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# Appendix F

## Traffic Impact Assessment

# 2740 BRUXNER HIGHWAY, CASINO
# TRAFFIC IMPACT ASSESSMENT

**FOR**

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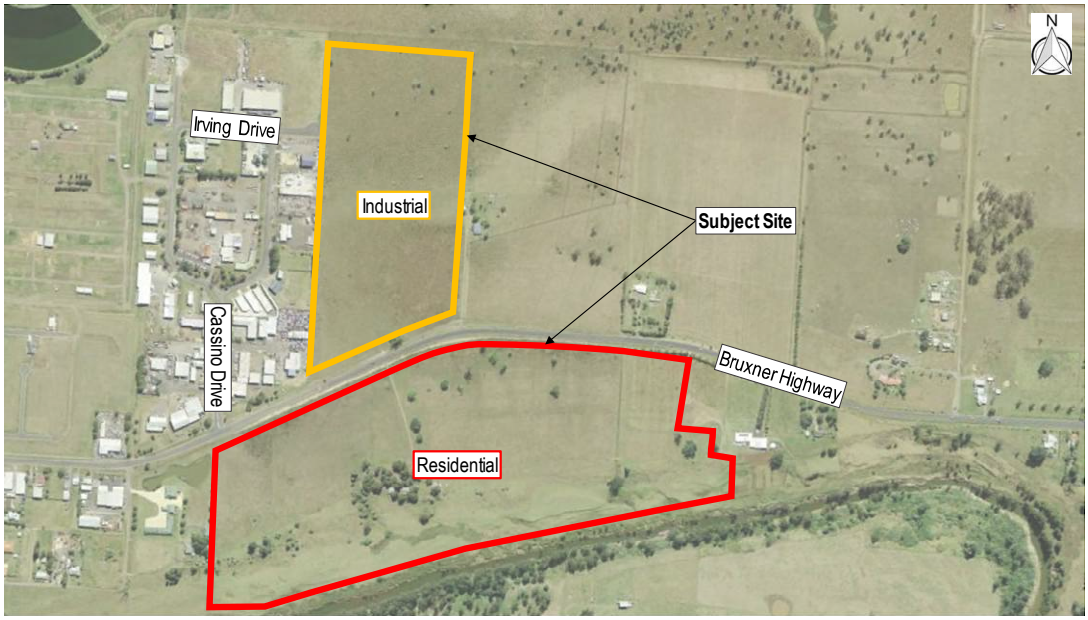
# 1. INTRODUCTION

## 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 / Cassino 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.

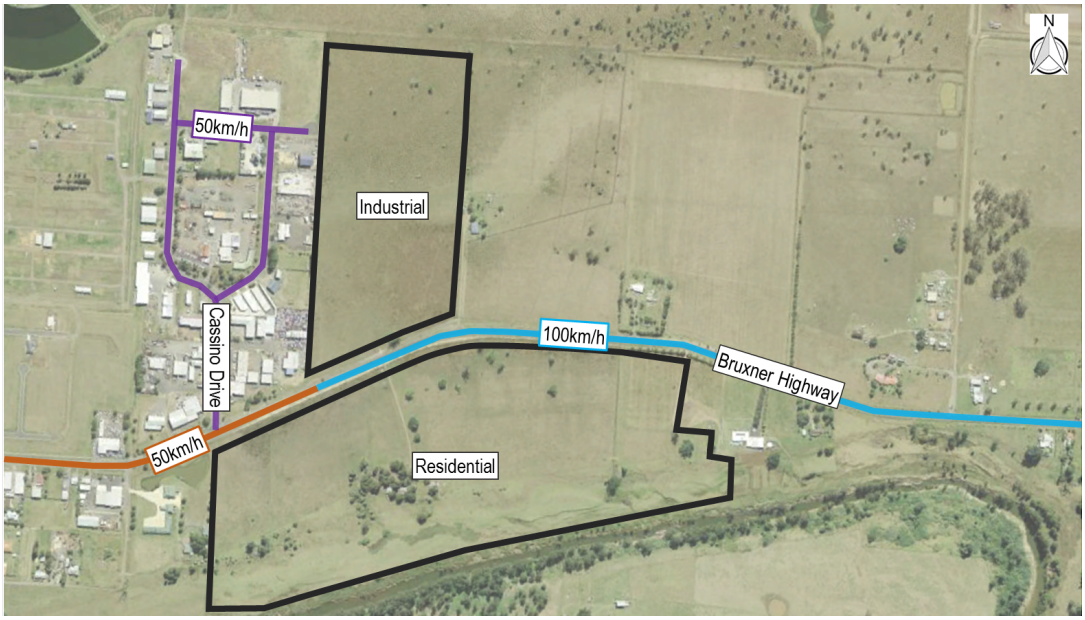



**Figure 2.1: Existing Surrounding Speed Zones**

## 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.

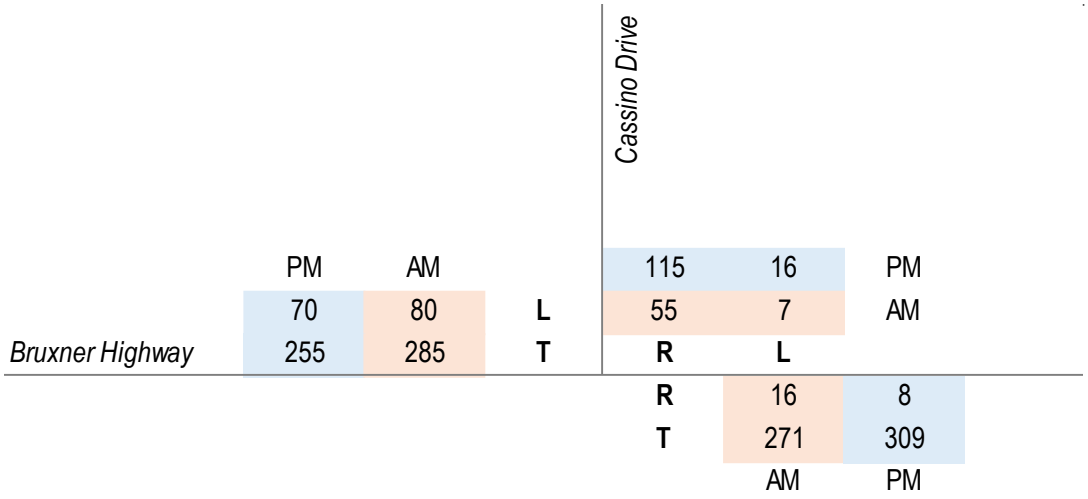



**Figure 2.2: 2018 Background Survey Volumes**

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 144,000m$^2$ and a residential land use to the south of Bruxner Highway, which comprises of approximately 186,000m$^2$.

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): 130,200m$^2$*
- *Approximate Lot. Size (based on lot sizes of similar developments nearby): 600m$^2$*
- *Number of Lots (Usable area/lot size):* ***217 lots***

***Industrial Land Use***

- *Area: 144,000 m$^2$*
- *Usable area (40% x Total Area):* ***57,600m$^2$***

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 600m$^2$, 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).

