

2740 BRUXNER HIGHWAY, CASINO TRAFFIC IMPACT ASSESSMENT

FOR

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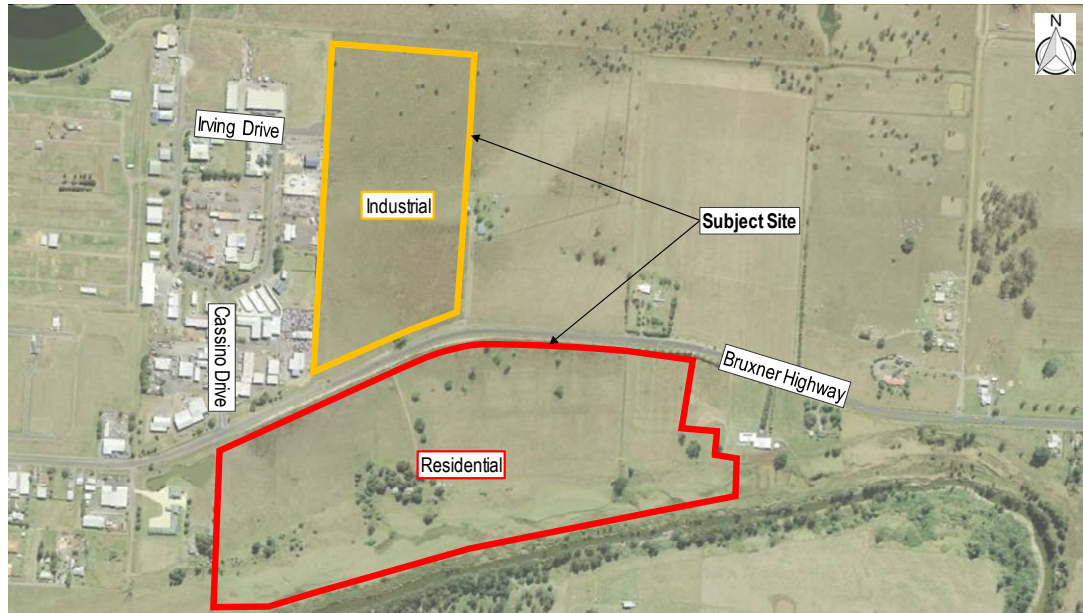
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1. INTRODUCTION

1.1 BACKGROUND

Bitzios Consulting has been engaged by JM & CA Imeson to prepare a traffic assessment for the proposed residential and industrial rezoning at 2740 Bruxner Highway, Casino. The subject site location is shown in Figure 1.1.



Source: Google Earth – NSW Globe

Figure 1.1: Subject Site Location

1.2 SCOPE

The scope of works for this assessment will consist of the following:

- a review of the existing road network and traffic conditions in proximity to the site;
- a review of Roads and Maritime Services (RMS) crash data to identify any accident history within 250m of the site access and/or safety issues;
- estimation of development's likely traffic generation and the distribution onto the external road network;
- one (1) SIDRA assessment of the Bruxner Highway / Casino Drive intersection for year of opening and 10-year design horizon for 'base' and 'development' scenario traffic conditions;
- one (1) SIDRA assessment of the Bruxner Highway / Industrial Access intersections for year of opening and 10-year design horizon for 'base' and 'development' scenario traffic conditions;
- one (1) SIDRA assessment of the Bruxner Highway / Residential Access intersections for year of opening and 10-year design horizon for 'base' and 'development' scenario traffic conditions; and
- a conceptual layout detailing the required geometric form of the Bruxner Highway / Development Access intersections, including lane widths, number of turning lanes, storage lanes etc.

2. EXISTING CONDITIONS

2.1 EXISTING SITE

The subject site exists as a greenfield site on either side (i.e. both north and south) of the Bruxner Highway, approximately 350m east of the Casino town centre.

2.2 EXISTING ROAD NETWORK

Details of the road network surrounding the site is shown in Table 2.1.

Table 2.1: Road Network

Road Name	No. of Lanes	Speed Limit	Divided	Jurisdiction	Hierarchy	Comments
Bruxner Highway	2 (two-way)	100km/h	No	Roads and Maritime Services	Arterial	Primary east-west arterial road connecting Casino to Lismore and Pacific Highway (Ballina). Fronts the subject site.
Cassino Drive	2 (two-way)	50km/h	No	Richmond Valley Council	Local Collector	Intersects with Bruxner Highway to the west. Services a number of industrial land uses adjacent to the subject site.

It is noted that the Bruxner Highway changes from a 100km/h zone to a 50km/h zone in the westbound direction, approximately 190m east of the Bruxner Highway / Cassino Drive intersection. Figure 2.1 shows the existing speed zone change surrounding the subject site.

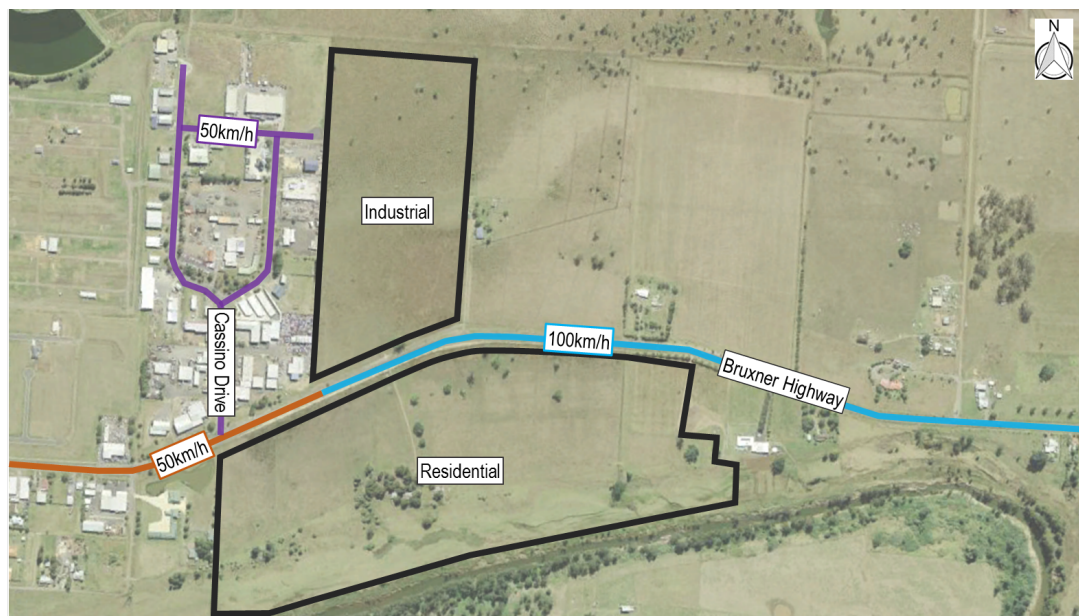


Figure 2.1: Existing Surrounding Speed Zones

2.3 BACKGROUND TRAFFIC VOLUMES

Background traffic volumes for Bruxner Highway / Cassino Drive were obtained from intersection counts undertaken by Traffic Data and Control (TDC) on 31st January 2018. The count data was recorded for both the AM (7:30AM – 8:30AM) and PM (3:45PM – 4:45PM) peak periods and is presented in Figure 2.2.

				Cassino Drive		
Bruxner Highway	PM	AM		115	16	PM
	70	80	L	55	7	AM
	255	285	T	R	L	
				R	16	8
				T	271	309
					AM	PM

Figure 2.2: 2018 Background Survey Volumes

The survey results for the AM and PM peak period traffic volumes are provided in Appendix A.

2.4 CRASH DATA

Crash data was sourced from RMS for the section of road on the Bruxner Highway and Cassino Drive in the vicinity of the subject site. The crash data included all recorded crashes from 2012 to 2016. The crashes recorded on each approach are summarised in Table 2.2.

Table 2.2: Crash History Data Summary

Crash Date	Location	Key Direction	Type	Severity
2012	In front of Bruxner Highway / Arthur Street	Eastbound and westbound	Head-on	Fatal
2014	In front of Bruxner Highway / Arthur Street	Eastbound and westbound	Head-on	Serious injury
2016	Intersection of Bruxner Highway/Cassino Drive	T-junction	Rear-end	Moderate injury

Source: RMS

When considering the three (3) crashes that have occurred from 2012 to 2016, two (2) occurred as a head-on crash at the bend on Bruxner Highway and one (1) occurred at the Bruxner Highway / Cassino Drive priority-controlled intersection (e.g. vehicles rear-ended while waiting to turn).

3. PROPOSED DEVELOPMENT

The development proposes to rezone the subject site to include an industrial land use to the north of Bruxner Highway, comprising of approximately 144,000m² and a residential land use to the south of Bruxner Highway, which comprises of approximately 186,000m².

At the time of this report, detailed development plans were not available. As such, for the purposes of this report, a first principle approach was used to determine the number of lots at the residential land use and industrial land use developments, as detailed below:

Residential Land Use

- Area: 186,000 m²
- Usable area (70% x Total Area): 130,200m²
- Approximate Lot. Size (based on lot sizes of similar developments nearby): 600m²
- Number of Lots (Usable area/lot size): **217 lots**

Industrial Land Use

- Area: 144,000 m²
- Usable area (40% x Total Area): **57,600m²**

In the centre of Casino, the percentage of residential lot area over total land area was estimated in the order of 60%. A usable area of 70% was applied for the proposed development in order to undertake a conservative assessment, by modelling increased development traffic. By applying an average lot size of 600m², this yields a total of 217 lots.

At the adjacent industrial area on Cassino Drive, the percentage of gross leasable floor area over total land area was estimated in the order of 25%. Similarly, a gross floor area of 40% was applied for the proposed development in order to undertake a conservative assessment, by modelling increased development traffic.

4. TRAFFIC ASSESSMENT

4.1 FUTURE GROWTH

Specific growth rates for the Bruxner Highway at Casino were not able to be sourced through Council historic or strategic population estimates, profile.id estimates, or RMS permanent count sites. Notwithstanding this, the *RMS Ballina to Tenterfield Corridor Strategy (2009)* states the populations of Lismore and Casino are forecast to increase by 3% per annum over a 25-year period from 2006 to 2031. For this traffic assessment, a compounding growth rate of 1% per annum has been adopted to conservatively estimate an increase in background traffic at the year-of-opening (2019) and 10-year design horizon (2029).

4.2 FORECAST BACKGROUND TRAFFIC VOLUMES

Forecast background traffic volumes for the year of opening (2019) and 10-year post development (2029) for the development intersections are provided in Appendix B.

4.3 TRAFFIC GENERATION

Traffic generation rates for the proposed development were sourced from *RMS Guide to Traffic Generating Developments (2002)* and *RMS Guide to Traffic Generating Developments Technical Note (2013)*. The rates applicable to the proposed development and the resultant traffic generation are shown in Table 4.1.

Table 4.1: Traffic Generation

Land Use	Quantity	Peak Trip Rate		Peak Trip Generation	
		AM	PM	AM	PM
Residential	217 dwellings	0.71 trips/dwelling	0.78 trips/dwelling	154	169
Industrial	57,600m ² GFA	0.32 trips/100m ² GFA	0.39 trips/100m ² GFA	184	225
Total				338	394

Table 4.2 shows the development IN/OUT splits. For residential land uses it was assumed that 30% of the trips were inbound and 70% of the trips were outbound during the AM peak. The opposite was assumed for the PM peak. For industrial land uses, the land use it is expected that the splits are opposite to the residential land use, as shown below.

Table 4.2: Development Trip Splits

Land Use	Peak Hour Trips (vph)		AM Split (%)		PM Split (%)		AM Peak Trips (vph)		PM Peak Trips (vph)	
	AM	PM	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Residential	154	169	20%	80%	70%	30%	46	108	118	51
Industrial	184	225	70%	30%	30%	70%	129	55	67	157
Total							175	163	185	208

Table 4.2 shows the development is expected to generate in the order of 175 incoming and 163 outgoing trips during the AM peak, and 185 incoming and 208 outgoing trips during the PM peak.

4.4 TRAFFIC DISTRIBUTION

The development traffic distribution for the development has been based on the traffic survey distributions. These surveys are considered to provide an indication of typical traffic movements in the vicinity of the subject site. The development traffic distribution and design (i.e. background plus development) traffic distributions) for the year of opening (2019) and 10-year post development (2029) are provided in Appendix B.

5. PROPOSED INTERSECTION TREATMENTS

5.1 PROPOSED ACCESS ARRANGEMENT

Two (2) priority-controlled T-intersections are proposed as part of this development, as shown in Figure 5.1. The two (2) proposed intersections will service each land use separately, to reduce conflicts between residential and industrial traffic (i.e. high proportion of heavy vehicles).

