



# CAMBRAY CONSULTING

TRAFFIC ENGINEERING + TRANSPORT PLANNING



## **Proposed Service Station & Car Wash Access Amendments 325 Shaw Road, Shaw**

### **TRAFFIC IMPACT ASSESSMENT REPORT**

*Prepared for Kingsun Investments Pty Ltd*

*1 July 2025*

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## 1.0 Introduction

Cambray Consulting was engaged to assess the traffic arrangements for the modification of an approved Service Station development located at 325 Shaw Road, Shaw.

This assessment involved:

- An assessment of the physical layout of the site from a traffic perspective, taking into consideration:
  - Vehicle access arrangements including sizing, location and sight distance adequacy;
  - Carparking provision and layout, and on-site vehicle circulation arrangements; and
  - Servicing requirements and vehicle swept path analyses.
- An assessment of the traffic impact of the proposed development upon the adjacent road network, including:
  - SIDRA Intersection assessment of the proximate road network:
    - The proposed Shaw Road / Site Access;
    - The Dalrymple Road / Shaw Road traffic signals.
  - An Aggregate Delay Assessment as per the Department of Transport and Main Roads (DTMR's) Guidelines to Traffic Impact Assessment (GTIA) document.
- A Road Safety Assessment as per DTMR's GTIA document.

The proposed development plan is provided in **Appendix A**.

### 1.1 Limits of Report

This report takes into account the particular instructions and requirements of our client. Cambray Consulting has taken care in the preparation of this report, however it neither accepts liability nor responsibility whatsoever in respect of:

- Any use of this report by a third party;
- Any third party whose interests may be affected by any decision made regarding the contents of this report; and/or
- Any conclusion drawn resulting from omission or lack of full disclosure by the client or the client's consultants.

### 1.2 Safety in Design

Within our scope, we have identified safety in design issues and potential hazards, whenever reasonably practicable within our field of expertise. Due to our limited and upfront role on this project, it is not considered reasonably practicable to identify all potential hazards which may occur throughout the life of the project, including during detailed design and construction activities. It is strongly recommended that safety in design issues be reviewed during all ensuing design and construction stages of the project.

### 1.3 Qualifications

This report was prepared by:

- Simon Nitkiewicz, Principal Transport Engineer – BE Civil (Hons I), BSc Biochem, TMD 842, **RPEQ 31604**.





## 2.0 Context

The subject site is located at 325 Shaw Road, Shaw and is legally described as Lot 19 on SP107219.

On 21 June 2016 an application for a Material Change of Use for a Service Station was lodged with the City of Townsville Council (Council). The application received approval from:

- The Department of Infrastructure, Local Government and Planning (DILGP) on 8 March 2017 (DILGP reference SDA-0816-032892). Approved Plans are provided in **Appendix B**;
- The City of Townsville Council (Council) on 1 August 2017 (Council reference MI16/0015). Approved plans are provided in **Appendix C**.

An extension application was lodged with Council and subsequently approved on 24 July 2023 (Council reference MCU21/0089.01).

The approved development included an all-movements access to / from Dalrymple Road (Council controlled) and no direct access to / from Shaw Road (TMR Controlled).

This proposal includes an access to / from Shaw Road, limited to left-in, right-in, and left-out movements (i.e. no right-out movements). It is not proposed to make any changes to the Dalrymple Road access that has been approved previously.

### 2.1 Site Location

The site is located within the City of Townsville Council (Council) local government area. The development locality is illustrated in **Figure 2.1**.



**Figure 2.1 Site Locality**



## 2.2 Surrounding Road Network

Key characteristics of the adjacent road network are summarised in **Table 2.1**.

**Table 2.1 Surrounding Road Network**

| Road           | Jurisdiction | Hierarchy     | Speed Limit |
|----------------|--------------|---------------|-------------|
| Dalrymple Road | Council      | Arterial Road | 80 km/hr    |
| Shaw Road      | TMR          | Arterial Road | 80 km/hr    |



### 3.0 Proposed Development

The site benefits from an existing approval for a Service Station (MI16/0015). It is not proposed to amend the land uses associated with this application, being Service Station with ancillary Shop / Food and Drink Outlet and Car Wash.

Compared to the previous proposal, the key changes from a transport planning perspective are as follows:

- Provision of a new access to / from Shaw Road, accommodating left-in, right-in and left-out movements (i.e. no right-turn out movements); and
- Formalisation of the Car Wash area, with dimensions of wash bays and vacuum bays more in alignment with general tenant specifications (albeit somewhat conservatively sized).

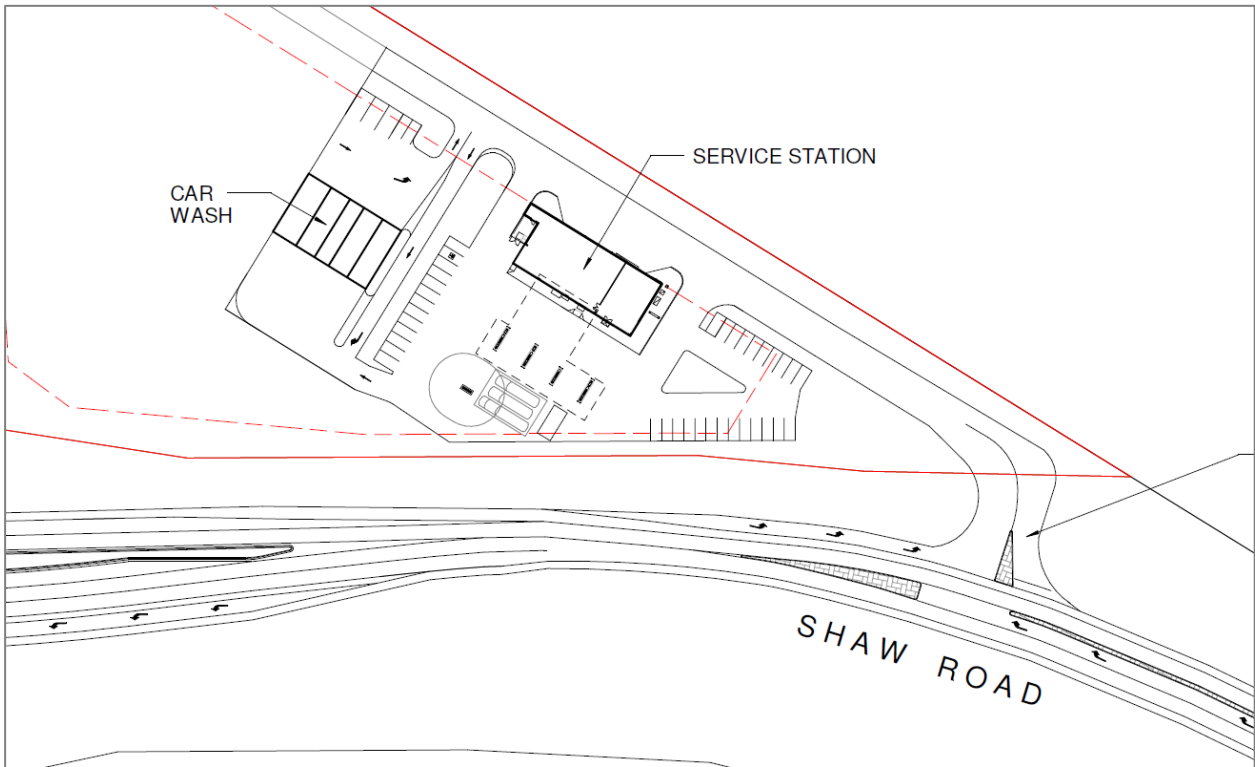
The proposed development yields are summarised in **Table 3.1**.

**Table 3.1 Summary of amended Stage 1 and proposed Stage 2 development yields**

| Land Use              | Development Yield                                                                                           |
|-----------------------|-------------------------------------------------------------------------------------------------------------|
| Service Station       | 356m <sup>2</sup> of GFA*                                                                                   |
| Food and Drink Outlet | 150m <sup>2</sup>                                                                                           |
| Car Wash              | 522m <sup>2</sup> of GFA<br>two (2) automatic wash bays, two (2) manual wash bays and three (3) vacuum bays |

\*Equivalent to ~250m<sup>2</sup> of convenience store area \*\*Conservatively includes plant, office and wash bays

The proposed plan of development is provided in **Appendix A** and an extract of the site layout is provided in **Figure 3.1**.



**Figure 3.1 Proposed Development**



## 4.0 Shaw Road Access Arrangements

It is proposed to achieve direct access to / from Shaw Road. A concept external layout of the proposed access arrangement is provided in **Appendix D**. Supporting swept paths of a 19m AV are also provided.

The proposed Shaw Road access arrangements include left-in, right-in and left-out movements. No right-turn out movements are proposed.

**Figure 4.1** illustrates the proposed layout and site access arrangements for the development.



**Figure 4.1 Shaw Road Concept External Layout**

### 4.1 Geometric Parameters

Key design parameters for the Shaw Road access concept are provided in **Table 4.1**.

**Table 4.1 Myall Street / Ferrells Road**

| Parameter                                                      | Adopted    | Comment                                                                                                                                                                                                                         |
|----------------------------------------------------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AUL – Posted Speed 80 km/hr &amp; design speed 90 km/hr</b> |            |                                                                                                                                                                                                                                 |
| Width (turn lane)                                              | 3.5m (min) | <ul style="list-style-type: none"> <li>This is compliant with RPDM / AGRD4a (2.8m minimum)</li> </ul>                                                                                                                           |
| Width (through lane)                                           | 3.5m (min) | <ul style="list-style-type: none"> <li>In line with existing provisions and compliant with RPDM / AGRD4a (3.0m)</li> </ul>                                                                                                      |
| Diverge                                                        | 90.0 (min) | <ul style="list-style-type: none"> <li>Design diverge for AUL at 90 km/hr is 90m</li> <li>Detailed consideration of left-turn adequacy is provided in the response to the 13 September 2024 SARA Information Request</li> </ul> |
| <b>CHR – Posted Speed 80 km/hr &amp; Design Speed 90 km/hr</b> |            |                                                                                                                                                                                                                                 |
| Width (turn lane)                                              | 3.5m (min) | <ul style="list-style-type: none"> <li>In line with existing provisions and compliant with RPDM / AGRD4a (3.5m proposed &gt; 2.8m minimum)</li> </ul>                                                                           |
| Diverge + Storage                                              | 144.0m     | <ul style="list-style-type: none"> <li>Storage of 19.0m (AV type vehicle)</li> <li>Deceleration of 125m – compliant with ‘comfortable’ condition per RPDM CHR at 90 km/hr, i.e. a high-standard of design</li> </ul>            |





## 4.2 Shaw Road Sight Distance Review

A desktop sight line investigation has been conducted and indicates:

- Shaw road is visually open and flat approaching the proposed access point (**Figure 4.2**);
- Sight distances are generally unobstructed and able to achieve 214m or more.

The concept functional layout (**Appendix D**) also includes a desktop sight line assessment that shows that the horizontal road geometry supports sight distances in excess of 214m.



**Figure 4.2 Sight Line Facing South (from approximately new site access location)**

A summary of sight line standards is provided in **Table 4.2**.

**Table 4.2 Sight Line Standard**

| Assessment                                                                                   | Design Speed            | Recommended Quantum |
|----------------------------------------------------------------------------------------------|-------------------------|---------------------|
| RPDM / AGRD4a Safe Intersection Sight Distance (SISD), 2.0 Second Reaction Time              | 90 km/hr Approach Speed | 214.0m              |
| RPDM / AGRD4a Minimum Gap Sight Distance (MGSD), 5.0 Second Gap                              | 90 km/hr Approach Speed | 125.0m              |
| Australian Standard 2890.1: Parking Facilities Off-street Carparking, Desirable 5 Second Gap | 80 km/hr Posted Speed   | 111.0m              |

Based on the above, the proposed access location achieves all noted sight line models, including the minimum sight line standards described in the Australian Standards and even the conservative SISD model, being the highest standard of sight line within RPDM / AGRD4a guidelines.



## 5.0 Vehicle Parking

The proposed development includes provision of 36 parking spaces, allocated as follows:

- 35 general parking spaces;
- One (1) parking space for persons with a disability.

The proposed parking provision has been reviewed against Council's Parking Rates Planning Scheme Policy as summarised in **Table 5.1**.

**Table 5.1 Parking Code Review**

| Land Use              | Yield                                                                                                                                              | Car Park Rate                                                                                                                                                                                                                        | Car Parking Required      |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Service Station       | 356m <sup>2</sup>                                                                                                                                  | One (1) space per 40m <sup>2</sup> of GFA.                                                                                                                                                                                           | 8.9                       |
| Food and Drink Outlet | 150m <sup>2</sup> of GFA<br>Adopted Split:<br>40% dining (60m <sup>2</sup> );<br>40% prep (60m <sup>2</sup> );<br>20% storage (30m <sup>2</sup> ). | One (1) space per 10m <sup>2</sup> of GFA available to the public (including outdoor dining);<br>One (1) space per 50m <sup>2</sup> of GFA for food preparation; AND<br>One (1) space per 100m <sup>2</sup> of GFA used for storage. | 6+<br>1.2+<br>0.3=<br>7.5 |
| Car Wash              | 4 Wash Bays                                                                                                                                        | Two (2) spaces                                                                                                                                                                                                                       | 2                         |
| <b>Total</b>          |                                                                                                                                                    |                                                                                                                                                                                                                                      | <b>19</b>                 |

Based on the above, the proposed provision of parking spaces complies with the requirements set out in Council's Parking Rates Planning Scheme Policy and is thereby acceptable from a transport planning perspective.

### 5.1 Disability Parking Requirements

The proposed site layout includes one (1) parking space marked and sized for persons with a disability (PWD space) in accordance with Australian Standards 2890.6:2009 Parking facilities Part 6: Off-street parking for people with disabilities. This equates to greater than one (1) PWD space per 50 ordinary parking spaces and is therefore compliant with the Building Code of Australia (BCA).



## 6.0 Geometric Configuration Review

The traffic elements of the site layout were reviewed against:

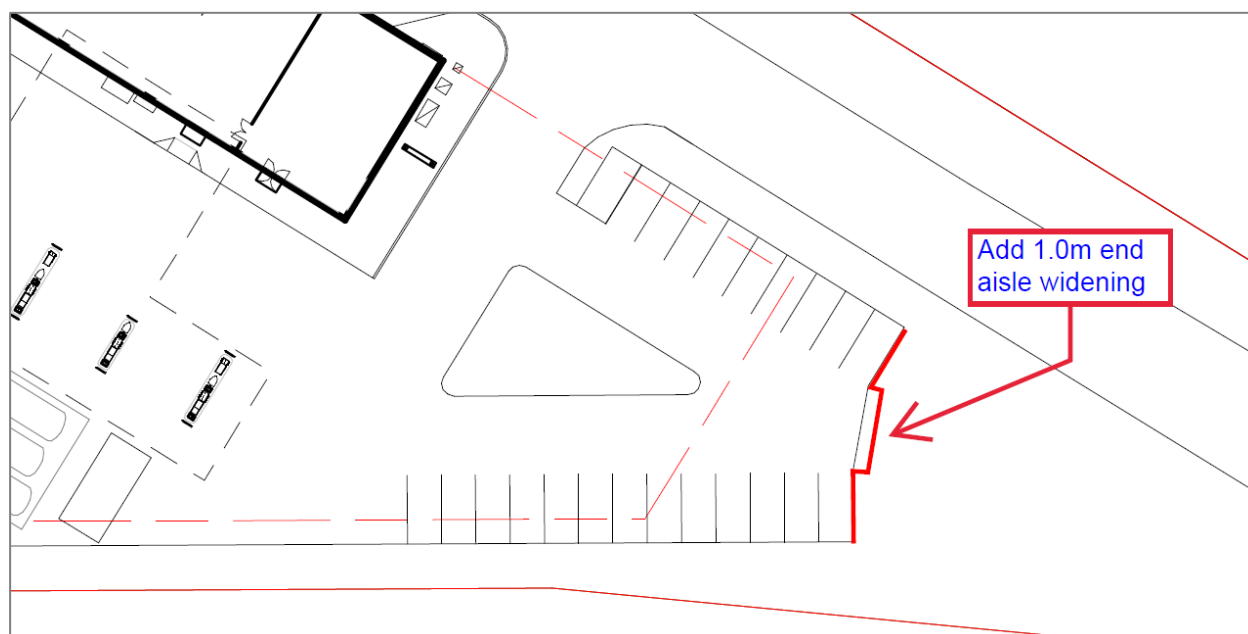
- The City of Townsville Council's Car Parking Planning Scheme Policy;
- AS2890.1: Parking Facilities, Off-street parking (AS2890.1);
- AS2890.6: Parking Facilities, Off-street parking for people with disabilities (AS2890.6).

The results are summarised in **Table 6.1**.

**Table 6.1 Geometric layout review**

| Parameter                             | Recommended                | Proposed    |
|---------------------------------------|----------------------------|-------------|
| Bay Dimensions (General, Class 3)     | 2.6m x 5.4m                | 2.6m x 5.4m |
| Bay Dimensions (Staff parking spaces) | 2.4m x 5.4m (min)          | 2.4m x 5.4m |
| Car Parking Aisle                     | 6.6m (min)                 | 6.6m        |
| Service Aisle                         | 6.5m (min)                 | 6.5m        |
| Bay Dimensions (PWD)                  | 2.4m x 5.4m                | 2.4m x 5.4m |
| Shared Area (PWD)                     | 2.4m x 5.4m                | 2.4m x 5.4m |
| End of Aisle Turnaround               | Not Provided*<br>See below | 1.0m        |

The parking module proximate to the service station would benefit from provision of a 1.0m end aisle extension in accordance with AS2890.1, which can be included as a condition of approval (**Figure 6.1**).