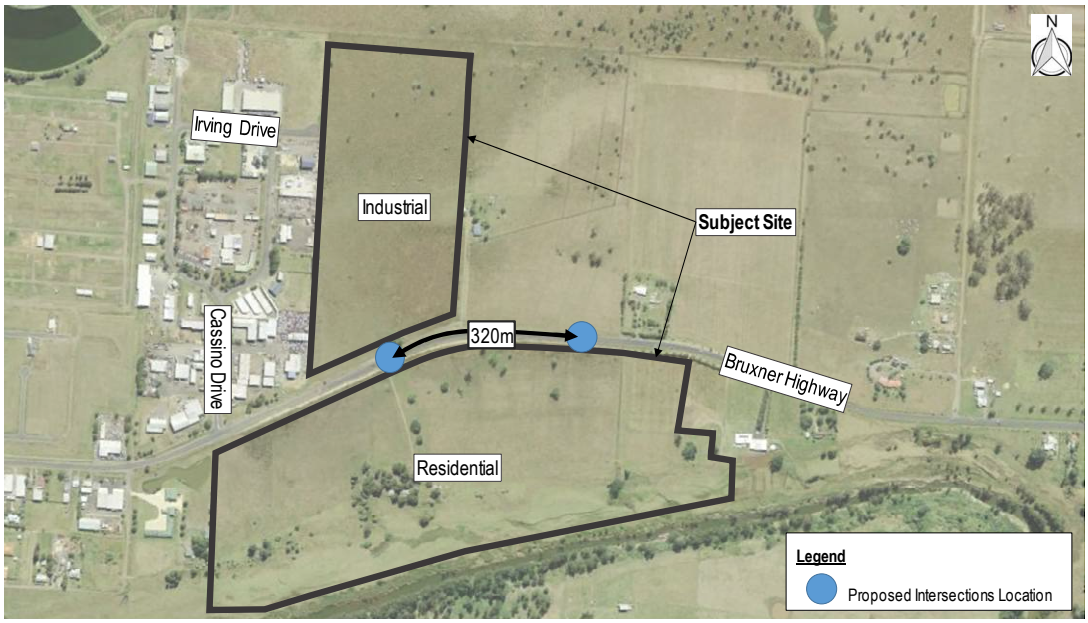



**Figure 5.1: Proposed Intersection Locations**

## 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.

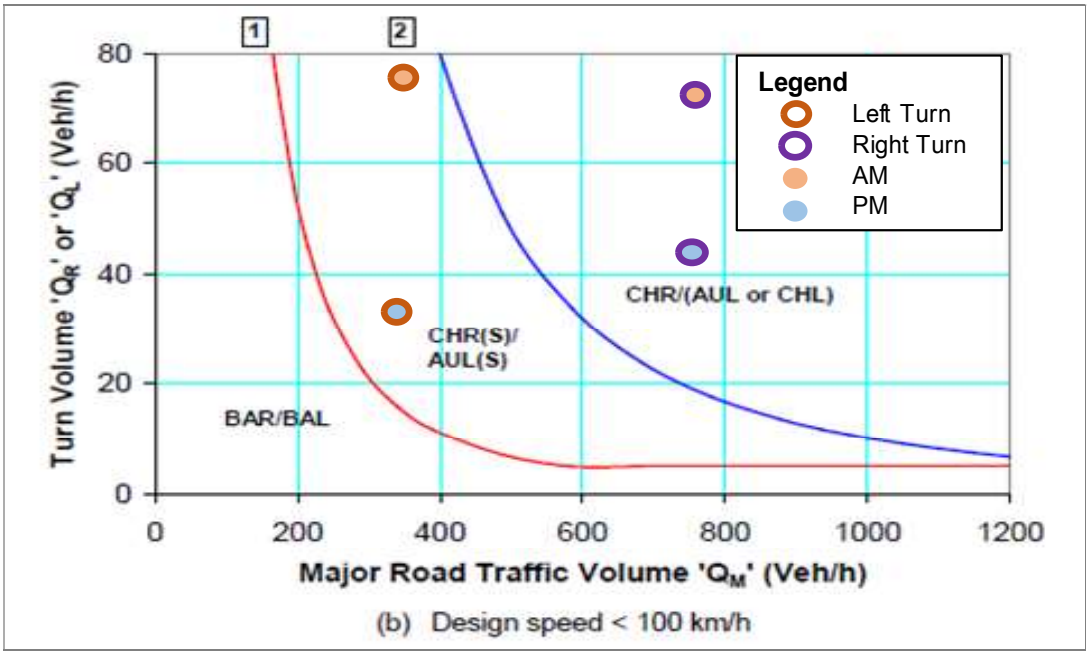



**Figure 5.2: Bruxner Highway / Industrial Access 2029 Turn Warrants**

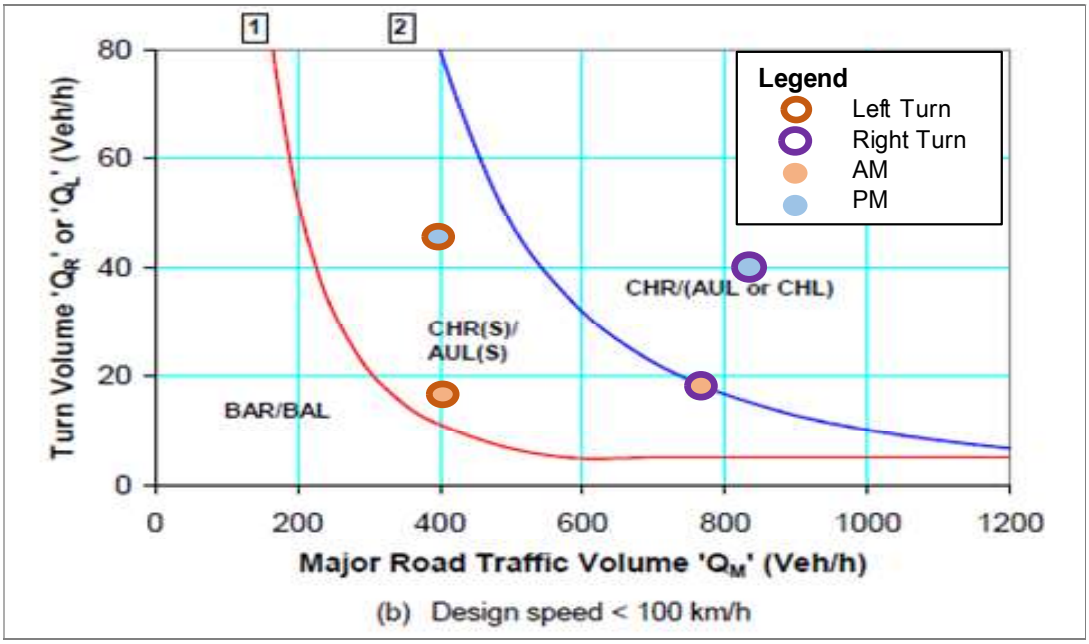



**Figure 5.3: Bruxner Highway / Residential Access 2029 Turn Warrants**

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.

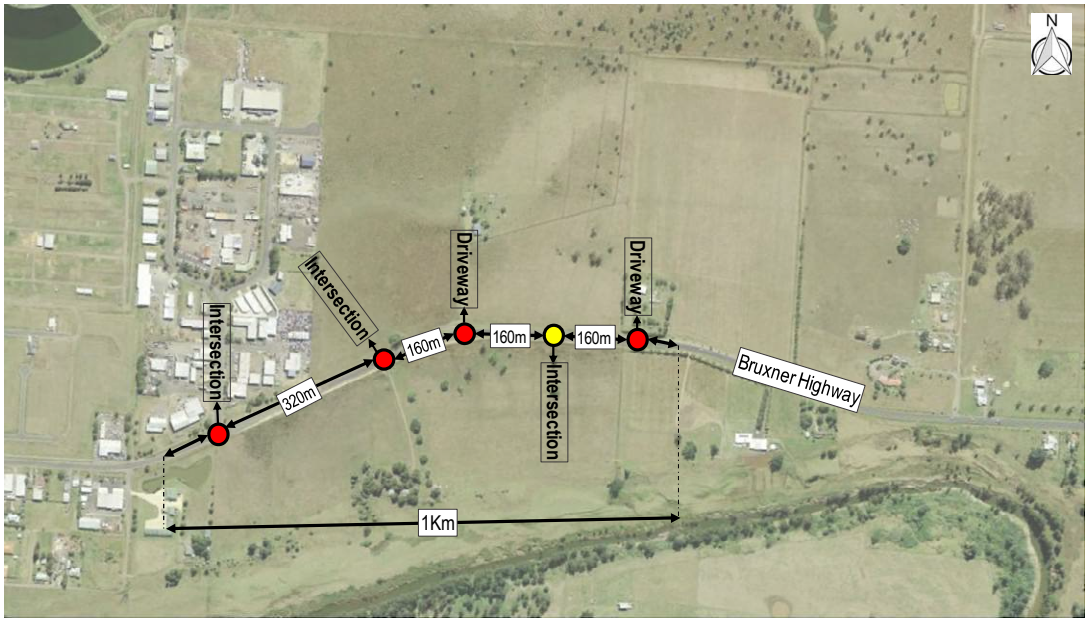



**Figure 5.6: Proposed Access Spacing**

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.

