traffic and parking” assessment, the generic Bunnings floorspace is the total retail area shown above as the sites assessed to established Bunnings traffic generation and parking characteristics (refer to Appendix F) generally have no BM & LSY or very little while at the same time this area has a negligible contribution to traffic generation and parking demand.

A total of 424 undercroft parking spaces will be provided with access ramp connection to the existing eastern driveway on Smith Street. Smith Street will be widened and the existing western driveway on Smith Street will be closed while the Highway will also be widened to provide for a right turn bay for the turn into the site together with a left turn out of the site.

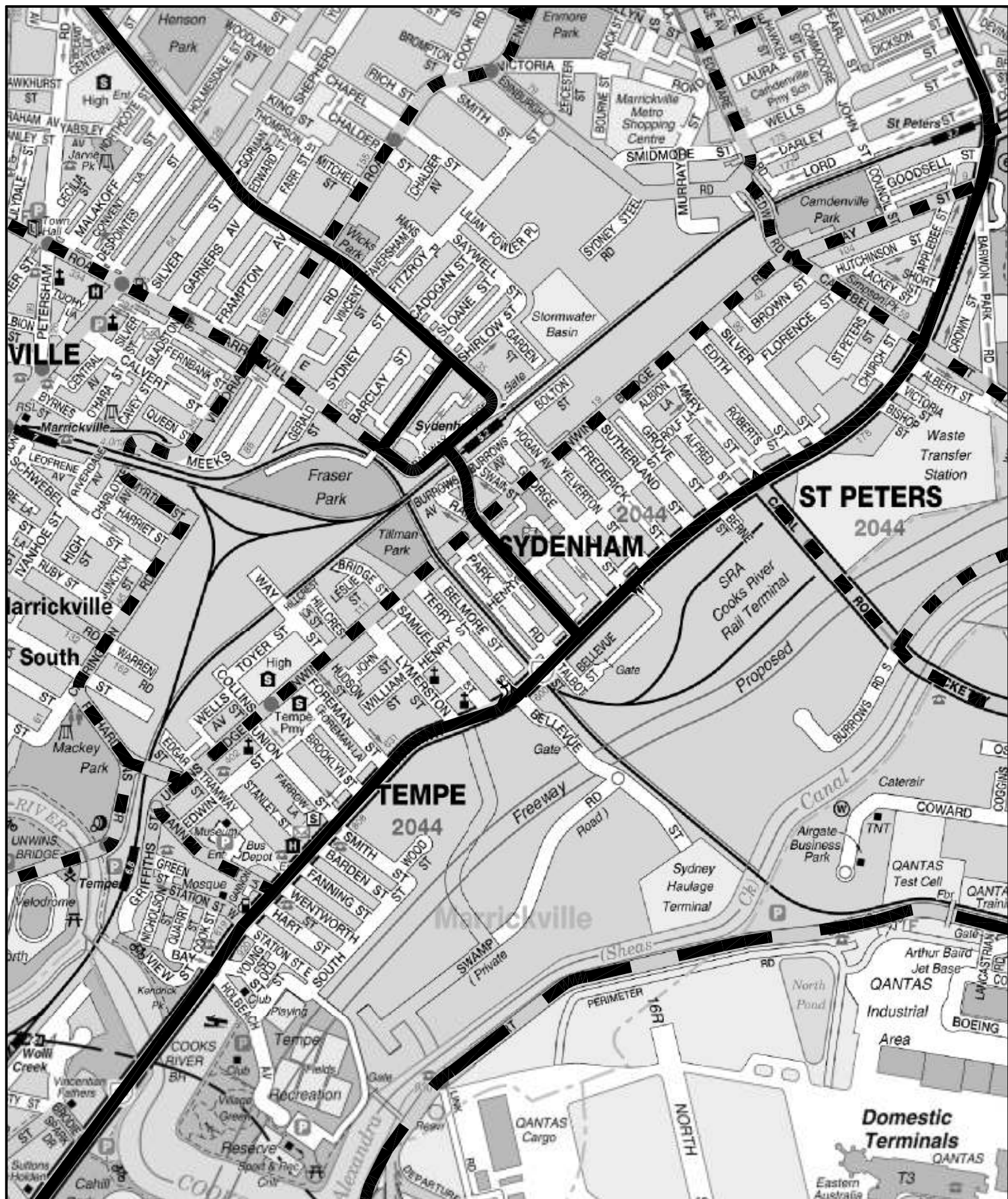
Details of the proposed revised development scheme are provided on the revised plans prepared by John R Brogan Architects which reproduced in part in Appendix B.

3. ROAD NETWORK AND TRAFFIC CIRCUMSTANCES

3.1 ROAD NETWORK

The road network serving the development site (Figure 3) comprises:

- * *Princes Highway* – a State Road and arterial route being the principal north-south connection between Sydney and Wollongong
- * *M5 Motorway* – a State Road and arterial route linking between General Holmes Drive at Kyeemagh and Liverpool with ramp connections to Princes Highway (eastbound egress) and Marsh Street
- * *Canal Road-Gardeners Road* – a State Road and sub-arterial route linking between Princes Highway and Anzac Parade
- * *Unwins Bridge Road* – a Regional Road and major collector road running parallel and to the west of the Highway with linkage via Gannon Street, Railway Road and Mary Street
- * *Railway Road* – a major collector road linking westerly from the Princes Highway through Marrickville
- * *Union Street* – a local access roadway connecting between the Princes Highway and Unwins Bridge Road
- * *Smith Street* – a local access roadway connecting between the Princes Highway and South Street



LEGEND

- ARTERIAL
- SUB-ARTERIAL
- COLLECTOR



ROAD NETWORK

FIG 3

3.2 TRAFFIC CONTROLS

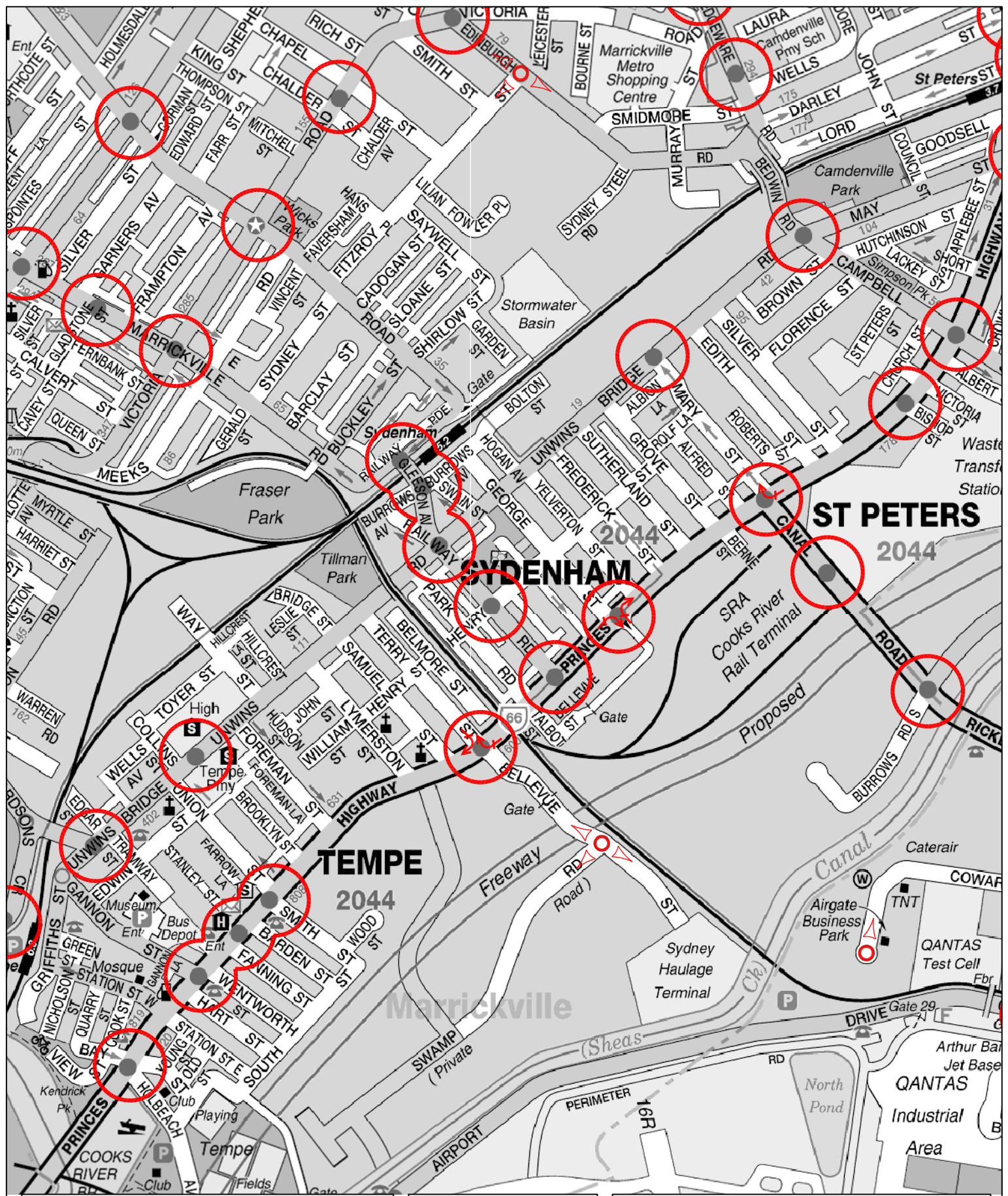
The principal traffic controls which have been applied to the road system in the vicinity of the site (Figure 4) comprise:

- * traffic signals at the Princes Highway and Union Street and Smith Street intersection. Details of this intersection arrangement are provided in Appendix C including the right turn arrow phase for the turn into Smith Street, prohibition of the turn into Union Street and pedestrian crossing facilities
- * the traffic signals at the Princes Highway/IKEA access intersection
- * the one way westerly traffic flow in Union Street
- * CLEARWAY restrictions (AM northbound/PM southbound) supplemented by sections of NO STOPPING/NO PARKING and BUS ZONE restrictions along the Highway
- * central median island along the Highway including the site frontage
- * the sections of NO STOPPING and NO PARKING restriction on Smith Street

3.3 TRAFFIC CONDITIONS

An indication of the traffic conditions in the vicinity of the site is provided by data published by RMS and other available survey material. The data published by RMS is expressed in terms of Annual Average Daily Traffic (AADT) and the latest available data is provided in the following:

Location	AADT
Princes Highway at Cooks River	62,075
Princes Highway north of Railway Road	52,841



The results of the surveys undertaken during the morning, afternoon and weekend midday peak periods are provided on Figure 5a and 5b at the various intersections along this section of the highway. The traffic generation characteristics of Bunnings use are that there is relatively little activity during the weekday morning peak commuter period (and similarly with IKEA) while the peak activity occurs in the midday/early afternoon period on weekends with the weekday afternoon activity being some 50% of the weekend peak.

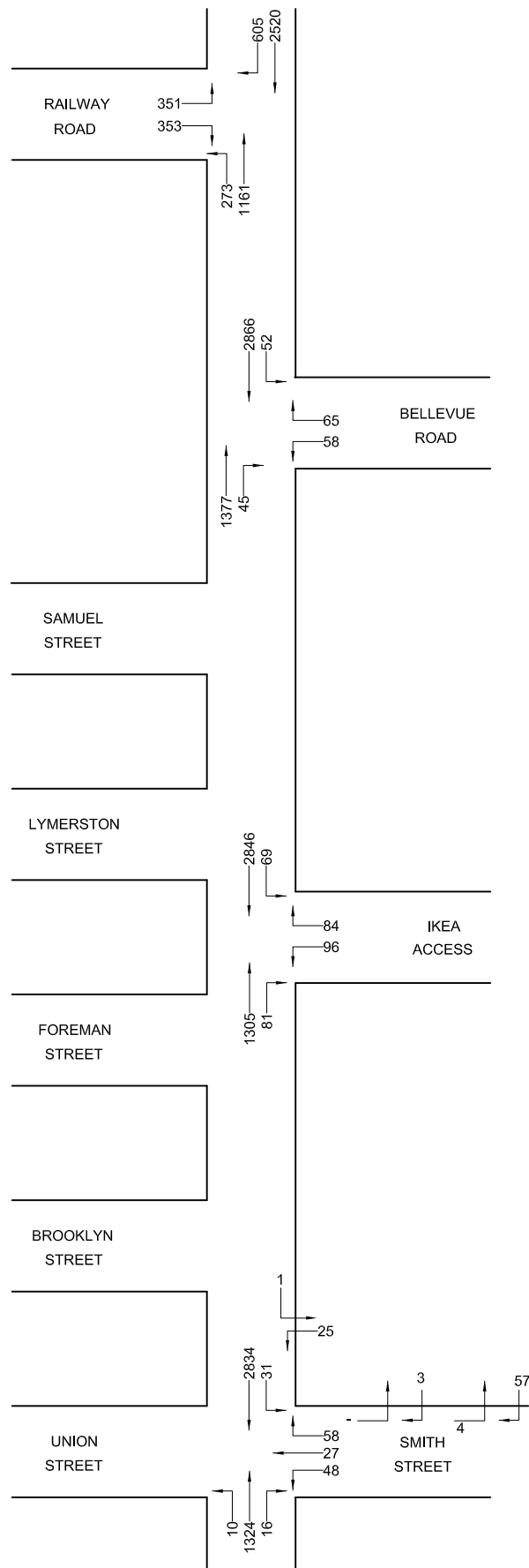
It is apparent in relation to the movements along the Highway that:

- * the flows during the weekend midday/afternoon peak are some 25 to 35% lower bi-directionally and some 50% directionally than the weekday morning and afternoon peaks
- * the northbound morning peak is significantly higher than the southbound afternoon peak and to some extent this reflects the morning peak tidal flow provision for northbound traffic (not reciprocated for southbound in the afternoon)

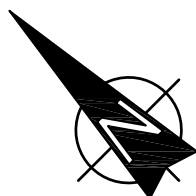
The existing operational performance of the Princes Highway, Smith Street and Union Street intersection has been assessed using the SIDRA program and the results of that assessment are provided in Appendix F and summarised in the following:

PM			WEMD		
LOS	DS	AVD	LOS	DS	AVD
A	0.853	9.8	B	0.876	18.5

The criteria for interpreting SIDRA output is reproduced overleaf and it is apparent that a satisfactory level of service is achieved at the intersection. It has been the recent experience subsequent to the opening of the nearby IKEA development that the operating conditions on this section of the highway have not deteriorated and are generally satisfactory apart from some northbound congestion in the morning peak.