**Figure 6.1 End Aisle Extension**

In summary, with the above change, the assessed dimensions comply with the relevant Australian Standards (2890.1, 2890.2, 2890.6). On this basis the internal layout is acceptable from a traffic engineering perspective.



## 7.0 Servicing & Swept Path Arrangements

### 7.1 Servicing Review

The proposed site layout has been configured to accommodate the movements of the following design vehicles:

- 19m Articulated Vehicle (fuel tanker);
- Heavy Rigid Vehicle (general servicing / refuse collection).

Swept paths are provided in **Appendix E** and demonstrate that the adopted design vehicles are able to:

- Access the site in a forward gear;
- Manoeuvre into position (to load/unload, wholly within the site boundary) whilst maintaining acceptable or greater clearances to obstructions; and
- Depart the site in a forward gear.

The proposed development is therefore adequate from a swept path perspective.





## 8.0 Traffic Volumes

### 8.1 Background Traffic Volumes

Austraffic were commissioned to undertake traffic surveys at the Shaw Road / Dalrymple Road intersection on Thursday 16 November 2023.

A summary of the traffic survey results is provided in **Table 7.1**. A copy of the data is provided in **Appendix F**.

**Table 8.1 Network Peak Demands**

| Survey Location            | Demand [vph] |
|----------------------------|--------------|
| <b>Weekday 7:30-8:30am</b> |              |
| Shaw Road / Dalrymple Road | 2,321        |
| <b>Weekday 4:00-5:00pm</b> |              |
| Shaw Road / Dalrymple Road | 2,156        |

The City of Townsville “TownsvilleMAPS – Community”<sup>1</sup> tool provides projected traffic flows. Within the tool peak hour traffic on Shaw Road, north of the Dalrymple Road / Shaw Road traffic signals are as follows:

- 4,195 total movements (AM and PM peak hour) in 2023;
- 5,298 total movements (AM and PM peak hour) in 2036.

This equates to a linear growth rate of 2% per annum, which has been applied to the recorded survey data to forecast future traffic flows.

Turning movements are provided in **Appendix G**.

## 8.2 Development Traffic

### 8.2.1 Development Traffic Generation

Adopted trip generation rates are provided in **Table 8.2**.

**Table 8.2 Adopted Trip Generation Rates**

| Land Use                 | Weekday AM Peak Hour Trips       | Weekday PM Peak Hour Trips       | Source                      |
|--------------------------|----------------------------------|----------------------------------|-----------------------------|
| Service Station          | 66 trips per 100m <sup>2</sup>   | 66 trips per 100m <sup>2</sup>   | RMS                         |
| Food and Drink Outlet    | 38.5 trips per 100m <sup>2</sup> | 38.5 trips per 100m <sup>2</sup> | TMR Traffic Generation Data |
| Car Wash (Manual Bay)    | 8 trips per Manual Bay           | 8 trips per Manual Bay           | ITE & Industry Experience   |
| Car Wash (Automatic Bay) | 15.2 Trips per 100m <sup>2</sup> | 15.2 Trips per 100m <sup>2</sup> | ITE & Industry Experience   |

<sup>1</sup> [https://maps.townsville.qld.gov.au/Mapping/index.html?viewer=TownsvilleMAPS\\_Community.Mapping](https://maps.townsville.qld.gov.au/Mapping/index.html?viewer=TownsvilleMAPS_Community.Mapping)



The RTA's Guide specifies service station trip generation based on convenience store area rather than Gross Floor Area (GFA). Convenience store area excludes the console, office, storage and amenities and normally occupies in the order of 60% or less of the total GFA of the fuel shop. We conservatively assessed the Service Station convenience store area as 70% of the GFA.

The trip generation yields of the proposed development are summarised in **Table 4.2**

**Table 4.2 Trip Generation Yields**

| Land Use               | Yield                       | Unit                                        |
|------------------------|-----------------------------|---------------------------------------------|
| Service Station        | 250 m <sup>2</sup>          | m <sup>2</sup> of Convenience Store Area    |
| Food and Drink Outlet  | 150 m <sup>2</sup>          | m <sup>2</sup> of Gross Leasable Floor Area |
| Car Wash Automatic Bay | 195 m <sup>2</sup> (2 bays) | m <sup>2</sup> of GFA / Automatic Wash Bays |
| Car Wash Manual Bay    | 2 bays                      | Manual Wash Bays                            |

The proposed uses are convenience-based and a significant proportion of the traffic accessing the site will be motorists already on the road network whom would otherwise pass the development site (linked trips). For service stations and car washes standard industry practice is to adopt a new trip generation rate of 5-10% of total generated trip-ends (the remaining being drop-in trips). For food and drink outlets the Queensland Governments Guidelines for Assessment of Road Impacts of Development (GARID) document provides guidance on the proportion of new and linked trips.

Adopted trip segmentation is summarised in **Table 8.3**.

**Table 8.3 Adopted Trip Segmentation Rates**

| Land Use                        | Trip Segmentation |        | Source                         |
|---------------------------------|-------------------|--------|--------------------------------|
|                                 | New               | Linked |                                |
| Service Station                 | 10%               | 90%    | Conservative Industry Approach |
| Ancillary Food and Drink Outlet | 40%               | 60%    | GARID                          |
| Car Wash                        | 10%               | 90%    | Conservative Industry Approach |

**Table 8.4** summarises the estimated Weekday PM Peak hour trip generation. This has also been conservatively applied to the AM peak hour.

**Table 8.4 Adopted Peak Hour Trip Generation**

| Land Use                        | Trip Segmentation |        | Total Trips |
|---------------------------------|-------------------|--------|-------------|
|                                 | New               | Linked |             |
| Service Station                 | 17                | 149    | 165         |
| Ancillary Food and Drink Outlet | 23                | 35     | 58          |
| Car Wash (Auto)                 | 3                 | 27     | 30          |
| Car Wash (Manual)               | 2                 | 14     | 16          |
| Total                           | 44                | 224    | 268         |

An in / out split of 50% / 50% has been applied.



### 8.2.2 Development Traffic Distribution

Development trips were assigned to the external network with consideration of the proposed land uses, access movements and recorded background traffic flows. The adopted proportions are summarised below:

- For new trips:
  - 20% to/from the north to / from Shaw Road;
    - 100% enter via Shaw Road;
    - 100% egress via Shaw Road.
  - 35% to / from the east to / from Dalrymple Road, of these:
    - 50% enter via Shaw road;
    - 50% enter via Dalrymple Road;
    - 100% egress via Dalrymple Road;
  - 30% to / from the south, of these;
    - 50% enter via A1 and Dalrymple Road;
    - 25% enter via Shaw Road and Dalrymple Road;
    - 25% enter via Shaw Road;
    - 67% egress via Dalrymple Road to the A1;
    - 33% egress via Dalrymple Road to Shaw Road;
  - 15% to / from the west;
    - 50% enter via the A1 and Dalrymple Road;
    - 50% enter via State Road 14 / Woolcock Street then Shaw Road;
    - 50% egress from Dalrymple Road to the A1;
    - 50% egress Shaw Road to State Road 14 / Woolcock Street.
- For linked trips during the AM peak period;
  - 32% approach from the north via Shaw Road;
  - 22% approaching from the East via Dalrymple Road;
  - 22% approach from the south via Shaw Road;
  - 24% approach from the west via Dalrymple Road;
- For linked trips during the PM peak period;
  - 36% approach from the north via Shaw Road;
  - 33% approaching from the East via Dalrymple Road;
  - 23% approach from the south via Shaw Road;
  - 8% approach from the west via Dalrymple Road.

All linked trips are now proportioned based on exact recorded traffic counts. This is conservative as it will mean drivers will not act in a way that improves convenience and minimizes travel time, and therefore may undertake multiple right-turns to access and depart the site, when in reality a proportion of motorists would simply access the services as part of a more convenient route. For example, rather than turning right-in to access the site at Shaw Road as part of a return trip, they could have accessed the site left-in as part of the original trip.

Turning movements are supplied in **Appendix G**.



### 8.2.3 Traffic Scenario

The following traffic volume scenarios were developed:

- 2023 Survey (AM and PM peak hour);
- 2025 Background (AM and PM peak hour);
- 2025 Background + Year of Completion (AM and PM peak hour);
- 2035 Background (AM and PM peak hour); and
- 2035 Background + Design Horizon (AM and PM peak hour).

Turning movements are supplied in **Appendix G**.



## 9.0 Traffic Impact Assessment

### 9.1 Assessment Criteria

The main criteria utilised to assess intersection performance is the Degree of Saturation (DOS), which is the ratio of maximum demand volume to capacity at an intersection.

Austrroads Guide to Traffic Management Part 12 (AGRTM12) provides guidance in relation to the practical capacities based on intersection control and are summarised in **Table 9.1**.

**Table 9.1 Adopted Assessment Criteria (DOS)**

| Intersection Type   | Practical DOS Threshold                 |
|---------------------|-----------------------------------------|
| Priority Controlled | 0.80                                    |
| Roundabouts         | 0.85                                    |
| Signals             | 0.90 "should generally not be exceeded" |

For priority control intersections, the critical delay represents the worst average delay for an individual movement. For traffic signals, average delay over all movements should be taken. The NSW Roads and Maritime Services (RMS) Guide to Traffic Engineering Developments provides guidance in relation to average delay and LOS thresholds. The recommended thresholds are reproduced in **Table 9.2**.

**Table 9.2 Adopted Assessment Criteria (Average Delay and LOS)**

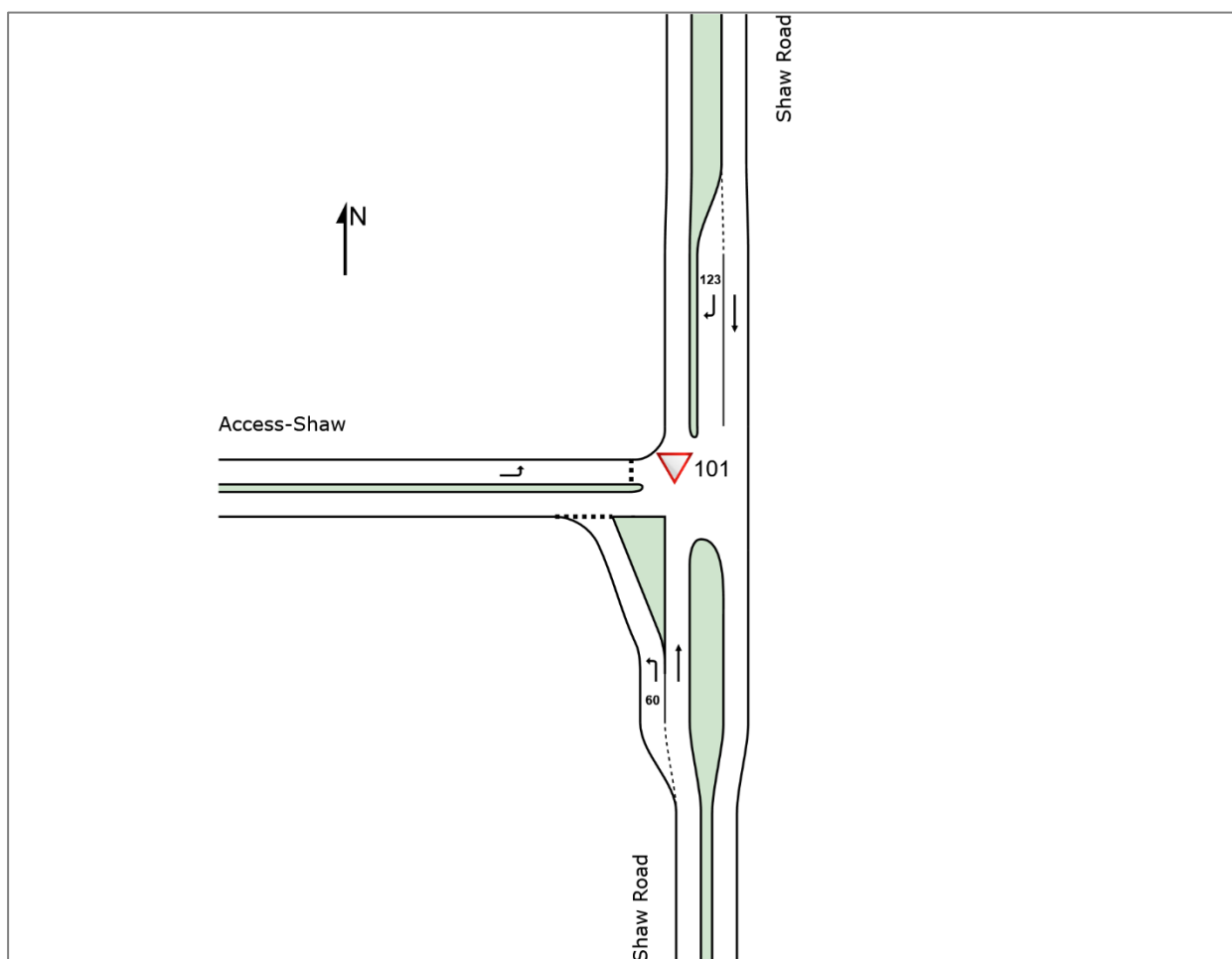
| Level of Service (LOS) | Average Delay / Vehicle |
|------------------------|-------------------------|
| A                      | < 14 seconds            |
| B                      | 15 to 28 seconds        |
| C                      | 29 to 42 seconds        |
| D                      | 43 to 56 seconds        |
| E                      | 57 to 70 seconds        |
| F                      | > 70 seconds            |

The Department of Transport and Main Roads (TMR's) Guide to Traffic Impact Assessment (GTIA) document does not specify thresholds for each specific LOS, however, does acknowledge that the LOS C to D delay threshold is >42 seconds (which is consistent with the RMS guidelines). Albeit, GTIA acknowledges that in contemporary urban networks, many intersections are already operating at a DOS of greater than one, and therefore with delays likely exceeding this threshold.



## 9.2 Shaw Road / Site Access

The SIDRA layout for the assessed intersection configuration is provided in **Figure 9.1**.



**Figure 9.1 Shaw Road / Site Access**

The SIDRA analysis results are summarised in **Table 9.3**.

**Table 9.3 SIDRA Results – Shaw Road / Site Access**

| Scenario                                  | Demand (vehs/hr) | DOS   | Critical Delay (s) | Critical Queue                  |
|-------------------------------------------|------------------|-------|--------------------|---------------------------------|
| <b>Weekday AM Peak Hour (7:30-8:30am)</b> |                  |       |                    |                                 |
| 2035 BG + Dev                             | 2,036            | 0.530 | 12.2               | Left turn from access: 2.2m     |
| <b>Weekday PM Peak Hour (4:00-5:00pm)</b> |                  |       |                    |                                 |
| 2035 BG + Dev                             | 2,016            | 0.511 | 11.5               | Right turn from Shaw Road: 2.3m |

SIDRA Outputs are provided in **Appendix H**.





The results indicate that the access is expected to operate below standard industry degree of saturation thresholds for a priority intersection (i.e. DOS less than 0.80) across a 10-year design horizon for all assessment scenarios.

The assessment also indicates that the access maintains reserve capacity for growth beyond this standard planning horizon.

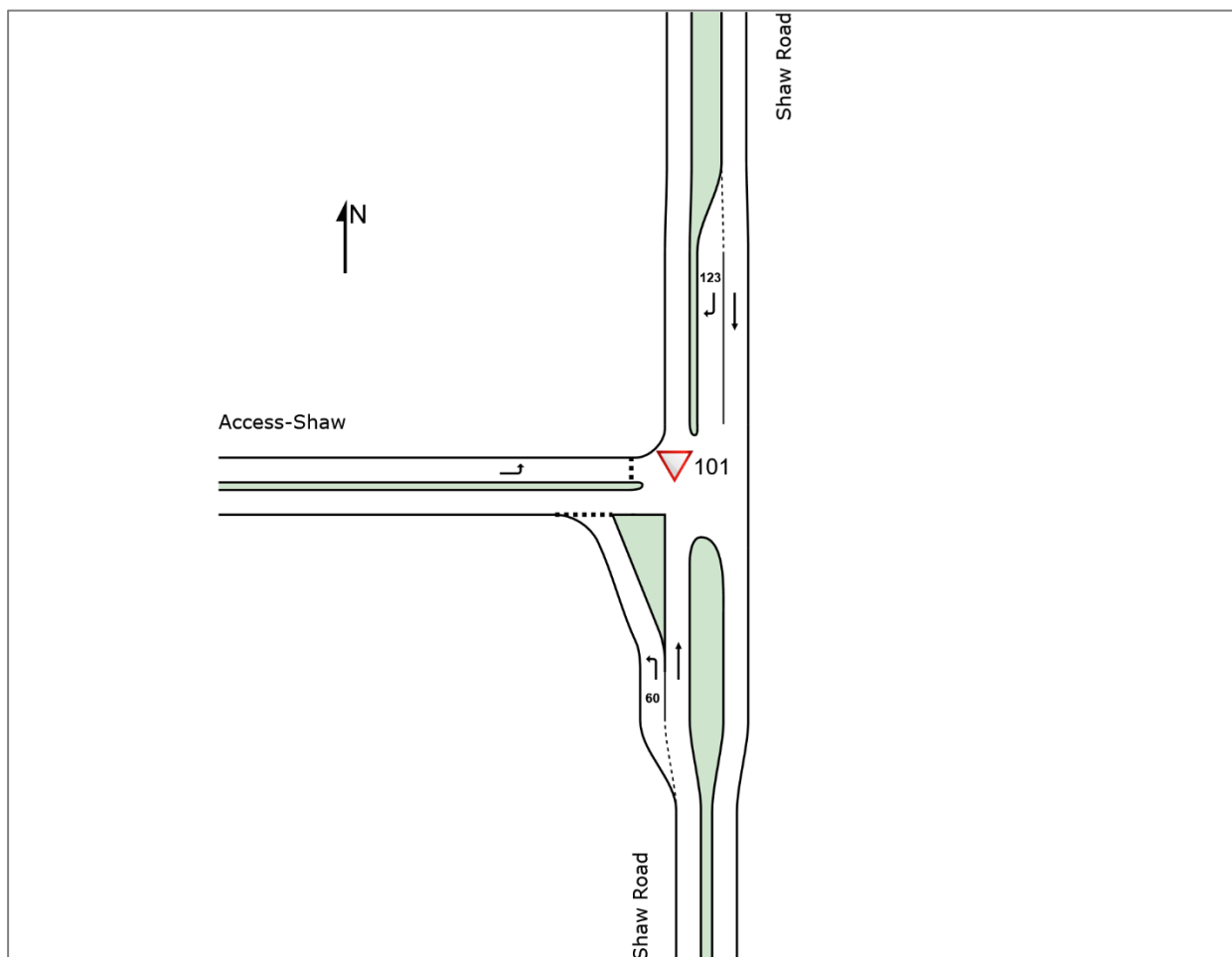
Based on the above, the access arrangement is acceptable from a traffic operations perspective.