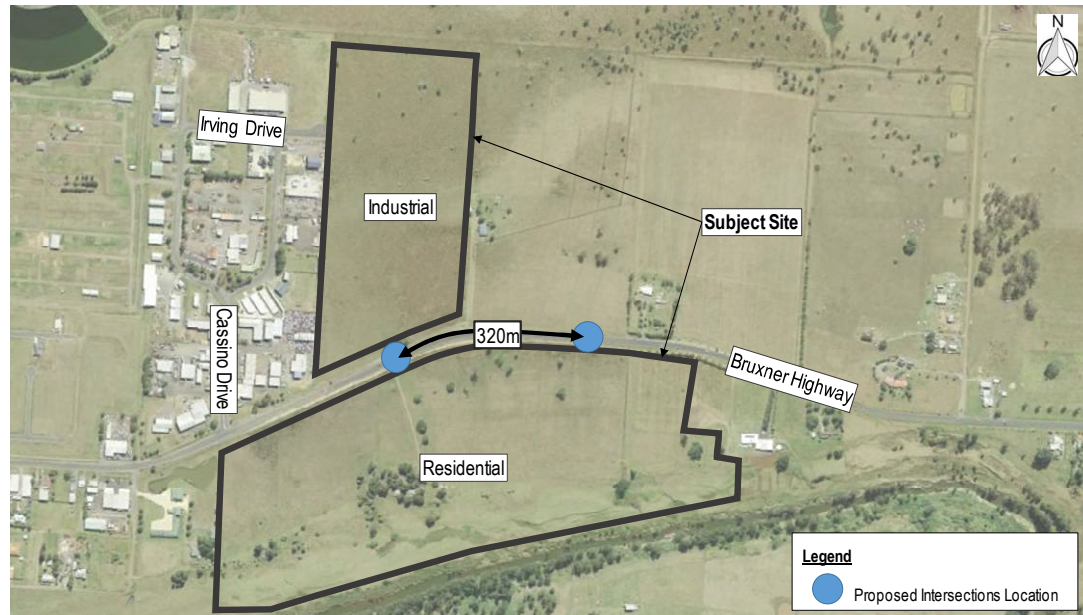


Figure 5.1: Proposed Intersection Locations

5.2 DESIGN SPEED LIMIT

Currently, the posted speed limit along the subject site frontage is 100km/h, with a reduction to 50km/h for westbound traffic (i.e. heading into town) approximately 200m east of the Bruxner Highway / Cassino Drive intersection. The industrial developments which take access from Cassino Drive are located on the current 'edge of town' of Casino. The proposed development would extend the 'edge of town' approximately 800m to the east.

Additionally, as identified in Chapter 2.4, three (3) crashes occurred along the proposed site frontage from 2012 to 2016: two (2) head-on crashes on the Bruxner Highway at the bend; and one (1) rear-end crash at the Bruxner Highway / Cassino Drive intersection. Each of these crashes can be attributed a combination of excessive speed and driver distraction.

Given the above, it is recommended that a speed limit review is undertaken for this section of road. A desirable outcome of this review from a safety perspective would result in the extension of the 50km/h zone to the edge of the proposed developments with an 80km/h speed limit buffer of 300-400m to allow drivers to safely slow from 100km/h to 50km/h as per *Australian Standard 1742.4*.

5.3 TURN WARRANTS ASSESSMENT

A turn warrants assessment was undertaken for the Bruxner Highway / Industrial Access and Bruxner Highway / Residential Access intersection to determine any additional turn lane treatments required. This assessment was undertaken in accordance with Austroads *Guide to Traffic Management Part 6* using 2029 design traffic volumes. The left-turn and right-turn turn warrants assessments for the Bruxner Highway / Industrial Access and Bruxner Highway / Residential Access intersection Figure 5.2 and Figure 5.3 respectively.

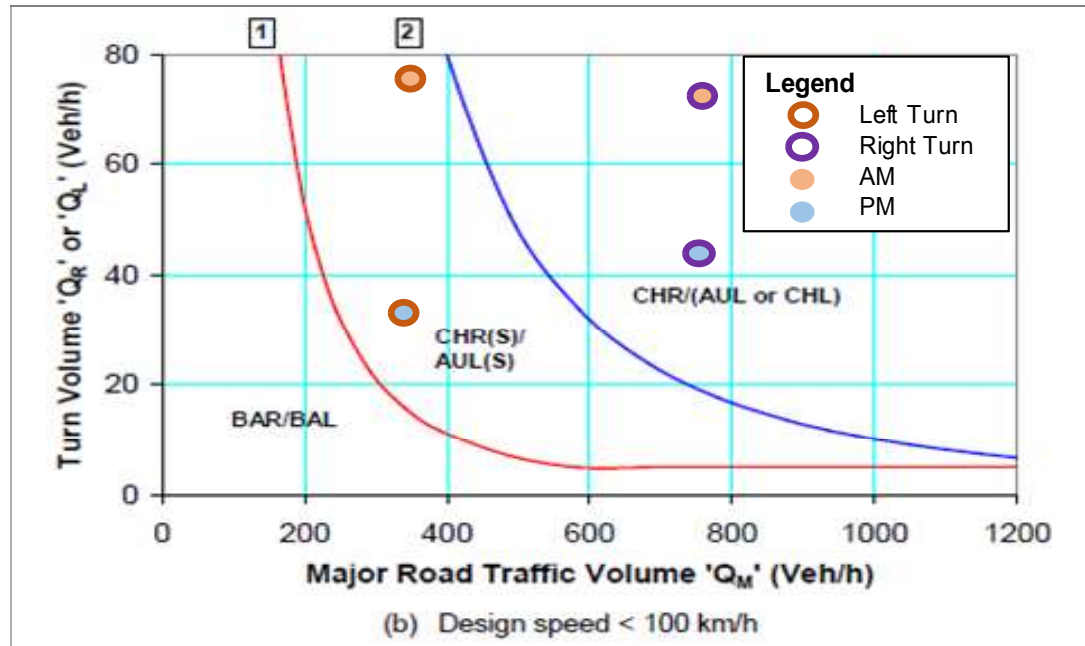


Figure 5.2: Bruxner Highway / Industrial Access 2029 Turn Warrants

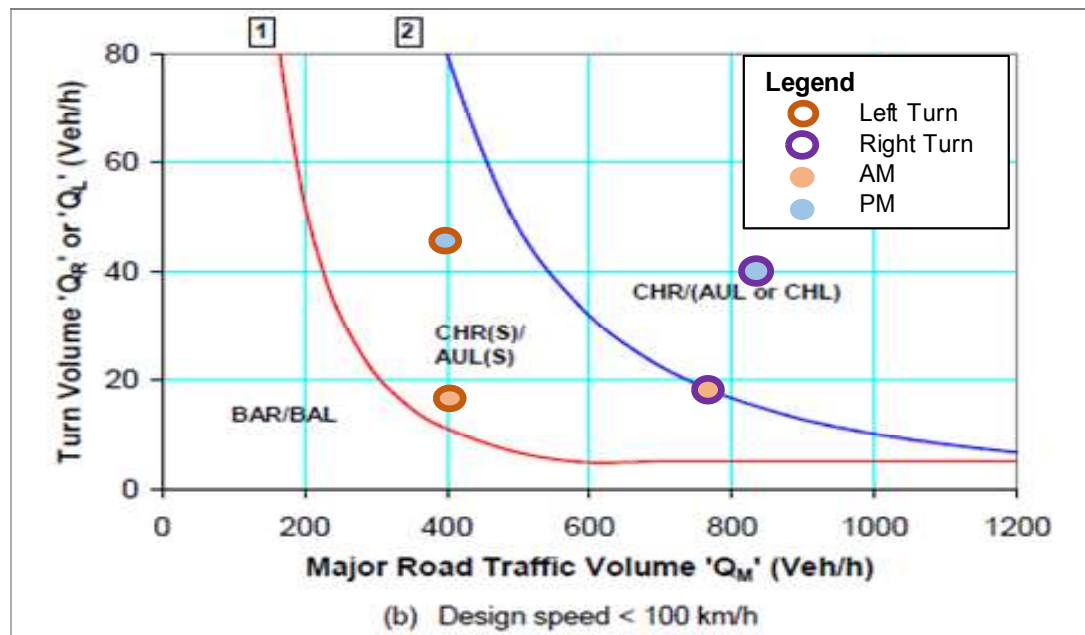


Figure 5.3: Bruxner Highway / Residential Access 2029 Turn Warrants

Figure 5.2 and Figure 5.3 shows that the subject priority-controlled intersections require CHR and AUL turn treatments. The minimum lengths for the CHR and AUL are 55m and 50m respectively in accordance with Austroads guidelines. This accounts for additional design safety, by designing to an 85th percentile vehicular speed of 60km/h for a recommended posted speed limit of 50km/h.

The detailed concept designs of the proposed intersections are provided in Appendix C.

5.4 INTERSECTION SPACING ASSESSMENT

5.4.1 Methodology

The spacing of the proposed intersections has been assessed in accordance with the criteria outlined in Appendix A of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General*. The assessment has considered the following criteria:

- safety;
- stopping sight distance;
- intersection sight distance;
- functional area;
- left-turn conflict overlap;
- influence distance; and
- egress capacity.

5.4.2 Safety

Section E.2 of Austroads *Guide to Road Design Part 4: Intersections and Crossing – General* states 'separating conflicts and minimising conflicts is the usual way to improve safety'. Regarding the relationship between crash rates and the frequency of connections along a road, Appendix A of the Guide provides the following as shown in Figure 5.4.

Unsignalised access points per km ¹	Average spacing ² (m)	Relative crash rate
6	330	1.0
12	165	1.4
18	110	1.8
24	80	2.1
30	66	2.4
36	55	3.0
42	48	3.5

1. Total access connections on both sides of the roadway.
2. Average spacing between access connections on the same side of the roadway.
Notes:
Values converted from the original imperial units with minor rounding.
This table is not inconsistent with the findings of Austroads (2000).
Source: TRB (2003).

Source: Austroads *Guide to Road Design Part 4: Intersections and Crossing – General*

Figure 5.4: Relative Crash Rates for Unsignalised Access Spacing

The area surrounding the proposed development currently presents four (4) unsignalised access points per km, as shown in Figure 5.5.



Figure 5.5: Existing Access Spacing

The proposed development will replace the existing southern access and create one (1) new access point off Bruxner Highway, as shown in Figure 5.6.

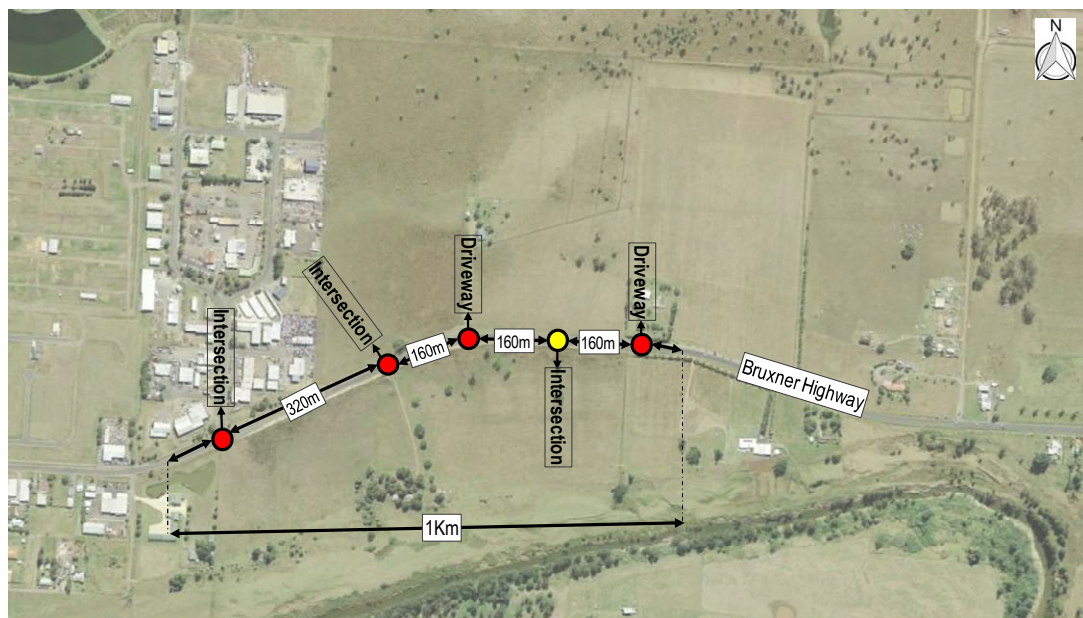


Figure 5.6: Proposed Access Spacing

The proposed development will increase the number of access points on Bruxner Highway within 1km from four (4) to five (5). This is not expected to increase the relative crash rate as shown in Figure 5.4, and as such, the nominated locations of the proposed intersections achieve the safety requirements.