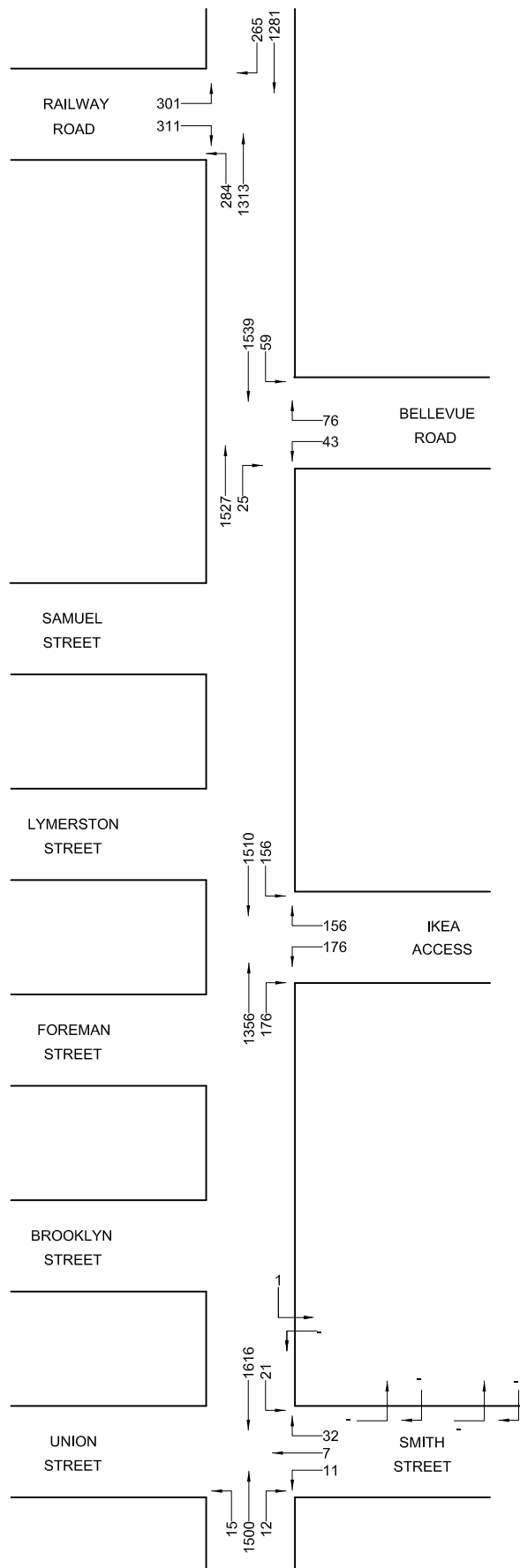


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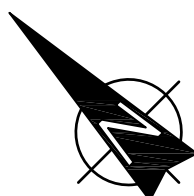


**EXISTING PM PEAK
TRAFFIC FLOWS**

FIG 5a



LEGEND



**EXISTING SATURDAY
PEAK
TRAFFIC FLOWS**

FIG 5b

3.4 PUBLIC TRANSPORT SERVICES

Public transport services located within walking distance of the site include both rail and bus services.

Rail Services

Both Sydenham and Tempe Stations are within reasonable walking distance and Sydenham Station has rail services from the Eastern Suburbs/Illawarra line and the Bankstown line. Tempe Station has rail services from the Eastern Suburbs/Illawarra line and the Airport and East Hills line. Both stations have regular train services operating on weekdays and weekends, with Sydenham Station having the highest number of services.

Bus Services

Sydney Buses operate a number of bus services along the Princes Highway in the Tempe/St Peters area. These include:

- Route 422 – City to Tempe
- Route 357 – Bondi Junction to Sydenham
- Route 425 – Dulwich Hill to Tempe

Sydney Buses operate regular bus services along these routes on weekdays and on weekends with bus stops located on the Princes Highway adjacent to the site.

3.5 FUTURE CIRCUMSTANCES

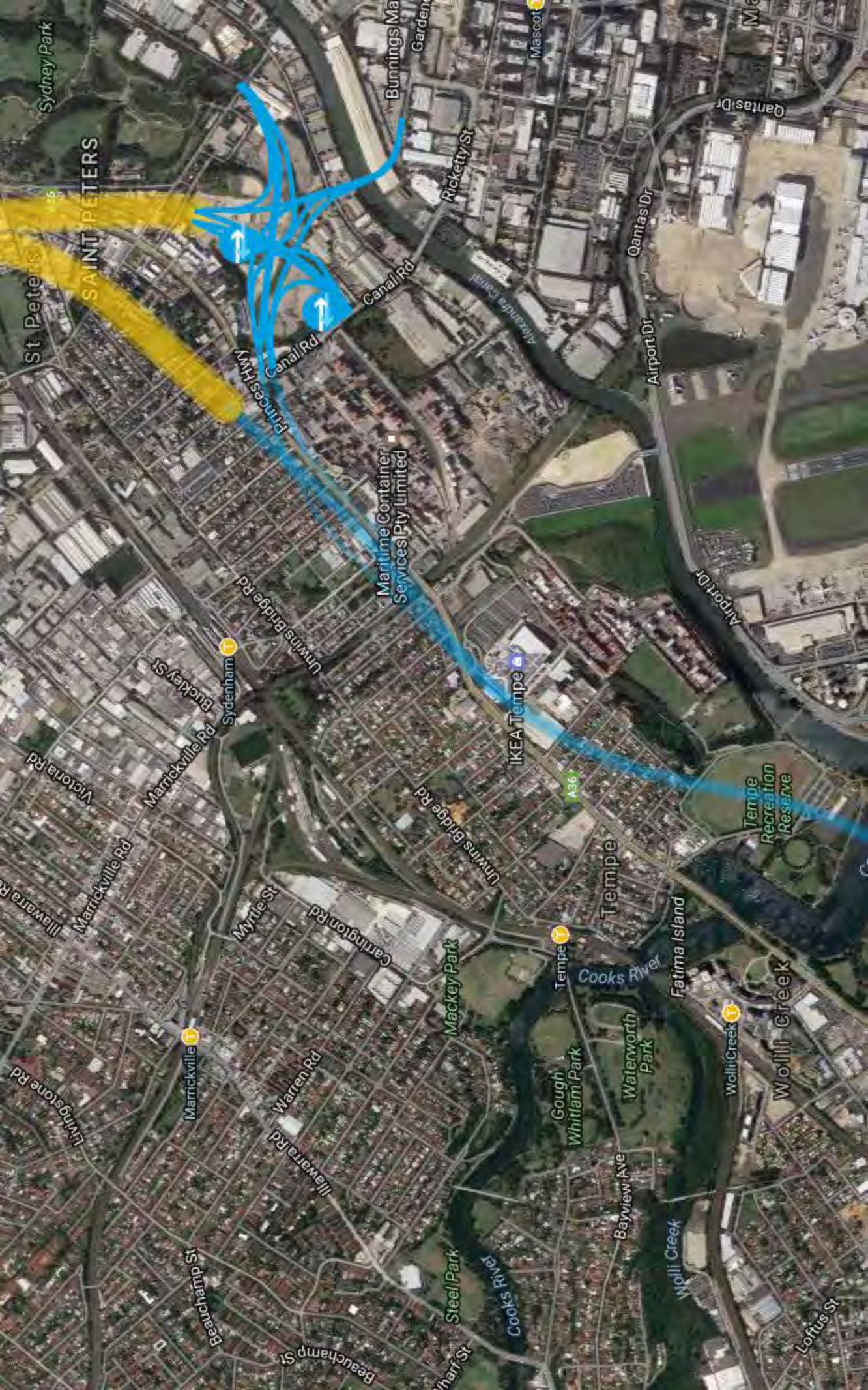
Road Network

The only definitive proposal for the road network is that of the West Connex project which includes:

- * an interchange in the vicinity of Campbell Street and east-west ramp connections
- * upgraded capacity on the M5 Motorway (including the tunnel) and introduction of a toll

- * connection to/from the Port and Airport
- * provision for future connection to the M6 route over Captain Cook Bridge

Detail traffic projections for this project are not available at this time, however, it is apparent that the project (see extract of relevant details overleaf) would significantly reduce the traffic demands along the highway through Tempe.



4. ACCESS AND TRAFFIC

ACCESS

The proposed vehicle access arrangements will comprise:

- * ingress and egress for the carpark and ingress for delivery/service vehicles located on Smith Street at the eastern site boundary in a position very similar to an existing access driveway
- * right turn ingress for the carpark and left turn egress for the carpark and delivery/service vehicles on the Princes Highway frontage located at the northern site boundary. The highway will be widened to provide the new right turn bay and RMS have advised their concurrence to this proposal (see Appendix D)

These accesses will be located on straight and relatively level sections of roadway where there are excellent sight distances available. The design of the proposed accesses will accord with the requirements of AS2890.1 & 2.

Details of the proposed modifications to the Princes Highway, Smith Street and Union Street intersection and the proposed new access intersection are shown on the traffic plan overleaf.

The RMS letter dated 29.8.17 requires the provision of:

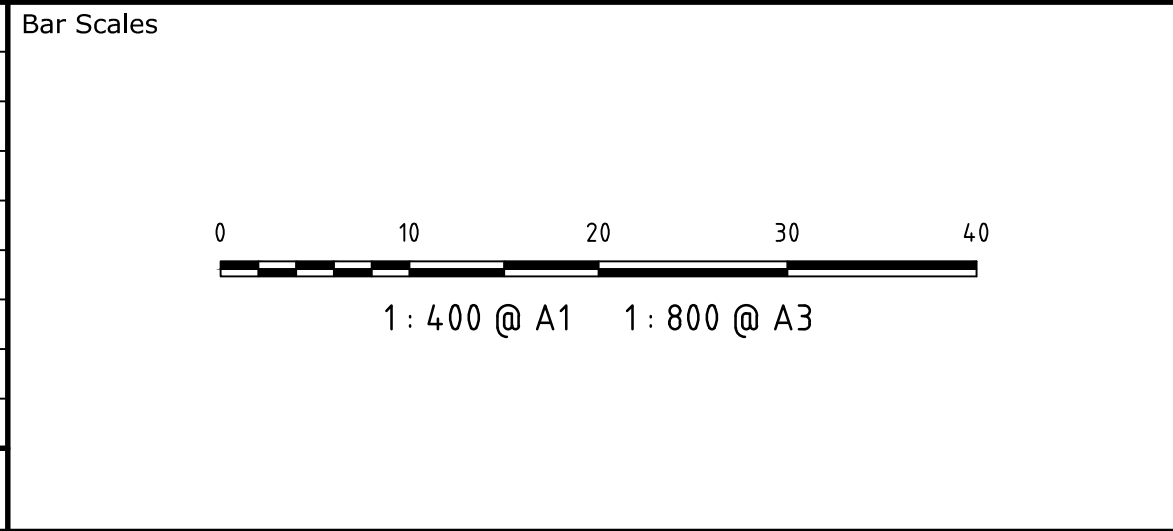
- a revised Traffic Impact Assessment
- an independent Road Safety Audit

The revised Traffic Impact Assessment is provided in this report and the Road Safety Audit prepared by Traffic Solutions is provided in Appendix E.

The Audit concludes that the proposed access arrangement will be satisfactory subject to two minor modifications which will be incorporated in the final design to be submitted to RMS.



Issue	Description	Date
P7	ISSUED FOR INFORMATION	05-09-17
P6	ISSUED FOR INFORMATION	05-09-17
P5	ISSUED FOR INFORMATION	28-03-17
P4	ISSUED FOR INFORMATION	16-03-17
P3	ISSUED FOR INFORMATION	24-11-16
P2	ISSUED FOR INFORMATION	31-08-16
P1	ISSUED FOR INFORMATION	31-08-16



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Height Datum	AHD	Approved	

Project	BUNNINGS WAREHOUSE TEMPE
Title	PROPOSED ROAD LAYOUT GENERAL ARRANGEMENT PLAN - OPTION 2

Civil Engineers and Project Managers		
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Status	FOR INFORMATION NOT FOR CONSTRUCTION	A1
Drawing No.	SKC14	Issue
Project No.	15-274	P7

TRAFFIC

The former uses on the site were significant and comprised some 160 staff associated with the Pretty Girl operation and truck movements associated with the Linfox Warehouse operation and the Pretty Girl import and distribution operation. These activities generate some 90-100 vtp/h in the morning and afternoon peak periods through the 3 access driveways including an ingress/egress driveway on the highway frontage.