SIDRA outputs are provided in **Appendix I**.



### 9.3 Dalrymple Road / Site Access

The SIDRA layout for the assessed intersection configuration is provided in **Figure 9.1**.



**Figure 9.2 Dalrymple Road / Site Access**

The SIDRA analysis results are summarised in **Table 9.3**.

**Table 9.4 SIDRA Results – Dalrymple Road / Site Access**

| Scenario                                  | Demand (vehs/hr) | DOS   | Critical Delay (s) | Critical Queue              |
|-------------------------------------------|------------------|-------|--------------------|-----------------------------|
| <b>Weekday AM Peak Hour (7:30-8:30am)</b> |                  |       |                    |                             |
| 2035 BG + Dev                             | 1,024            | 0.366 | 17.9               | Left turn from access: 3.6m |
| <b>Weekday PM Peak Hour (4:00-5:00pm)</b> |                  |       |                    |                             |
| 2035 BG + Dev                             | 800              | 0.225 | 11.8               | Left-turn from access: 1.7m |

SIDRA Outputs are provided in **Appendix H**.



The results indicate that the access is expected to operate below standard industry degree of saturation thresholds for a priority intersection (i.e. DOS less than 0.80) across a 10-year design horizon for all assessment scenarios.

The assessment also indicates that the access maintains reserve capacity for growth beyond this standard planning horizon.

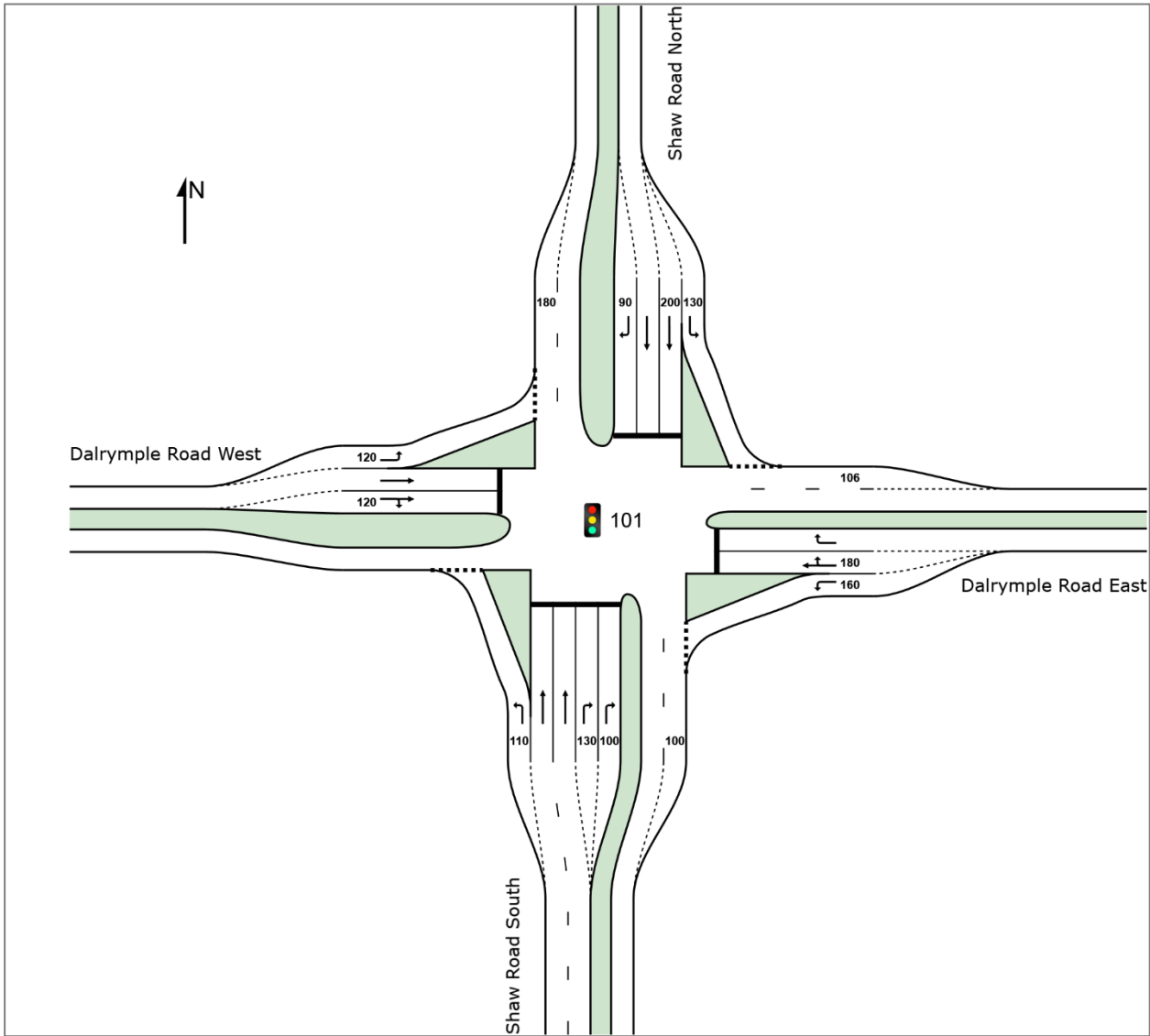
Based on the above, the access arrangement is acceptable from a traffic operations perspective.

SIDRA outputs are provided in **Appendix I**.



### 9.4 Dalrymple Road / Shaw Road

The SIDRA layout for the assessed intersection configuration is provided in **Figure 9.3**.



**Figure 9.3 Dalrymple Road / Shaw Road SIDRA**

SIDRA analysis results are summarised in **Table 9.5**.

**Table 9.5 SIDRA Results – Dalrymple Road / Shaw Road**

| Scenario                                  | Demand (vehs/hr) | DOS   | Critical Delay (sec) | 95 <sup>th</sup> %ile Queue (m)        |
|-------------------------------------------|------------------|-------|----------------------|----------------------------------------|
| <b>Weekday AM Peak Hour (7:30-8:30am)</b> |                  |       |                      |                                        |
| 2025 BG                                   | 2,543            | 0.594 | 37.6                 | 113.5m North Approach Through Movement |
| 2025 BG+DEV                               | 2,569            | 0.604 | 38.4                 | 109.9 North Approach Through Movement  |
| <b>Weekday PM Peak Hour (4:00-5:00pm)</b> |                  |       |                      |                                        |
| 2025 BG                                   | 2,361            | 0.524 | 34.4                 | 107.4m North Approach Through Movement |
| 2025 BG+DEV                               | 2,391            | 0.678 | 35.5                 | 106.5 East Approach Through Movement   |

The results indicate that the intersection is expected to operate below standard industry degree of saturation thresholds for a signalised intersection (i.e. DOS less than 0.9) under all assessment scenarios. Also, the analysis indicates that the development is expected to have a minimal impact on the operations of the intersection as demonstrated by key performance criteria (DOS, queueing, delay) being generally consistent between with and without development scenarios.

Based on the above, the development is acceptable from a traffic impact perspective.

SIDRA outputs are provided in **Appendix D**.

An aggregate delay assessment is provided in **Section 10.0**.



## 10.0 Aggregate Delay Assessment

The Department of Transport and Main Roads (TMR's) Guide to Traffic Impact assessment (GTIA) sets out the standard process for assessing delay impacts on the State-controlled road network. The desired outcome of the GTIA is to ensure that the sum of intersection delays on base traffic does not significantly worsen due to development.

An assessment of aggregate delay at the Dalrymple Road / Shaw Road traffic signals has been completed with results summarised in **Table 10.1**.

**Table 10.1 Aggregate Network Delay**

| Scenario                                     |           | Scenario 1<br>2025 BG vs 2025 BG + Dev |
|----------------------------------------------|-----------|----------------------------------------|
| <b>Base Case (2025 BG)</b>                   |           |                                        |
| AM Peak                                      |           | 95743.7                                |
| PM Peak                                      |           | 81294.6                                |
| <b>With Development (e.g. 2025 BG + Dev)</b> |           |                                        |
| AM Peak                                      |           | 96770.9                                |
| PM Peak                                      |           | 81830.4                                |
| <b>ID</b>                                    |           |                                        |
| AM Peak                                      | Δ seconds | 1027.2                                 |
|                                              | Δ %       | 1.1%                                   |
| PM Peak                                      | Δ seconds | 535.8                                  |
|                                              | Δ %       | 0.7%                                   |
| Total                                        | Δ seconds | 1563.0                                 |
|                                              | Δ %       | 0.9%                                   |

The assessment indicates that the aggregate delay is 0.9%, far below the typical 5% threshold. This is expected noting the proposal is a small scale convenience based development.

It is also noted that the aggregate delay assessment is comparing the proposal against a background traffic where the site has no development on it whatsoever. Noting TMR has already approved a development, albeit with varied access arrangements, it would be valid to compare the impact of the proposal against this as a base line. This would show even further reduced traffic impacts and highlights the minor scale of the proposal.

Detailed delay calculations are provided in **Appendix I**.



## 11.0 Road Safety Assessment

In line with the Department of Transport and Main Roads Guide to Traffic Impact Assessment (GTIA) Document a road safety assessment has been completed and includes:

- Adoption of Safety Risk Score Matrix reported in the Queensland Guide to Traffic Impact Assessment (**Figure 11.1**);
- Crash likelihood being assigned based on recorded crash incidence, existing road infrastructure elements and operational characteristics;
- Crash severity based on the severity guidance sheet within the Queensland Guide to Road Safety and from the Queensland Road Safety Technical User Volumes (QRSTUV) Guide to Speed Management.

|                      |                    | Potential consequence |                  |                       |                     |              |
|----------------------|--------------------|-----------------------|------------------|-----------------------|---------------------|--------------|
|                      |                    | Property only (1)     | Minor injury (2) | Medical treatment (3) | Hospitalisation (4) | Fatality (5) |
| Potential likelihood | Almost certain (5) | M                     | M                | H                     | H                   | H            |
|                      | Likely (4)         | M                     | M                | M                     | H                   | H            |
|                      | Moderate (3)       | L                     | M                | M                     | M                   | H            |
|                      | Unlikely (2)       | L                     | L                | M                     | M                   | M            |
|                      | Rare (1)           | L                     | L                | L                     | M                   | M            |

**Figure 11.1 GTIA Risk Matrix, L: Low Risk, M:Medium Risk, H: High Risk**

There were two (2) serious crashes recorded over a period of five (5) years (2019 to 2023). These are discussed below:

- A DCA 803 Off-path: On Curve: Hit Object crash in 2020. The driver was under the influence of alcohol;
- A DCA 301 rear-end type crash in 2020. There is limited information, but the data indicates the at fault driver had a medical condition that contributed to the crash.

Specific locations of each crash is shown in **Figure 11.2**.





**Figure 11.2 Crash Review**

The overall incidence of crashes is low in the context of a major four-way traffic signalized intersection.



A comparative risk assessment has been completed with results provided in **Appendix F**.

The assessment indicates that:

- The mitigation measures, such as banning the right-turn out from the proposed access, maximise safety in a pragmatic manner;
- There are no high-risk score items that would require further mitigation;
- Road safety is not 'significantly worsened' under the proposed development.

In terms of broader safety impacts, we note that the proposal is only generating less than a single year of background traffic growth at the Shaw Road / Dalrymple Road intersection and that there is only a single serious crash incident within the last 5 years (2020 specifically, prior to the recent upgrade). We are of the view that incremental utilisation of the existing traffic signals (the highest form of control) will in no practical way result in a 'significant worsening' of the safety of this intersection.



## 12.0 Summary and Recommendations

### 12.1 Physical Layout

The subject site is 325 Shaw Road, Shaw. On 21 June 2016 an application was lodged with the City of Townsville Council over the site for a Material Change of Use for a Service Station. The proposal received approval from both Council and The Department of Infrastructure, Local Government and Planning.

The abovementioned approval included an all-movements access to / from Dalrymple Road (Council controlled) and no direct access to / from Shaw Road (TMR Controlled).

It is now proposed to develop the site and provide an access to / from Shaw Road, limited to left-in, right-in, and left-out movements (i.e. no right-out movements).

Key findings of this report are summarised below:

- No changes are proposed to the Dalrymple Road access that has been previously approved;
- The proposal includes an access to / from Shaw Road limited to left-in, right-in, and left-out movements (i.e. no right-out movements);
- The access is supported by deceleration lanes configured in accordance with TMR's RPDM document;
- The access facilitates sight lines that comply with not only minimum AS2890 standard, but also the Safe Intersection Sight Distance Model per TMR's RPDM;
- On-site carparking provision is in accordance with Council's Planning Scheme;
- On-site traffic element geometry is in accordance with Council's Planning Scheme;
- A swept path assessment shows the design vehicles (being HRV and AV) are able to access and depart the site in a forward gear.

### 12.2 Traffic Impact Assessment

The traffic assessment indicates that the development is anticipated to generate in the order of 268 vehicle trips during weekday AM and PM peak hours. Of these 44 are new with the balance being linked.

A detailed SIDRA intersection assessment has been completed and indicates:

- The proposed Shaw Road / Site access operates adequately across the 10-year planning horizon, and maintains capacity for future growth;
- The proposed development has a minimal / acceptable impact on network delay, as highlighted by an aggregate delay assessment demonstrating a less than 5% delay impact at the Dalrymple Road / Shaw Road traffic signals.

Based on the above the proposed development is acceptable from a traffic impact perspective.



## 12.3 Recommendation

In light of the above, we recommend that the development be approved with reasonable and relevant conditions.

If you have any queries or require any further information regarding the above please do not hesitate to contact the undersigned on 07 3221 3503.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'S. Nitkiewicz', with a stylized flourish at the end.