5.4.3 Stopping Sight Distance

Section E.3 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* states “desirably, a driver can clear the intersection or access connection and have at least stopping sight distance available to react to a potential conflict and come to a stop”.

Thus, a downstream access connection should not be less than the approach sight distance from the downstream side of the previous connection or intersection’. Table 3.1 of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* prescribes an approach sight distance of:

- 73m for a 60km/h design speed (i.e. posted speed + 10km/h);
- 92m for a 70km/h design speed;
- 114 for an 80km/h design speed; and
- 165 for a 100km/h design speed;

The nominated locations of the proposed intersections achieve this requirement for up to an **80km/h** design speed.

5.4.4 Intersection Sight Distance

Section E.4 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* states 'this sight distance is required to allow a driver to enter or cross a major roadway'. Table 3.2 of Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* prescribes a sight distance of:

- 123m for a 60km/h design speed;
- 151m for a 70km/h design speed;
- 181m for an 80km/h design speed; and
- 248m for a 100km/h design speed.

The nominated locations of the proposed intersections achieve this requirement for up to a **70km/h** design speed.

5.4.5 Functional Area

Section E.5 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* states 'the functional area of an intersection is the area beyond the physical intersection of two facilities that comprises decision and manoeuvre distance, plus any required vehicle storage length, and can be protected through corner clearance standards and connection spacing standards'. Table E 2 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* provides an upstream functional intersection distance of:

- 155m for a 60km/h design speed; and
- 215m for an 80km/h design speed.

The nominated locations of the proposed intersections achieve this requirement for up to a **60km/h** design speed.

5.4.6 Left-turn Conflict Overlap

Section E.6 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* states 'an overlap occurs when the through driver must monitor more than one access at a time'. Table E 3 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* provides a minimum spacing of:

- 80m for a 60km/h design speed; and
- 105m for an 70km/h design speed.

The nominated locations of the proposed intersections achieve this requirement for up to a **70km/h** design speed.

5.4.7 Influence Distance

Section E.7 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* states 'the influence distance of a driveway (or minor access street) is defined as the sum of the impact distance (comparable to the manoeuvre distance in section E.5) plus the perception/reaction distance'. Table E 5 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* provides a driveway influence distance for a 2% (least-case) spill-back rate of:

- 130m for a 60km/h design speed;
- 155m for a 70km/h design speed; and

- 190m for an 80km/h design speed.

The nominated locations of the proposed intersections achieve this requirement for up to a **70km/h** design speed.

5.4.8 Egress Capacity

Section E.8 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* states 'egress capacity refers to the ability of vehicles to exit from an access into the traffic stream'. Table E 6 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* provides a distance value to maximise the ability of cars to re-enter the through traffic stream from an unsignalised driveway of:

- 170m for a 60km/h design speed;
- 240m for a 70km/h design speed; and
- 300m for an 80km/h design speed.

The nominated locations of the proposed intersections are deemed to comply with this requirement for a **60km/h** design speed.

5.4.9 Summary

Table 5.1 demonstrates that a **60km/h** design speed (i.e. 50km/h posted speed + 10km/h) complies with Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* considering the Intersection Spacing Assessment for Bruxner Highway surrounding the proposed development.

Table 5.1: Intersection Spacing Assessment

Intersection Spacing Assessment	Design Speed			
	60km/h	70km/h	80km/h	100km/h
Safety	Compliant	Compliant	Compliant	Compliant
Stopping Sight Distance	Compliant	Compliant	Compliant	Non-Compliant
Intersection Sight Distance	Compliant	Compliant	Non-Compliant	Non-Compliant
Left-turn Conflict Overlap	Compliant	Compliant	Non-Compliant	Non-Compliant
Influence Distance	Compliant	Compliant	Non-Compliant	Non-Compliant
Functional Area	Compliant	Non-Compliant	Non-Compliant	Non-Compliant
Egress Capacity	Compliant	Non-Compliant	Non-Compliant	Non-Compliant

It is important to note that Section A.10 of Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* states 'roads with speeds greater than 70km/h are usually more critical than roads with speeds less than 70km/h'.

It is recommended that the 50km/h posted speed limit on the Bruxner Highway is extended past the development to ensure compliance with the codes and standards above.

6. INTERSECTION PERFORMANCE ANALYSIS

6.1 OVERVIEW

The key intersections of Bruxner Highway / Cassino Drive, Bruxner Highway / Industrial Access and Bruxner Highway / Residential Access were assessed using SIDRA intersection V7.0. The year-of-opening (2019) and 10-year design horizon (2029) was analysed for “Background” and “Design” traffic scenario. The locations of the analysed intersection are provided in Figure 6.1.

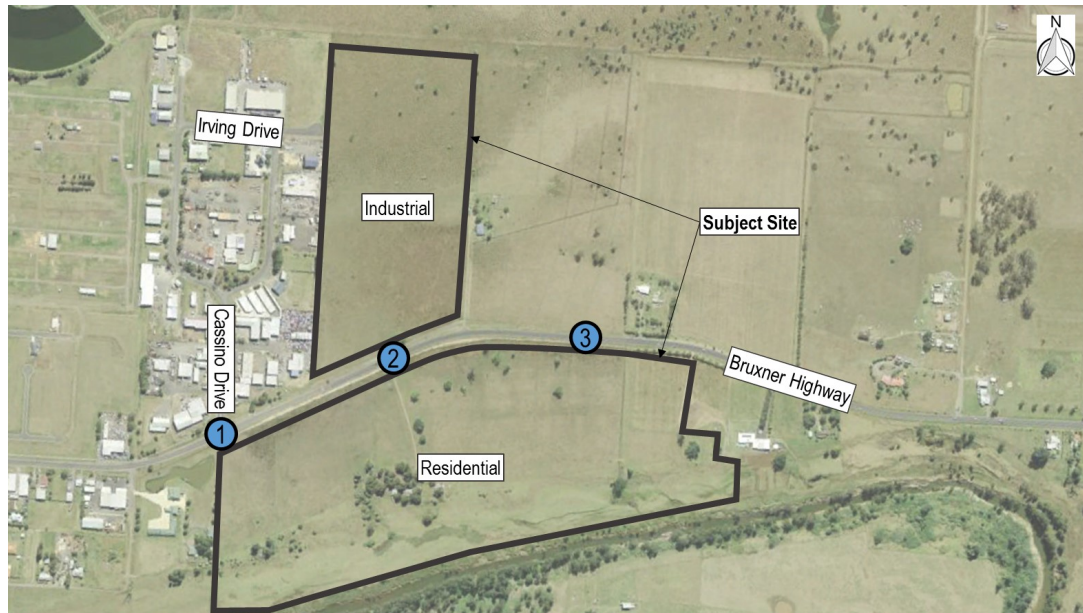


Figure 6.1: Intersection Analysis Locations

6.2 INTERSECTION 1: BRUXNER HIGHWAY / CASSINO DRIVE

The configuration of the Bruxner Highway / Cassino Drive priority-controlled intersection is shown in Figure 6.2.

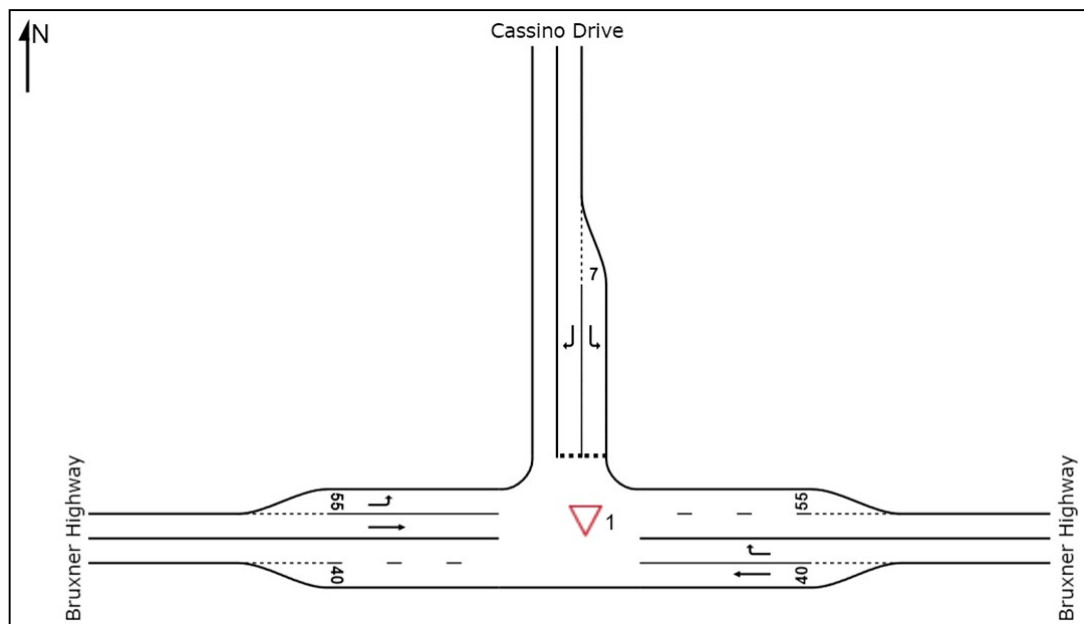


Figure 6.2: Bruxner Highway / Cassino Drive Intersection Configuration

The SIDRA assessment results for the Bruxner Highway / Cassino Drive for 2019 and 2029 AM and PM peak periods for “background” (without development) and “design” (with development) scenarios are provided in Table 6.1.

Table 6.1: Bruxner Highway / Cassino Drive Intersection Results Summary

Approach	Movement	Year-Of-Opening			10-Year Design Horizon		
		Saturation (v/c)	Delay (s)	95%ile Queues (m)	Saturation (v/c)	Delay (s)	95%ile Queues (m)
AM Peak Hour Background Traffic							
Bruxner Highway (E)	Through	0.16	0	0	0.17	0	0
	Right	0.02	8	1	0.02	8	1
Cassino Drive (N)	Left	0.01	6	0	0.01	6	0
	Right	0.18	13	5	0.20	14	6
Bruxner Highway (W)	Left	0.06	6	0	0.06	6	0
	Through	0.17	0	0	0.18	0	0
AM Peak Hour Design Traffic							
Bruxner Highway (E)	Through	0.19	0	0	0.20	0	0
	Right	0.03	9	1	0.03	9	1
Cassino Drive (N)	Left	0.01	7	0	0.01	7	0
	Right	0.24	17	7	0.27	20	8
Bruxner Highway (W)	Left	0.06	6	0	0.06	6	0
	Through	0.22	0	0	0.23	0	0
PM Peak Hour Background Traffic							
Bruxner Highway (E)	Through	0.18	0	0	0.20	0	0
	Right	0.01	7	0	0.01	8	0
Cassino Drive (N)	Left	0.02	6	1	0.02	6	1
	Right	0.37	15	13	0.41	17	15
Bruxner Highway (W)	Left	0.05	6	0	0.05	6	0
	Through	0.15	0	0	0.16	0	0
PM Peak Hour Design Traffic							
Bruxner Highway (E)	Through	0.19	0	0	0.21	0	0
	Right	0.01	8	0	0.02	8	0
Cassino Drive (N)	Left	0.03	7	1	0.03	7	1
	Right	0.47	20	17	0.52	24	20
Bruxner Highway (W)	Left	0.05	6	0	0.05	6	0
	Through	0.20	0	0	0.21	0	0

The SIDRA results presented in Table 6.1 indicate that Bruxner Highway / Cassino Drive intersection is expected to operate within the acceptable thresholds for the year-of-opening (2019) and 10-year horizon (2029) irrespective of the proposed developed. Detailed SIDRA Results are provided in Appendix D.

6.3 INTERSECTION 2: BRUXNER HIGHWAY / INDUSTRIAL ACCESS

The configuration of the Bruxner Highway / Industrial Access priority-controlled intersection is shown in Figure 6.3.