The proposed Bunnings with 19,813m² of retail floor area will have a projected generation based on the TTPA researched 'trend lines' of:

AM	@ 0.60 vtp/h/100m ²	102 vtp/h (say 120)
PM	@ 1.56 vtp/h/100m ²	310 vtp/h
WEEKEND	@ 4.50 vtp/h/100m ²	890 vtp/h

This generation would be discounted by the existing site generation and normal passing trade factors as follows:

	Existing	P/Trade	Distribution of "Additional"
AM	90 vtp/h	-	15 IN 15 OUT
PM	90 vtp/h	28% (87)	54 IN 79 OUT
WEMD	-	28% (236)	320 IN 320 OUT

The projected distribution of future site generated traffic is as follows:

- north 45%
- south 45%
- other 10%

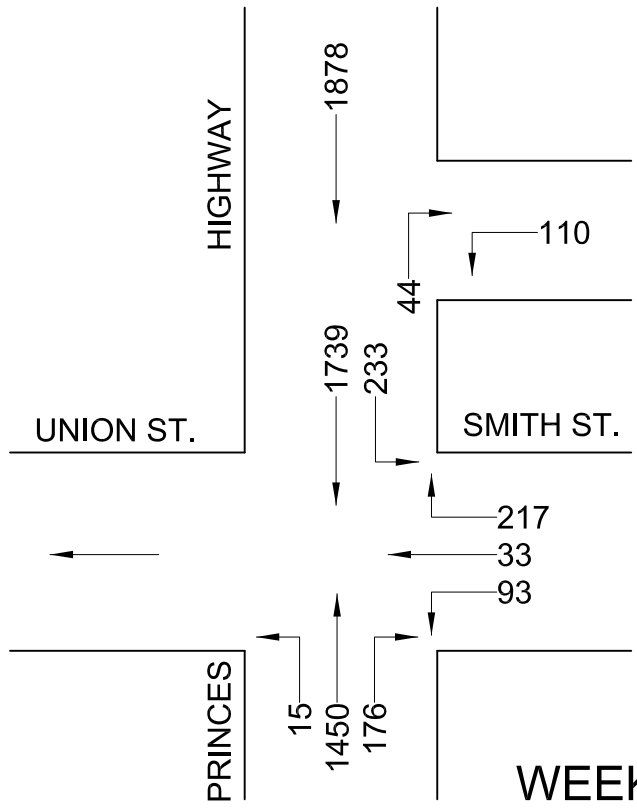
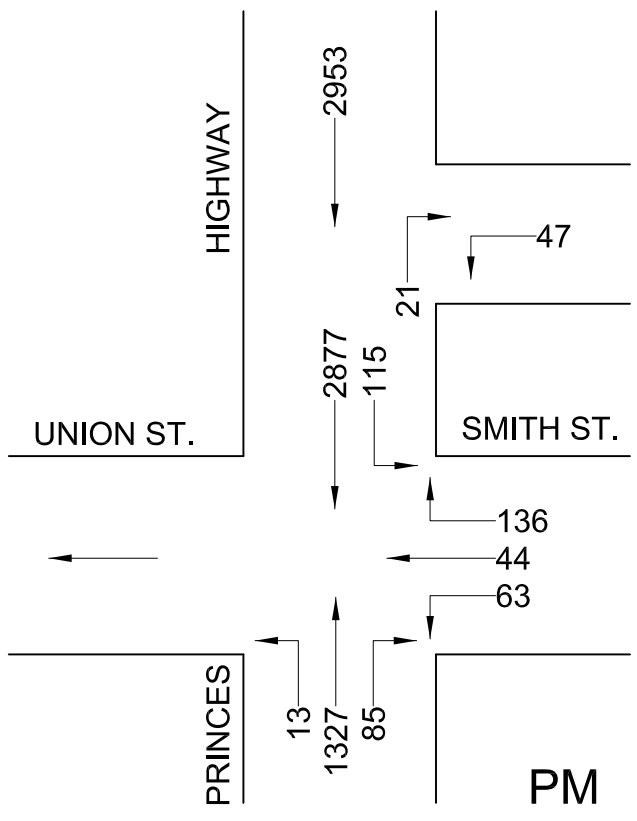
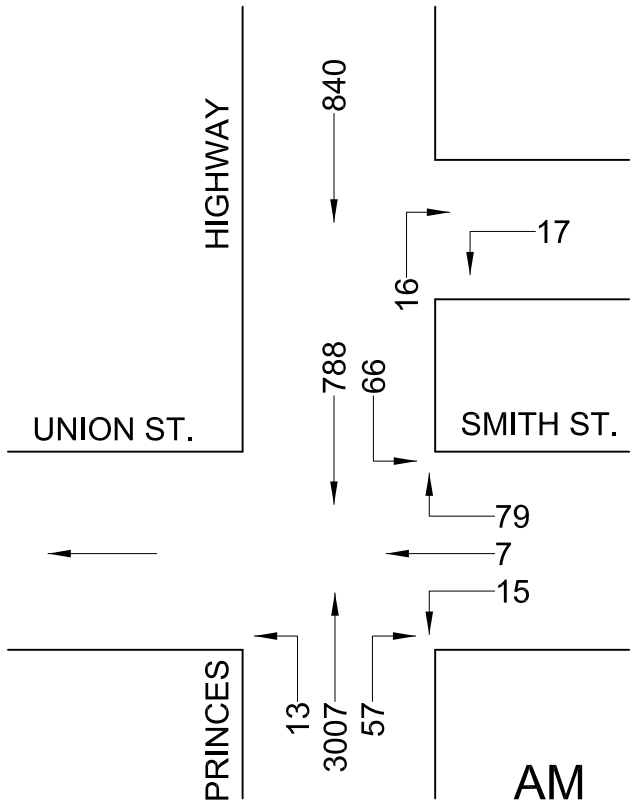
The future traffic circumstances have been 'constructed' with a process of:

- deleting the existing peak movements
- adjusting for passing trade
- adding the "additional" generated movements
- distributing over the 2 access intersections

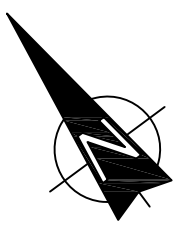
The projected future traffic volumes resultant to the proposed Bunnings development (Figure 6) have been modelled using the SIDRA program for the proposed road geometry and intersection/access treatments. The results of this modelling indicating a satisfactory outcome are provided in Appendix F and are summarised in the following while the criteria for interpreting SIDRA output is reproduced overleaf.

	AM		PM		WEMD	
	LOS	AVD	LOS	AVD	LOS	AVE
Highway/Smith	A	4.9	A	9.2	A	13.6
Highway/Access	A	0.1	A	0.4	A	0.5

The results of the SIDRA assessment indicate that satisfactory operational performance will be achieved at the intersection and the access during the peak traffic periods with the proposed development.



LEGEND



**PROJECTED PEAK
TRAFFIC MOVEMENTS**

FIG 6

Criteria for Interpreting Results of SIDRA Analysis

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good	Good
'B'	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
'C'	Satisfactory	Satisfactory but accident study required
'D'	Operating near capacity	Near capacity and Accident Study required
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
'F'	Unsatisfactory and requires additional capacity	Unsatisfactory and requires other control mode

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below, which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (ie inner city conditions) and on some roads (ie minor side street intersecting with a major arterial route).

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabouts	Give Way and Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by **traffic signals**¹ both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a **roundabout or GIVE WAY or STOP signs**, satisfactory intersection operation is indicated by a DS of 0.8 or less.

¹ the values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs

5. PARKING

Council's DCP specifies a parking provision for Bulky Goods use (Area 3) of 1 space per 100m², however the actual peak parking demands for Bunnings, which is significantly different to "bulky goods" is a peak parking demand of 1 space per 55 to 48m² and application of this criteria to the proposed Bunnings would indicate the following:

19,813m² @ 1 space per 55 to 48m² – 360 to 412 spaces

It is proposed to provide a total of 424 spaces with the proposed Bunnings (including appropriate accessible and trailer spaces) and this will:

- avoid any on-street overflow in seasonal peak periods
- include suitable accessible spaces
- include team member spaces
- include car and trailer spaces

Whilst team members will avail themselves of the conveniently located rail and bus services it is largely impractical for Bunnings customers to travel on public transport or bicycle/motorcycle with bulky purchases. A large proportion of residential properties in the vicinity of the site do not have off-street parking and as a result there is a high level of on-street parking in the area.

Consistent with the IKEA development and the approved bulky goods development on the site it is proposed to provide a level of carparking vehicle will not result in any on-street overflow.

Council's DCP also specifies a requirement for bicycles and motorcycles as follow:

Bicycle	
Staff	1 per 150m ² GFA
Store	1 per 1,000m ² GFA
Motorcycle	5% carparking numbers

Accordingly, provision for motorcycles and bicycles are made in the following:

Bicycle	8 spaces
Motorcycle	17 spaces

It is apparent that the proposed arrangements will have regard for Council's DCP principles noting that the nature of Bunnings floorspace and customers present circumstances which are dissimilar to Councils "bulky goods" category.

6. INTERNAL CIRCULATION AND SERVICING

INTERNAL CIRCULATION

The design of the internal circulation and parking areas including the aisles and bays etc. will accord with the design criteria of AS 2890.1 & 6 as well as Council's DCP and the circulation system will be very flexible due to the two-way traffic provisions.

SERVICING

The internal circulation system for trucks will be largely independent of the system for cars. The trucks will ingress through the access on Smith Street into the delivery area and depart along the northern side then through the new access intersection on Princes Highway.

The design provisions for service vehicles will accord with the AS2890.2 criteria and the requirements of all vehicles requiring to access the site as indicated on the turning path assessment provided in Appendix G.

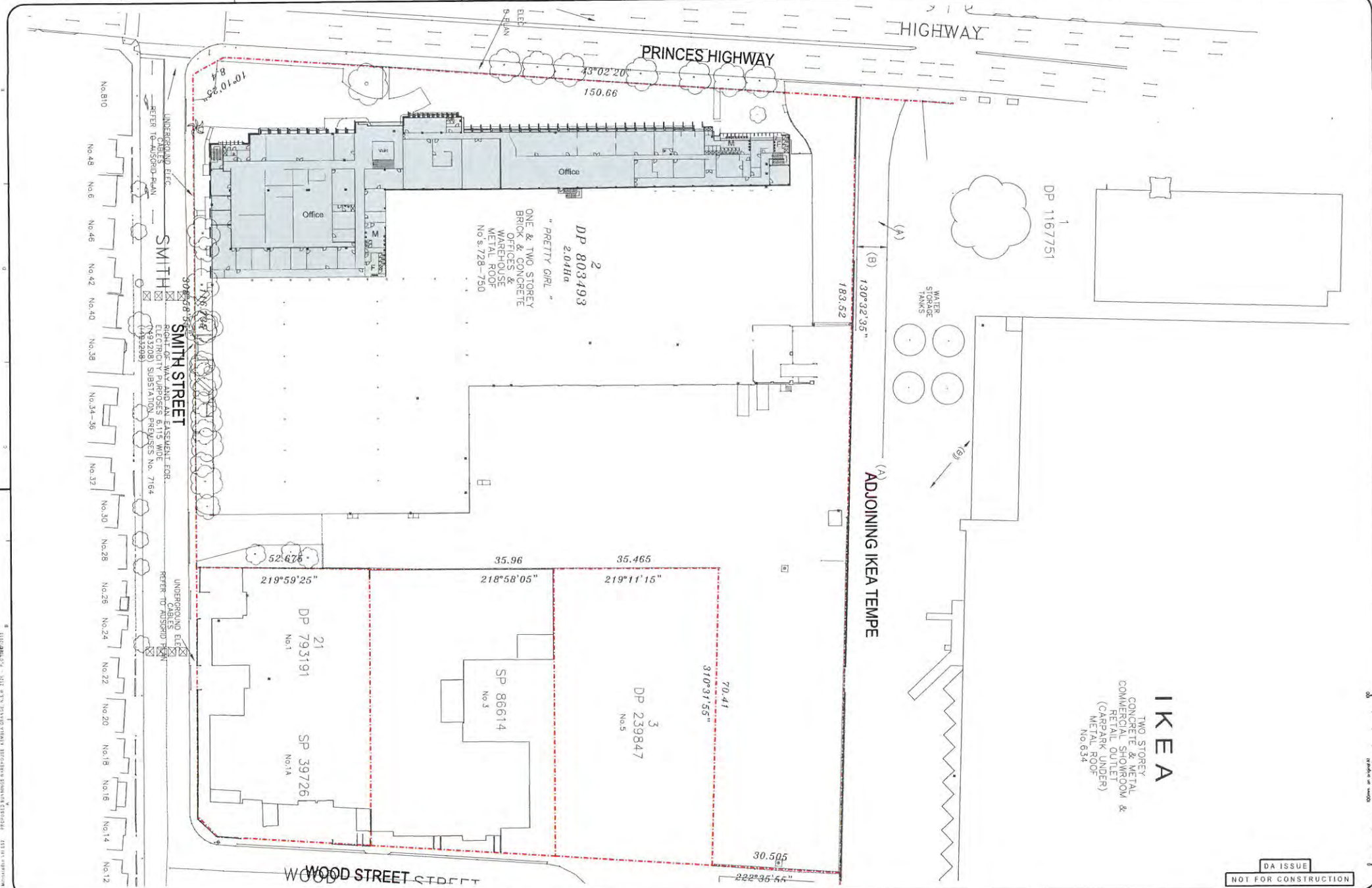
7. CONCLUSION

The Pretty Girl site on the Princes Highway at Smith Street, which adjoins the IKEA site, has an existing active warehouse/office uses and Consent was previously granted for a Bulky Goods development of some 22,000m² on the site. This assessment has concluded that the proposed Bunnings development scheme:

- * will not present any adverse traffic implications subject to the proposed widening along the highway (for right and left turn bays) and along Smith Street
- * will provide adequate and appropriate onsite parking
- * will have satisfactory provisions for access, internal circulation and servicing

Appendix A

PLANS OF EXISTING



DA ISSUE
NOT FOR CONSTRUCTION

NO.	AMENDMENT	DATE	NO.	AMENDMENT	DATE
1	ISSUE	28.07.13			
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CLIENT

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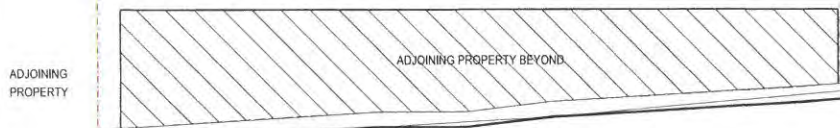
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A.B.N. 95 093 284 759



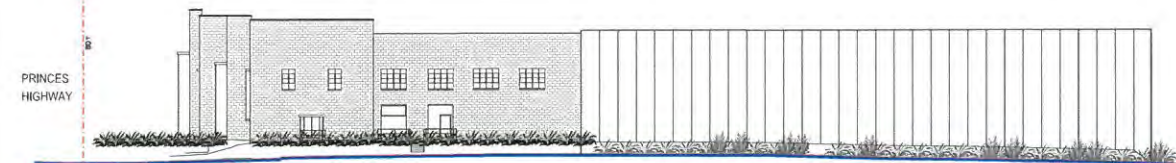
PROPOSED BUNNINGS WAREHOUSE TEMPE
728 - 750 PRINCES HIGHWAY (CNR SMITH ST)
TEMPE NSW 2044