**Simon Nitkiewicz**

Principal Transport Engineer | Cambray Consulting Pty Ltd  
BECivil (Hons I) | BSc Biochem | TMD #842 | RPEQ 31604

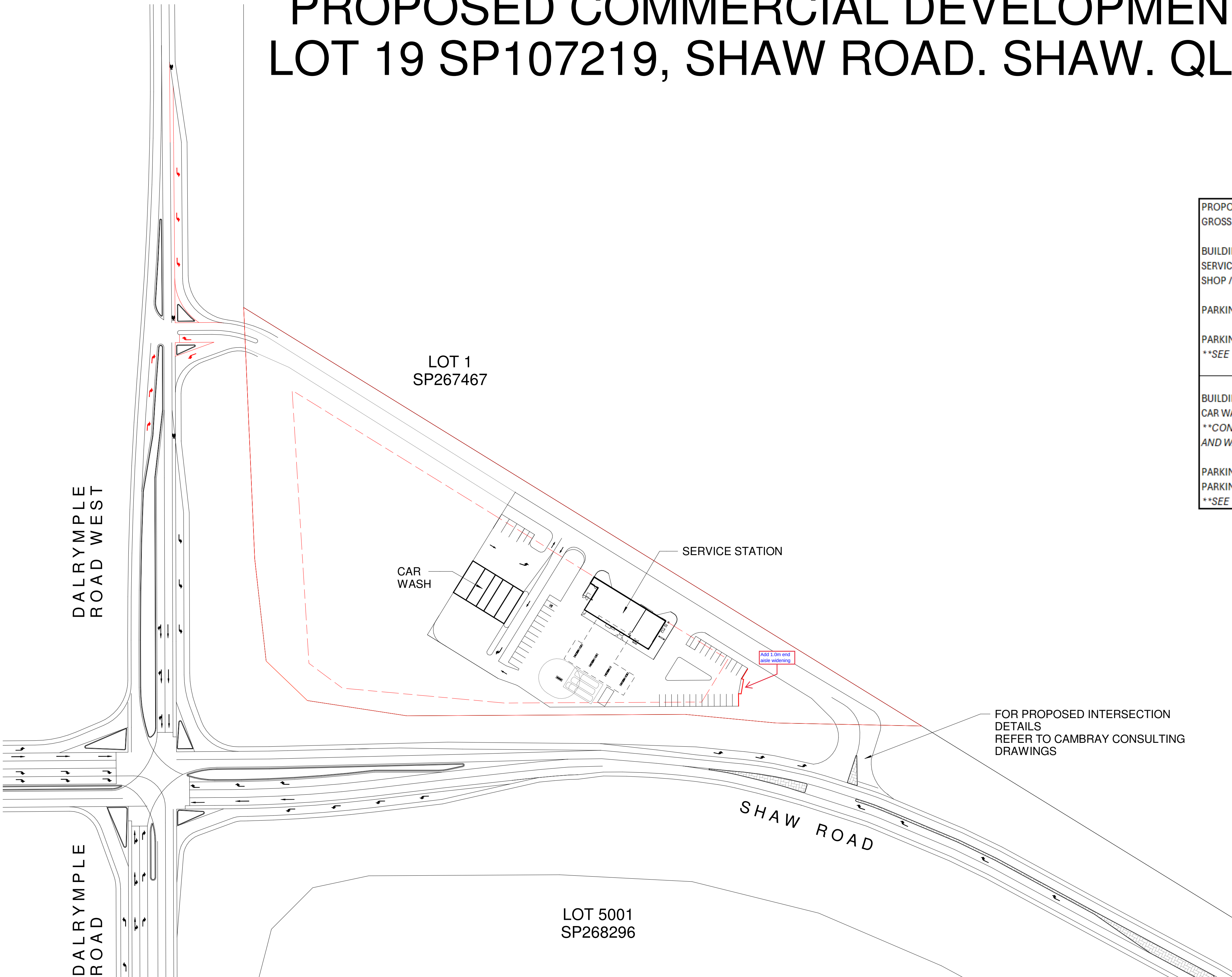
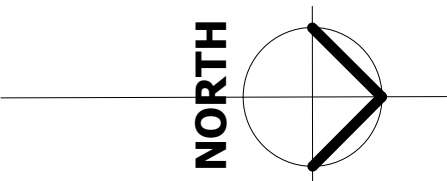
## **APPENDIX A**

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### Proposed Development Plan



# PROPOSED COMMERCIAL DEVELOPMENT LOT 19 SP107219, SHAW ROAD. SHAW. QLD.



| PROPOSED LAYOUT AREA SCHEDULE                            |   |          |
|----------------------------------------------------------|---|----------|
| GROSS FLOOR AREA - GFA                                   |   |          |
| BUILDING 1                                               |   |          |
| SERVICE STATION                                          | = | 356 sqm. |
| SHOP / FOOD AND DRINK OUTLET                             | = | 150 sqm. |
| PARKING SPACES REQUIRED                                  | = | 17       |
| PARKING SPACES PROVIDED                                  | = | 34       |
| **SEE TRAFFIC REPORT FOR DETAIL **                       |   |          |
| BUILDING 2                                               |   |          |
| CAR WASH                                                 | = | 522 sqm. |
| **CONSERVATIVELY INCLUDES PLANT, OFFICE AND WASH BAYS ** |   |          |
| PARKING SPACES REQUIRED                                  | = | 2        |
| PARKING SPACES PROVIDED                                  | = | 2        |
| **SEE TRAFFIC REPORT FOR DETAIL **                       |   |          |

**SITE PLAN**  
Scale: 1 : 1000

## REAL PROPERTY DESCRIPTION

LOT No: 19  
PLAN No: SP107219  
AREA: 2.56 Ha

| Amendments |          |                        | COPYRIGHT ©<br>Copyright Laws Prohibit the copying and use of this drawing and design in any form without written consent from Brett Hodgkinson.<br><br>All dimensions are to be verified on site prior to any commencement of any construction works. |  |  |  |  |  | THIS DRAWING IS TO SCALE WHEN PRINTED ON A1 PAPER | <b>BRETT HODKINSON</b><br>B U I L D I N G   D E S I G N<br><br>BHBD Pty. Ltd.<br>QBCC Lic. No. 15007761 Medium Rise<br>ABN 52 609 527 451 | M: 0402 255 609<br>E: brett@bhbd.com.au | Drawn   | B.H.       | KINGSUN                                |
|------------|----------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|---------|------------|----------------------------------------|
| Date       | Revision | Description            |                                                                                                                                                                                                                                                        |  |  |  |  |  |                                                   |                                                                                                                                           |                                         | Checked | B.H.       | PROPOSED COMMERCIAL DEVELOPMENT        |
| 06.04.24   | A        | FOR APPROVAL DTMR      |                                                                                                                                                                                                                                                        |  |  |  |  |  |                                                   |                                                                                                                                           |                                         | Scale   | As shown   | LOT 19 SP107219, SHAW ROAD. SHAW. QLD. |
| 14.06.24   | B        | SITE BUILDINGS REVISED |                                                                                                                                                                                                                                                        |  |  |  |  |  |                                                   |                                                                                                                                           |                                         | Date    | APRIL 2024 | Project No. 24-06 KIN                  |
|            |          |                        |                                                                                                                                                                                                                                                        |  |  |  |  |  |                                                   |                                                                                                                                           |                                         |         |            | Sheet No. A01                          |

## **APPENDIX B**

---

SARA Approved Layout





1 PROPOSED OVERALL SITE PLAN  
1 : 750

| PROPOSED LAYOUT AREA SCHEDULE<br>(GROSS FLOOR AREA - G.F.A) |   |       |
|-------------------------------------------------------------|---|-------|
| BUILDING A                                                  |   |       |
| SERVICE STATION                                             | = | 247m² |
| SHOP / FAST FOOD                                            | = | 280m² |
| PARKING SPACES REQUIRED                                     |   |       |
| 527m² (GFA) @ 1 PER 15 =                                    |   | 34    |
| PARKING SPACES PROVIDED                                     |   | 36    |
| BUILDING B (CAR WASH) =                                     |   |       |
|                                                             |   | 304m² |
| PARKING SPACES REQUIRED                                     |   |       |
| QUEUING                                                     | = | 16    |
| PARKING SPACES                                              | = | 2     |
| PARKING SPACES PROVIDED                                     |   |       |
| (16 QUEUING + 3 SPACES)                                     |   | 19    |

| REAL PROPERTY DESCRIPTION |                    |
|---------------------------|--------------------|
| LOT:                      | LOT 19 ON SP107219 |
| COUNTY:                   | ELPHINSTONE        |
| PARISH:                   | BOHLE              |
| SITE AREA:                | 2.582ha            |

PLANS AND DOCUMENTS  
referred to in the  
DEVELOPMENT APPROVAL

Approval no: SDA-0816-032892

Date: 8 March 2017



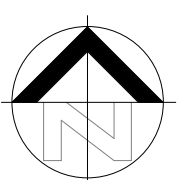
ISSUED FOR  
APPROVAL

| AMENDMENTS |               |            |
|------------|---------------|------------|
| ISSUE      | DESCRIPTION   | DATE       |
| 1          | DA APPROVAL   | 18-06-2016 |
| 2          | REVISED ISSUE | 27-06-2016 |
| 3          | REVISED ISSUE | 28-06-2016 |
| 4          | REVISED ISSUE | 08-12-2016 |
| 5          | REVISED ISSUE | 11-12-2016 |

PROPOSED COMMERCIAL  
DEVELOPMENT, LOT 19 ON  
SP107219

KINGSUN INVESTMENTS PTY LTD

OVERALL SITE PLAN



|                              |                        |
|------------------------------|------------------------|
| DRAWING<br>NUMBER:<br>DA-002 | ISSUE:<br>5            |
| PROJECT No:<br>2016-08       | SCALE:<br>As indicated |
| DATE:<br>APR'16              | DRAWN:<br>TDK          |

360 design

p. 07 4927 9942  
m. 041 774 8107  
e. info@360design.com.au

A.B.N 12 926 793 207  
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Licence No. 1271179



## **APPENDIX C**

---

Council Approved Layout



| PROPOSED LAYOUT AREA SCHEDULE<br>(GROSS FLOOR AREA - G.F.A) |   |       |
|-------------------------------------------------------------|---|-------|
| BUILDING A                                                  |   |       |
| SERVICE STATION                                             | = | 250m² |
| SHOP / FAST FOOD                                            | = | 150m² |
| PARKING SPACES REQUIRED                                     |   |       |
| 400m² (GFA) @ 1 PER 40 =                                    |   | 10    |
| PARKING SPACES PROVIDED                                     |   | 13    |
| BUILDING B (CAR WASH) =                                     |   |       |
| PARKING SPACES REQUIRED                                     |   |       |
| QUEUING                                                     | = | 16    |
| PARKING SPACES                                              | = | 2     |
| PARKING SPACES PROVIDED                                     |   | 19    |
| (16 QUEUING + 3 SPACES)                                     |   |       |

| REAL PROPERTY DESCRIPTION |                    |
|---------------------------|--------------------|
| LOT:                      | LOT 19 ON SP107219 |
| COUNTY:                   | ELPHINSTONE        |
| PARISH:                   | BOHLE              |
| SITE AREA:                | 2.582ha            |

APPROVED  
SUBJECT TO  
CONDITIONS



MI16/0015  
25/07/2017

1 PROPOSED OVERALL SITE PLAN  
1 : 750

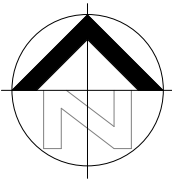
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APPROVAL

| AMENDMENTS |               |            |
|------------|---------------|------------|
| ISSUE      | DESCRIPTION   | DATE       |
| 1          | DA APPROVAL   | 18-06-2016 |
| 2          | REVISED ISSUE | 27-06-2016 |
| 3          | REVISED ISSUE | 28-06-2016 |
| 4          | REVISED ISSUE | 08-12-2016 |
| 5          | REVISED ISSUE | 11-12-2016 |
| 6          | REVISED ISSUE | 04-06-2017 |
| 7          | REVISED ISSUE | 06-06-2017 |

PROPOSED COMMERCIAL  
DEVELOPMENT, LOT 19 ON  
SP107219

KINGSUN INVESTMENTS PTY LTD

OVERALL SITE PLAN



DRAWING NUMBER:  
DA-002

PROJECT No:  
2016-08

DATE:  
APR'16

ISSUE:  
7

SCALE:  
As indicated

DRAWN:  
TDK



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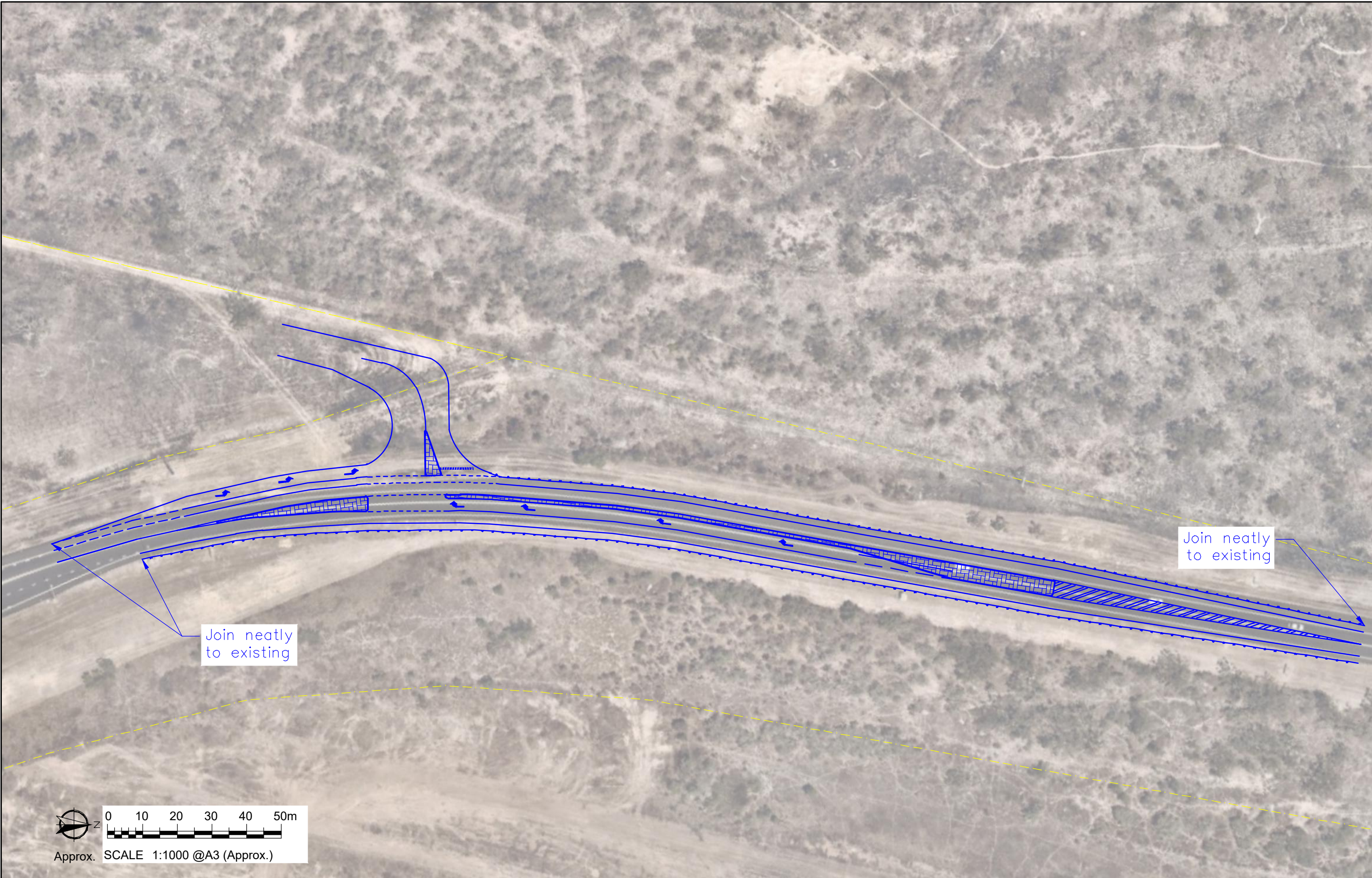
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## **APPENDIX D**

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### Concept External Functional Layout





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t : 07 3221 3503 | e : contact@cambray.com.au

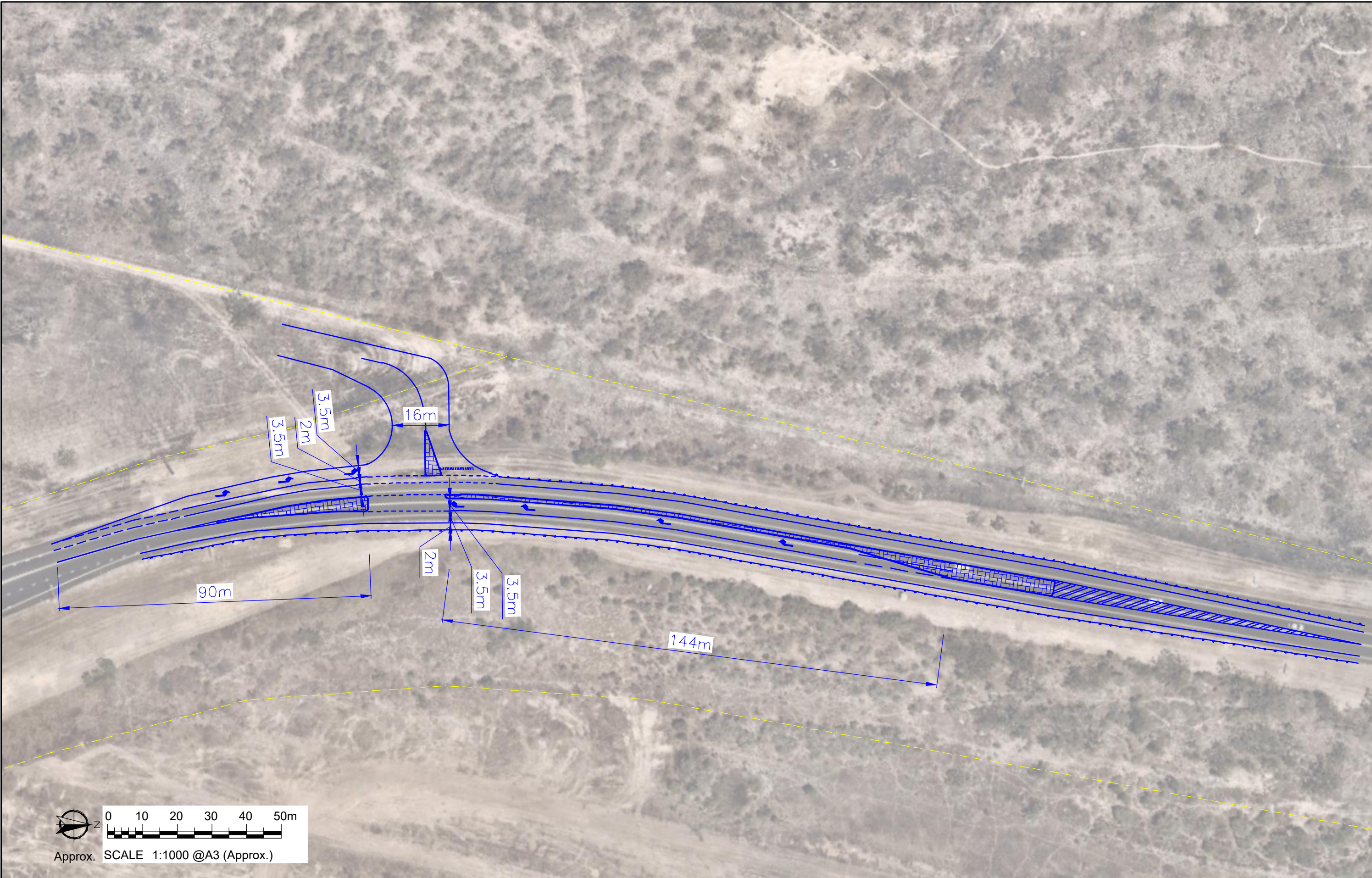
DRAWING TITLE  
Proposed Commercial Development  
Functional Layout  
Shaw Road