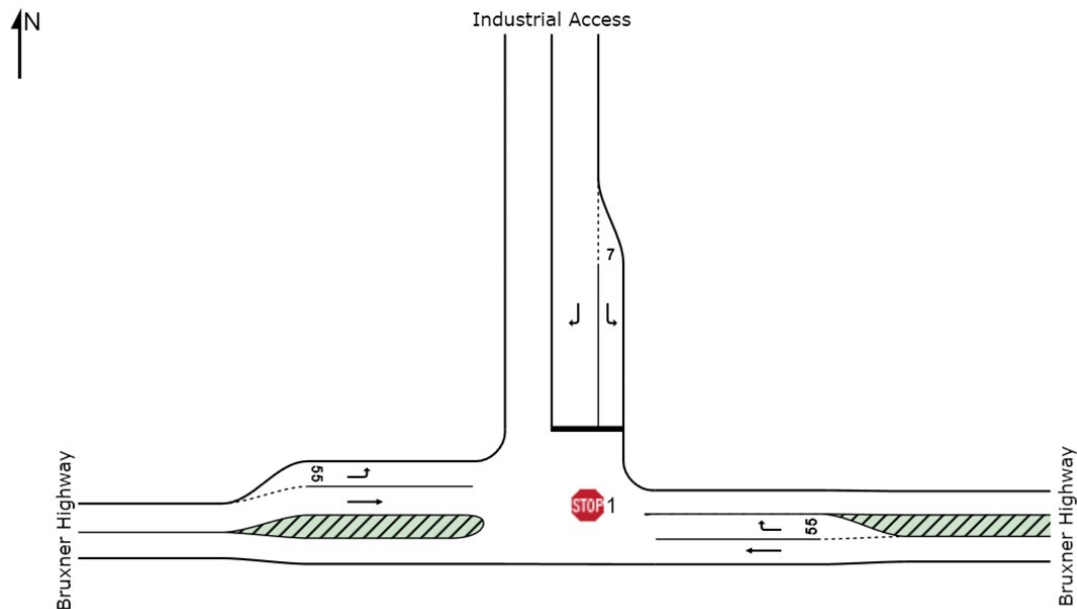


Figure 6.3: Bruxner Highway / Industrial Access Intersection Configuration

The SIDRA assessment results for the Bruxner Highway / Industrial Access for 2019 and 2029 AM and PM peak periods for “design” (with development) scenarios are provided in Table 6.2.

Table 6.2: Bruxner Highway / Industrial Access Intersection Results Summary

Approach	Movement	Year-Of-Opening			10-Year Design Horizon		
		Saturation (v/c)	Delay (s)	95%ile Queues (m)	Saturation (v/c)	Delay (s)	95%ile Queues (m)
AM Peak Hour Design Traffic							
Bruxner Highway (E)	Through	0.20	0	0	0.21	0	0
	Right	0.07	8	2	0.08	8	2
Industrial Access (N)	Left	0.04	10	1	0.04	10	1
	Right	0.11	22	3	0.13	24	3
Bruxner Highway (W)	Left	0.04	6	0	0.04	6	0
	Through	0.18	0	0	0.19	0	0
PM Peak Hour Design Traffic							
Bruxner Highway (E)	Through	0.20	0	0	0.22	0	0
	Right	0.04	8	1	0.04	8	1
Industrial Access (N)	Left	0.10	10	3	0.10	11	3
	Right	0.33	24	10	0.38	28	12
Bruxner Highway (W)	Left	0.02	6	0	0.02	6	0
	Through	0.19	0	0	0.20	0	0

The SIDRA results presented in Table 6.2 indicate that Bruxner Highway / Industrial Access intersection is expected to operate within the acceptable thresholds for the year-of-opening (2019) and 10-year horizon (2029) irrespective of the proposed developed. Detailed SIDRA Results are provided in Appendix D.

6.4 INTERSECTION 3: BRUXNER HIGHWAY / RESIDENTIAL ACCESS

The configuration of the Bruxner Highway / Residential Access priority-controlled intersection is shown in Figure 6.4.

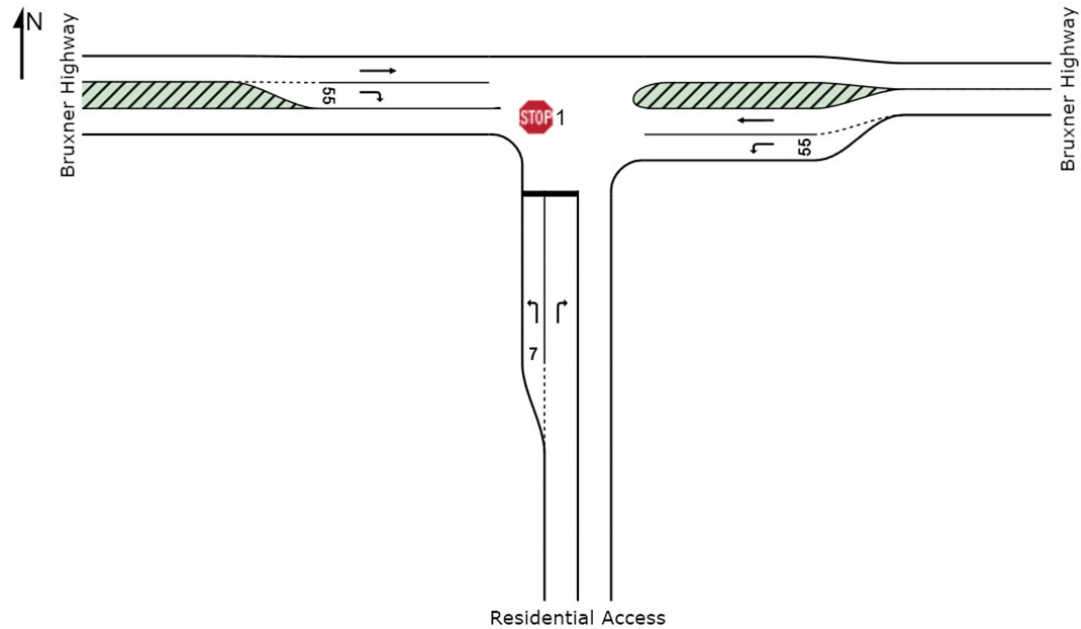


Figure 6.4: Bruxner Highway / Residential Access Intersection Configuration

The SIDRA assessment results for the Bruxner Highway / Industrial Access for 2019 and 2029 AM and PM peak periods for “design” (with development) scenarios are provided in Table 6.3.

Table 6.3: Bruxner Highway / Residential Access Intersection Results Summary

Approach	Movement	Year-Of-Opening			10-Year Design Horizon		
		Saturation (v/c)	Delay (s)	95%ile Queues (m)	Saturation (v/c)	Delay (s)	95%ile Queues (m)
AM Peak Hour Design Traffic							
Residential Access (S)	Left	0.07	10	2	0.08	10	2
	Right	0.19	19	5	0.22	21	6
Bruxner Highway (E)	Left	0.01	6	0	0.01	6	0
	Through	0.20	0	0	0.22	0	0
Bruxner Highway (W)	Through	0.18	0	0	0.20	0	0
	Right	0.03	7	1	0.03	8	1
PM Peak Hour Design Traffic							
Residential Access (S)	Left	0.04	10	1	0.04	10	1
	Right	0.10	20	2	0.11	23	3
Bruxner Highway (E)	Left	0.04	6	0	0.04	6	0
	Through	0.20	0	0	0.22	0	0
Bruxner Highway (W)	Through	0.20	0	0	0.21	0	0
	Right	0.07	8	2	0.07	8	2

The SIDRA results presented in Table 6.3 indicate that Bruxner Highway / Residential Access intersection is expected to operate within the acceptable thresholds for the year-of-opening (2019) and 10-year horizon (2029) irrespective of the proposed developed. Detailed SIDRA Results are provided in Appendix D.

7. SUMMARY AND CONCLUSIONS

The key findings of the Traffic Impact Assessment for the proposed development located at Bruxner Highway, Casino are as follows:

- the proposal is for residential and industrial rezoning at 2740 Bruxner Highway, Casino;
- based on a first principle approach the proposed development is expected to consist of 155 residential lots and 72,000m² of usable industrial land use;
- the development is expected to generate 194 incoming and 148 outgoing trips during the AM peak, and 169 incoming and 233 outgoing trips during the PM peak;
- it is recommended that the 50km/h zone that currently exist approximately 200m east of the Bruxner Highway / Cassino Drive intersection is extended approximately 200m east from the proposed Bruxner Highway / Residential Land Use Access intersection. The exact location of speed zones and buffers are to be confirmed by a speed limit review;
- the proposed intersection spacing complies with Appendix A of Austroads Guide to Road Design Part 4: Intersections and Crossings – General for a 60km/h design speed and a 50km/h posted speed;
- turn warrants assessment determined the subject priority-controlled intersections requires a CHR and AUL turn treatments for the industrial and residential areas; and
- the SIDRA results indicate the Bruxner Highway / Cassino Drive, Bruxner Highway / Industrial Access and Bruxner Highway / Residential Access intersections are expected to operate within acceptable thresholds for the year-of-opening (2019) and 10-year horizon (2029) under both background and design traffic scenarios.

Based on the above assessment, and on the basis of extending the 50km/h speed zone, it is concluded that there are no significant traffic or transport impacts associated with the proposed development to preclude its approval and relevant conditioning on transport planning grounds.