EXISTING FLOOR PLAN
FIRST FLOOR LEVEL

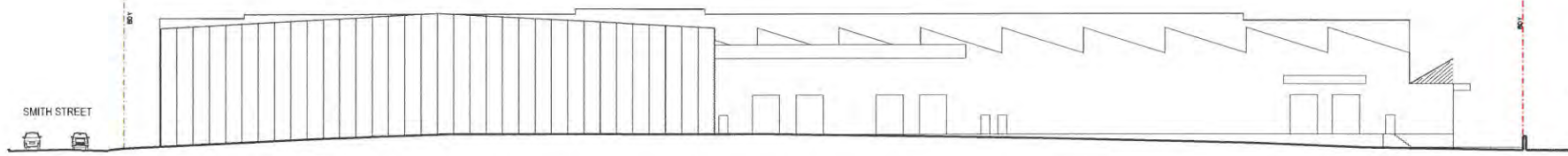
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DATE: OCT 13
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DRG. NO: E02
AMD NO: A



04 NORTH ELEVATION
E01 SCALE 1:250



03 SOUTH ELEVATION
E01 SCALE 1:250



02 EAST ELEVATION
E01 SCALE 1:250



01 WEST ELEVATION
E01 SCALE 1:250



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1	DA ISSUE	08.07.15			

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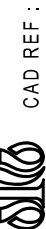
PROPOSED BUNNINGS WAREHOUSE TEMPE
728 - 750 PRINCES HIGHWAY (CNR SMITH ST)
TEMPE NSW 2044
EXISTING ELEVATIONS

SCALE: 1:250
DATE: OCT 13
PROJ. NO. 1381
DRG. NO. E03
AMD NO. A

Appendix B

DEVELOPMENT PLANS

CAD REF: Microstation V8 SS2 PROPOSED BUNNINGS WAREHOUSE, KEMBLA GRANGE, N.S.W. 2556 - PLOT08September2017



NO.	AMENDMENT	DATE	NO.	AMENDMENT	DATE
A	04 ISSUE	09.07.15			
B	ADDITIONAL '04' ISSUE	13.01.16			
C	04 ISSUE	21.03.17			
D	HWY RIGHT TURN NO SIGNALS	5.09.17			

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Verify dimensions from site and refer any discrepancies to Architects for clarification.

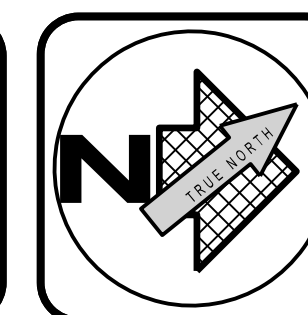


A.B.N. 93 003 284 759

JOHN R. BROGAN & ASSOCIATES

PTY. LIMITED
ARCHITECTS, PLANNERS & COMMERCIAL INTERIOR DESIGNERS

37 PITT ST, SYDNEY NSW 2000
PH: (02) 9 221 2833 FAX: (02) 9 251 4741
EMAIL: jrb@brogans.com.au



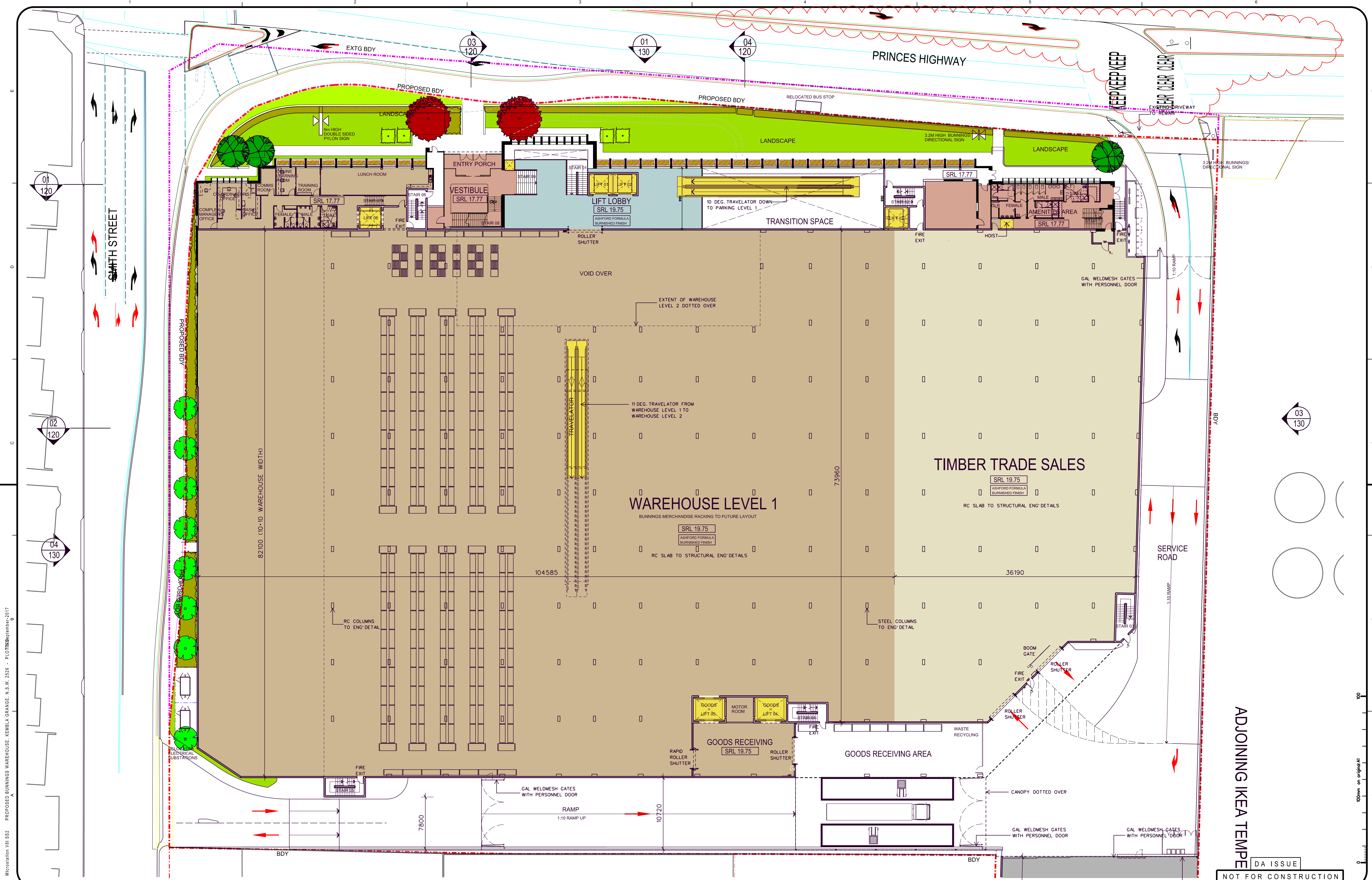
PROPOSED BUNNINGS WAREHOUSE TEMPE
728 - 750 PRINCES HIGHWAY (CNR SMITH ST)
TEMPE NSW 2044

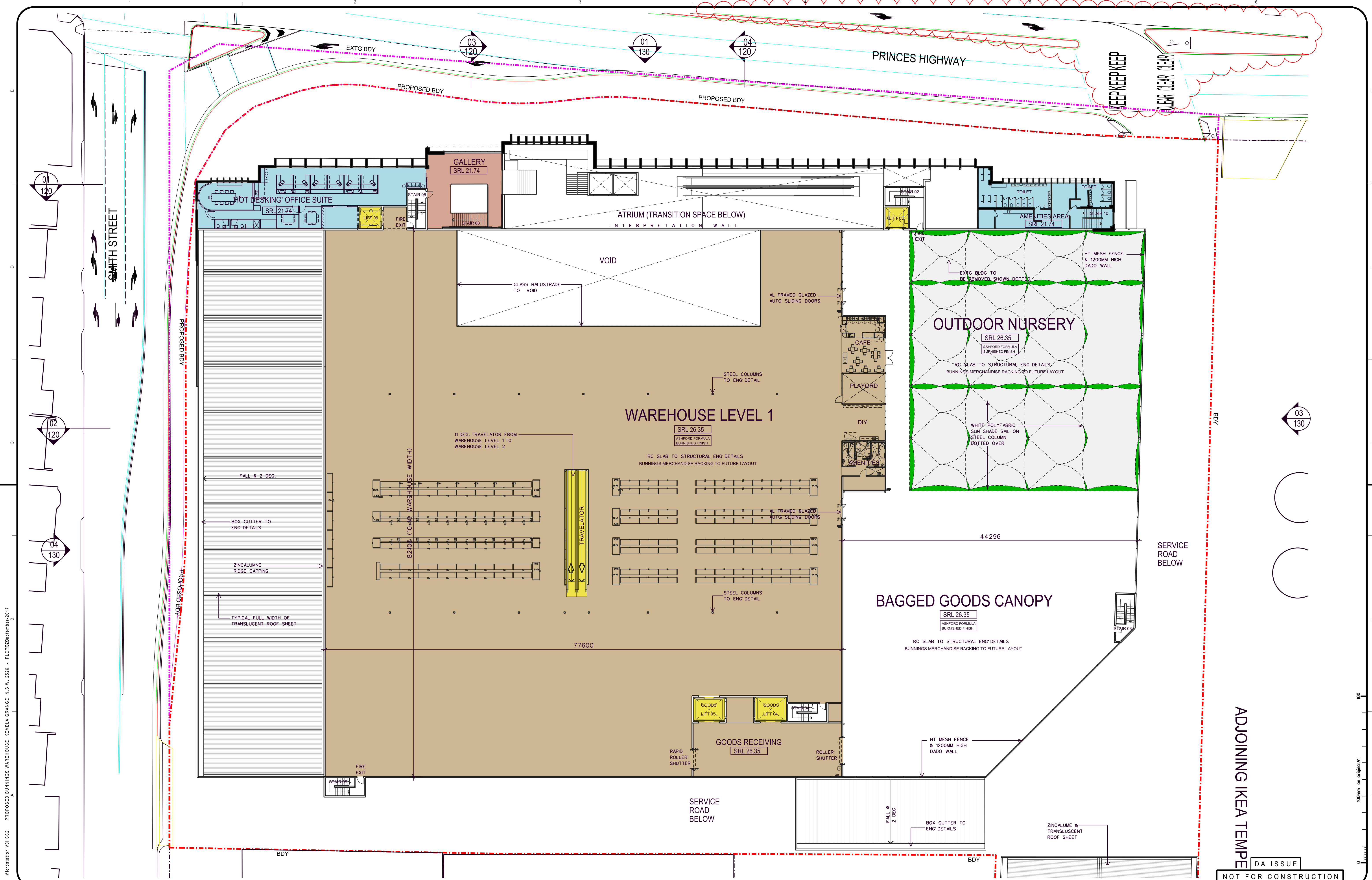
FLOOR PLAN
WAREHOUSE LEVEL 1

SCALE :
1:250

DATE :
OCT 13

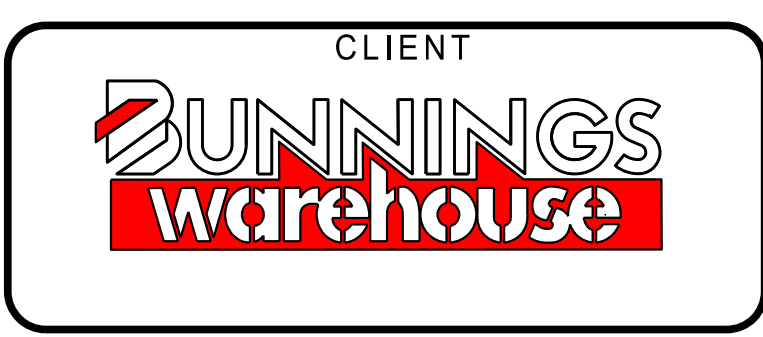
PROJ. NO.
1381
DRG. NO.
101
AMD NO.
D





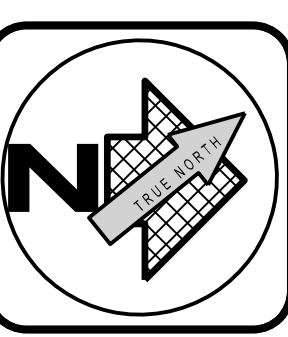
NO.	AMENDMENT	DATE	NO.	AMENDMENT	DATE
A	DA ISSUE	09.07.15			
B	DA ISSUE	11.05.17			
C	HWY RIGHT TURN NO SIGNALS	15.09.17			

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PROPOSED BUNNINGS WAREHOUSE TEMPE
728 - 750 PRINCES HIGHWAY (CNR SMITH ST)
TEMPE NSW 2044

FLOOR PLAN
WAREHOUSE LEVEL 2

SCALE :
1:250

DATE :
OCT 13

PROJ. NO.
1381

DRG. NO.
102

AMD NO.
C

ADJOINING IKEA TEMPE

DA ISSUE
NOT FOR CONSTRUCTION

[illegible]

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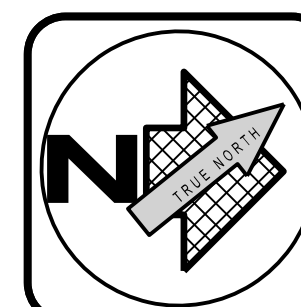
Verify dimensions from site and refer any discrepancies to Architects for clarification.



A.B.N. 93 003 284 759

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PROPOSED BUNNINGS WAREHOUSE TEMPE
728 - 750 PRINCES HIGHWAY (CNR SMITH ST)
TEMPE NSW 2044

SITE PLAN
UNDERCROFT PARKING LEVEL

SCALE :
1:400

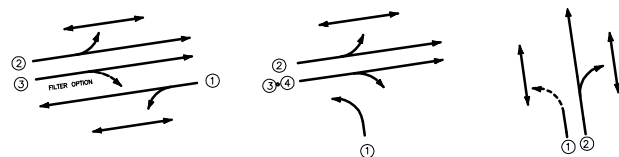
DATE :
OCT 13

PROJ. NO.
1381
DRG. NO.
031
AMD NO.
B

Appendix C

INTERSECTION PLANS

1. This site is SCATS linked
2. All Push buttons are Audio Tactile, except push button on Post 6.
3. Special STOP sign (R1-4) attached to Post 4.
4. Kerb ramps to be constructed at all pedestrian crossings in accordance with Model Drawing MD.R173.Bø1.A.1.