LOCATION  
325 Shaw Road  
Shaw, QLD 4817

| REV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | DATE | AMENDMENT / ISSUE | DWN | CHK |
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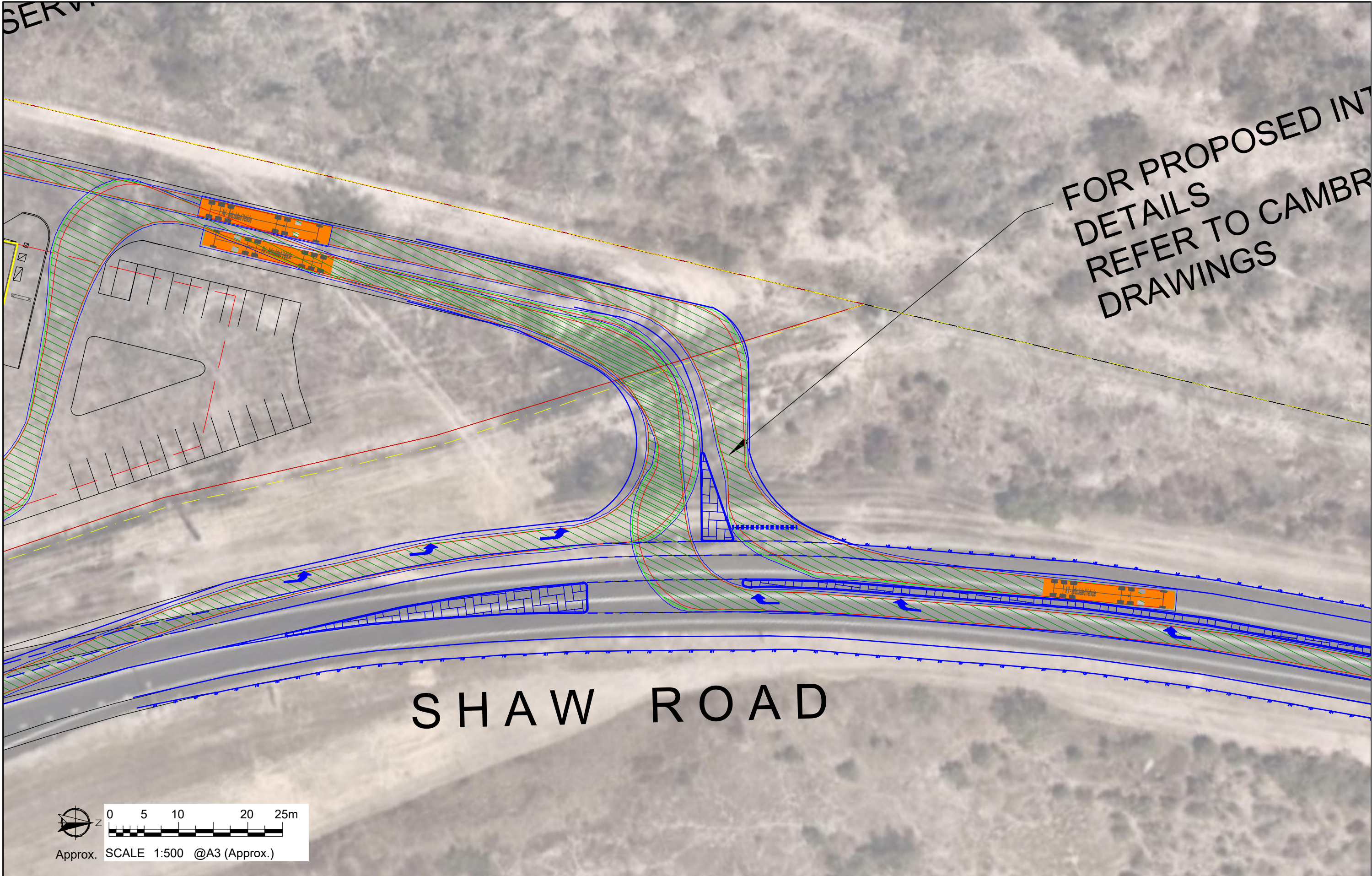
DRAWING TITLE  
Proposed Commercial Development  
Functional Layout  
Shaw Road  
Dimensions

LOCATION  
325 Shaw Road  
Shaw, QLD 4817

| REV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | DATE | AMENDMENT / ISSUE | DWN | CHK |
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DRAWING TITLE  
Proposed Commercial Development  
Functional Layout  
Shaw Road  
Swept Path Assessment - 19m AV

LOCATION  
325 Shaw Road  
Shaw, QLD 4817

| REV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | DATE | AMENDMENT / ISSUE | DWN | CHK |
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DRAWING TITLE

Proposed Commercial Development

Functional Layout

Shaw Road

Safe Intersection Sight Distance

LOCATION

325 Shaw Road

Shaw, QLD 4817

| REV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | DATE | AMENDMENT / ISSUE | DWN | CHK |
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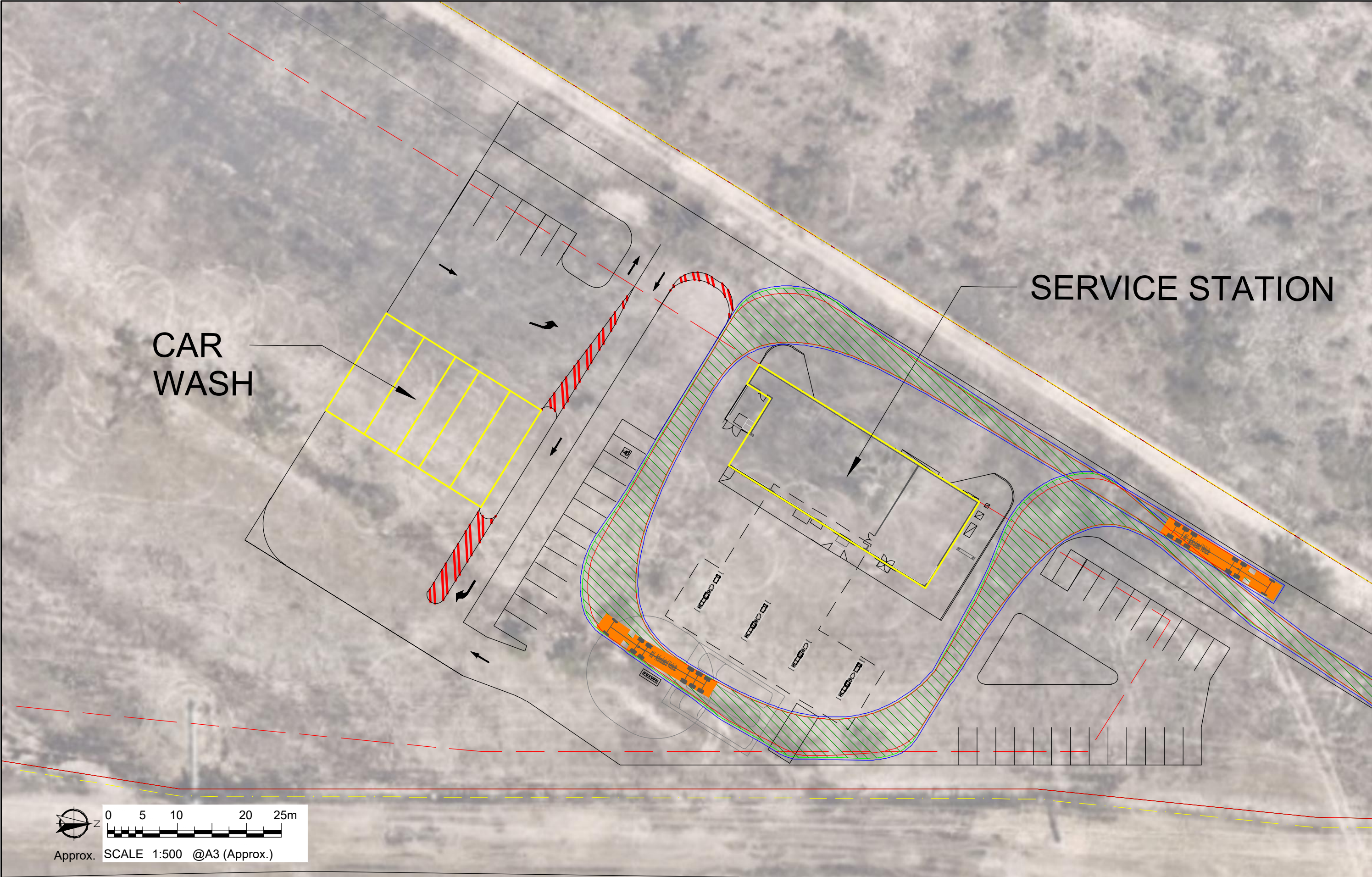
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## **APPENDIX E**

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### **Swept Path Assessment**



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DRAWING TITLE  
Proposed Service Station & Car Wash  
Swept Path Assessment  
19m AV

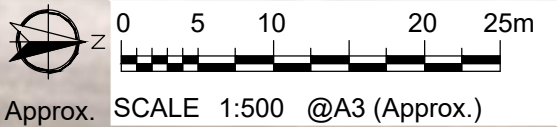
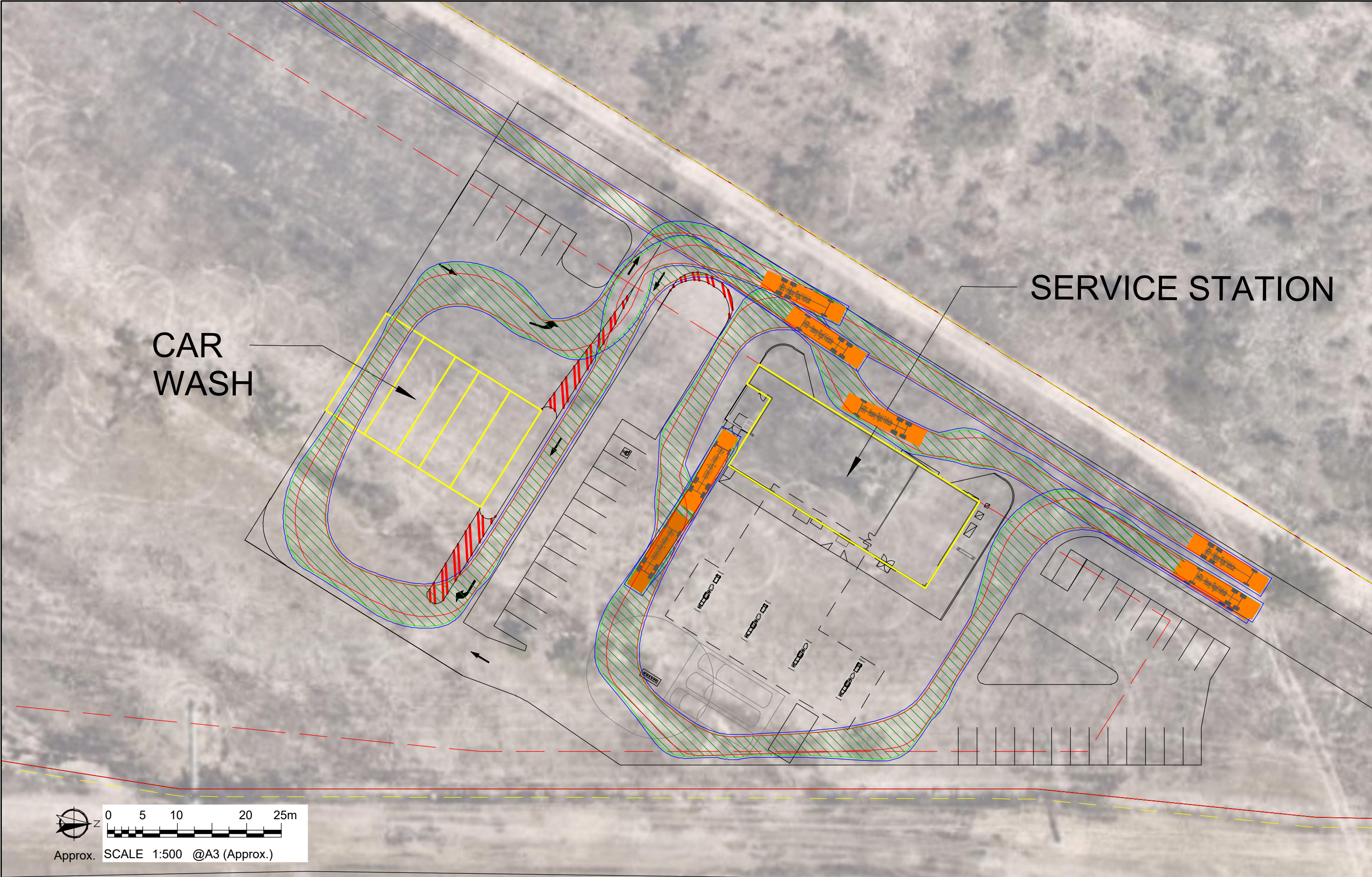
LOCATION  
325 Shaw Road  
Shaw, QLD 4817

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|     |      |                   |     |     |

DISCLAIMER  
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|                                            |                         |                                                |  |
|--------------------------------------------|-------------------------|------------------------------------------------|--|
| <b>PRELIMINARY</b><br>NOT FOR CONSTRUCTION |                         | JOB No. // DRAWING No.<br>KIN0323-01//<br>SK07 |  |
| DATE<br>19.06.24                           | *Scale (A3)<br>As shown | PREPARED FOR<br>For Discussion                 |  |





**CAMBRAYconsulting**  
Traffic Engineering and Transport Planning

Suite 2601, 21 Mary Street Brisbane Q 4000  
t : 07 3221 3503 | e : contact@cambray.com.au

DRAWING TITLE  
Proposed Commercial Development  
Swept Path Assessment  
HRV

LOCATION  
325 Shaw Road  
Shaw, QLD 4817

| REV | DATE | AMENDMENT / ISSUE | DWN | CHK |
|-----|------|-------------------|-----|-----|
| A   | -    | -                 | -   | -   |
|     |      |                   |     |     |
|     |      |                   |     |     |
|     |      |                   |     |     |

DISCLAIMER  
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|                                            |                         |                                                |  |
|--------------------------------------------|-------------------------|------------------------------------------------|--|
| <b>PRELIMINARY</b><br>NOT FOR CONSTRUCTION |                         | JOB No. // DRAWING No.<br>KIN0323-01//<br>SK08 |  |
| DATE<br>19.06.24                           | *Scale (A3)<br>As shown | PREPARED FOR<br>For Discussion                 |  |

## **APPENDIX F**

---

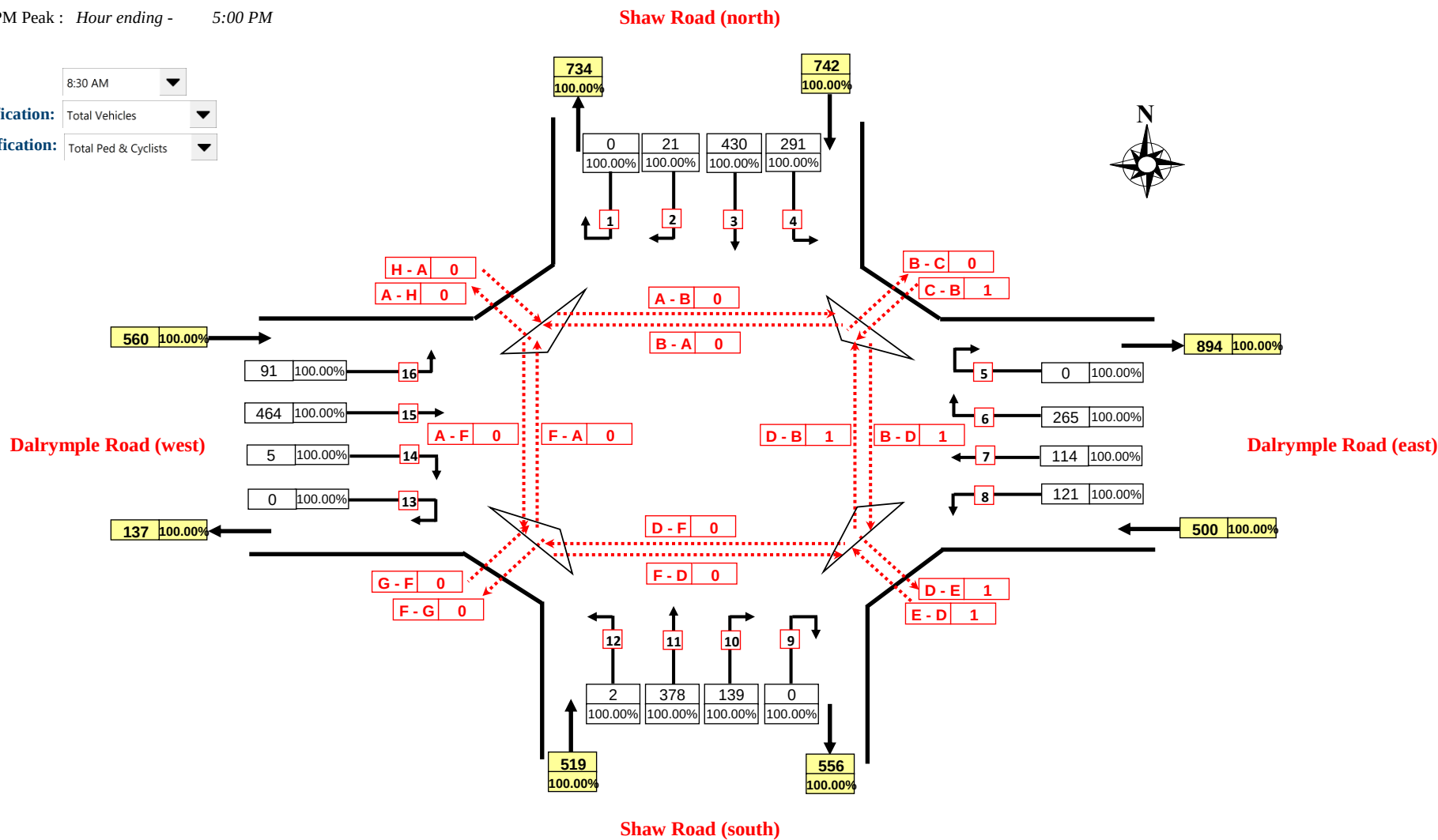
### Traffic Count Data



# AUSTRAFFIC VIDEO INTERSECTION COUNT

**Site No.:** 1  
**Weather:** Fine  
**Location:** Dalrymple Road/Shaw Road, Shaw  
**Day/Date:** Thursday, 16 November 2023  
**Summary:** AM Peak : Hour ending - 8:30 AM  
PM Peak : Hour ending - 5:00 PM