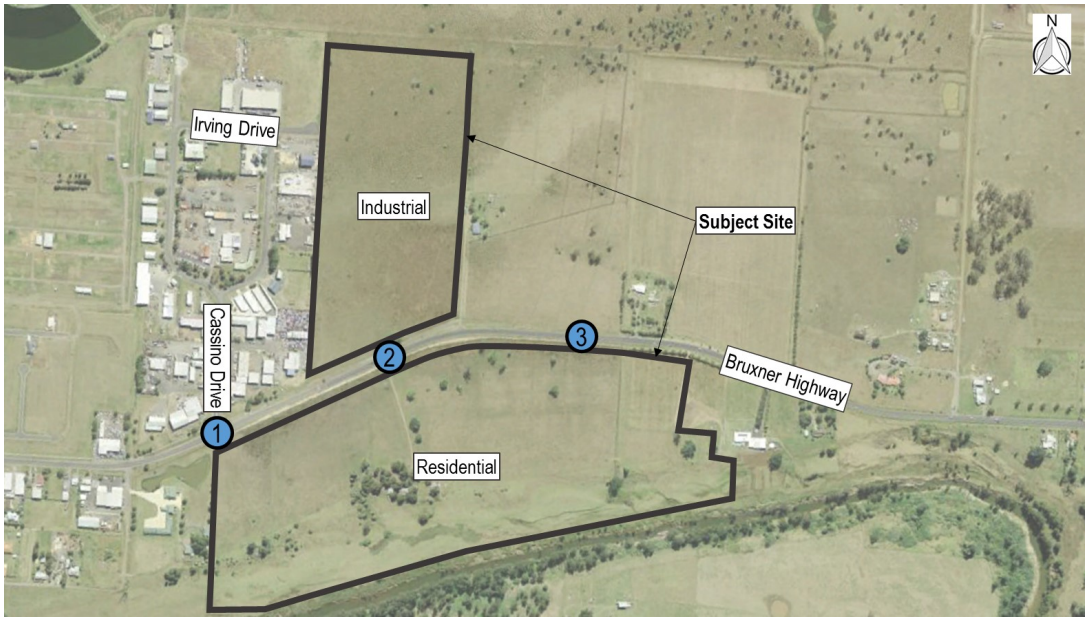



**Figure 6.1: Intersection Analysis Locations**

## 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.

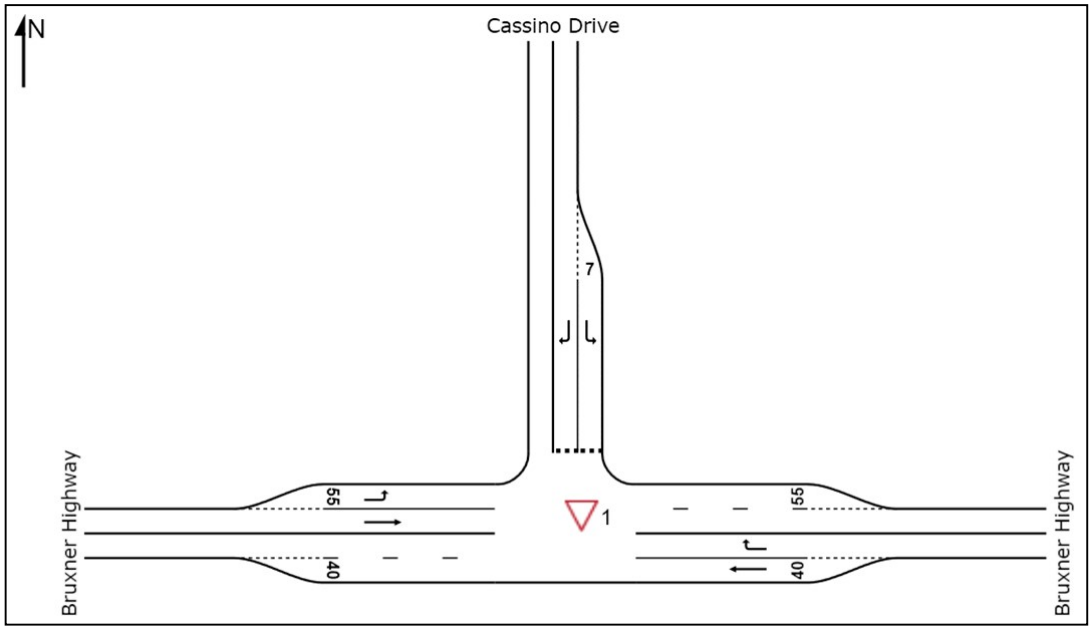



**Figure 6.2: Bruxner Highway / Cassino Drive Intersection Configuration**

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.

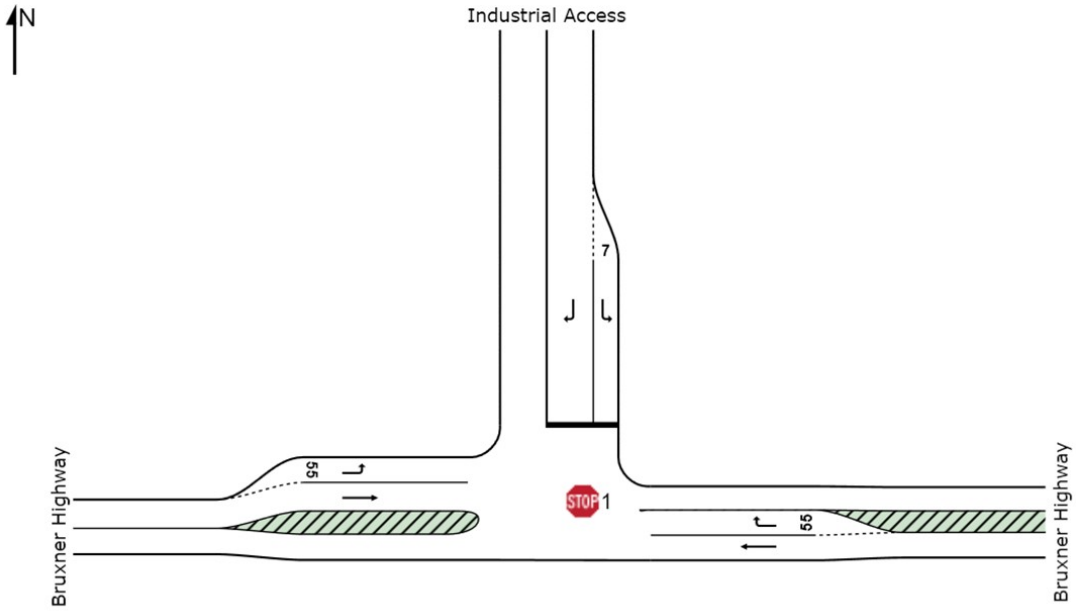



**Figure 6.3: Bruxner Highway / Industrial Access Intersection Configuration**

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.