APPENDIX A

TRAFFIC SURVEY RESULTS

Turning Movement Count Summary

Site ID: 1

Location: Bruxner Hwy & Casino Dr, Casino

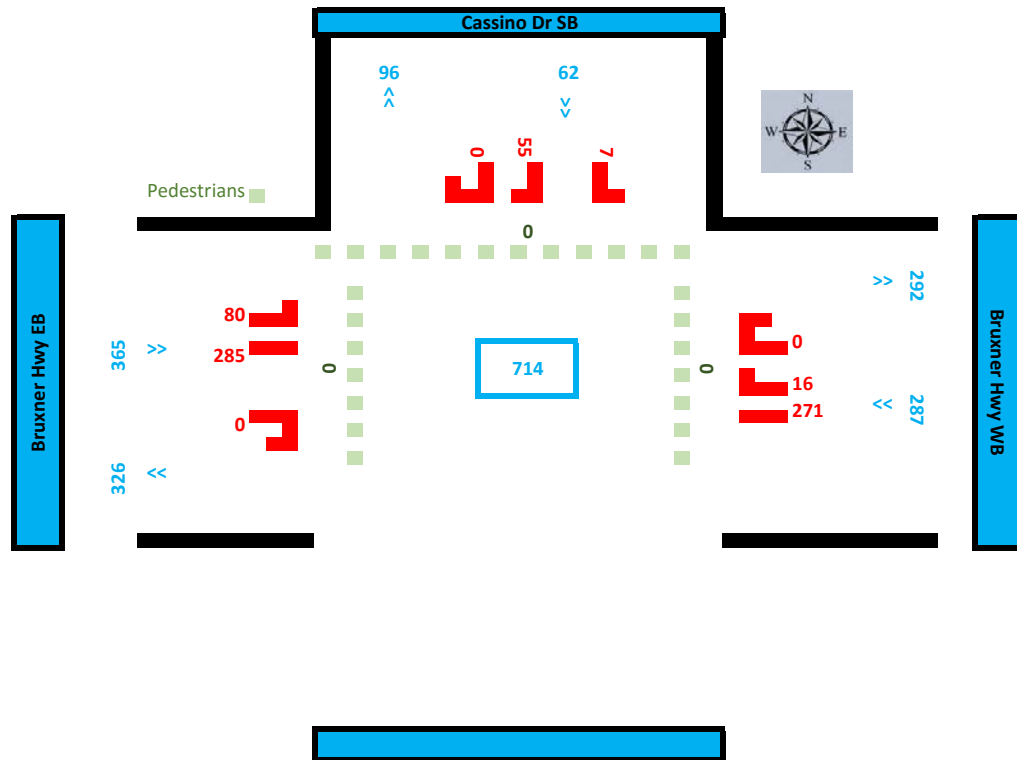
Date: 31-Jan-2018

Surveyed Time: 6:00 AM to 9:00 AM

Weather: Fine

Data for hour starting: 7:30 AM to 8:30 AM

Vehicle Class: ALL VEHICLES



Turning Movement Count Summary

Site ID: 1

Location: Bruxner Hwy & Casino Dr, Casino

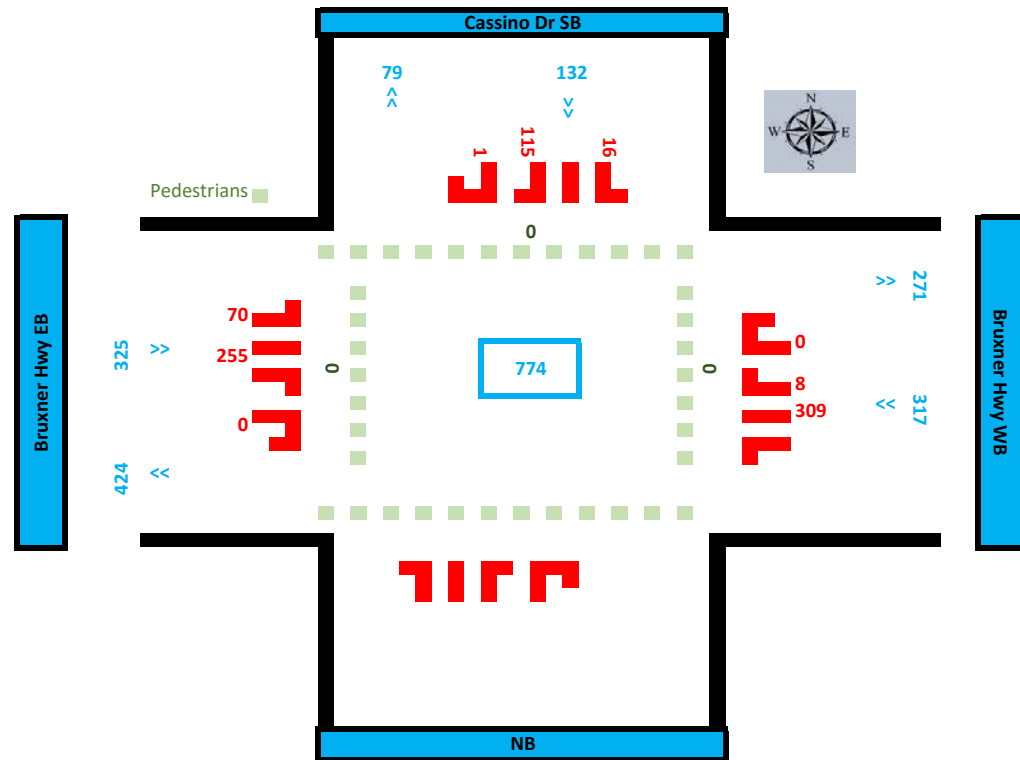
Date: 31-Jan-2018

Surveyed Time: 3:00 PM to 6:00 PM

Weather: Fine

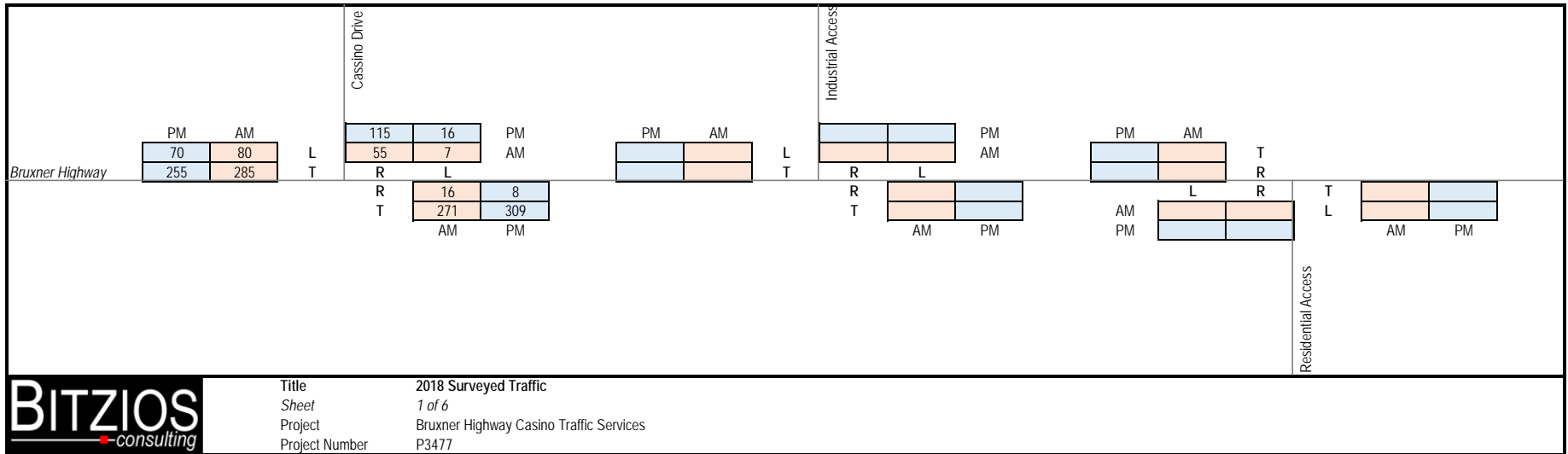
Data for hour starting: 3:45 PM to 4:45 PM