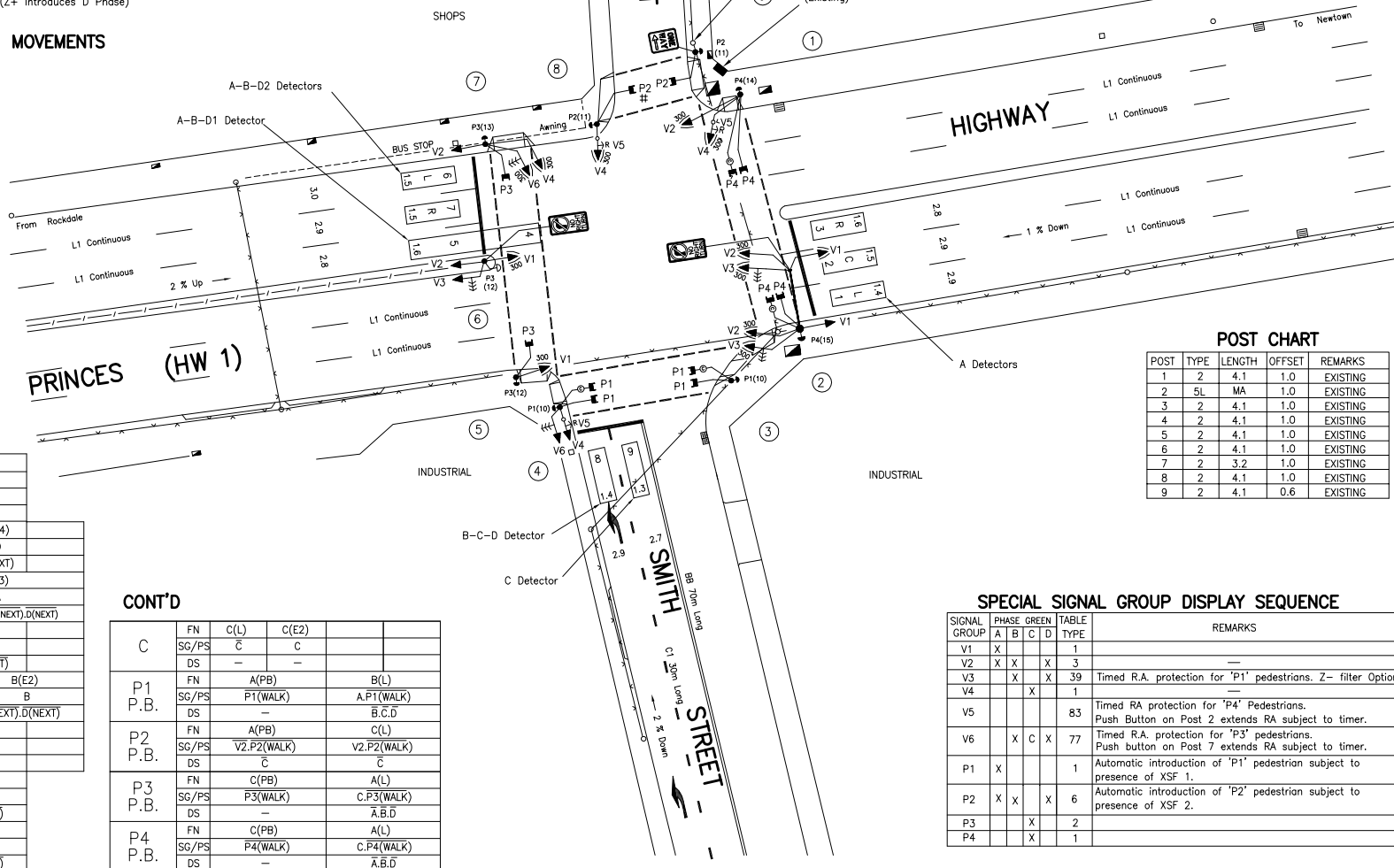


A PHASE

B & D PHASE
(Z+ Introduces D Phase)

C PHASE

MOVEMENTS



Detector		Specifications			
A	FN	A(L)	A(E1)		
	SG/PS	\bar{A}	A		
	DS	—	—		
A-B-D1 Depart. & Approach	FN	B(PR)	D(PR)	B(E4)	D(E4)
	SG/PS	A	A	B	D
	DS	—	Z+	A(NEXT)	A(NEXT)
A-B-D1 Approach	FN	A(L), B(L)	D(L)		A(E3)
	SG/PS	V2	V2		A
	DS	—	Z+	A-B-D1(PR), B(NEXT), D(NEXT)	
cont.	FN	B(E3)		D(E3)	
Approach	SG/PS	B		D	
	DS	A(NEXT), D(NEXT)		A(NEXT), B(NEXT)	
	FN	A(L)	A(E2)		B(E2)
A-B-D2	SG/PS	V2	A		B
	DS	—	B(NEXT), D(NEXT)		A(NEXT), D(NEXT)
	cont.	FN	D(E2)		
A-B-D2	SG/PS	D			
	DS	A(NEXT), B(NEXT)			
	FN	B(PR)	D(PR)		B(E1)
B-C-D	SG/PS	$\bar{B}, \bar{C}, \bar{D}$	$\bar{B}, \bar{C}, \bar{D}$		B
	DS	\bar{C}	Z+, \bar{C}		$\bar{C}(\text{NEXT}), \text{D}(\text{NEXT})$
	cont.	FN	C(E1)		D(E1)
B-C-D	SG/PS	C			D
	DS	B(NEXT), D(NEXT)		B(NEXT), C(NEXT)	

C		FN	C(L)	C(E2)		
		SG/PS DS	\bar{C}	c		
P1 P.B.	FN		A(PB)		B(L)	
	SG/PS DS		P1(WALK)		A.P1(WALK)	
P2 P.B.	FN		A(PB)		C(L)	
	SG/PS DS		V2.P2(WALK)		V2.P2(WALK)	
P3 P.B.	FN		C(PB)		A(L)	
	SG/PS DS		P3(WALK)		C.P3(WALK)	
P4 P.B.	FN		C(PB)		A(L)	
	SG/PS DS		P4(WALK)		C.P4(WALK)	

SIGNAL GROUP	PHASE	GREEN	TABLE	REMARKS		
	A	B	C	D	TYPE	
V1	X				1	
V2	X	X		X	3	—
V3	X	X	X	X	39	Timed R.A. protection for 'P1' pedestrians. Z— filter Opt.
V4			X		1	
V5					83	Timed R.A. protection for 'P4' Pedestrians. Push Button on Post 2 extends RA subject to timer.
V6		X	C	X	77	Timed R.A. protection for 'P3' pedestrians. Push button on Post 7 extends RA subject to timer.
P1	X				1	Automatic introduction of 'P1' pedestrian subject to presence of XSF 1.
P2	X	X		X	6	Automatic introduction of 'P2' pedestrian subject to presence of XSF 2.
P3		X			2	
P4	X		X		1	

Appendix D

RMS CONCURRENCE CORRESPONDENCE



29 August 2017

Our Reference: SYD17/00630/03
Council Ref: DA2017/00185

The General Manager
Inner West Council
2-14 Fisher Street
Petersham NSW 2049

Dear Sir/Madam

**PROPOSED BUNNINGS DEVELOPMENT
750 PRINCES HIGHWAY, TEMPE**

Reference is made to Council's email dated 15 August 2017, regarding the abovementioned Application which was referred to Roads and Maritime Services (Roads and Maritime) which requires consent for the provision of traffic control lights under Section 87 of the *Roads Act, 1993* and for concurrence in accordance with Section 138 of the *Roads Act, 1993*.

After meeting with the proponent and Roads and Maritime reviewing the submitted 'Assessment of Roads and Maritime Warrants For Provision of Traffic Signals', Roads and Maritime does not support traffic signals at this location. This is based on the assessment not meeting the Roads and Maritime requirements under the Warrants, in that the assessment indicated that the traffic volumes only indicate 16 (AM) and 47 (PM) vehicles entering the northern access during peak times and 117 movements during weekday at midday, which equates to only two car movements per minute.

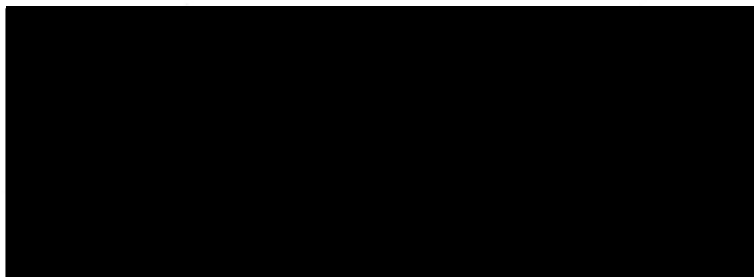
Furthermore, traffic signals are not supported at this location due to the detrimental impact this would have on the network operations of southbound traffic on the Princes Highway. Since this section of the Highway is considerably congested and additional traffic signals would increase travel times and delays.

It should be noted that Roads and Maritime previously agreed to priority-controlled (unsignalised) right turns into the site, to support site access, in the previous letter dated 13 October 2016. Roads and Maritime provided further email clarification to these requirements dated 28 February 2017 and by letter dated 30 May 2017.

Therefore amended plans should be submitted demonstrating removal of the proposed traffic signals into the site via the Princes Highway and the incorporation of Road and Maritime previous requirements. Upon receipt of this information, Roads and Maritime will review and provide a response accordingly. It is also requested that the proponent submit a Transport Impact Assessment (TIA) and an independent Road Safety Audit (RSA) to support the application.

Roads and Maritime Services

Should you have any further inquiries in relation to this matter, please do not hesitate to contact our A/Senior Planner Brendan Pegg on 0400 250 950 by email at development.sydney@rms.nsw.gov.au.





30 May 2017

Our Reference: SYD17/00630
Council Ref: DA2017/00185

The General Manager
Inner West Council
2-14 Fisher Street
Petersham NSW 2049

Dear Sir/Madam

**PROPOSED BUNNINGS DEVELOPMENT
750 PRINCES HIGHWAY, TEMPE**

Reference is made to Council's letter dated 1 May 2017, regarding the abovementioned Application which was referred to Roads and Maritime Services (Roads and Maritime) which requires consent for the provision of traffic control lights under Section 87 of the *Roads Act, 1993* and for concurrence in accordance with Section 138 of the *Roads Act, 1993*.


Roads and Maritime has reviewed the submitted development application and notes that a traffic report has not been submitted with the proposed development to allow Roads and Maritime to undertake a comprehensive assessment of the proposed development. Therefore Roads and Maritime does not support the development at this stage due to the previous requirements of Roads and Maritime letter dated 13 October 2016 (ref: SYD14/01364/07 attached) not being incorporated in the current submission.

Roads and Maritime does not support the provision for traffic signals into the site from Princes Highway. Roads and Maritime previously agreed to filtered right turns into the site along with other requirements of its previous letter dated 13 October 2016. Roads and Maritime provided further email clarification to these requirements dated 28 February 2017.

Therefore amended plans should be submitted demonstrating removal of the proposed traffic signals into the site off Princes Highway and the incorporation of Road and Maritime previous requirements. Upon receipt of this information, Roads and Maritime will review and provide a response accordingly.

Should you have any further inquiries in relation to this matter, please do not hesitate to contact Hans Pilly Mootanah on telephone 8849 2076 or by email at development.sydney@rms.nsw.gov.au

Yours sincerely,


Senior Land Use Planner
Network Sydney South Precinct

Roads and Maritime Services

Ross Nettle



Hi Phil,

Roads and Maritime provides the following Pre-DA response to your enquiry below:

1. Does RMS recommend removal of the remaining on-street parking on the Highway? We demonstrated that it was minimal and little used and the sites have alternative access .

Response: Roads and Maritime position on parking restrictions remains as per our original response which stated that parking on the western side of the Princes Highway shall remain as currently signposted.

2. Does RMS support maintenance of the RT movement at Smith Street?

Response: Roads and Maritime advises that the RT movement into Smith Street shall remain as it is currently operating.

I hope this clarifies your query. Should you have any further questions, please do not hesitate to contact me.

Kind regards,

Hans Pilly Mootanah
Land Use Planner
Network Sydney | South Precinct
T 02 8849 2076
www.rms.nsw.gov.au
Every journey matters

Roads and Maritime Services
Level 11 27 Argyle Street Parramatta NSW 2150



Good morning Hans,

Thank you for the response. Can you advise RMS' position, on a "pre-DA basis" on two important matters:

1. Does RMS recommend removal of the remaining on-street parking on the Highway? We demonstrated that it was minimal and little used and the sites have alternative access .
2. Does RMS support maintenance of the RT movement at Smith Street?



13 October 2016

Our Reference: SYD14/01364/07
Council Ref: DA201500385

Attention:

Ruba Osman
Marrickville Council
ruba.osman@innerwest.nsw.gov.au

Dear Sir/Madam

**PROPOSED BUNNINGS DEVELOPMENT
750 PRINCES HIGHWAY, TEMPE**

Reference is made to Council's letter dated 23 July 2015, regarding the abovementioned Application which was referred to Roads and Maritime Services (Roads and Maritime) which requires consent for the provision of traffic control lights under Section 87 of the *Roads Act, 1993* and for concurrence in accordance with Section 138 of the *Roads Act, 1993*.

Roads and Maritime has since had on-going discussions with Bunnings with regards to the traffic implications on the surrounding network. Upon receipt of this information, further assessment was undertaken. As a result of these assessments and discussions, Bunnings is revising their access options into the site. Roads and Maritime at its meeting with Bunnings on 17 August 2016 agreed to an access strategy. Therefore Roads and Maritime provides the following comments:

1. Roads and Maritime advises that the subject property is within an area under investigation in relation to the Westconnex project. This proposal may change as no decision has yet been made and accordingly it is not possible at this date to provide any further information as to the likelihood of any part of the subject property being required. In this regard, Westconnex can be contacted for further information – info@westconnex.com.au or by calling 1300 660 246
2. Roads and Maritime would support right in only access from Princes Highway into the site, however the filtered right turns into Smith Street at the traffic signals will need to be banned to meet Roads and Maritime requirements.
3. Council will need to undertake consultation with Smith Street residents as the right turn will be removed from the highway

Roads and Maritime Services

4. Therefore; Roads and Maritime supports the following works on Princes Highway;

- Proposed right in only access on Princes Highway (in a dedicated right turn bay)
- Raised concrete median on Princes Highway
- Left turn slip lane into Smith Street (with road widening into their property)
- Re-alignment of Princes Highway at this location to accommodate all works.