**Hour Ending:** 8:30 AM  
**On-road classification:** Total Vehicles  
**Off-road classification:** Total Ped & Cyclists

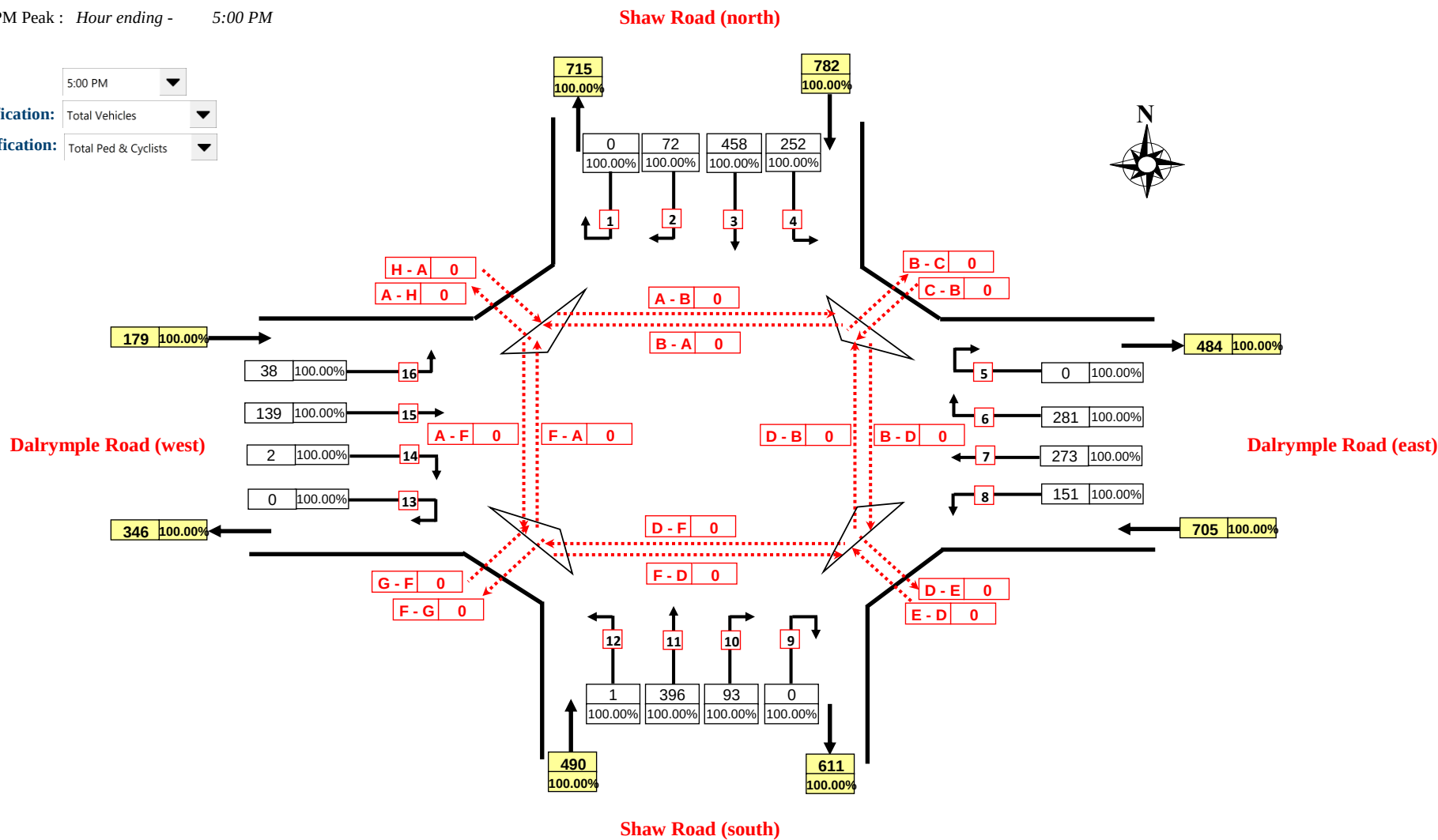


**Note:** 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

# AUSTRAFFIC VIDEO INTERSECTION COUNT

**Site No.:** 1  
**Weather:** Fine  
**Location:** Dalrymple Road/Shaw Road, Shaw  
**Day/Date:** Thursday, 16 November 2023  
**Summary:** AM Peak : Hour ending - 8:30 AM  
PM Peak : Hour ending - 5:00 PM

**Hour Ending:** 5:00 PM  
**On-road classification:** Total Vehicles  
**Off-road classification:** Total Ped & Cyclists



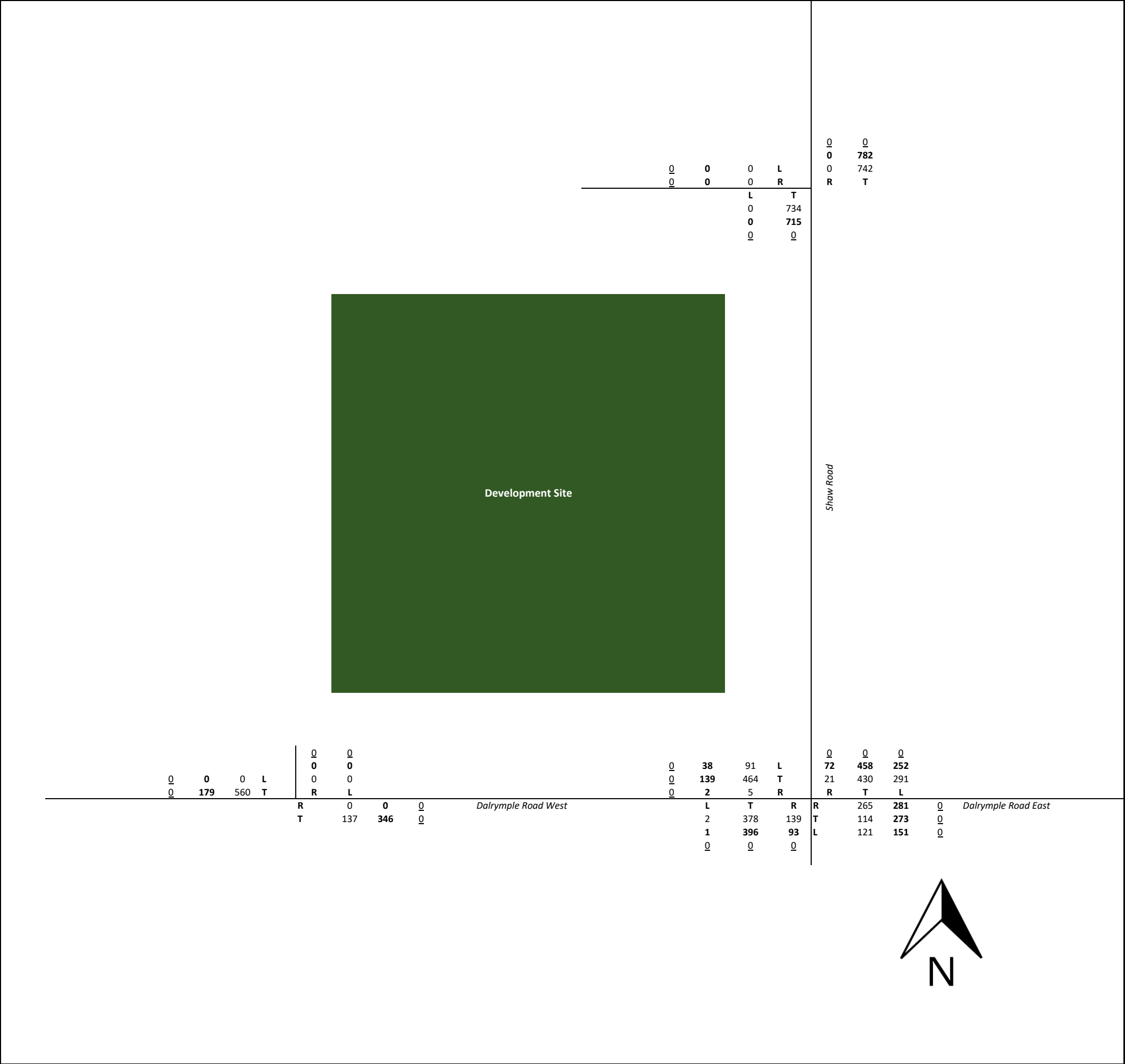
**Note:** 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

## **APPENDIX G**

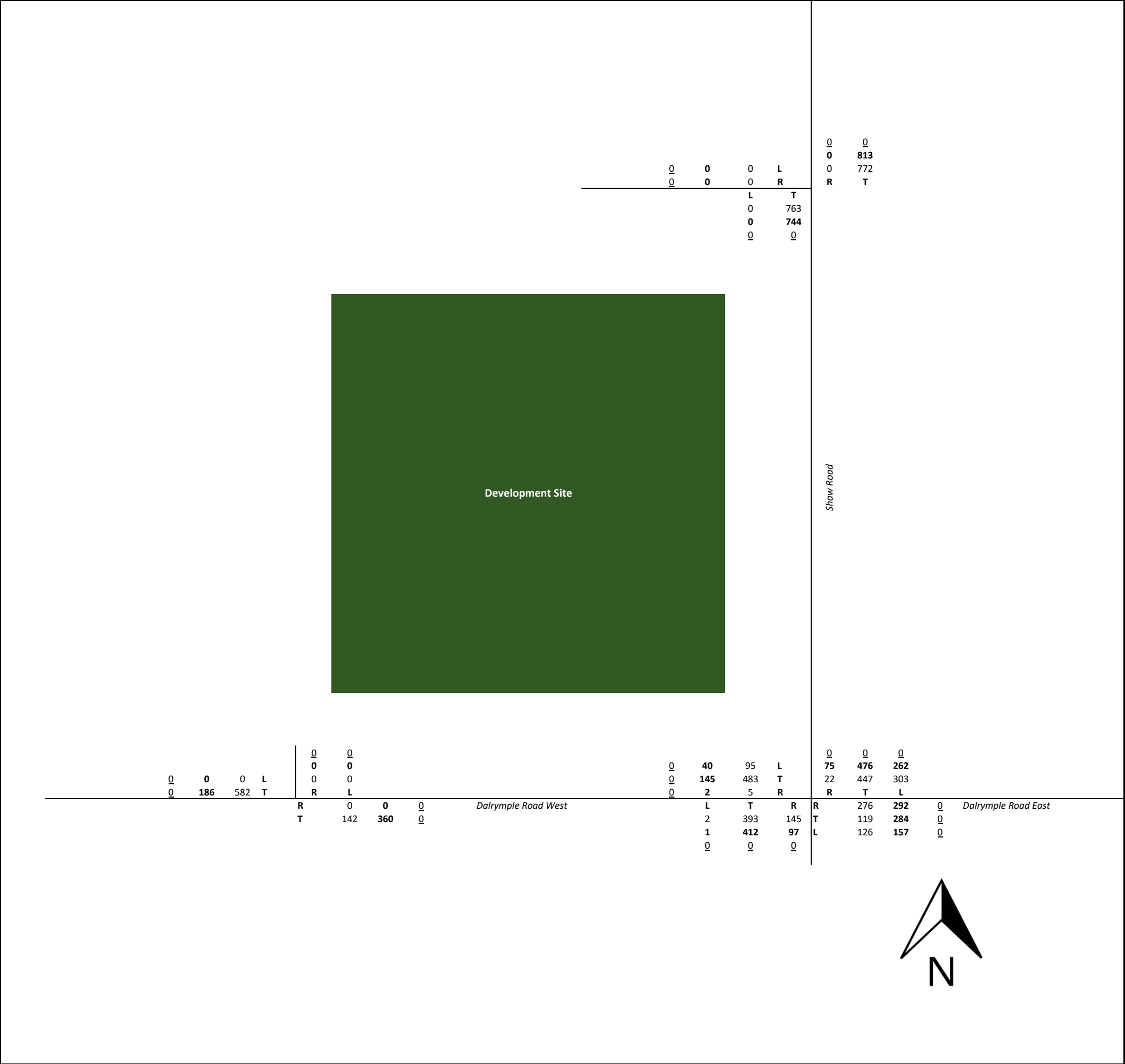
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### Turning Movements





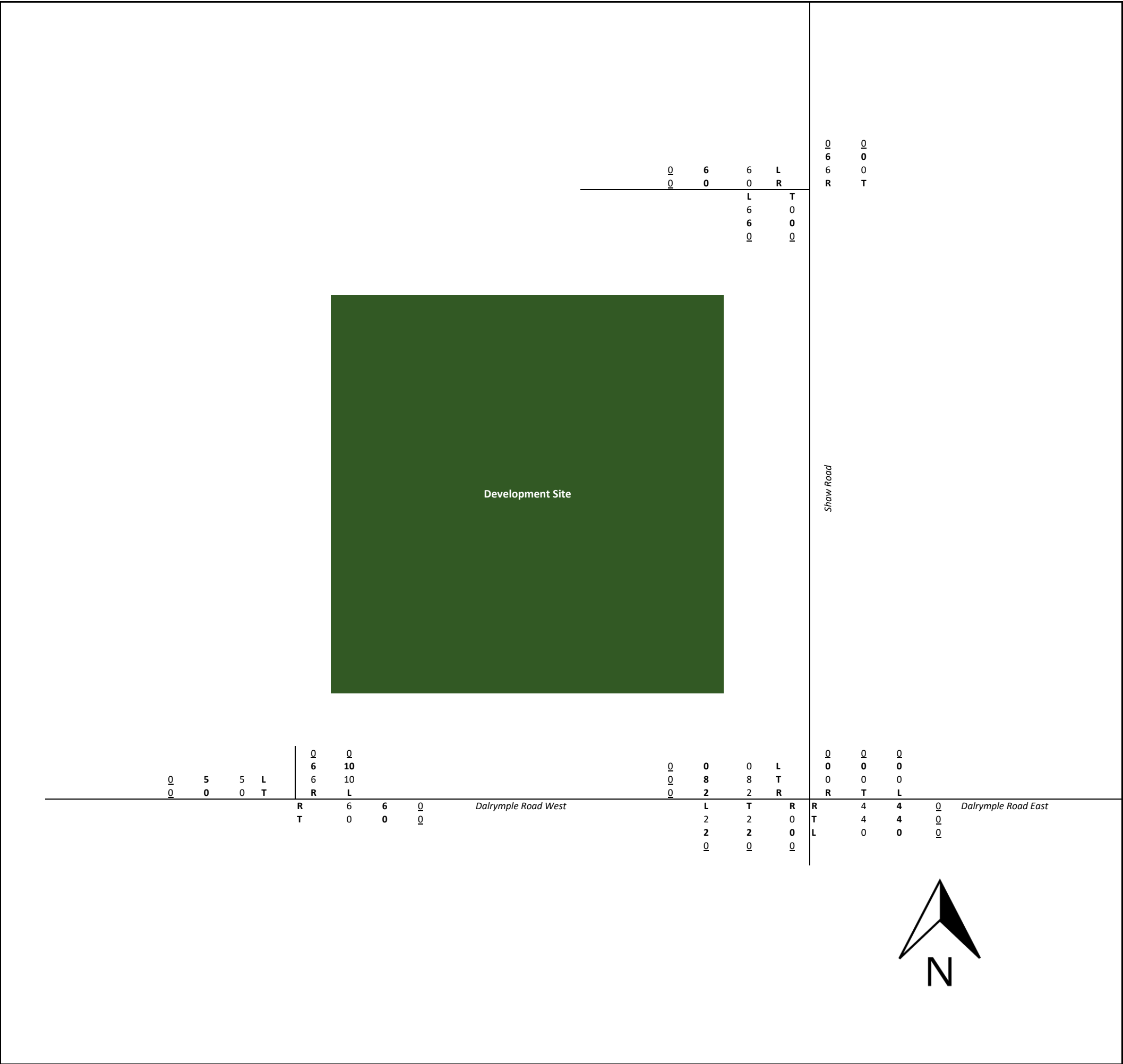
|           |         |              |  |                  |                    |              |   |                                                                                                                                                                   |  |                     |  |
|-----------|---------|--------------|--|------------------|--------------------|--------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------|--|
| Figure No |         | Figure Name: |  | 2023 Survey Data |                    | Job Name:    |   | 325 Shaw Road, Shaw                                                                                                                                               |  |                     |  |
| 1         |         | Job Number:  |  | KIN0323-01       |                    | Date:        |   | 16/01/2025                                                                                                                                                        |  |                     |  |
|           |         | Prepared by: |  | SN               |                    | Reviewed By: |   | SN                                                                                                                                                                |  |                     |  |
| Legend    |         |              |  |                  |                    |              |   |  <div>CAMBRAYconsulting<br/>Traffic Engineering and Transport Planning</div> |  |                     |  |
| 00        | AM Peak |              |  | L                | Left Turn Movement |              | R |                                                                                                                                                                   |  | Right Turn Movement |  |
| (00)      | PM Peak |              |  | T                | Through Movement   |              | U |                                                                                                                                                                   |  | U-Turn Movement     |  |



|           |         |              |  |                                                   |                    |              |   |                                                                                       |  |                     |  |
|-----------|---------|--------------|--|---------------------------------------------------|--------------------|--------------|---|---------------------------------------------------------------------------------------|--|---------------------|--|
| Figure No |         | Figure Name: |  | Est. Year of Completion (2025) Background Volumes |                    | Job Name:    |   | 325 Shaw Road, Shaw                                                                   |  |                     |  |
| 2         |         | Job Number:  |  | KIN0323-01                                        |                    | Date:        |   | 16/01/2025                                                                            |  |                     |  |
|           |         | Prepared by: |  | SN                                                |                    | Reviewed By: |   | SN                                                                                    |  |                     |  |
| Legend    |         |              |  |                                                   |                    |              |   |  |  |                     |  |
| 00        | AM Peak |              |  | L                                                 | Left Turn Movement |              | R |                                                                                       |  | Right Turn Movement |  |
| (00)      | PM Peak |              |  | T                                                 | Through Movement   |              | U |                                                                                       |  | U-Turn Movement     |  |