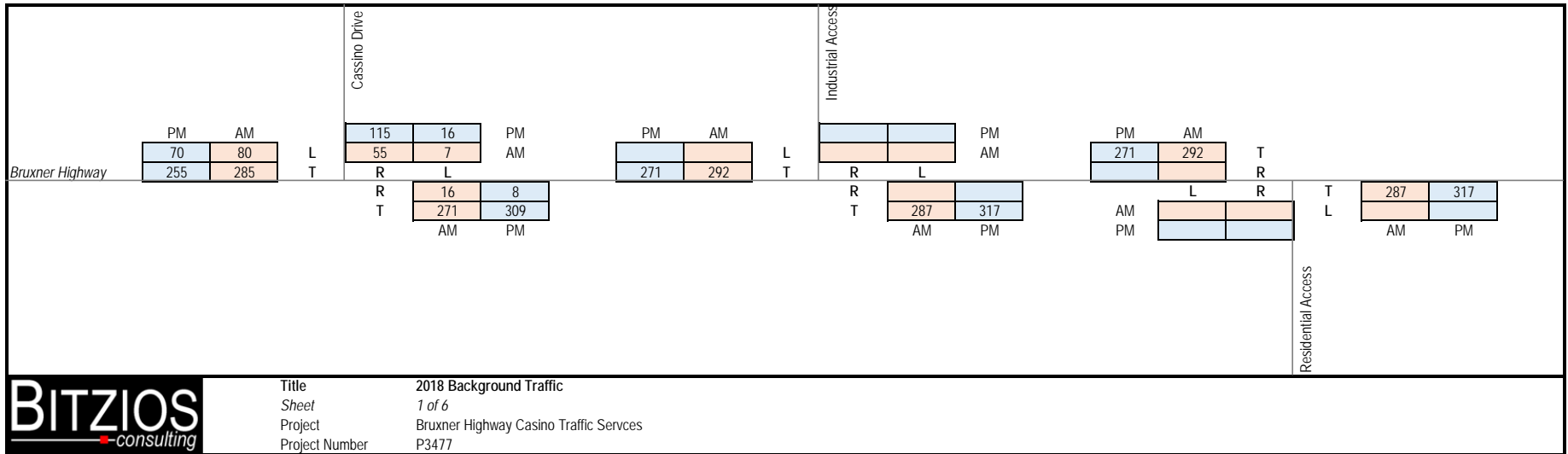
Vehicle Class: ALL VEHICLES

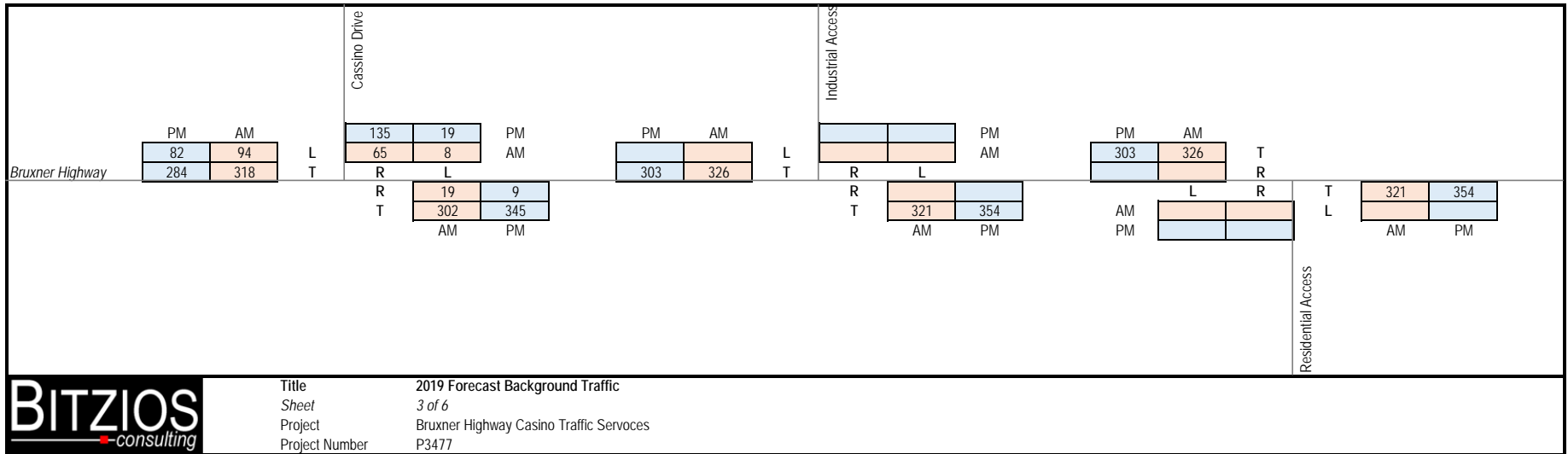


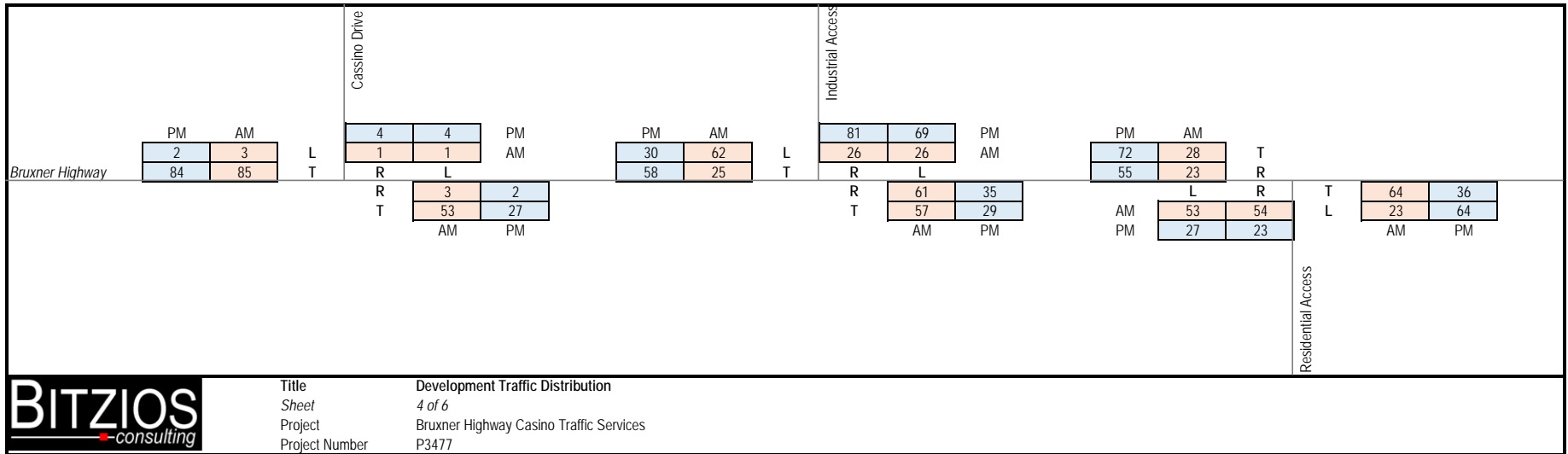
APPENDIX B

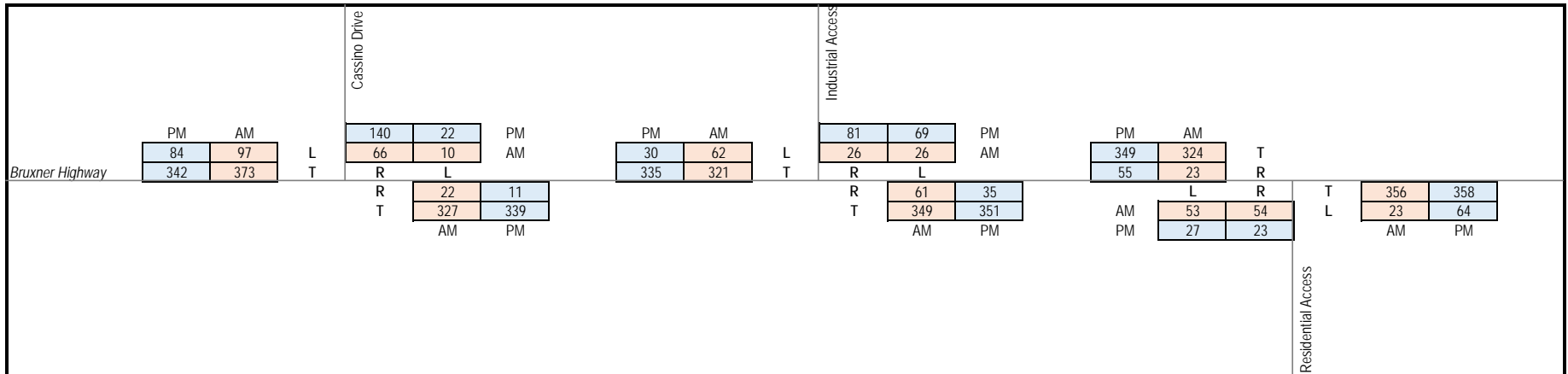
NETWORK DIAGRAMS

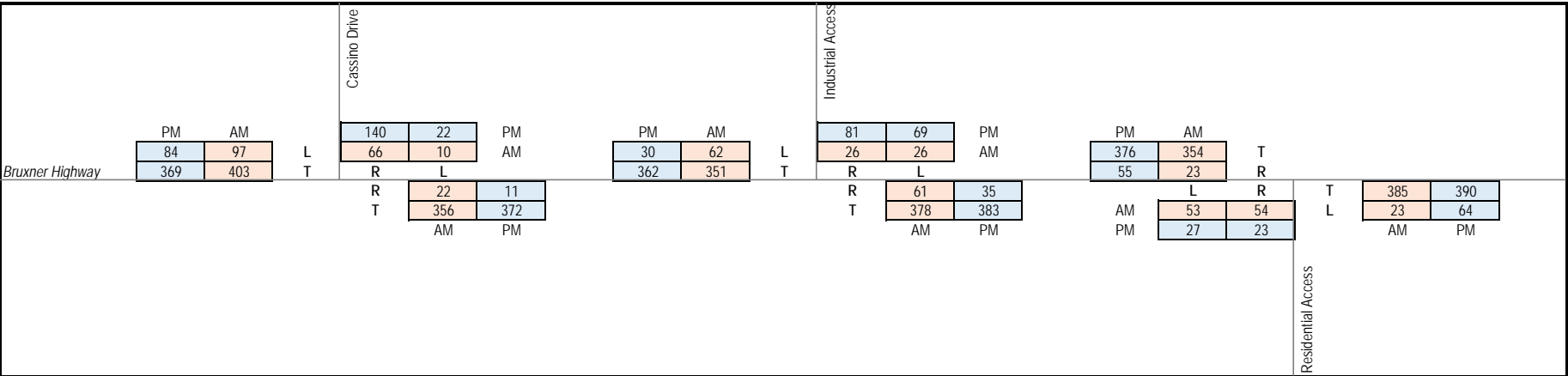












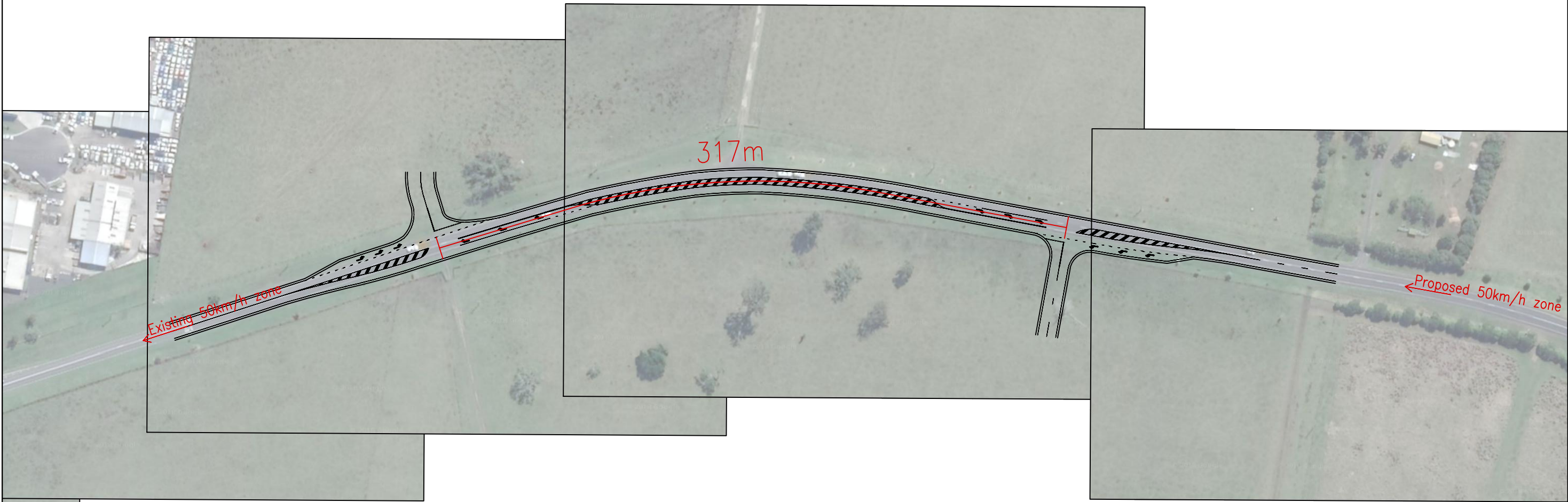
Title
Sheet
Project
Project Number

2029 Forecast Design Traffic
6 of 6
Bruxner Highway Casino Traffic Services
P3477

APPENDIX C

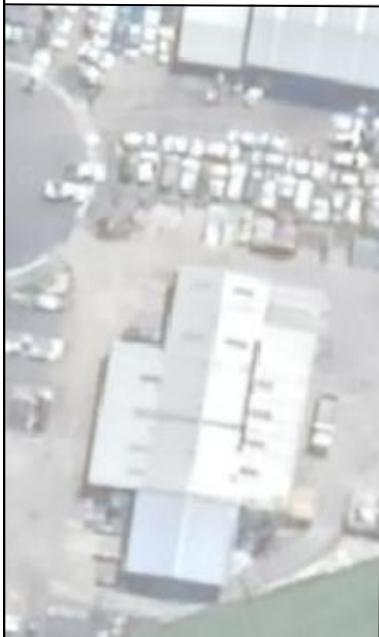
INTERSECTION CONCEPT DESIGNS

- 1. Raised reflective pavement markers to be placed as per AS1742 requirements.
- 2. Turning lanes designed to a design speed of 60km/h



<div>BITZIOS</div> <div>consulting</div>		<div>020 800 0000</div> <div>020 800 0000</div> <div>020 800 0000</div> <div>020 800 0000</div>	Project				2740 Bruxner Highway Casino Traffic Services	Drawn	S.K	Checked	A.B	
			Title				Bruxner Highway / Development Accesses Intersection Concepts	NOT FOR CONSTRUCTION			Date	10/05/2018
								Project Number	Issue		Sheet Number	
								P3477	003		1	

- 1. Raised reflective pavement markers to be placed as per AS1742 requirements.
- 2. Turning lanes designed to a design speed of 60km/h



<div>BITZIOS</div> <div>consulting</div>		<div>01020304050</div> <div>Scale @ A3</div> <div>1:1000</div>					Project	2740 Bruxner Highway Casino Traffic Services			Drawn	S.K	Checked	A.B	
									Title	Bruxner Highway / Industrial Access Intersection Concept	<div>NOT FOR CONSTRUCTION</div>		Date		10/05/2018
								Project Number	P3477	Issue	003	Sheet Number	2		

- 1. Raised reflective pavement markers to be placed as per AS1742 requirements.
- 2. Turning lanes designed to a design speed of 60km/h



<div>BITZIOS</div> <div>consulting</div>		<div>01020304050</div> <div>Scale @ A3</div> <div>1:1000</div>					Project	2740 Bruxner Highway Casino Traffic Services			Drawn	S.K	Checked	A.B
									Title	Bruxner Highway Curve Widening	<div>NOT FOR CONSTRUCTION</div>	Date	10/05/2018	
							Project Number	P3477	Issue	003	Sheet Number	3		

- 1. Raised reflective pavement markers to be placed as per AS1742 requirements.
- 2. Turning lanes designed to a design speed of 60km/h

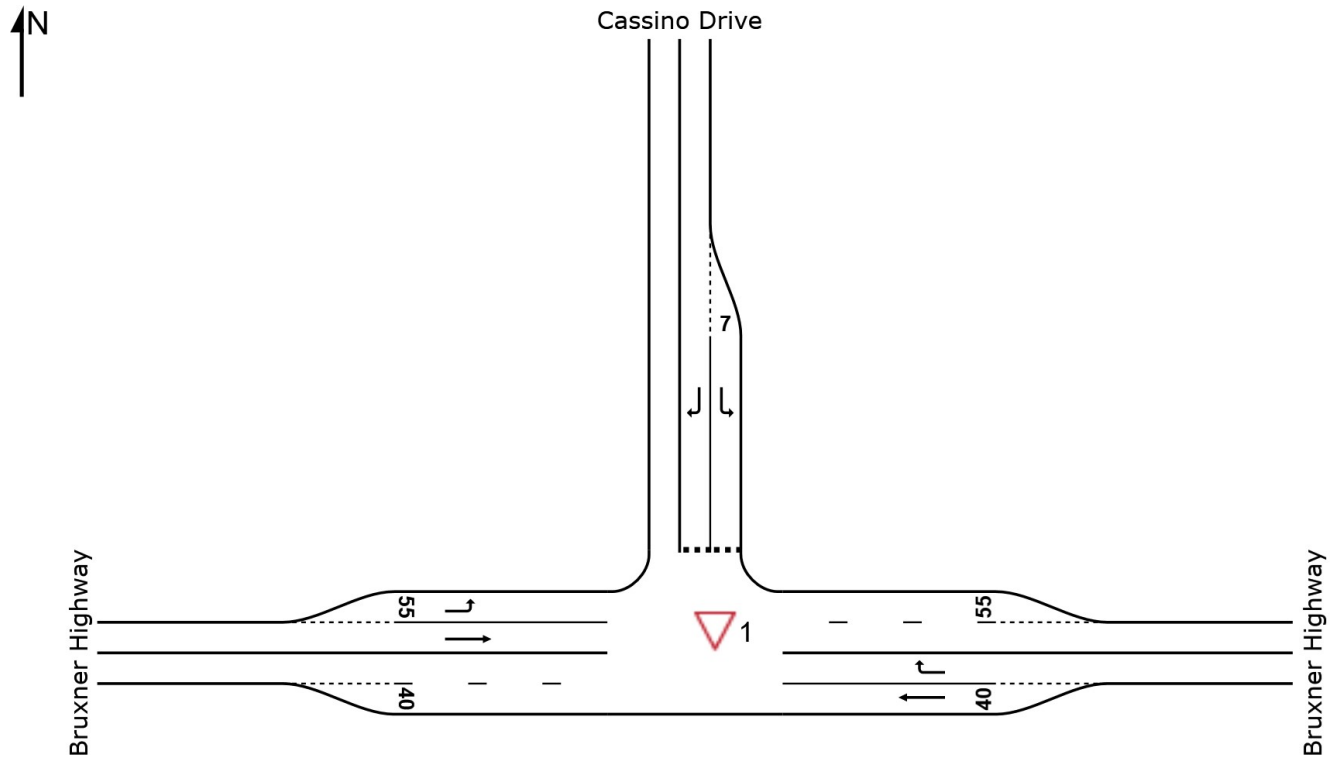


<div>BITZIOS</div> <div>consulting</div>		<div>01020304050</div> <div>Scale @ A3</div> <div>1:1000</div>	<div></div> <div></div> <div></div> <div></div>	<div></div> <div></div> <div></div> <div></div>	<div>Project</div> <div>2740 Bruxner Highway Casino Traffic Services</div> <div>Title</div> <div>Bruxner Highway / Residential Access Intersection Concept</div>	<div>Drawn</div> <div>S.K</div> <div>Checked</div> <div>A.B</div>		
						<div>NOT FOR CONSTRUCTION</div> <div>Date</div> <div>10/05/2018</div>		
						<div>Project Number</div> <div>P3477</div>	<div>Issue</div> <div>003</div>	<div>Sheet Number</div> <div>4</div>

APPENDIX D

SIDRA SUMMARIES

Bruxner Highway / Cassino Drive Priority-Controlled Intersection
2019 Background Traffic
AM Peak Hour
Giveway / Yield (Two-Way)



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Organisation: BITZIOS CONSULTING | Created: Friday, 11 May 2018 2:59:24 PM

Project: P:\P3477 2740 Bruxner Hwy Casino Traffic Services\Technical Work\Models\SIDRA\P3477.001M Bruxner Cassino Existing.sip7

MOVEMENT SUMMARY

▽ Site: 1 [2019 BG AM - Existing]