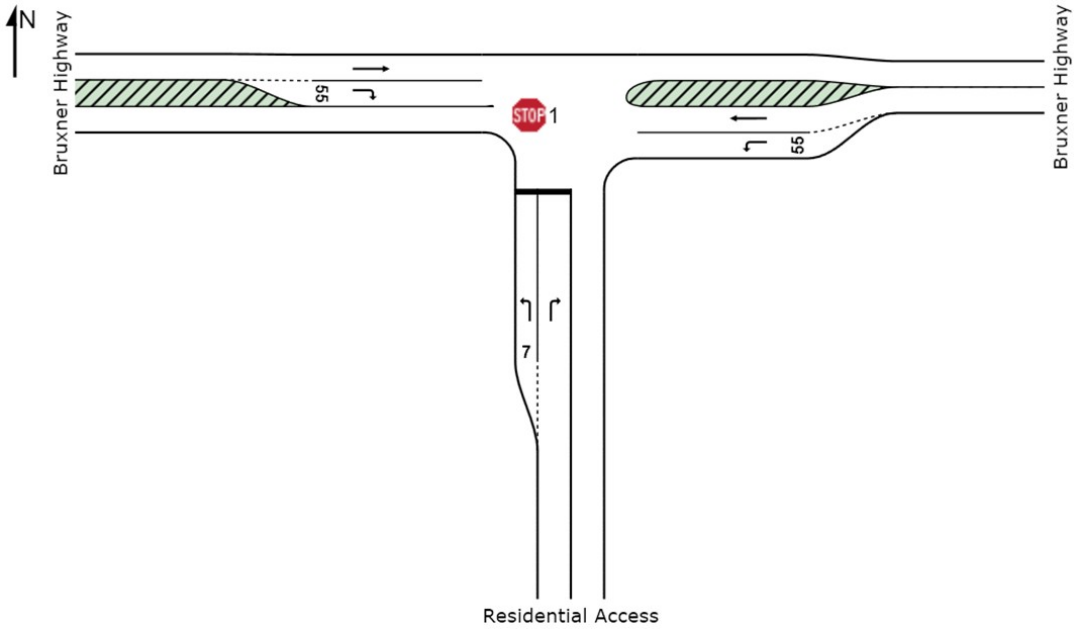



**Figure 6.4: Bruxner Highway / Residential Access Intersection Configuration**

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 72,000m$^2$ 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.

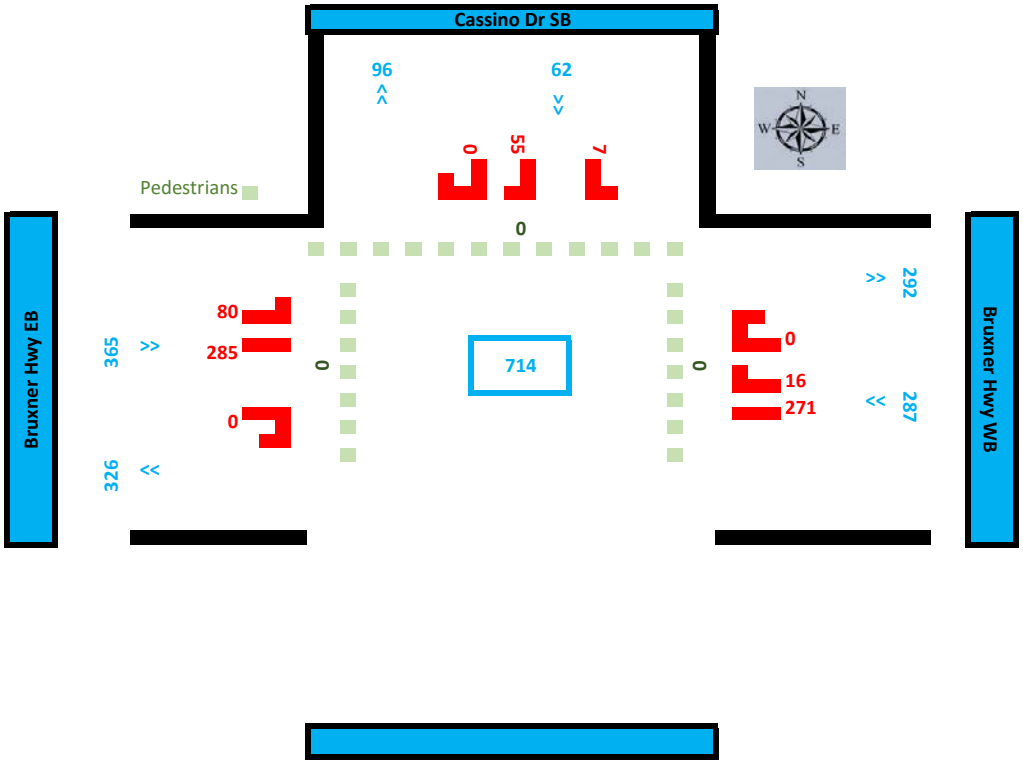
Based on the above assessment, and on the basis of extending the 50km/h speed zone, it is concluded that there are no significant traffic or transport impacts associated with the proposed development to preclude its approval and relevant conditioning on transport planning grounds.

# APPENDIX A

# TRAFFIC SURVEY RESULTS

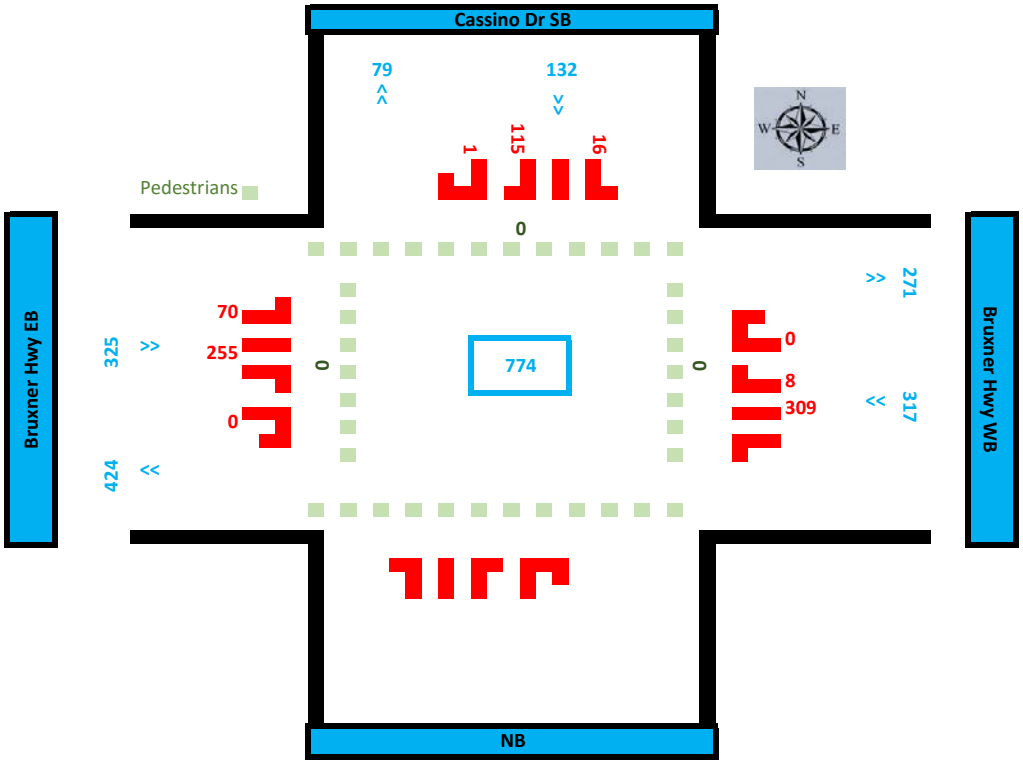
# Turning Movement Count Summary

| | |
|---|---|
| Site ID: | 1 |
| Location: | Bruxner Hwy & Cassino 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 |