5. A No U Turn restriction will need to be installed on the proposed raised central median opposite Foreman Street facing north bound traffic. (closure of the median on the highway)

It is emphasised that the comments provided above are informal and of a Pre-DA nature. They are not to be interpreted as binding upon Roads and Maritime and may change following formal assessment of a submitted development application from the appropriate consent authority.

Should you have any further inquiries in relation to this matter, please do not hesitate to contact Hans Pilly Mootanah on telephone 8849 2076 or by email at development.sydney@rms.nsw.gov.au



**Senior Land Use Planner
Network and Safety Section**

Appendix E

ROAD SAFETY AUDIT



Traffic Solutions Pty Ltd

**PROPOSED SIGN CONTROLLED VEHICLE
ACCESS TO 728 – 750 PRINCES HIGHWAY,
TEMPE.**

**FEASIBILITY STAGE
ROAD SAFETY AUDIT**

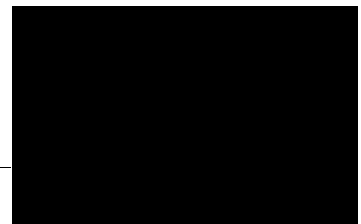
October 2017

REF: 17.18.030

PROPOSED SIGN CONTROLLED VEHICLE ACCESS TO 728 – 750 PRINCES HIGHWAY, TEMPE. – FEASIBILITY STAGE ROAD SAFETY AUDIT

Prepared By: Craig Hazell, Director Traffic Solutions P/L
Accredited Level 3 (Senior/Lead Auditor) Road Safety
Auditor – Institute of Public Works Engineering
Australia (IPWEA)

For: Mr. Ross Nettle
Director
Transport and Traffic Planning Associates Pty Ltd
Suite 502, Level 5, 282 Victoria Avenue
Chatswood NSW 2067
Phone (02) 9411 5660



Report No.: 17.18.030

Date: 6 October 2017

Issue: FINAL

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1. INTRODUCTION	3
2. EXISTING CONDITIONS	5
3. DEFICIENCY AND RECOMMENDATION RANKINGS	5
4. RECOMMENDATIONS FROM PREVIOUS AUDITS	6
5. PLANS AND CHECKLIST REVIEW	6
6. PROPONENT RESPONSE TO ISSUES RAISED	7

APPENDIX A	AUSTROADS FEASIBILITY STAGE ROAD SAFETY AUDIT CHECKLIST
-------------------	--

FIGURES

1	LOCATION
----------	-----------------

1. **INTRODUCTION**

This report is the result of a Feasibility Stage Road Safety Audit of a proposed new intersection into a proposed Bunnings Warehouse development off Princes Highway, Tempe. (Figure 1)

The proposal is to provide a new 'T' intersection at the northern boundary of the site know as 728 – 750 Princes Highway, Tempe. The intersection is proposed to permit right turns into the site from the south on Princes Highway and left turns to the south along the Princes Highway from the subject site.

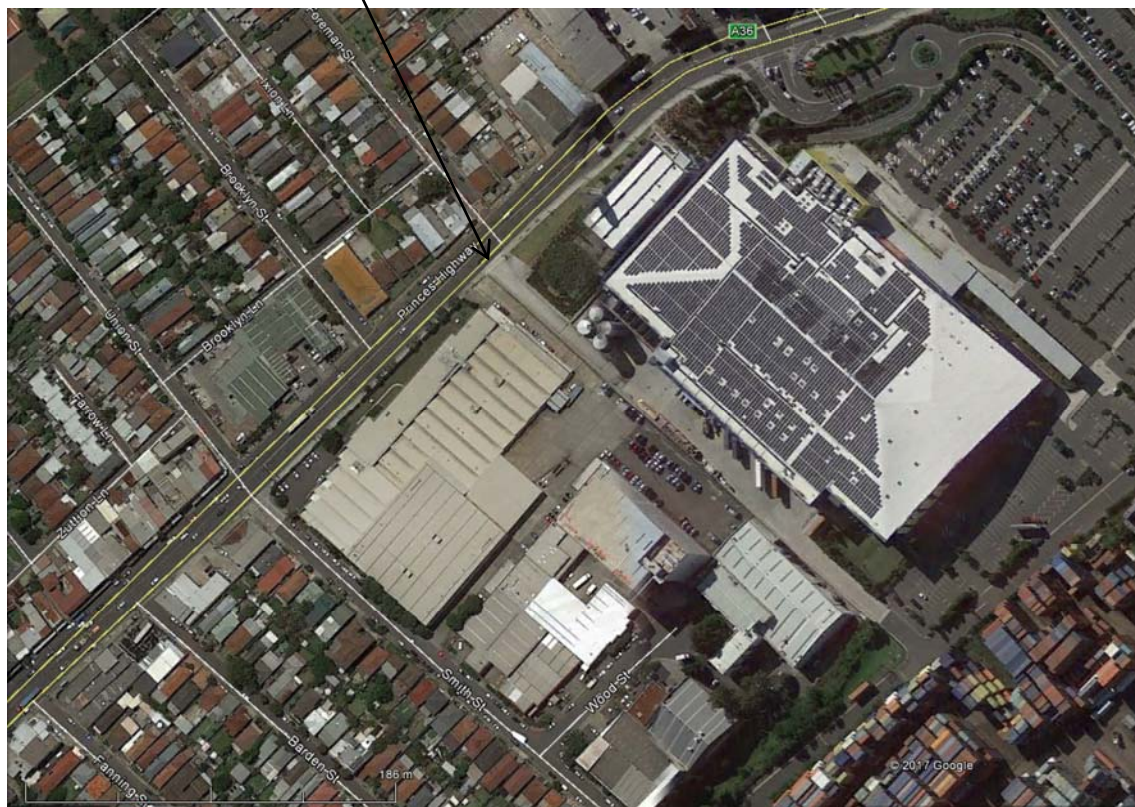
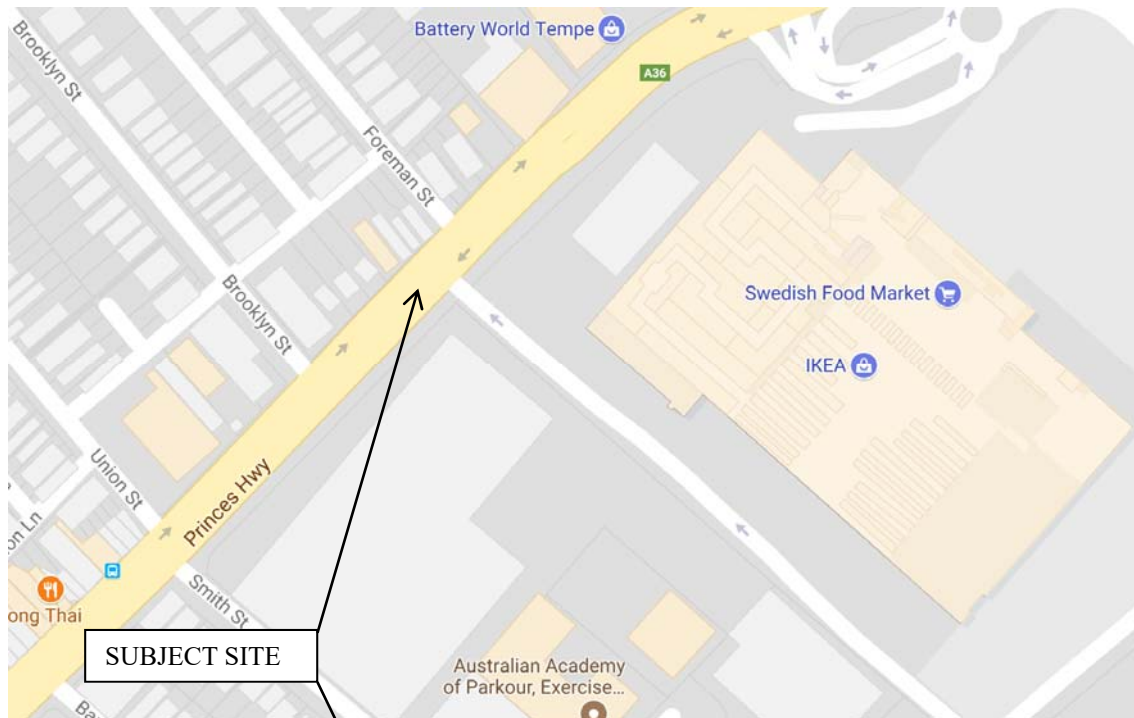
The following has been conducted as part of this Detailed Design Stage Road Safety Audit:

- Review of proposal against relevant AUSTROADS checklists, AUSTROADS guidelines, RMS guidelines and Australian Standards.
- The undertaking of a site visit to gain an appreciation of the surrounding environs and road circumstances during the day and night.
- Identify any issues that should considered as part of the future design.

The following reports that have been reviewed as part of this Audit:

- AUSTROADS 'Guide to Road Safety, Part 6 Road Safety Audit – Jan 2009'
- AUSTROADS Traffic Engineering Practice Series.
- AUSTROADS Guide to Road Design series.
- RMS road design guide.
- RMS NSW speed zoning guidelines.
- Australian Standards AS 2890 series.

A concept plan has been provided by Transport and Traffic Planning Associates Pty Ltd prepared by at&l, entitled proposed road layout general arrangement plan – option 2, project number 15-274, drawing No. SKC14, issue P7 and dated 15 September 2017.



LOCATION

Fig 1

2. EXISTING CONDITIONS

As part of this Audit an inspection of the existing road environment was completed and it revealed that:

- Princes Highway has a 60 km/h speed limit.
- Princes Highway has 3 trafficable lanes in each direction separated by a central raised median island.
- Eastern side of Princes Highway has clearway restrictions from 6.00am – 10.00am Monday to Friday.
- Western side of Princes Highway has clearway restrictions from 3.00pm – 7.00pm Monday to Friday, full time No Stopping restrictions.
- Street lighting is provided on the majority of electricity poles along this section of the Princes Highway.

3. DEFICIENCY AND RECOMMENDATION RANKINGS

The Plans have been assessed against the AUSTROADS Road Safety Audit Guidelines (January 2009 edition) Concept Design Stage Road Safety Audit Checklist.

All noted safety deficiencies were given a risk rating based on the probability of a crash occurring due to the deficiency and likely severity of the crash. The following matrix was used to determine the risk rating.

Likelihood Severity	Highly Probable	Occasional	Improbable
Major	High	High	Medium
Moderate	High	Medium	Low
Minor	Medium	Low	Low

Explanation of terms:

Highly probable: It is likely that a number of these crashes of this type could occur within one year.

Occasional: It is likely that one crash of this type could occur within one year.

Improbable: It is likely that one crash of this type occurs every three years.

Major: The crash is likely to result in death or serious injuries.

Moderate: The crash is likely to result in minor injuries or large scale of property damage.

Minor: The crash is likely to result in minor property damage or many *near miss* crash events.

One of three possible priority levels (e.g. high, medium or low) has been assigned to each safety issue. The priority levels are defined as follows:

High Priority: A high road safety risk requiring redesign or design amendment with resolution prior to construction

Medium Priority: A medium road safety risk that may require redesign or design amendment with resolution prior to road opening

Low Priority: A lower road safety risk that should be considered in subsequent design development and/or monitored during initial operations

4. **RECOMMENDATION FROM PREVIOUS AUDITS**

Traffic Solutions Pty Ltd is not aware of any previous road safety audits for this new intersection proposal.

5. **PLANS AND CHECKLIST REVIEW**

The at&l concept plan has been assessed against the AUSTROADS Road Safety Audit Guidelines (January 2009 edition) Feasibility Stage Road Safety Audit Checklist.

The results of this checklist review are that the design plans for the proposed intersections revealed the following deficiencies:

Table 1: Audit Findings and responses for the feasibility stage audit			
Audit Findings	Ranking	Client	
		Accept Yes/No	Response
The electricity light pole on the west side of the Princes Highway immediately south of the existing driveway (and proposed location of intersection) does not have a street light. Consideration of street lighting should be included in the concept design.	LOW	YES	See section 6
It is noted that a separation splitter island is indicated on the concept plan across the footpath between the proposed vehicle access and the adjoining Ikea loading dock driveway. The eastern footpath of Princess highway is a shared pedestrian/bicycle path and consideration should be given to providing an appropriate distance between the proposed access road and Ikea driveway that is sufficient for both user groups.	LOW	YES	See section 6

The completed checklist is provided as appendix B for reference.

6. **PROPONENT RESPONSE TO ISSUES RAISED**

Transport and Traffic Planning Associates has advised:

- The electricity cables will be undergrounded and the existing poles removed, however suitable street lighting will be provided as suggested.
- The IKEA driveway is a permanently gated Emergency only egress (as per the Consent) which has never to my knowledge been open from the day that IKEA started trading. On that basis, I think that this is not an issue.