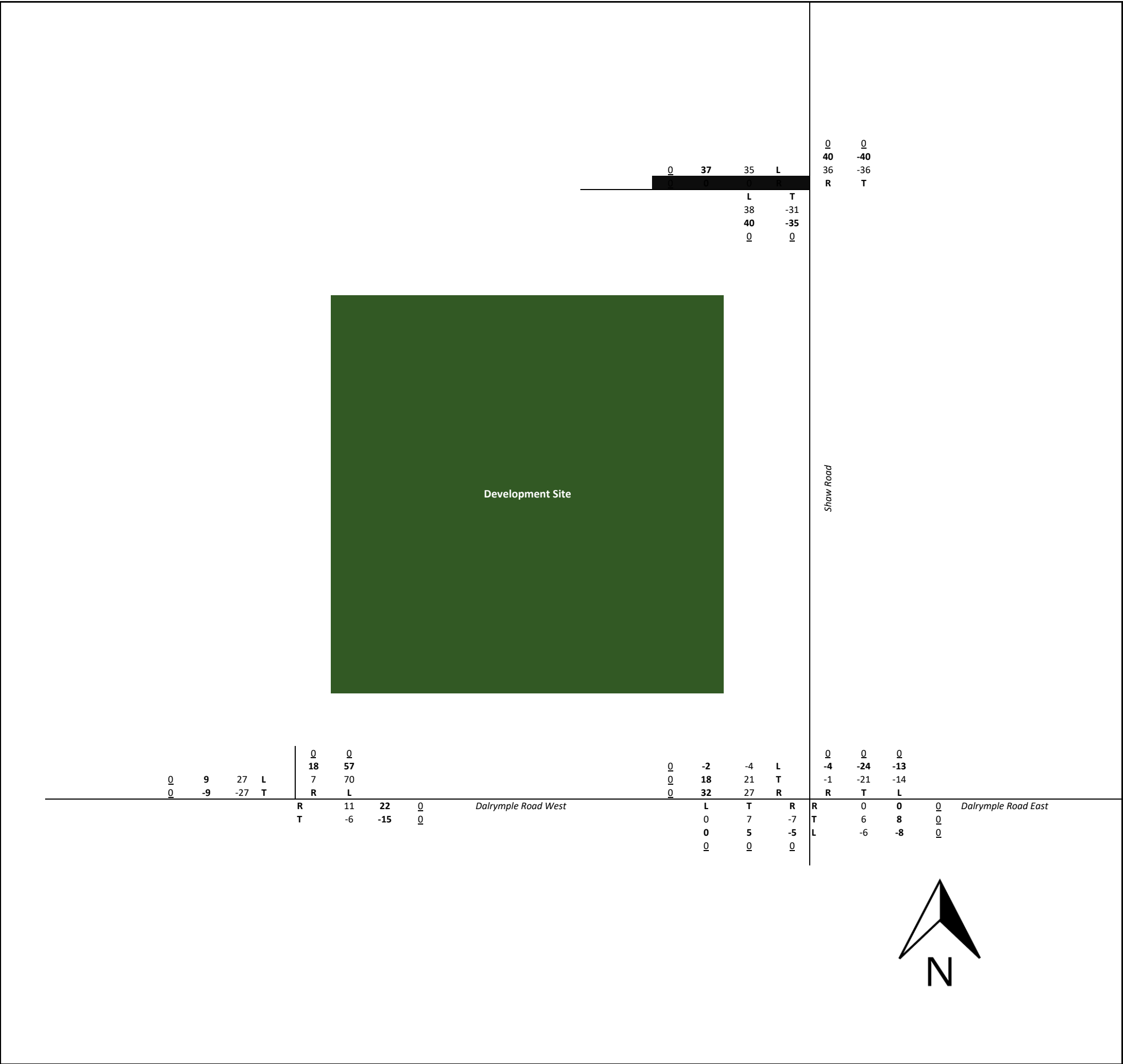




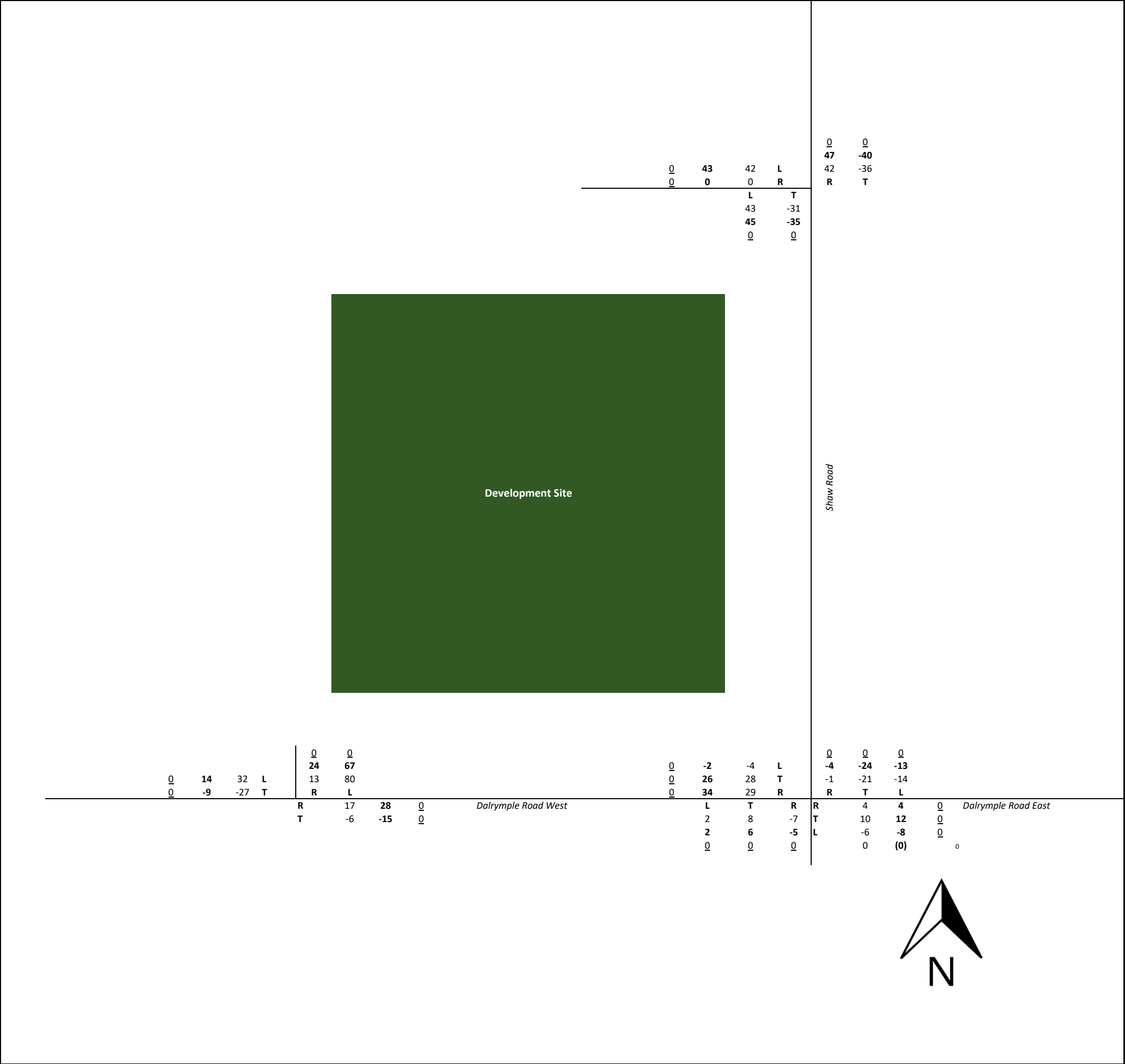
|           |         |              |  |                       |                    |              |   |                                                                                       |  |                     |  |
|-----------|---------|--------------|--|-----------------------|--------------------|--------------|---|---------------------------------------------------------------------------------------|--|---------------------|--|
| Figure No |         | Figure Name: |  | New Development Trips |                    | Job Name:    |   | 325 Shaw Road, Shaw                                                                   |  |                     |  |
| 4         |         | Job Number:  |  | KIN0323-01            |                    | Date:        |   | 16/01/2025                                                                            |  |                     |  |
|           |         | Prepared by: |  | SN                    |                    | Reviewed By: |   | SN                                                                                    |  |                     |  |
| Legend    |         |              |  |                       |                    |              |   |  |  |                     |  |
| 00        | AM Peak |              |  | L                     | Left Turn Movement |              | R |                                                                                       |  | Right Turn Movement |  |
| (00)      | PM Peak |              |  | T                     | Through Movement   |              | U |                                                                                       |  | U-Turn Movement     |  |







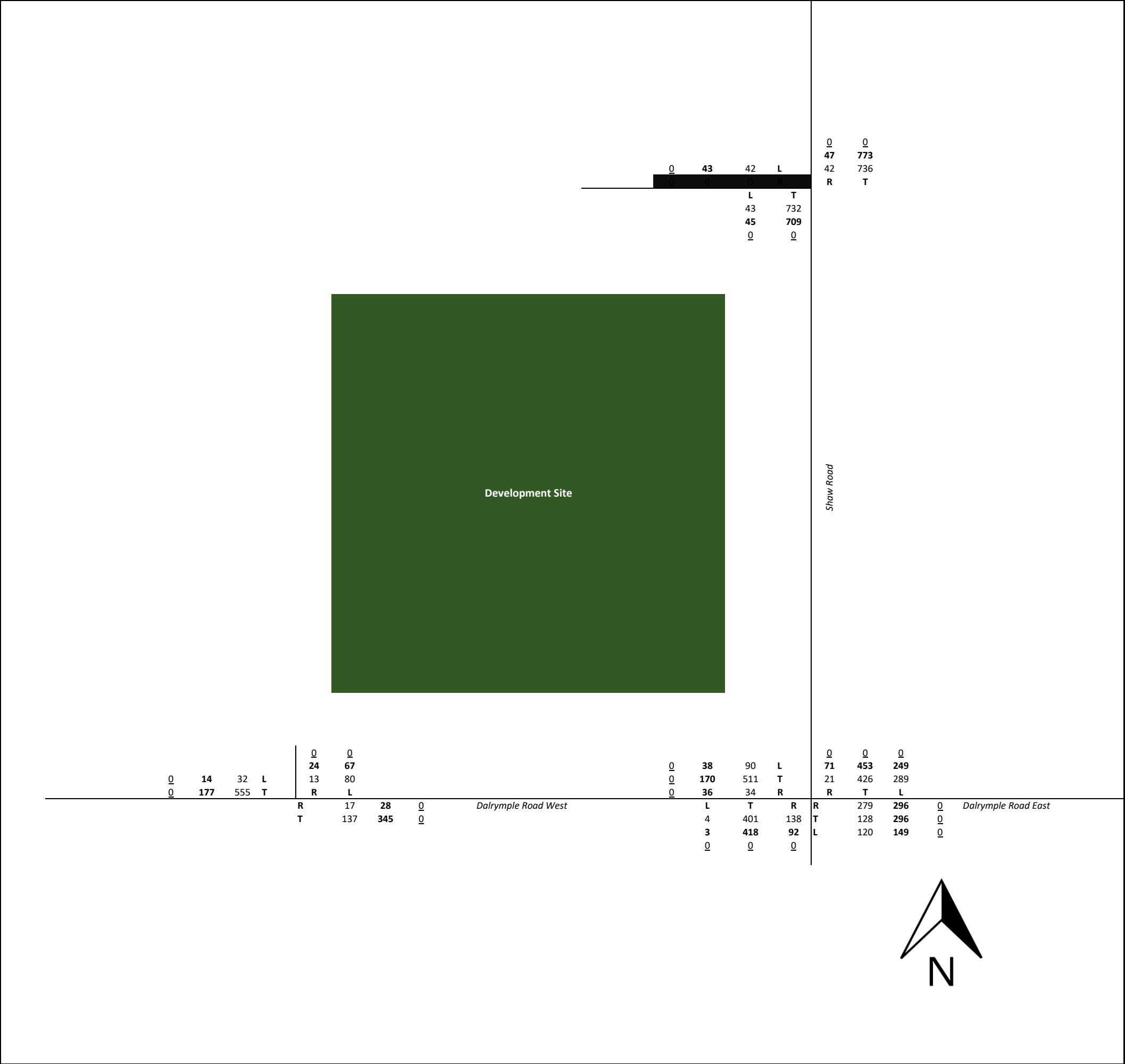
|           |         |              |  |                          |                    |              |   |                                                                                       |  |                     |  |
|-----------|---------|--------------|--|--------------------------|--------------------|--------------|---|---------------------------------------------------------------------------------------|--|---------------------|--|
| Figure No |         | Figure Name: |  | Linked Development Trips |                    | Job Name:    |   | 325 Shaw Road, Shaw                                                                   |  |                     |  |
| 5         |         | Job Number:  |  | KIN0323-01               |                    | Date:        |   | 16/01/2025                                                                            |  |                     |  |
|           |         | Prepared by: |  | SN                       |                    | Reviewed By: |   | SN                                                                                    |  |                     |  |
| Legend    |         |              |  |                          |                    |              |   |  |  |                     |  |
| 00        | AM Peak |              |  | L                        | Left Turn Movement |              | R |                                                                                       |  | Right Turn Movement |  |
| (00)      | PM Peak |              |  | T                        | Through Movement   |              | U |                                                                                       |  | U-Turn Movement     |  |



|           |         |              |  |                         |                    |              |   |                     |  |
|-----------|---------|--------------|--|-------------------------|--------------------|--------------|---|---------------------|--|
| Figure No |         | Figure Name: |  | Total Development Trips |                    | Job Name:    |   | 325 Shaw Road, Shaw |  |
| 6         |         | Job Number:  |  | KIN0323-01              |                    | Date:        |   | 16/01/2025          |  |
|           |         | Prepared by: |  | SN                      |                    | Reviewed By: |   | SN                  |  |
| Legend    |         |              |  |                         |                    |              |   |                     |  |
| 00        | AM Peak |              |  | L                       | Left Turn Movement |              | R | Right Turn Movement |  |
| (00)      | PM Peak |              |  | T                       | Through Movement   |              | U | U-Turn Movement     |  |