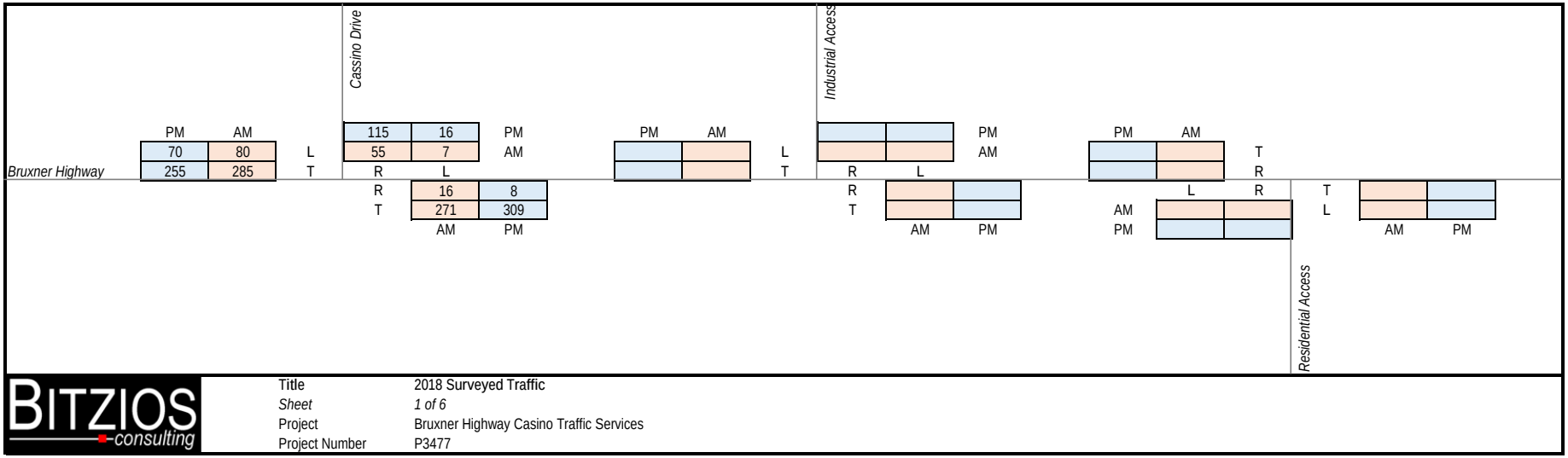
# Turning Movement Count Summary

| | |
|---|---|
| Site ID: | 1 |
| Location: | Bruxner Hwy & Cassino 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 |



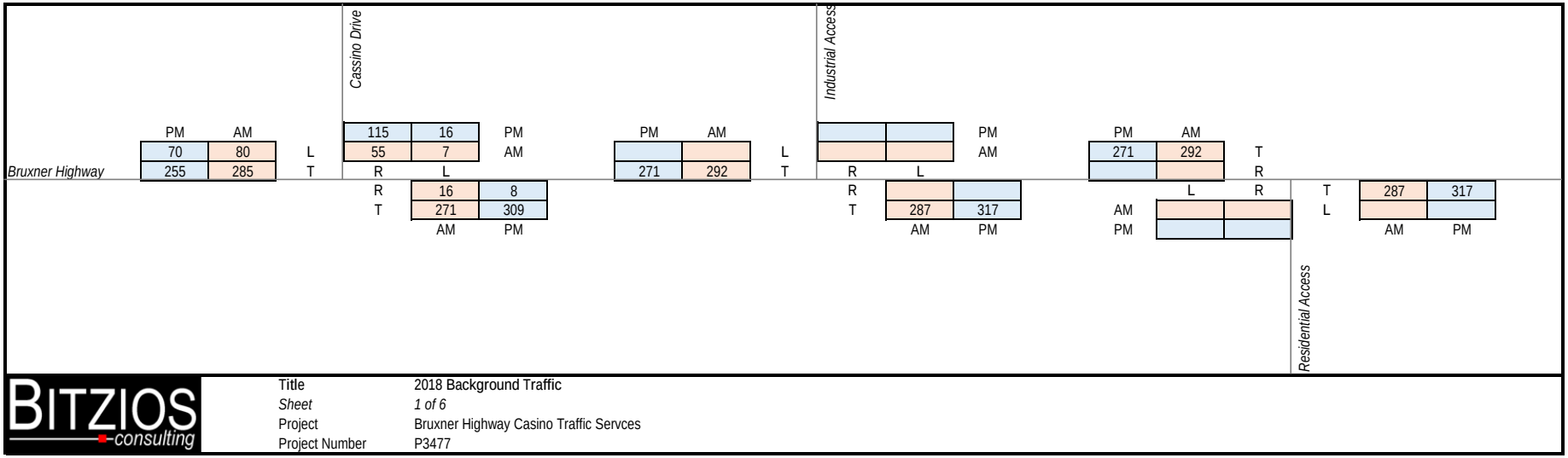
# APPENDIX B

# NETWORK DIAGRAMS

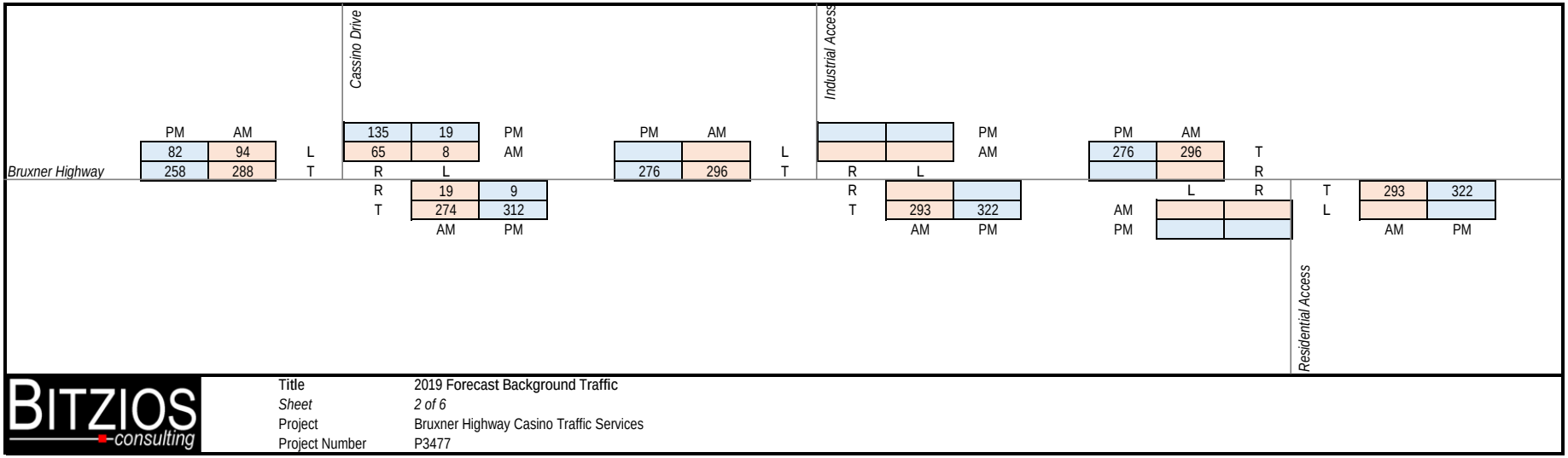



BITZIOS consulting

| | |
|---|---|
| Title | 2018 Surveyed Traffic |
| *Sheet* | *1 of 6* |
| Project | Bruxner Highway Casino Traffic Services |
| Project Number | P3477 |

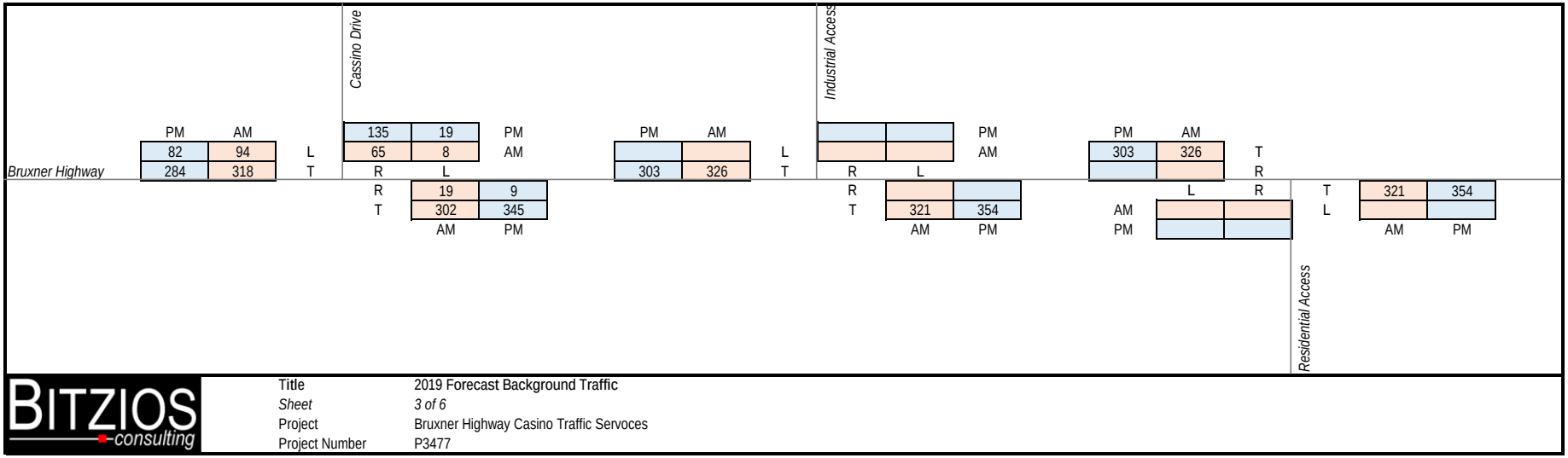



| | |
|---|---|
| Title | 2018 Background Traffic |
| *Sheet* | *1 of 6* |
| Project | Bruxner Highway Casino Traffic Servces |
| Project Number | P3477 |