APPENDIX B AUSTROADS FEASIBILITY STAGE ROAD SAFETY AUDIT CHECKLIST

AUSTROADS Checklist 1: Feasibility Stage Audit

Issue	Yes	No	Comment
1.1 General topics			
1.1.1 Scope of project; function; traffic mix			
What is the intended function of the scheme?	✓		To provide vehicle access
Is the design consistent with the function of the road?	✓		
Will the proposed scheme/redesign safely cater for: <ul style="list-style-type: none"> ▫ cars? ▫ motorcyclists? ▫ Cyclists ▫ pedestrians? ▫ heavy vehicles? ▫ buses? 	✓		Issue of shared bicycle/pedestrian path raised with designer
Is the expected mix of traffic adequately catered for?	✓		
Will the proposed scheme be consistent with adjacent roads, land forms and traffic management?	✓		
1.1.2 Type and degree of access to property and developments			
Is the degree of access control consistent with the road's function and with other sections of the road?	✓		
Will sight distances be satisfactory: <ul style="list-style-type: none"> ▫ at intersections? ▫ at property accesses? 	✓		
Is the design speed (or the likely vehicle speeds) compatible with the number and type of intersections/property accesses present?	✓		
Does the width of the right of way satisfy access needs?			n/a
1.1.3 Major generators of traffic			
Are all major generators of traffic (including housing or shopping centres) far enough away to avoid unsafe influences on the form of the design?	✓		
Have existing or alternative accesses been arranged to ensure existing suburbs/areas are not cut off by the development of the scheme/works?	✓		
Are the accesses for significant traffic generators far enough away from intersections for safety?	✓		

Issue	Yes	No	Comment
Is sight distance to and from accesses to significant traffic generators adequate?	✓		
Will the proposed scheme be consistent with adjacent roads, land forms and traffic management?	✓		
1.1.4 Staging requirements			
Will this design be implemented in one stage only?	✓		
If the design is to be implemented in more than one stage, has safety been given a high priority <ul style="list-style-type: none"> ▪ in transitions between stages? ▪ in transitions to existing roads? 			n/a
Will the work avoid problems with safety standards elsewhere during construction?	✓		
1.1.5 Future works			
Will the route be free of compromises in safety if there is to be: <ul style="list-style-type: none"> ▪ future widening? ▪ the addition of a complete second carriageway? ▪ after realignments? ▪ major geometric changes at intersections? ▪ linear extensions of the scheme? 	✓		
1.1.6 Wider network effects			
Have all harmful safety effects of this scheme upon the surrounding road network been identified? Have they been adequately dealt with?	✓		
1.2 Design issues (general)			
1.2.1 Route choice			
Are all aspects associated with the location of the route and/or its alignment safe?	✓		
If the route follows existing roads what are the effects of this? (comment)			n/a
If the route is in 'green fields' (undeveloped corridor), is the alignment safe? Could it be safer? (comment)			n/a
Does the scheme fit in with the physical constraints of the landscape?	✓		
Does the scheme take account of major network considerations?	✓		
1.2.2 Impact of continuity with the existing network			
Are all sections/transitions where the proposed road scheme connects with the existing network free of potential problems?	✓		

Issue	Yes	No	Comment
1.2.3 Broad design standards			
Have the appropriate design standards been used? (having regard to the scope of the project and its function in relation to the traffic mix)	✓		
Does the geometric plan and profile meet design guidelines?	✓		
Have the appropriate design vehicle and check vehicle been used?	✓		
1.2.4 Design speed			
Has the appropriate design speed been selected with regard to: <ul style="list-style-type: none"> ▫ horizontal and vertical alignment? ▫ visibility? ▫ merging? ▫ weaving? ▫ decelerating or accelerating at intersections? 	✓		
Is sight distance generally satisfactory: <ul style="list-style-type: none"> ▫ at intersections? (if not, what implications?) ▫ at entry and exit ramps? ▫ at property entrances? ▫ at emergency vehicle access points? 	✓		
Can any sudden change in the speed regime or posted speed limit be safely accommodated?	✓		
Is the designated speed limit, if any, on the proposed road appropriate?	✓		
Is the designated or intended speed limit consistent with the design speed?	✓		
1.2.5 Design volume and traffic characteristics			
Is the design appropriate with regard to the design volume and traffic characteristics (including the effects of unusual proportions of heavy vehicles, cyclists and pedestrians, or side friction effects)?	✓		
Will the scheme safely cope with unforeseen or large increases in traffic volume?	✓		
Will the scheme safely cope with unforeseen changes in the traffic characteristics?	✓		

Issue	Yes	No	Comment
1.3 Intersections			
1.3.1 Number and type of intersections			
Are all aspects of intersections (for example, spacing, type, layout, etc.) appropriate with respect to: <ul style="list-style-type: none"> the broad concept of the project the function of this road and intersecting roads the traffic mix on this road and intersecting roads types which are consistent within the scheme, and consistent with adjacent sections? 	✓		
Is the frequency of intersections appropriate (neither too high nor too low): <ul style="list-style-type: none"> for safe access? to avoid impacts on the surrounding network? for emergency vehicle access? 	✓		
Have all physical, visibility or traffic management constraints which would influence the choice or spacing of intersections been considered?	✓		
Has the vertical and/or horizontal alignment been taken into account with regard to the style or spacing of intersections?	✓		
Are all of the proposed intersections necessary or essential?	✓		
Can any unnecessary intersections be removed? Can access safety be improved by changes on the surrounding road network?			n/a
Will the angle of the intersecting roads and the sight lines be adequate for the safety of all road users?	✓		
1.4 Environmental constraints			
1.4.1 Safety aspects			
Is the surrounding terrain free of physical or vegetation defects which could affect the safety of the scheme? (for example, heavy planting, forestry, deep cuttings, steep or rocky bluffs which constrain the design)	✓		
Do the gradients, curves and general design approaches fit in with the likely weather or environmental aspects of the terrain? (for example, fog-prone areas)	✓		
Has safety been considered in the location of environmental features? (for example, noise fences)	✓		
Does the scheme deal adequately with potential animal conflicts? (for example, kangaroos, wombats, cattle, etc.)			n/a

Issue	Yes	No	Comment
Will the scheme perform safely at night when it is wet, or there is fog? Are visual distractions (for example, scenic vistas) adequately dealt with? (for example, by providing areas for people to stop safely)	✓		
Has the issue of unstable country been considered? (for example, mine subsidence)	✓		
1.5 Any other matters 1.5.1 Safety aspects not already dealt with			
Has the possibility of flooding been adequately dealt with?	✓		
Have any railway level crossings been identified and are they treated adequately?			n/a
Have other distractions (for example, low-flying aircraft, advertising, etc.) been adequately dealt with?	✓		
Has the need for laybys or parking (for example, for tourist routes, trucks, picnic or rest areas) been considered?			n/a
Has the potential of the location to attract roadside stalls been considered?			n/a
Have all unusual or hazardous conditions associated with special events been considered?	✓		
Have all classes of pedestrians that could be seriously affected by the proposal been catered for? (for example, school children, elderly, etc.)	✓		
Have any safety or accident problems on the existing network been addressed? (not carried over to the new scheme)	✓		
Has the issue of providing lighting for the design been considered?	✓		Issue raised with designer
Has the need for drivers to stop been considered? (for example, generally, rest areas, truck parking, enforcement)			n/a
Have all other matters which may have a bearing on safety been addressed?	✓		

Appendix F

SIDRA RESULTS

MOVEMENT SUMMARY



Site: Princes Highway / Union St / Smith St AM Bunnings with Give Way Access

Princes Highway / Union St / Smith St

Existing Traffic Conditions with Left Turn Slip Lane on Princes Hwy Northern Approach

2016 AM Traffic Volumes with Approved Bulky Goods & Bunnings

Signals - Fixed Time Cycle Time = 140 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Princes Hwy SW											
30	L2	13	5.0	0.776	6.6	LOS A	6.2	45.2	0.10	0.10	51.0
31	T1	3007	5.0	0.776	1.1	LOS A	7.2	52.5	0.10	0.11	57.0
32	R2	54	5.0	0.776	7.1	LOS A	7.2	52.5	0.13	0.14	51.2
Approach		3074	5.0	0.776	1.2	LOS A	7.2	52.5	0.10	0.11	56.8
East: Smith St											
21	L2	15	0.0	0.041	46.8	LOS D	0.8	5.5	0.83	0.67	21.4
22	T1	7	0.0	0.174	57.4	LOS E	2.6	18.5	0.92	0.73	23.5
23	R2	79	0.0	0.174	62.4	LOS E	2.6	18.5	0.92	0.73	15.7
Approach		101	0.0	0.174	59.8	LOS E	2.6	18.5	0.91	0.72	17.1
North: Princes Hwy NE											
24	L2	66	5.0	0.051	6.4	LOS A	0.3	2.4	0.15	0.58	43.4
25	T1	788	5.0	0.229	12.3	LOS A	7.7	56.5	0.47	0.41	39.3
Approach		854	5.0	0.229	11.8	LOS A	7.7	56.5	0.45	0.42	39.6
All Vehicles		4029	4.9	0.776	4.9	LOS A	7.7	56.5	0.20	0.19	49.2

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P8	South Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
P5	East Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
P6	North Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
P6S	North Slip/Bypass Lane Crossing	10	0.5	LOS A	0.0	0.0	0.11	0.11
P7	West Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
All Pedestrians		50	51.4	LOS E			0.79	0.79

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: Princes Highway / Union St / Smith St PM Bunnings with Give Way Access

Princes Highway / Union St / Smith St

Existing Traffic Conditions with Left Turn Slip Lane on Princes Hwy Northern Approach

2016 PM Traffic Volumes with Approved Bulky Goods & Bunnings

Signals - Fixed Time Cycle Time = 140 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Princes Hwy SW											
30	L2	13	5.0	0.159	10.8	LOS A	4.1	29.7	0.31	0.28	47.0
31	T1	1327	5.0	0.796	14.5	LOS A	30.7	224.4	0.58	0.57	36.7
32	R2	85	5.0	0.796	52.6	LOS D	21.5	157.0	1.00	1.11	21.4
Approach		1425	5.0	0.796	16.7	LOS B	30.7	224.4	0.60	0.60	35.0
East: Smith St											
21	L2	63	0.0	0.173	48.6	LOS D	3.4	24.0	0.86	0.73	20.9
22	T1	44	0.0	0.352	58.3	LOS E	5.9	41.0	0.94	0.76	23.6
23	R2	136	0.0	0.352	64.0	LOS E	5.9	41.0	0.95	0.77	15.5
Approach		243	0.0	0.352	59.0	LOS E	5.9	41.0	0.92	0.76	18.6
North: Princes Hwy NE											
24	L2	115	5.0	0.112	11.0	LOS A	2.1	15.3	0.36	0.65	38.0
25	T1	2877	5.0	0.836	1.2	LOS A	7.1	52.0	0.12	0.11	57.1
Approach		2992	5.0	0.836	1.5	LOS A	7.1	52.0	0.13	0.13	56.0
All Vehicles		4660	4.7	0.836	9.2	LOS A	30.7	224.4	0.32	0.31	42.7

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P8	South Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
P5	East Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
P6	North Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
P6S	North Slip/Bypass Lane Crossing	10	0.5	LOS A	0.0	0.0	0.11	0.11
P7	West Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
All Pedestrians		50	51.4	LOS E			0.79	0.79

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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SIDRA INTERSECTION 6.0.24.4877

Project: F:\WORK\1717053 - BUNNINGS TEMPE - from 14274\MODELLING\SEPT 2017 PRIORITY CONTROL

ACCESS\2293.001M BUNNINGS TEMPE SUBMISSION.sip6

8000272, 6020795, TRANSPORT & TRAFFIC PLANNING ASSOCIATES, NETWORK / 1PC

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SIDRA
INTERSECTION 6

MOVEMENT SUMMARY



Site: Princes Highway / Union St / Smith St SAT Bunnings with Give Way Access

Princes Highway / Union St / Smith St

Existing Traffic Conditions with Left Turn Slip Lane on Princes Hwy Northern Approach

2016 SAT Traffic Volumes with Approved Bulky Goods & Bunnings

Signals - Fixed Time Cycle Time = 140 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Princes Hwy SW											
30	L2	15	5.0	0.164	6.4	LOS A	0.6	4.4	0.04	0.08	50.9
31	T1	1450	5.0	0.820	4.4	LOS A	19.4	141.3	0.16	0.18	49.9
32	R2	176	5.0	0.820	47.7	LOS D	19.4	141.3	0.88	1.04	22.2
Approach		1641	5.0	0.820	9.0	LOS A	19.4	141.3	0.24	0.27	43.0
East: Smith St											
21	L2	93	0.0	0.188	46.4	LOS D	4.8	33.9	0.81	0.75	21.5
22	T1	33	0.0	0.500	60.8	LOS E	8.2	57.5	0.97	0.79	22.8
23	R2	217	0.0	0.500	65.8	LOS E	8.2	57.5	0.97	0.79	15.0
Approach		343	0.0	0.500	60.1	LOS E	8.2	57.5	0.93	0.78	17.5
North: Princes Hwy NE											
24	L2	233	5.0	0.267	19.6	LOS B	7.4	54.0	0.55	0.72	30.9
25	T1	1739	5.0	0.505	8.0	LOS A	11.5	83.6	0.32	0.29	44.5
Approach		1972	5.0	0.505	9.4	LOS A	11.5	83.6	0.35	0.34	42.3
All Vehicles		3956	4.6	0.820	13.6	LOS A	19.4	141.3	0.35	0.35	37.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

The results of iterative calculations indicate a somewhat unstable solution. See the Diagnostics section in the Detailed Output report.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P8	South Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
P5	East Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
P6	North Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
P6S	North Slip/Bypass Lane Crossing	10	0.5	LOS A	0.0	0.0	0.11	0.11
P7	West Full Crossing	10	64.2	LOS F	0.0	0.0	0.96	0.96
All Pedestrians		50	51.4	LOS E			0.79	0.79

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 **Site: 10 BUNNINGS GIVEWAY ACCESS AM**

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: PRINCES HWY S											
2	T1	3086	5.0	0.545	0.0	LOS A	0.0	0.0	0.00	0.00	59.8
3	R2	16	0.0	0.029	8.2	LOS A	0.1	0.4	0.39	0.71	48.0
Approach		3102	5.0	0.545	0.1	NA	0.1	0.4	0.00	0.00	59.6
East: BUNNINGS ACCESS											
4	L2	17	0.0	0.016	6.7	LOS A	0.1	0.5	0.34	0.56	49.2
Approach		17	0.0	0.016	6.7	LOS A	0.1	0.5	0.34	0.56	49.2
North: PRINCES HWY N											
8	T1	840	5.0	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		840	5.0	0.148	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		3959	5.0	0.545	0.1	NA	0.1	0.5	0.00	0.01	59.6

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 10 BUNNINGS GIVEWAY ACCESS PM**