Bruxner Highway / Cassino Drive Priority-Controlled Intersection
 2019 Background Traffic
 AM Peak Hour
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	288	9.0	0.157	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	20	10.0	0.023	7.7	LOS A	0.1	0.7	0.45	0.63	48.4
Approach		308	9.1	0.157	0.5	NA	0.1	0.7	0.03	0.04	59.1
North: Cassino Drive											
7	L2	8	10.0	0.009	6.1	LOS A	0.0	0.2	0.37	0.55	48.5
9	R2	68	10.0	0.178	12.8	LOS B	0.7	4.9	0.67	0.85	44.4
Approach		77	10.0	0.178	12.0	LOS B	0.7	4.9	0.64	0.82	44.8
West: Bruxner Highway											
10	L2	99	10.0	0.057	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	303	9.0	0.165	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		402	9.2	0.165	1.4	NA	0.0	0.0	0.00	0.14	58.1
All Vehicles		787	9.2	0.178	2.1	NA	0.7	4.9	0.07	0.17	56.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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Project: P:\P3477 2740 Bruxner Hwy Casino Traffic Services\Technical Work\Models\SIDRA\P3477.001M Bruxner Cassino Existing.sip7

MOVEMENT SUMMARY

▽ Site: 1 [2019 BG PM - Existing]

Bruxner Highway / Cassino Drive Priority-Controlled Intersection
 2019 Background Traffic
 PM Peak Hour
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	328	9.0	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	9	10.0	0.010	7.4	LOS A	0.0	0.3	0.42	0.59	48.6
Approach		338	9.0	0.178	0.2	NA	0.0	0.3	0.01	0.02	59.6
North: Cassino Drive											
7	L2	20	10.0	0.021	5.9	LOS A	0.1	0.6	0.35	0.56	48.5
9	R2	142	10.0	0.366	15.0	LOS C	1.7	12.9	0.73	0.95	43.2
Approach		162	10.0	0.366	13.9	LOS B	1.7	12.9	0.68	0.90	43.8
West: Bruxner Highway											
10	L2	86	10.0	0.050	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	272	9.0	0.147	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		358	9.2	0.147	1.4	NA	0.0	0.0	0.00	0.14	58.2
All Vehicles		858	9.3	0.366	3.3	NA	1.7	12.9	0.13	0.23	55.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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MOVEMENT SUMMARY

▽ Site: 1 [2019 DES AM - Existing]

Bruxner Highway / Cassino Drive Priority-Controlled Intersection
2019 Design Traffic
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	344	9.0	0.187	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	23	10.0	0.030	8.4	LOS A	0.1	0.9	0.51	0.68	48.0
Approach		367	9.1	0.187	0.6	NA	0.1	0.9	0.03	0.04	59.0
North: Cassino Drive											
7	L2	11	10.0	0.013	6.7	LOS A	0.0	0.3	0.43	0.59	48.1
9	R2	69	10.0	0.239	17.3	LOS C	0.9	6.8	0.77	0.92	42.0
Approach		80	10.0	0.239	15.9	LOS C	0.9	6.8	0.73	0.88	42.8
West: Bruxner Highway											
10	L2	102	10.0	0.059	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	393	9.0	0.213	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		495	9.2	0.213	1.2	NA	0.0	0.0	0.00	0.12	58.4
All Vehicles		942	9.2	0.239	2.2	NA	0.9	6.8	0.07	0.15	56.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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Project: P:\P3477 2740 Bruxner Hwy Casino Traffic Services\Technical Work\Models\SIDRA\P3477.001M Bruxner Cassino Existing.sip7

MOVEMENT SUMMARY

▽ Site: 1 [2019 DES PM - Existing]

Bruxner Highway / Cassino Drive Priority-Controlled Intersection
2019 Design Traffic
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	357	9.0	0.194	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	12	10.0	0.014	8.0	LOS A	0.1	0.4	0.48	0.63	48.2
Approach		368	9.0	0.194	0.3	NA	0.1	0.4	0.02	0.02	59.5
North: Cassino Drive											
7	L2	23	10.0	0.027	6.5	LOS A	0.1	0.7	0.41	0.60	48.2
9	R2	147	10.0	0.468	20.0	LOS C	2.3	17.3	0.81	1.04	40.8
Approach		171	10.0	0.468	18.1	LOS C	2.3	17.3	0.76	0.98	41.7
West: Bruxner Highway											
10	L2	88	10.0	0.051	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	360	9.0	0.195	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		448	9.2	0.195	1.1	NA	0.0	0.0	0.00	0.11	58.5
All Vehicles		987	9.3	0.468	3.7	NA	2.3	17.3	0.14	0.23	55.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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MOVEMENT SUMMARY

▽ Site: 1 [2029 BG AM - Existing]

Bruxner Highway / Cassino Drive Priority-Controlled Intersection
 2029 Background Traffic
 AM Peak Hour
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	318	9.0	0.173	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	20	10.0	0.024	7.9	LOS A	0.1	0.7	0.47	0.64	48.3
Approach		338	9.1	0.173	0.5	NA	0.1	0.7	0.03	0.04	59.1
North: Cassino Drive											
7	L2	8	10.0	0.010	6.3	LOS A	0.0	0.2	0.39	0.56	48.4
9	R2	68	10.0	0.198	14.3	LOS B	0.7	5.5	0.71	0.87	43.6
Approach		77	10.0	0.198	13.4	LOS B	0.7	5.5	0.68	0.84	44.1
West: Bruxner Highway											
10	L2	99	10.0	0.057	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	335	9.0	0.182	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		434	9.2	0.182	1.3	NA	0.0	0.0	0.00	0.13	58.3
All Vehicles		848	9.2	0.198	2.1	NA	0.7	5.5	0.07	0.16	56.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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Project: P:\P3477 2740 Bruxner Hway Casino Traffic Services\Technical Work\Models\SIDRA\P3477.001M Bruxner Cassino Existing.sip7

MOVEMENT SUMMARY

▽ Site: 1 [2029 BG PM - Existing]

Bruxner Highway / Cassino Drive Priority-Controlled Intersection
2029 Background Traffic
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	363	9.0	0.197	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	9	10.0	0.011	7.5	LOS A	0.0	0.3	0.44	0.60	48.5
Approach		373	9.0	0.197	0.2	NA	0.0	0.3	0.01	0.02	59.6
North: Cassino Drive											
7	L2	20	10.0	0.022	6.1	LOS A	0.1	0.6	0.37	0.57	48.5
9	R2	142	10.0	0.410	17.3	LOS C	1.9	14.7	0.77	0.99	42.0
Approach		162	10.0	0.410	15.9	LOS C	1.9	14.7	0.72	0.94	42.7
West: Bruxner Highway											
10	L2	86	10.0	0.050	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	299	9.0	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		385	9.2	0.162	1.3	NA	0.0	0.0	0.00	0.13	58.3
All Vehicles		920	9.3	0.410	3.4	NA	1.9	14.7	0.13	0.23	55.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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MOVEMENT SUMMARY

▽ Site: 1 [2029 DES AM - Existing]

Bruxner Highway / Cassino Drive Priority-Controlled Intersection
2029 Design Traffic
AM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	375	9.0	0.203	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	23	10.0	0.032	8.7	LOS A	0.1	0.9	0.52	0.69	47.8
Approach		398	9.1	0.203	0.5	NA	0.1	0.9	0.03	0.04	59.1
North: Cassino Drive											
7	L2	11	10.0	0.014	6.9	LOS A	0.0	0.3	0.45	0.61	48.0
9	R2	69	10.0	0.270	19.8	LOS C	1.0	7.7	0.81	0.95	40.9
Approach		80	10.0	0.270	18.1	LOS C	1.0	7.7	0.76	0.90	41.7
West: Bruxner Highway											
10	L2	102	10.0	0.059	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	424	9.0	0.230	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		526	9.2	0.230	1.1	NA	0.0	0.0	0.00	0.11	58.5
All Vehicles		1004	9.2	0.270	2.2	NA	1.0	7.7	0.07	0.15	56.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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MOVEMENT SUMMARY

▽ Site: 1 [2029 DES PM - Existing]

Bruxner Highway / Cassino Drive Priority-Controlled Intersection
2029 Design Traffic
PM Peak Hour
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	392	9.0	0.213	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	12	10.0	0.015	8.2	LOS A	0.1	0.4	0.49	0.64	48.1
Approach		403	9.0	0.213	0.3	NA	0.1	0.4	0.01	0.02	59.5
North: Cassino Drive											
7	L2	23	10.0	0.028	6.7	LOS A	0.1	0.7	0.43	0.62	48.1
9	R2	147	10.0	0.528	23.5	LOS C	2.6	19.8	0.85	1.08	39.2
Approach		171	10.0	0.528	21.3	LOS C	2.6	19.8	0.80	1.02	40.2
West: Bruxner Highway											
10	L2	88	10.0	0.051	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	388	9.0	0.211	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		477	9.2	0.211	1.1	NA	0.0	0.0	0.00	0.11	58.6
All Vehicles		1051	9.3	0.528	4.0	NA	2.6	19.8	0.13	0.22	54.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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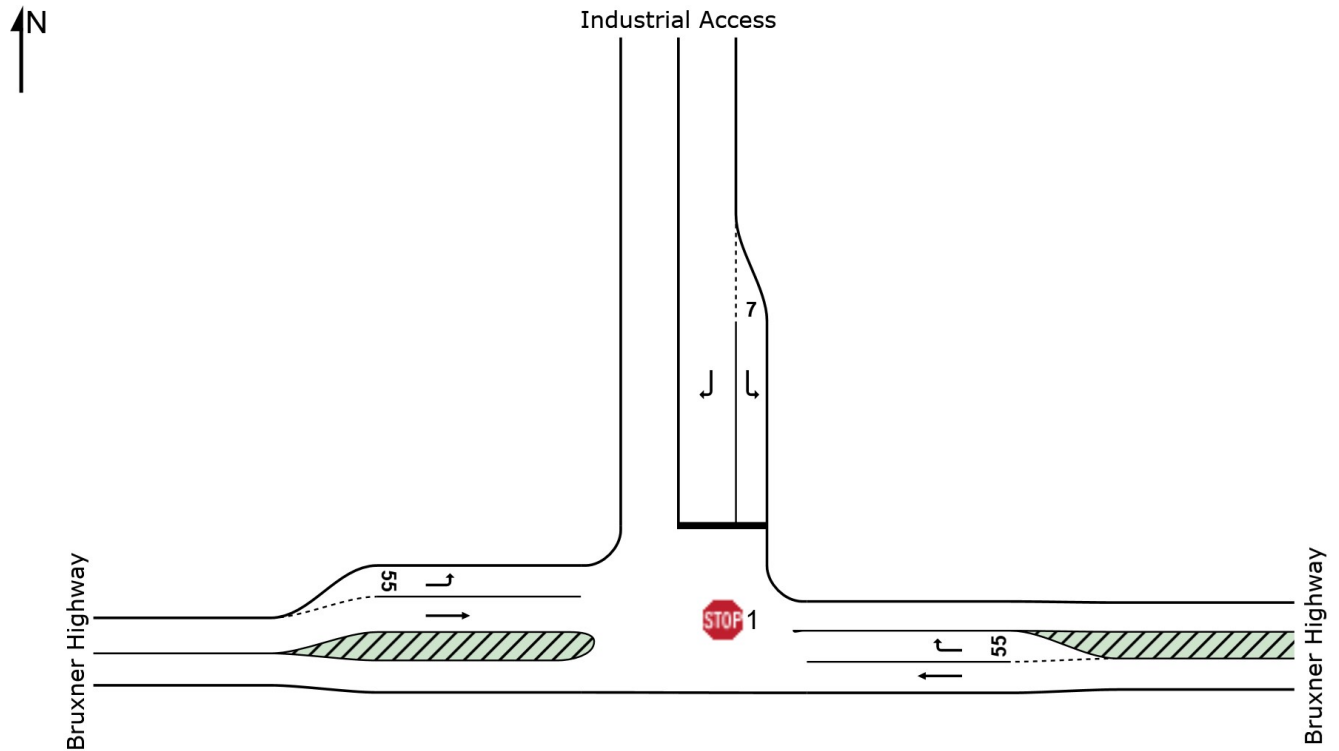
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Project: P:\P3477 2740 Bruxner Hway Casino Traffic Services\Technical Work\Models\SIDRA\P3477.001M Bruxner Cassino Existing.sip7

SITE LAYOUT

Site: 1 [2019 DES AM - Ind Access AUL CHR]

Bruxner Highway / Industrial Access Priority-Controlled Intersection
2019 Design Traffic
AM Peak Hour
Stop (Two-Way)



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MOVEMENT SUMMARY



Site: 1 [2019 DES AM - Ind Access AUL CHR]