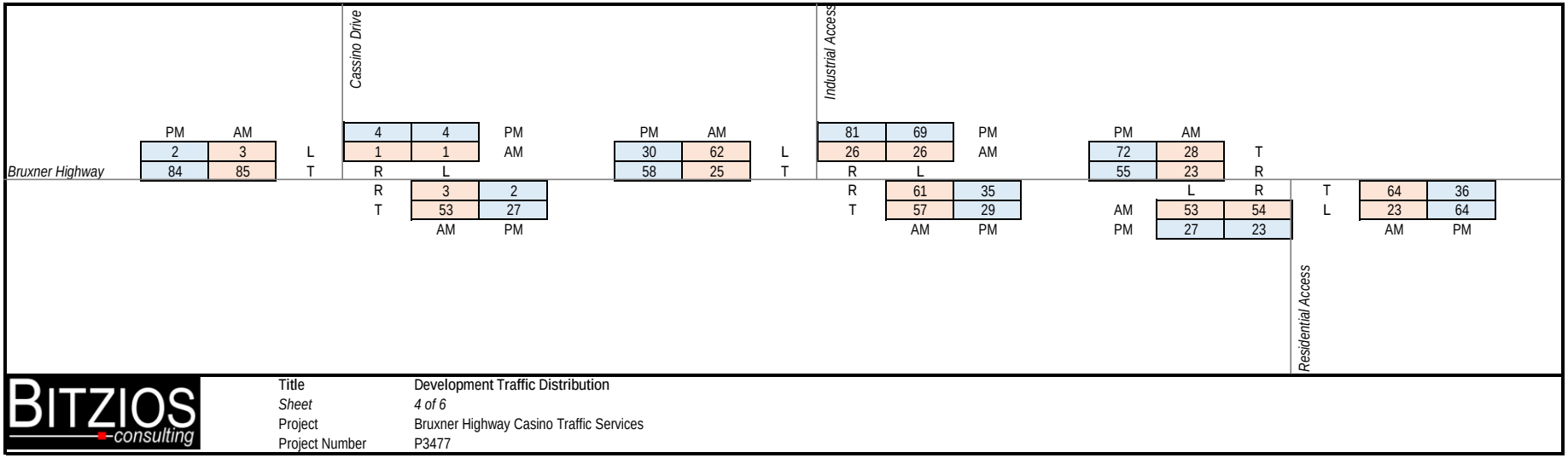

BITZIOS consulting

| | |
|---|---|
| Title | 2019 Forecast Background Traffic |
| *Sheet* | *2 of 6* |
| Project | Bruxner Highway Casino Traffic Services |
| Project Number | P3477 |



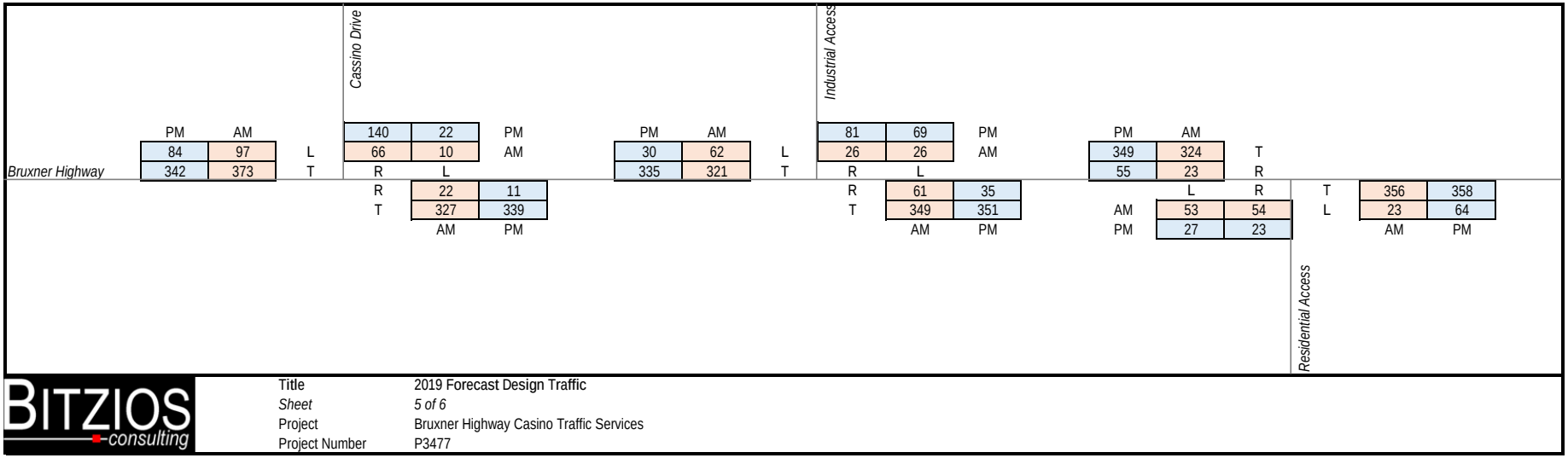

BITZIOS consulting

| | |
|---|---|
| Title | 2019 Forecast Background Traffic |
| *Sheet* | *3 of 6* |
| Project | Bruxner Highway Casino Traffic Servoces |
| Project Number | P3477 |



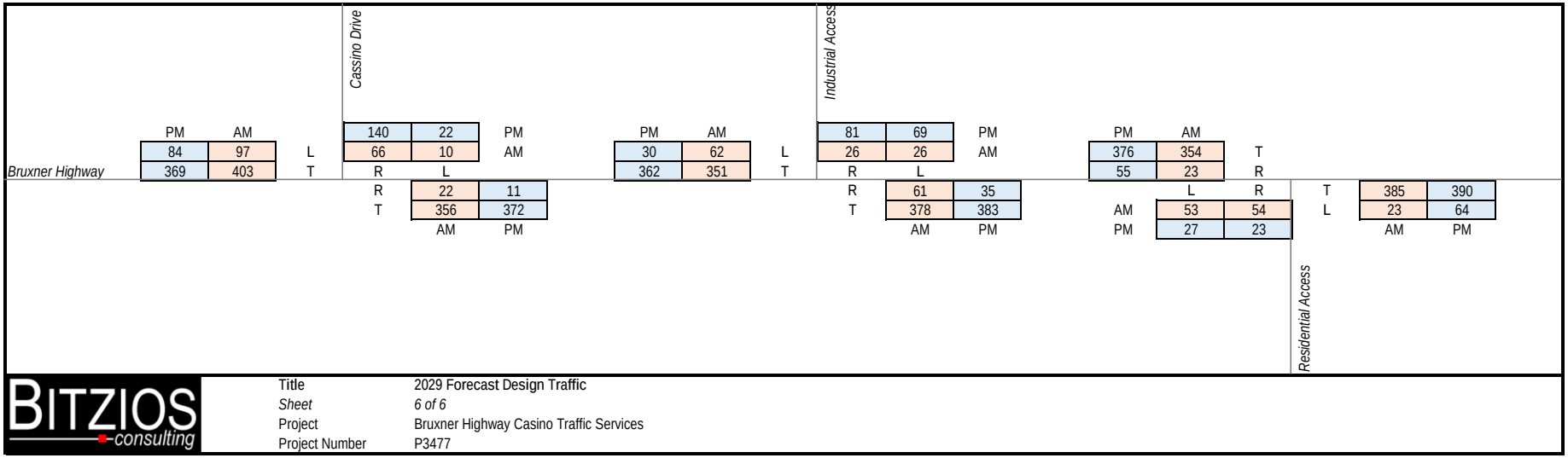

BITZIOS consulting

| | |
|---|---|
| Title | Development Traffic Distribution |
| *Sheet* | *4 of 6* |
| Project | Bruxner Highway Casino Traffic Services |
| Project Number | P3477 |