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: PRINCES HWY S											
2	T1	1442	5.0	0.382	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
3	R2	21	0.0	0.336	57.5	LOS E	0.7	4.6	0.95	1.00	24.0
Approach		1463	4.9	0.382	0.8	NA	0.7	4.6	0.01	0.01	57.4
East: BUNNINGS ACCESS											
4	L2	47	0.0	0.112	13.8	LOS A	0.4	2.9	0.71	0.88	43.1
Approach		47	0.0	0.112	13.8	LOS A	0.4	2.9	0.71	0.88	43.1
North: PRINCES HWY N											
8	T1	2953	5.0	0.521	0.0	LOS A	0.0	0.0	0.00	0.00	59.8
Approach		2953	5.0	0.521	0.0	NA	0.0	0.0	0.00	0.00	59.8
All Vehicles		4463	4.9	0.521	0.4	NA	0.7	4.6	0.01	0.01	58.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

 **Site: 10 BUNNINGS GIVEWAY ACCESS SAT**

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: PRINCES HWY S											
2	T1	1623	5.0	0.430	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
3	R2	44	0.0	0.194	17.8	LOS B	0.4	2.7	0.79	0.92	40.2
Approach		1667	4.9	0.430	0.5	NA	0.4	2.7	0.02	0.02	58.4
East: BUNNINGS ACCESS											
4	L2	110	0.0	0.155	9.3	LOS A	0.6	4.5	0.57	0.77	46.9
Approach		110	0.0	0.155	9.3	LOS A	0.6	4.5	0.57	0.77	46.9
North: PRINCES HWY N											
8	T1	1878	5.0	0.331	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1878	5.0	0.331	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		3655	4.8	0.430	0.5	NA	0.6	4.5	0.03	0.03	58.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Sunday, 17 September 2017 5:36:10 PM
SIDRA INTERSECTION 6.0.24.4877

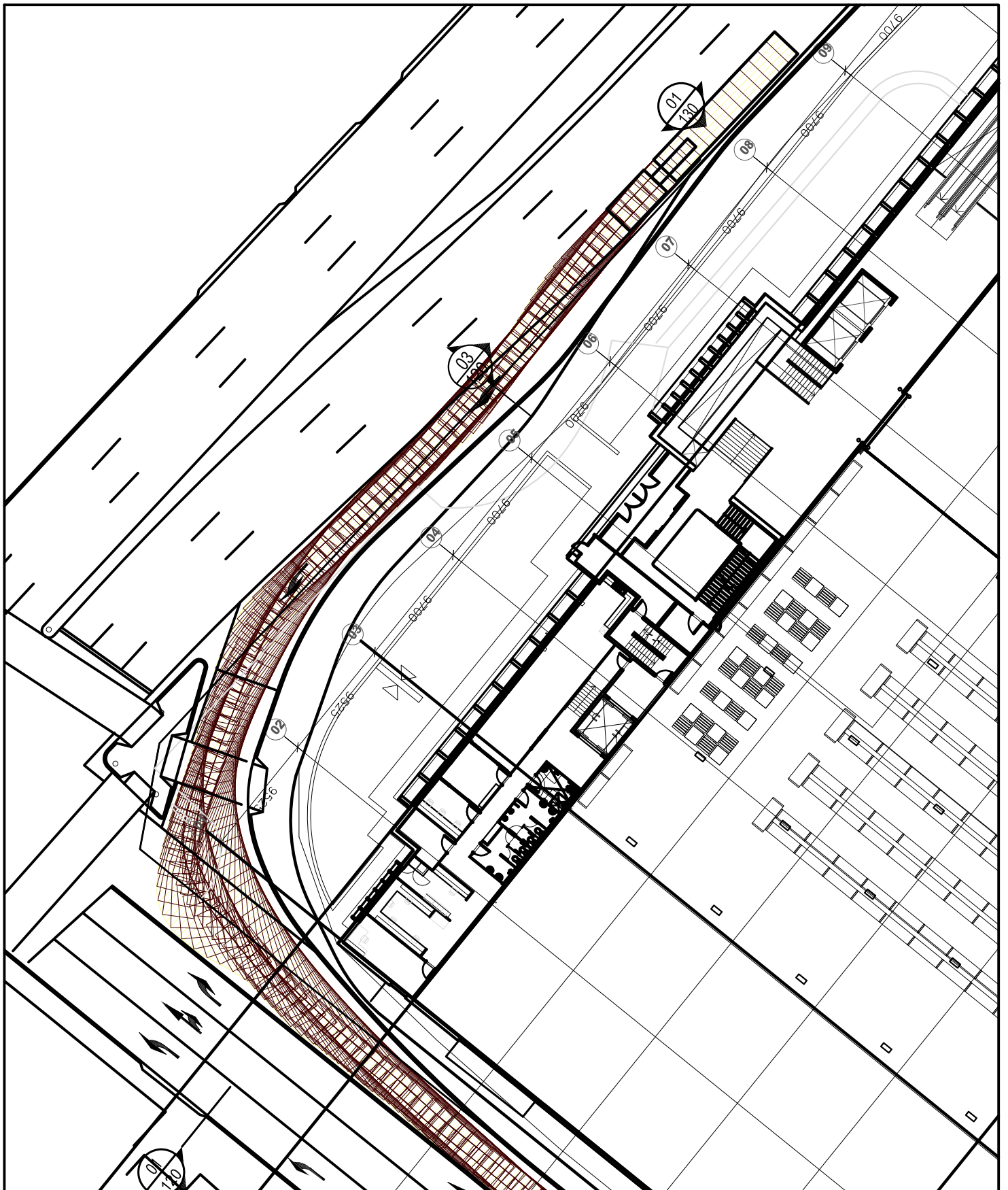
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Project: F:\WORK17\17053 - BUNNINGS TEMPE - from 14274\MODELLING\SEPT 2017 PRIORITY CONTROL
ACCESS\2293.001M BUNNINGS TEMPE SUBMISSION.sip6
8000272, 6020795, TRANSPORT & TRAFFIC PLANNING ASSOCIATES, NETWORK / 1PC

**SIDRA
INTERSECTION 6**

Appendix G

TURNING PATH ASSESSMENT



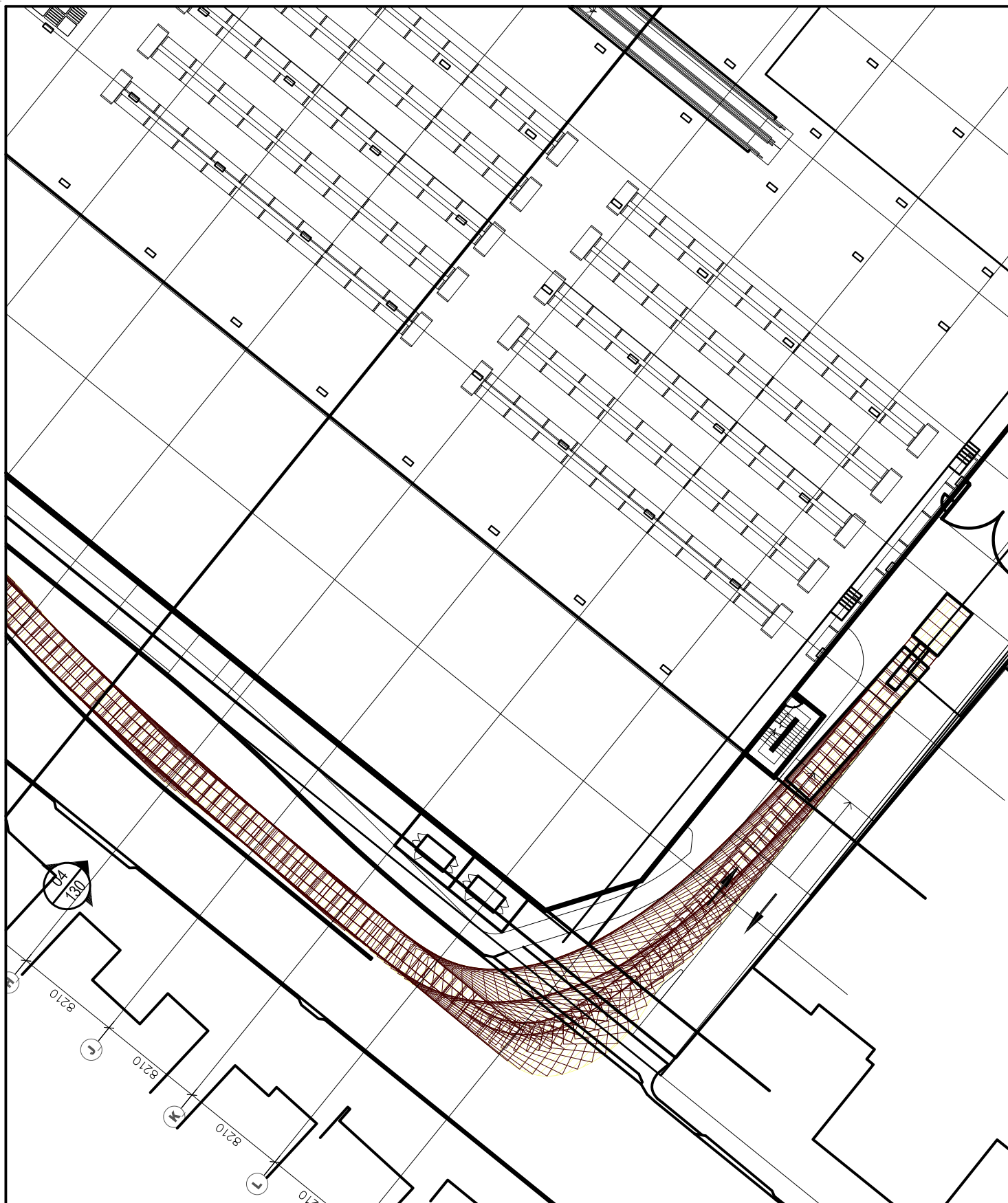
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2000. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



**SWEPT PATH ANALYSIS
OF A 19m ARTICULATED
VEHICLE ENTERING THE SITE**

SP 1



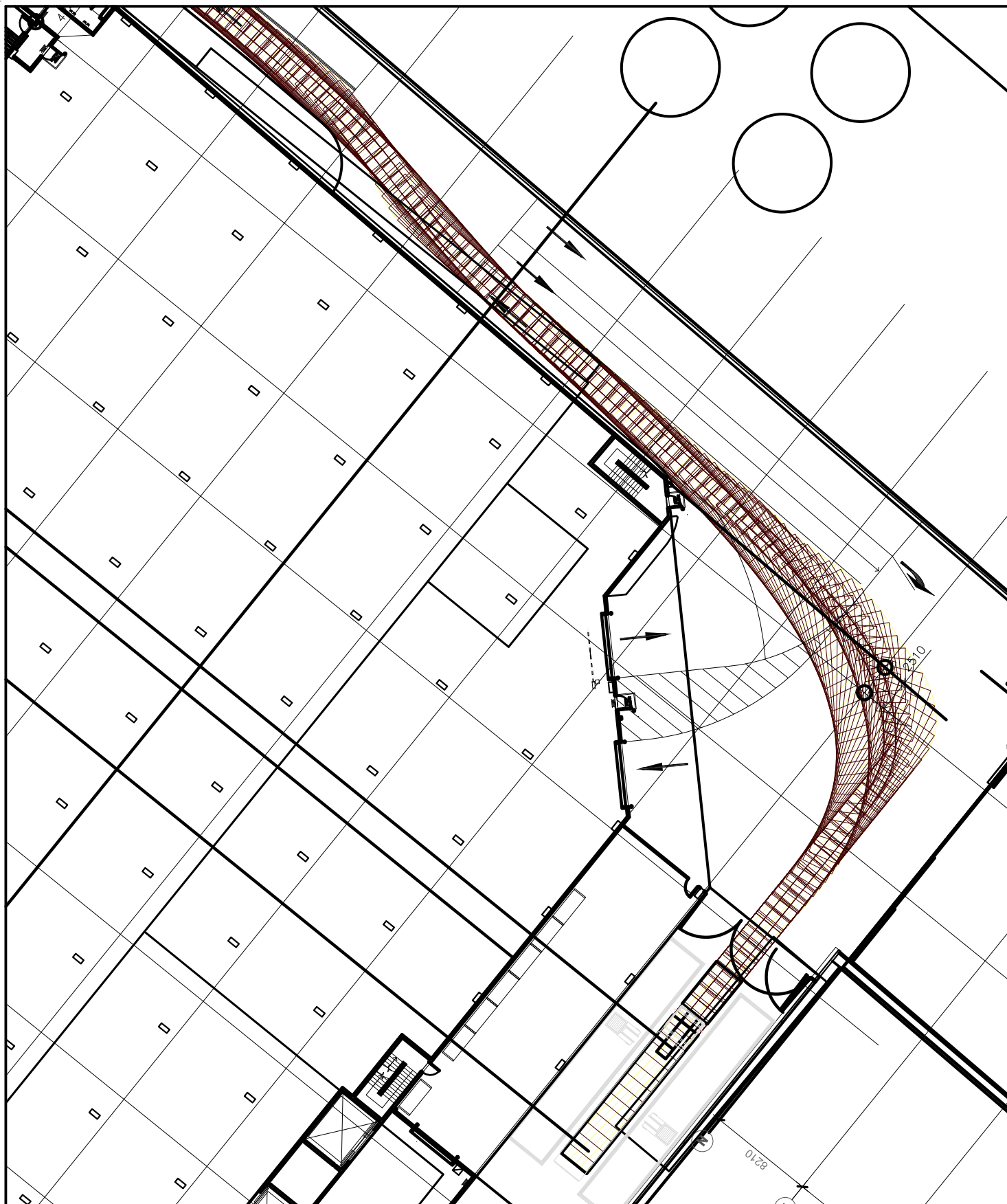
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2000. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



**SWEPT PATH ANALYSIS
OF A 19m ARTICULATED
VEHICLE ENTERING THE SITE**

SP 2



LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2000. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



**SWEPT PATH ANALYSIS
OF A 19m ARTICULATED
VEHICLE EXITING THE SITE**

SP 3



LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2000. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.



**SWEPT PATH ANALYSIS
OF A 19m ARTICULATED
VEHICLE EXITING THE SITE**

SP 4