Bruxner Highway / Industrial Access Priority-Controlled Intersection
2019 Design Traffic
AM Peak Hour
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	367	9.0	0.197	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	64	10.0	0.074	7.9	LOS A	0.3	2.2	0.47	0.66	48.7
Approach		432	9.1	0.197	1.2	NA	0.3	2.2	0.07	0.10	58.0
North: Industrial Access											
7	L2	27	10.0	0.037	10.0	LOS A	0.1	1.0	0.42	0.90	46.8
9	R2	27	10.0	0.112	21.7	LOS C	0.4	2.9	0.77	1.00	41.3
Approach		55	10.0	0.112	15.9	LOS C	0.4	2.9	0.60	0.95	43.9
West: Bruxner Highway											
10	L2	65	10.0	0.037	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	338	9.0	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		403	9.2	0.177	0.9	NA	0.0	0.0	0.00	0.09	58.8
All Vehicles		889	9.2	0.197	2.0	NA	0.4	2.9	0.07	0.15	57.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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MOVEMENT SUMMARY



Site: 1 [2019 DES PM - Ind Access AUL CHR]

Bruxner Highway / Industrial Access Priority-Controlled Intersection
2019 Design Traffic
PM Peak Hour
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	369	9.0	0.198	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	37	10.0	0.042	7.7	LOS A	0.2	1.2	0.45	0.64	48.8
Approach		406	9.1	0.198	0.7	NA	0.2	1.2	0.04	0.06	58.7
North: Industrial Access											
7	L2	73	10.0	0.099	10.3	LOS B	0.4	2.7	0.45	0.93	46.7
9	R2	85	10.0	0.332	24.2	LOS C	1.4	10.3	0.80	1.06	40.2
Approach		158	10.0	0.332	17.8	LOS C	1.4	10.3	0.64	1.00	42.9
West: Bruxner Highway											
10	L2	32	10.0	0.018	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	353	9.0	0.185	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		384	9.1	0.185	0.5	NA	0.0	0.0	0.00	0.05	59.3
All Vehicles		948	9.2	0.332	3.5	NA	1.4	10.3	0.12	0.21	55.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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MOVEMENT SUMMARY



Site: 1 [2029 DES AM - Ind Access AUL CHR]

Bruxner Highway / Industrial Access Priority-Controlled Intersection
2029 Design Traffic
AM Peak Hour
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	398	9.0	0.214	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	64	10.0	0.078	8.1	LOS A	0.3	2.3	0.49	0.68	48.5
Approach		462	9.1	0.214	1.2	NA	0.3	2.3	0.07	0.09	58.1
North: Industrial Access											
7	L2	27	10.0	0.038	10.3	LOS B	0.1	1.0	0.45	0.91	46.7
9	R2	27	10.0	0.128	24.1	LOS C	0.4	3.2	0.80	1.00	40.2
Approach		55	10.0	0.128	17.2	LOS C	0.4	3.2	0.62	0.95	43.2
West: Bruxner Highway											
10	L2	65	10.0	0.037	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	369	9.0	0.194	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		435	9.2	0.194	0.9	NA	0.0	0.0	0.00	0.09	58.8
All Vehicles		952	9.2	0.214	1.9	NA	0.4	3.2	0.07	0.14	57.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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MOVEMENT SUMMARY



Site: 1 [2029 DES PM - Ind Access AUL CHR]

Bruxner Highway / Industrial Access Priority-Controlled Intersection
2029 Design Traffic
PM Peak Hour
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Bruxner Highway											
5	T1	403	9.0	0.217	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	37	10.0	0.043	7.9	LOS A	0.2	1.2	0.47	0.65	48.7
Approach		440	9.1	0.217	0.7	NA	0.2	1.2	0.04	0.05	58.8
North: Industrial Access											
7	L2	73	10.0	0.103	10.6	LOS B	0.4	2.8	0.47	0.94	46.5
9	R2	85	10.0	0.379	27.8	LOS D	1.6	11.8	0.84	1.08	38.7
Approach		158	10.0	0.379	19.9	LOS C	1.6	11.8	0.67	1.02	41.9
West: Bruxner Highway											
10	L2	32	10.0	0.018	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	381	9.0	0.200	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		413	9.1	0.200	0.5	NA	0.0	0.0	0.00	0.04	59.4
All Vehicles		1011	9.2	0.379	3.6	NA	1.6	11.8	0.12	0.20	55.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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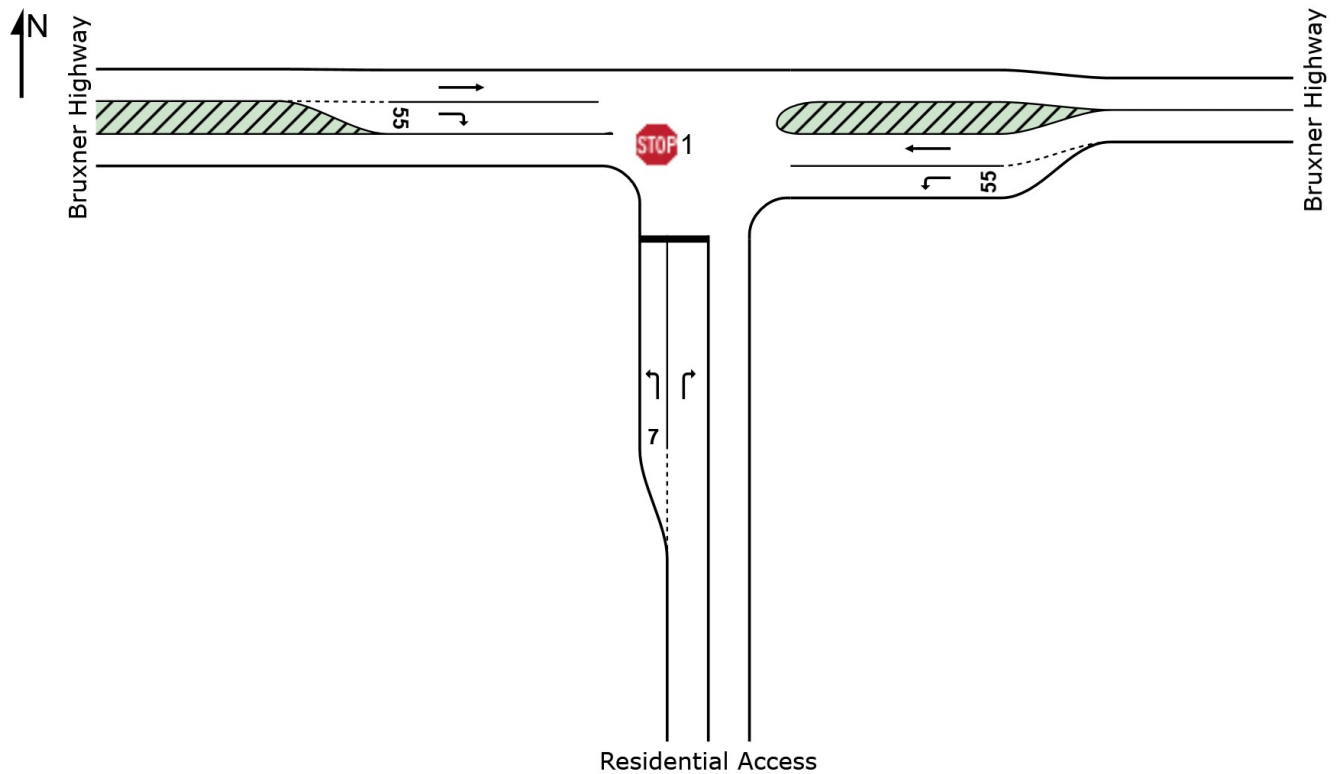
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Project: P:\P3477 2740 Bruxner Hway Casino Traffic Services\Technical Work\Models\SIDRA\P3477.001M Bruxner Ind Access AUL CHR.sip7

SITE LAYOUT

Site: 1 [2019 DES AM - Res Access AUL CHR]

Bruxner Highway / Residential Access Priority-Controlled Intersection
2019 Design Traffic
AM Peak Hour
Stop (Two-Way)



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MOVEMENT SUMMARY



Site: 1 [2019 DES AM - Res Access AUL CHR]

Bruxner Highway / Residential Access Priority-Controlled Intersection
2019 Design Traffic
AM Peak Hour
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Residential Access											
1	L2	56	1.0	0.074	9.8	LOS A	0.3	1.8	0.45	0.92	47.0
3	R2	57	1.0	0.192	18.9	LOS C	0.7	4.8	0.74	1.01	42.4
Approach		113	1.0	0.192	14.4	LOS B	0.7	4.8	0.60	0.96	44.6
East: Bruxner Highway											
4	L2	24	1.0	0.013	5.6	LOS A	0.0	0.0	0.00	0.58	53.6
5	T1	375	9.0	0.201	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		399	8.5	0.201	0.4	NA	0.0	0.0	0.00	0.03	59.5
West: Bruxner Highway											
11	T1	341	9.0	0.183	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R2	24	1.0	0.026	7.4	LOS A	0.1	0.7	0.45	0.63	48.7
Approach		365	8.5	0.183	0.5	NA	0.1	0.7	0.03	0.04	59.1
All Vehicles		877	7.5	0.201	2.2	NA	0.7	4.8	0.09	0.16	56.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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MOVEMENT SUMMARY



Site: 1 [2019 DES PM - Res Access AUL CHR]

Bruxner Highway / Residential Access Priority-Controlled Intersection
2019 Design Traffic
PM Peak Hour
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Residential Access											
1	L2	28	1.0	0.038	9.8	LOS A	0.1	0.9	0.44	0.90	47.1
3	R2	24	1.0	0.095	20.4	LOS C	0.3	2.2	0.76	1.00	41.7
Approach		53	1.0	0.095	14.6	LOS B	0.3	2.2	0.59	0.94	44.4
East: Bruxner Highway											
4	L2	67	1.0	0.036	5.6	LOS A	0.0	0.0	0.00	0.58	53.6
5	T1	377	9.0	0.202	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		444	7.8	0.202	0.9	NA	0.0	0.0	0.00	0.09	58.9
West: Bruxner Highway											
11	T1	367	9.0	0.197	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R2	58	1.0	0.066	7.8	LOS A	0.3	1.8	0.48	0.68	48.4
Approach		425	7.9	0.197	1.1	NA	0.3	1.8	0.07	0.09	58.1
All Vehicles		922	7.5	0.202	1.7	NA	0.3	2.2	0.06	0.14	57.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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Project: P:\P3477 2740 Bruxner Hwy Casino Traffic Services\Technical Work\Models\SIDRA\P3477.001M Bruxner Res Access AUL CHR.sip7

MOVEMENT SUMMARY



Site: 1 [2029 DES AM - Res Access AUL CHR]

Bruxner Highway / Residential Access Priority-Controlled Intersection
2029 Design Traffic
AM Peak Hour
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Residential Access											
1	L2	56	1.0	0.077	10.1	LOS B	0.3	1.9	0.47	0.93	46.9
3	R2	57	1.0	0.217	21.2	LOS C	0.8	5.5	0.78	1.02	41.3
Approach		113	1.0	0.217	15.7	LOS C	0.8	5.5	0.63	0.97	43.9
East: Bruxner Highway											
4	L2	24	1.0	0.013	5.6	LOS A	0.0	0.0	0.00	0.58	53.6
5	T1	405	9.0	0.218	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		429	8.5	0.218	0.3	NA	0.0	0.0	0.00	0.03	59.6
West: Bruxner Highway											
11	T1	373	9.0	0.200	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R2	24	1.0	0.027	7.6	LOS A	0.1	0.7	0.46	0.64	48.5
Approach		397	8.5	0.200	0.5	NA	0.1	0.7	0.03	0.04	59.1
All Vehicles		939	7.6	0.218	2.2	NA	0.8	5.5	0.09	0.15	56.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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MOVEMENT SUMMARY



Site: 1 [2029 DES PM - Res Access AUL CHR]

Bruxner Highway / Residential Access Priority-Controlled Intersection
2029 Design Traffic
PM Peak Hour
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Residential Access											
1	L2	28	1.0	0.040	10.1	LOS B	0.1	1.0	0.46	0.90	46.9
3	R2	24	1.0	0.108	22.5	LOS C	0.4	2.5	0.79	1.00	40.7
Approach		53	1.0	0.108	15.8	LOS C	0.4	2.5	0.61	0.95	43.8
East: Bruxner Highway											
4	L2	67	1.0	0.036	5.6	LOS A	0.0	0.0	0.00	0.58	53.6
5	T1	411	9.0	0.221	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		478	7.9	0.221	0.8	NA	0.0	0.0	0.00	0.08	59.0
West: Bruxner Highway											
11	T1	396	9.0	0.213	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R2	58	1.0	0.069	8.0	LOS A	0.3	1.8	0.50	0.70	48.3
Approach		454	8.0	0.213	1.0	NA	0.3	1.8	0.06	0.09	58.2
All Vehicles		984	7.6	0.221	1.7	NA	0.4	2.5	0.06	0.13	57.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

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.

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