BITZIOS consulting

| | |
|---|---|
| Title | 2019 Forecast Design Traffic |
| *Sheet* | *5 of 6* |
| Project | Bruxner Highway Casino Traffic Services |
| Project Number | P3477 |



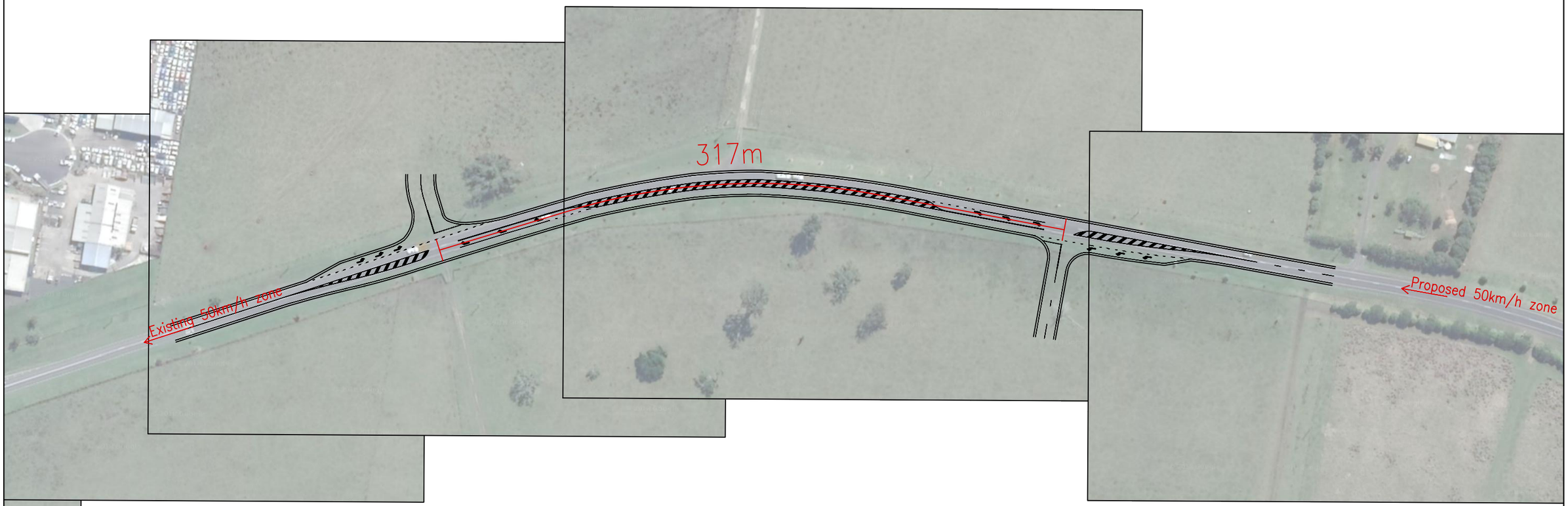

BITZIOS consulting

| | |
|---|---|
| Title | 2029 Forecast Design Traffic |
| *Sheet* | *6 of 6* |
| Project | Bruxner Highway Casino Traffic Services |
| Project Number | 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




BITZIOS consulting

N

0 20 40 60 80 100

Scale @ A3 1:2000

Project: 2740 Bruxner Highway Casino Traffic Services

Title: Bruxner Highway / Development Accesses Intersection Concepts

| Drawn | Checked |
|---|---|
| S.K | A.B |

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


| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| BITZIOS consulting | N | 0 10 20 30 40 50 Scale @ A3 1:1000 | | | | | Project: 2740 Bruxner Highway Casino Traffic Services | | Drawn: S.K / Checked: A.B |
| | | | | | | | Title: Bruxner Highway / Industrial Access Intersection Concept | NOT FOR CONSTRUCTION | 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


BITZIOS consulting

N

0 10 20 30 40 50
Scale @ A3
1:1000

Project: 2740 Bruxner Highway Casino Traffic Services

Title: Bruxner Highway Curve Widening

Drawn: S.K
Checked: A.B
NOT FOR CONSTRUCTION
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


BITZIOS consulting

N

0 10 20 30 40 50
Scale @ A3
1:1000

| | | | |
|---|---|---|---|
| Project: 2740 Bruxner Highway Casino Traffic Services | | Drawn: S.K | Checked: A.B |
| Title: Bruxner Highway / Residential Access Intersection Concept | NOT FOR CONSTRUCTION | Date: 10/05/2018 | |
| | Project Number: P3477 | Issue: 003 | Sheet Number: 4 |

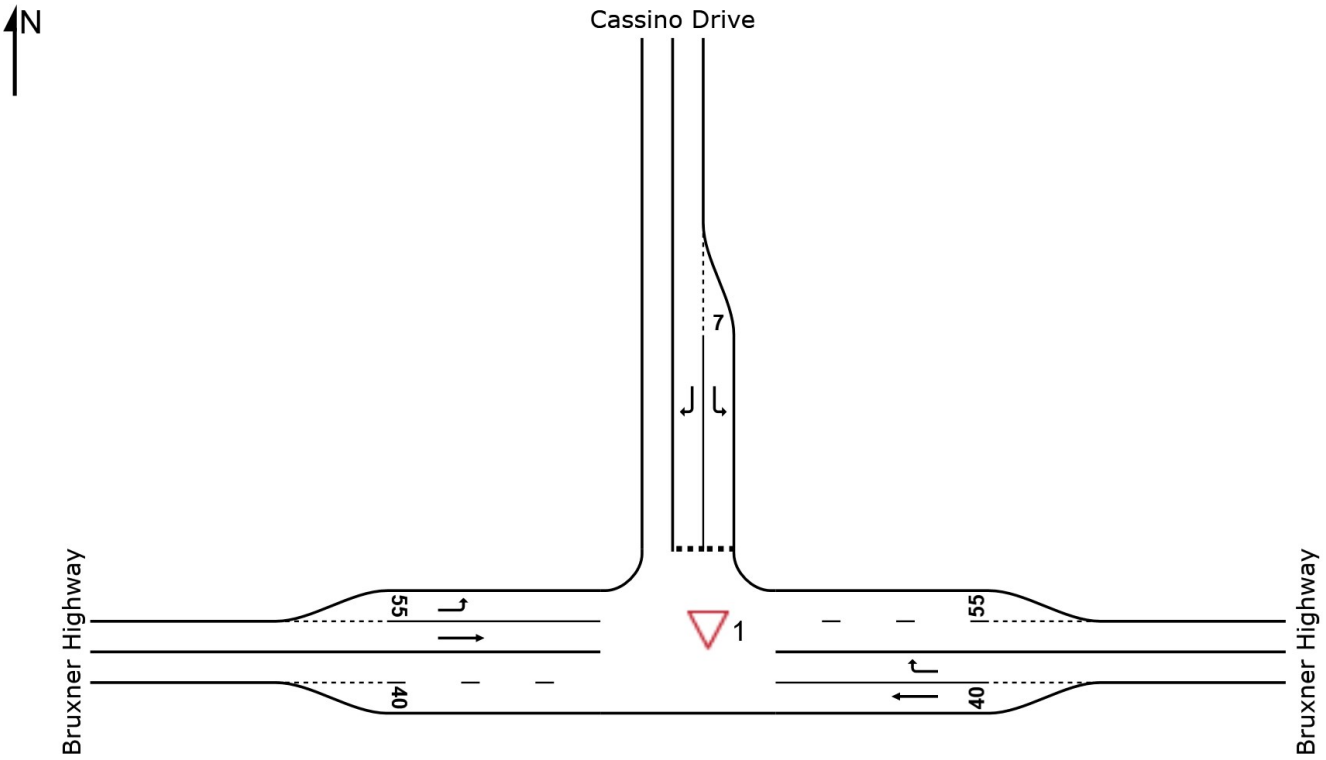
# APPENDIX D

# SIDRA SUMMARIES

# SITE LAYOUT

## Site: 1 [2019 BG AM - Existing]

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





Organisation: BITZIOS CONSULTING | Created: Friday, 11 May 2018 2:59:24 PM
Project: P:\P3477 2740 Bruxner Hway 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 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.

# 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 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 |
| 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.

# 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 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.

# 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 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.

# 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 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.

# 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 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.

# 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 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 |
| 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.

# 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**

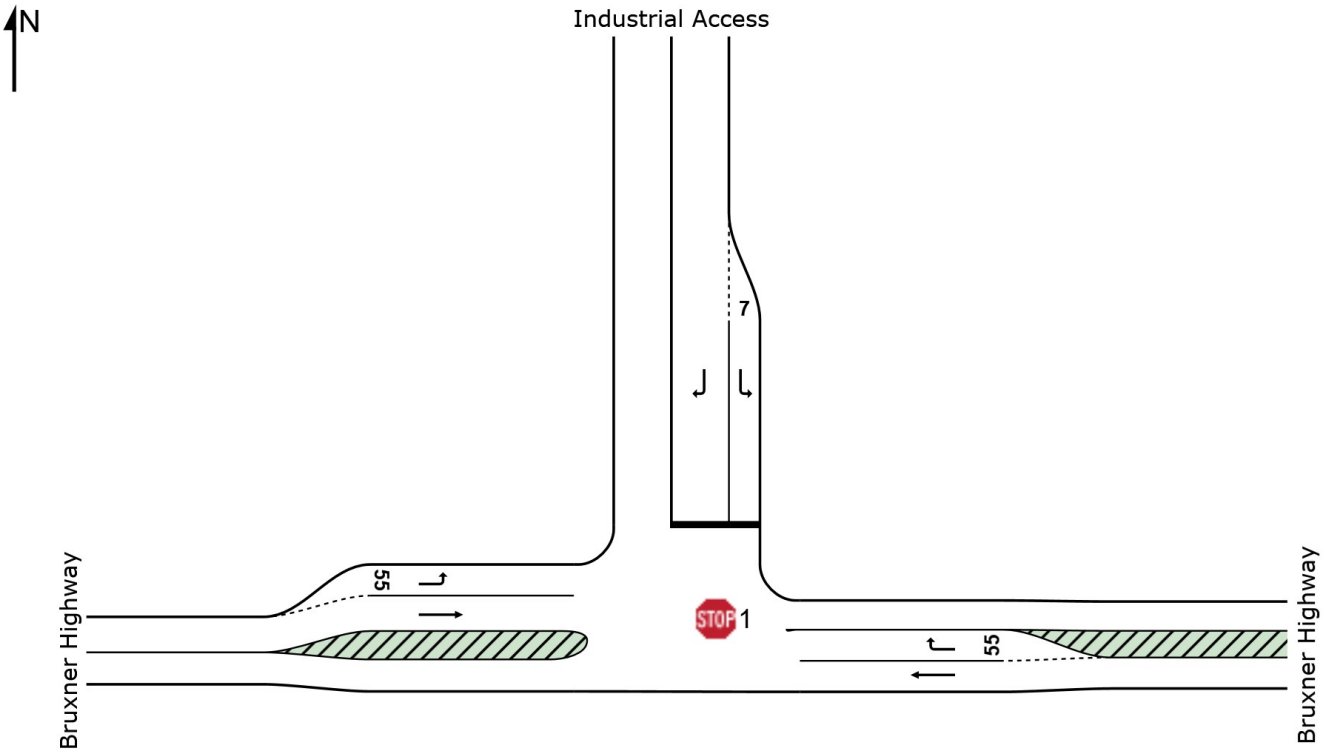
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Bruxner Highway | | | | | | | | | | | |
| 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.

# 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)





Organisation: BITZIOS CONSULTING | Created: Friday, 11 May 2018 3:05:07 PM
Project: P:\P3477 2740 Bruxner Hway Casino Traffic Services\Technical Work\Models\SIDRA\P3477.001M Bruxner Ind Access AUL CHR.sip7

# 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 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.

# 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 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.

# 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 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.

# 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**

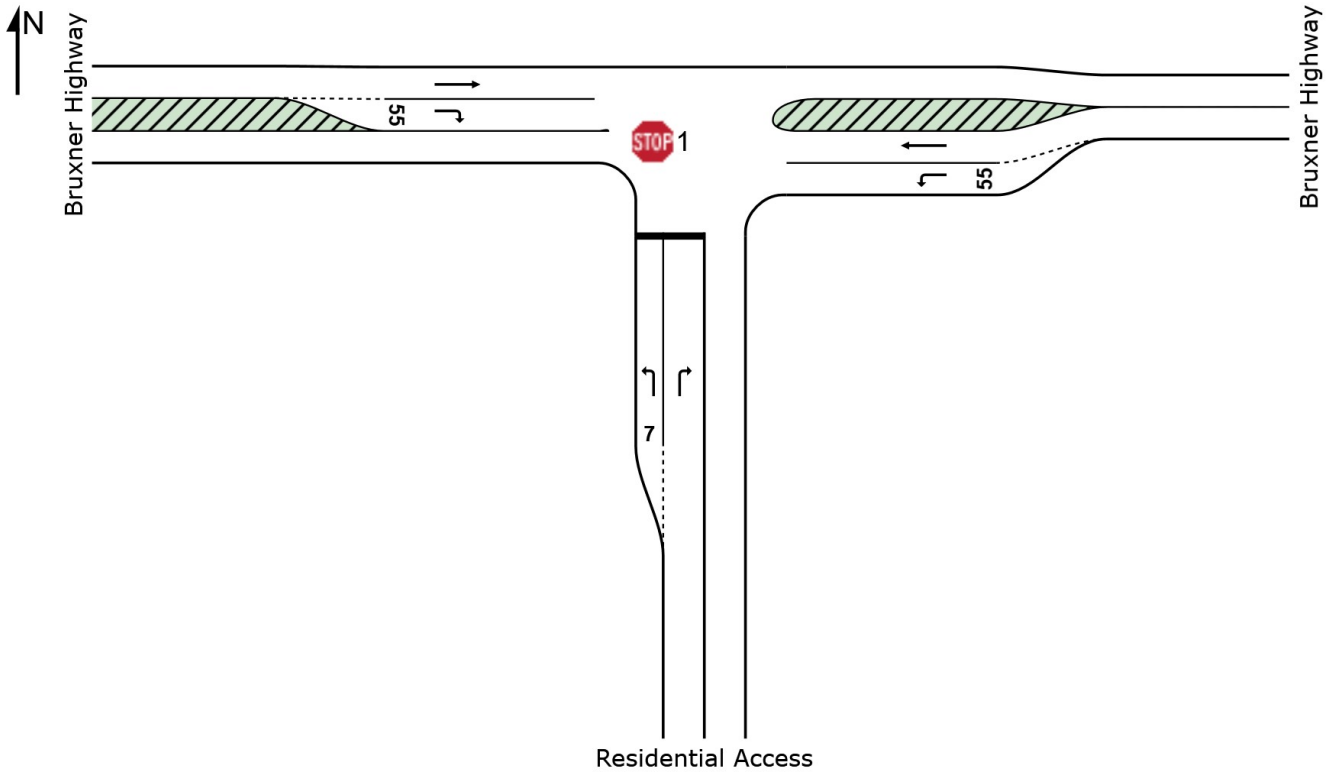
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Bruxner Highway | | | | | | | | | | | |
| 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.

# 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)





Organisation: BITZIOS CONSULTING | Created: Friday, 11 May 2018 3:06:51 PM
Project: P:\P3477 2740 Bruxner Hway Casino Traffic Services\Technical Work\Models\SIDRA\P3477.001M Bruxner Res Access AUL CHR.sip7

# 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 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: 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.

# 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 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: 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.

# 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 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: 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.

# 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 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: 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.