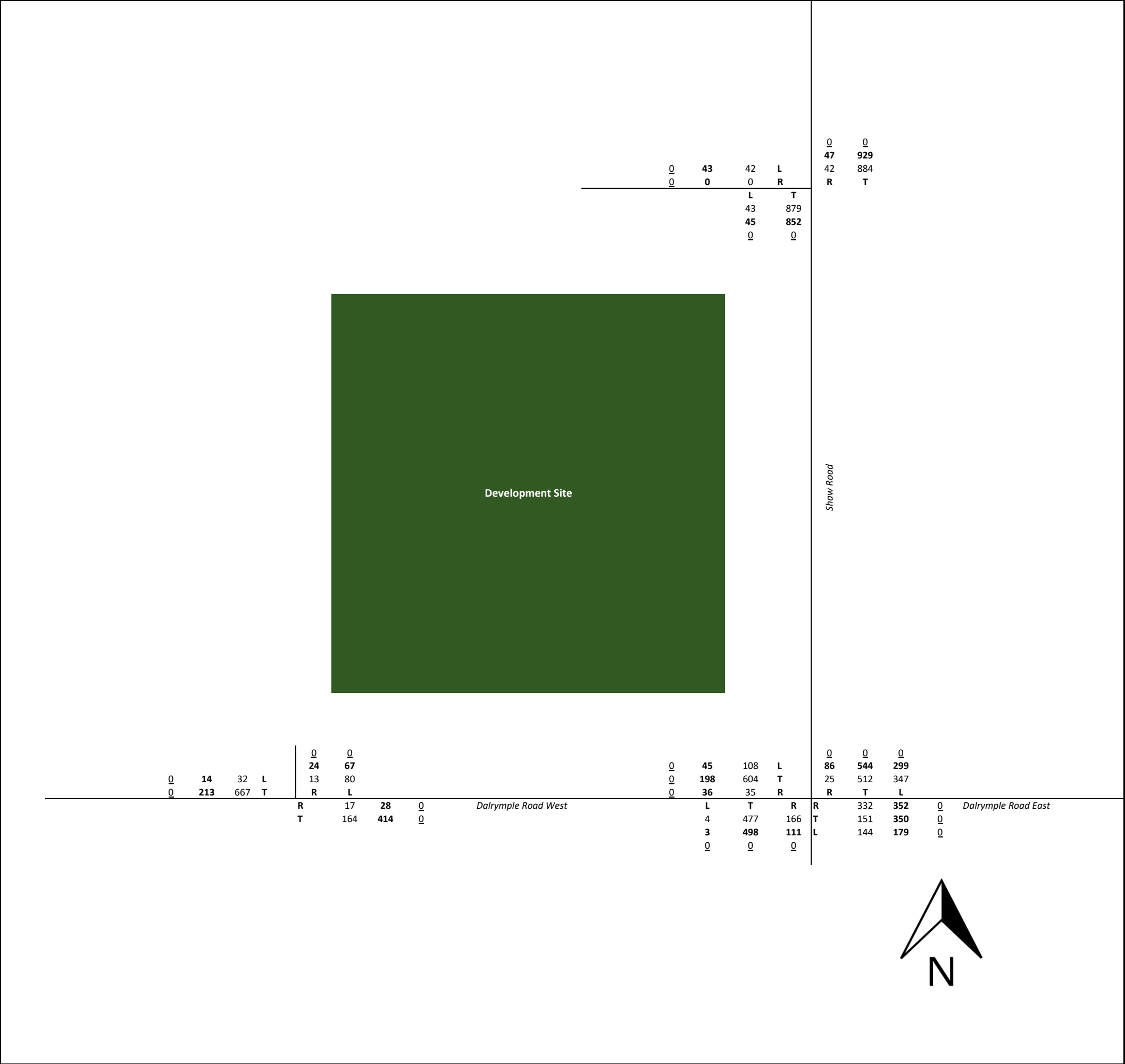


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Traffic Engineering and Transport Planning



|           |         |              |  |                    |                    |              |   |                                                                                       |  |                     |  |
|-----------|---------|--------------|--|--------------------|--------------------|--------------|---|---------------------------------------------------------------------------------------|--|---------------------|--|
| Figure No |         | Figure Name: |  | YoC BG + Dev trips |                    | Job Name:    |   | 325 Shaw Road, Shaw                                                                   |  |                     |  |
| 7         |         | Job Number:  |  | KIN0323-01         |                    | Date:        |   | 16/01/2025                                                                            |  |                     |  |
|           |         | Prepared by: |  | SN                 |                    | Reviewed By: |   | SN                                                                                    |  |                     |  |
| Legend    |         |              |  |                    |                    |              |   |  |  |                     |  |
| 00        | AM Peak |              |  | L                  | Left Turn Movement |              | R |                                                                                       |  | Right Turn Movement |  |
| (00)      | PM Peak |              |  | T                  | Through Movement   |              | U |                                                                                       |  | U-Turn Movement     |  |





|           |         |              |  |                     |                    |              |   |                     |  |
|-----------|---------|--------------|--|---------------------|--------------------|--------------|---|---------------------|--|
| Figure No |         | Figure Name: |  | DesH BG + Dev Trips |                    | Job Name:    |   | 325 Shaw Road, Shaw |  |
| 8         |         | Job Number:  |  | KIN0323-01          |                    | Date:        |   | 16/01/2025          |  |
|           |         | Prepared by: |  | SN                  |                    | Reviewed By: |   | SN                  |  |
| Legend    |         |              |  |                     |                    |              |   |                     |  |
| 00        | AM Peak |              |  | L                   | Left Turn Movement |              | R | Right Turn Movement |  |
| (00)      | PM Peak |              |  | T                   | Through Movement   |              | U | U-Turn Movement     |  |



**CAMBRAY**consulting  
Traffic Engineering and Transport Planning



## APPENDIX H

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SIDRA Output

## SITE LAYOUT

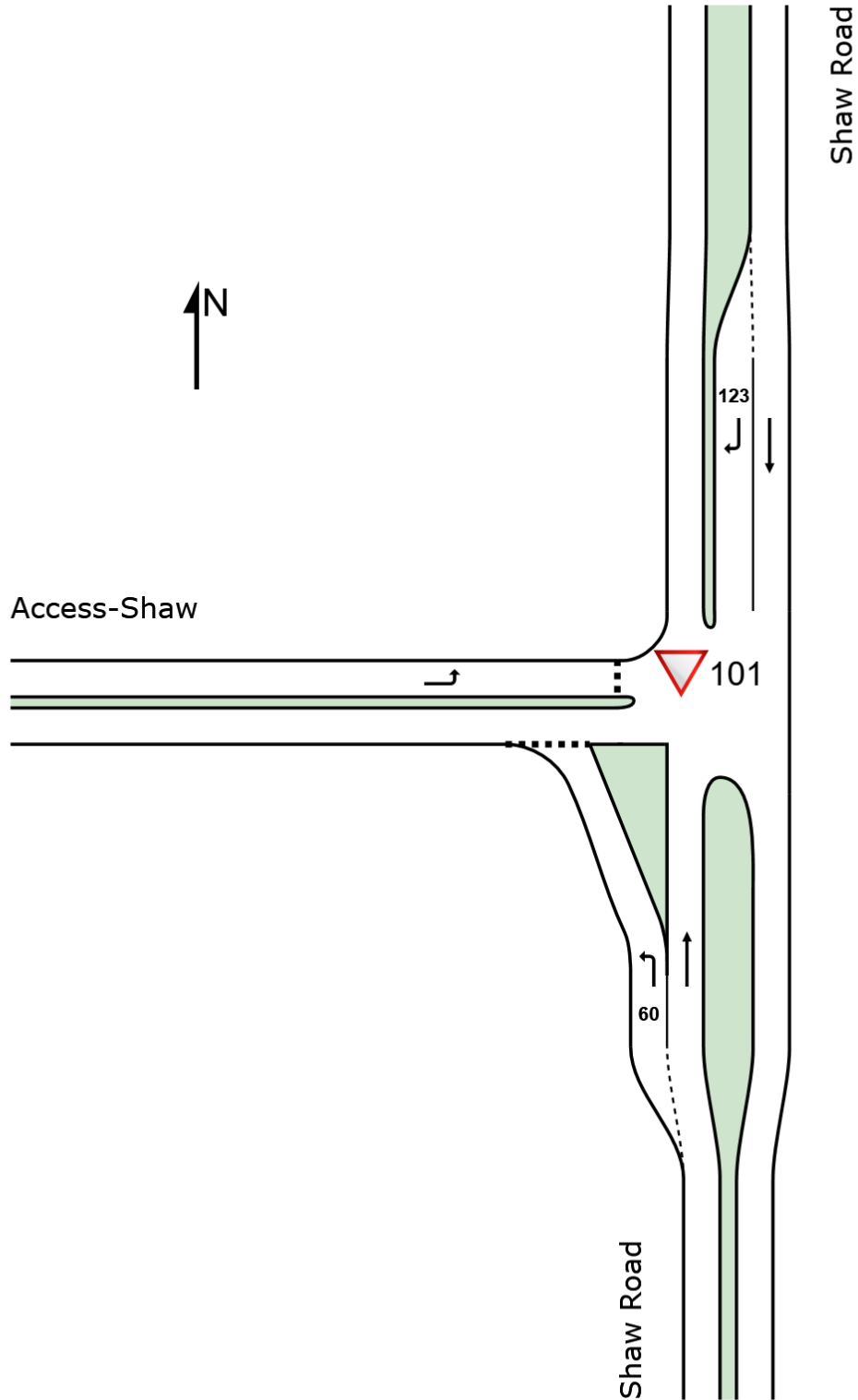
▽ Site: 101 [Shaw Access 2035 AM BG+Dev (Site Folder: DA  
SIDRA - RFI)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.





# MOVEMENT SUMMARY

Site: 101 [Shaw Access 2035 AM BG+Dev (Site Folder: DA  
SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |          | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh        | Dist ] m |           |                |                     | km/h        |
| South: Shaw Road             |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 1                            | L2   | All MCs   | 45           | 1.0 | 45            | 1.0 | 0.029     | 5.7         | LOS A            | 0.1               | 0.8      | 0.12      | 0.52           | 0.12                | 44.2        |
| 2                            | T1   | All MCs   | 925          | 9.3 | 925           | 9.3 | 0.503     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.6        |
| Approach                     |      |           | 971          | 8.9 | 971           | 8.9 | 0.503     | 0.4         | LOS A            | 0.1               | 0.8      | 0.01      | 0.02           | 0.01                | 59.1        |
| North: Shaw Road             |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 8                            | T1   | All MCs   | 978          | 8.8 | 978           | 8.8 | 0.530     | 0.2         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.5        |
| 9                            | R2   | All MCs   | 44           | 1.0 | 44            | 1.0 | 0.089     | 12.2        | LOS B            | 0.3               | 2.2      | 0.74      | 0.89           | 0.74                | 41.7        |
| Approach                     |      |           | 1022         | 8.4 | 1022          | 8.4 | 0.530     | 0.8         | NA               | 0.3               | 2.2      | 0.03      | 0.04           | 0.03                | 58.8        |
| West: Access-Shaw            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 10                           | L2   | All MCs   | 43           | 1.0 | 43            | 1.0 | 0.092     | 10.2        | LOS B            | 0.3               | 2.1      | 0.73      | 0.88           | 0.73                | 43.2        |
| Approach                     |      |           | 43           | 1.0 | 43            | 1.0 | 0.092     | 10.2        | LOS B            | 0.3               | 2.1      | 0.73      | 0.88           | 0.73                | 43.2        |
| All Vehicles                 |      |           | 2036         | 8.5 | 2036          | 8.5 | 0.530     | 0.8         | NA               | 0.3               | 2.2      | 0.03      | 0.05           | 0.03                | 58.6        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).  
Two-Way Sign Control Capacity Model: SIDRA Standard.  
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).  
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.  
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.  
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.



# MOVEMENT SUMMARY

Site: 101 [Shaw Access 2035 PM BG+Dev (Site Folder: DA  
SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |          | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh        | Dist ] m |           |                |                     | km/h        |
| South: Shaw Road             |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 1                            | L2   | All MCs   | 48           | 1.0 | 48            | 1.0 | 0.031     | 5.8         | LOS A            | 0.1               | 0.9      | 0.12      | 0.52           | 0.12                | 44.2        |
| 2                            | T1   | All MCs   | 896          | 6.6 | 896           | 6.6 | 0.479     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.6        |
| Approach                     |      |           | 944          | 6.3 | 944           | 6.3 | 0.479     | 0.4         | LOS A            | 0.1               | 0.9      | 0.01      | 0.03           | 0.01                | 59.1        |
| North: Shaw Road             |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 8                            | T1   | All MCs   | 978          | 3.1 | 978           | 3.1 | 0.511     | 0.2         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.6        |
| 9                            | R2   | All MCs   | 48           | 1.0 | 48            | 1.0 | 0.089     | 11.5        | LOS B            | 0.3               | 2.3      | 0.71      | 0.88           | 0.71                | 42.3        |
| Approach                     |      |           | 1026         | 3.0 | 1026          | 3.0 | 0.511     | 0.8         | NA               | 0.3               | 2.3      | 0.03      | 0.04           | 0.03                | 58.8        |
| West: Access-Shaw            |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 10                           | L2   | All MCs   | 45           | 1.0 | 45            | 1.0 | 0.089     | 9.5         | LOS A            | 0.3               | 2.1      | 0.70      | 0.86           | 0.70                | 43.9        |
| Approach                     |      |           | 45           | 1.0 | 45            | 1.0 | 0.089     | 9.5         | LOS A            | 0.3               | 2.1      | 0.70      | 0.86           | 0.70                | 43.9        |
| All Vehicles                 |      |           | 2016         | 4.5 | 2016          | 4.5 | 0.511     | 0.8         | NA               | 0.3               | 2.3      | 0.04      | 0.05           | 0.04                | 58.6        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).  
Two-Way Sign Control Capacity Model: SIDRA Standard.  
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).  
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.  
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.  
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# SITE LAYOUT

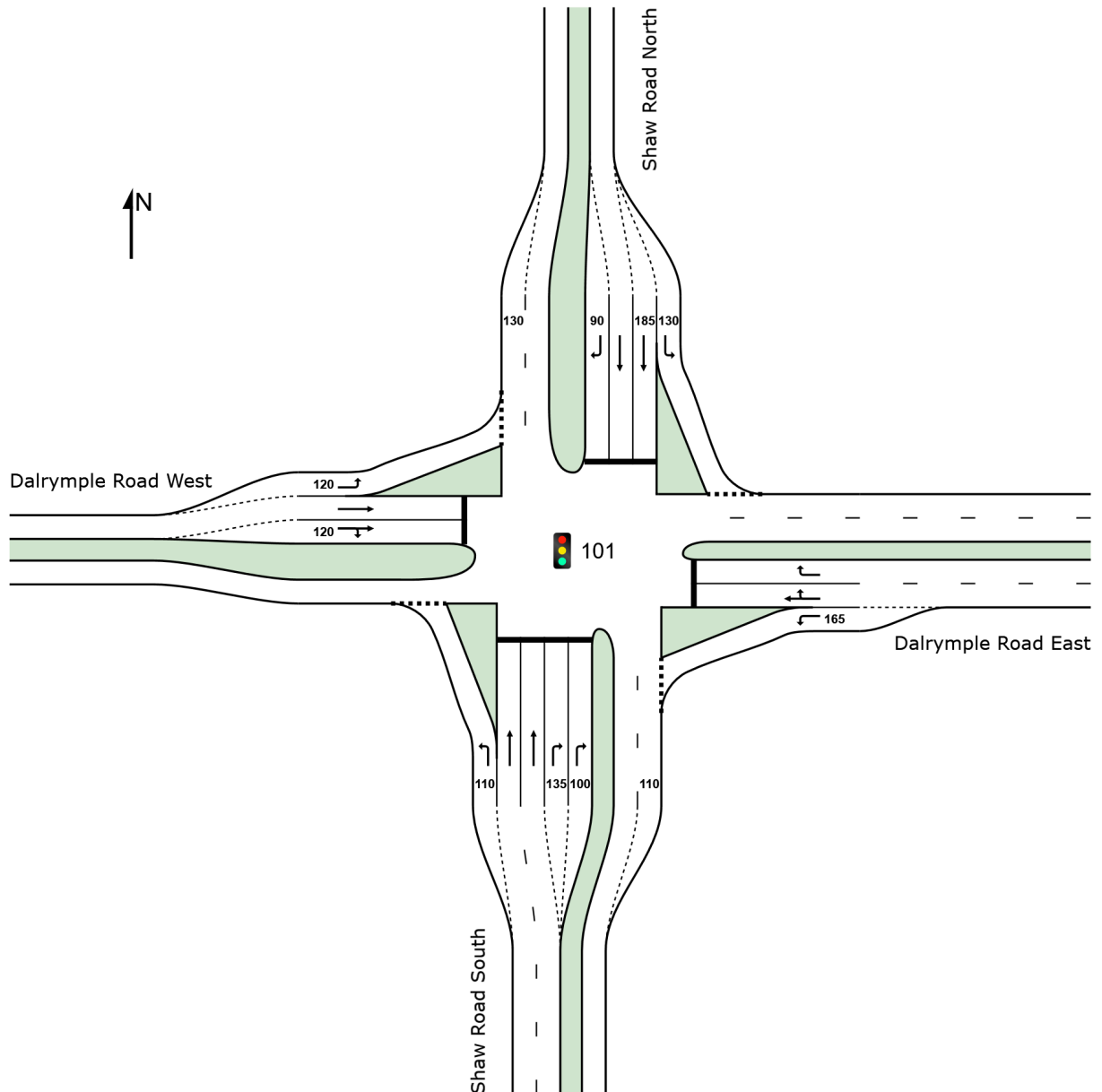
 Site: 101 [Shaw / Dalrymple 2025 AM BG (Site Folder: DA  
SIDRA - RFI)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Organisation: CAMBRAY CONSULTING | Licence: NETWORK / 1PC | Created: Thursday, 16 January 2025 2:44:05 PM

Project: C:\Projects\KIN0323\01\3. Deliverables\1. Reports\2. TIA\KIN0323-15.01.2024.sip9

# PHASING SUMMARY

 Site: 101 [Shaw / Dalrymple 2025 AM BG (Site Folder: DA  
SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 120 seconds (Site User-Given Cycle Time)

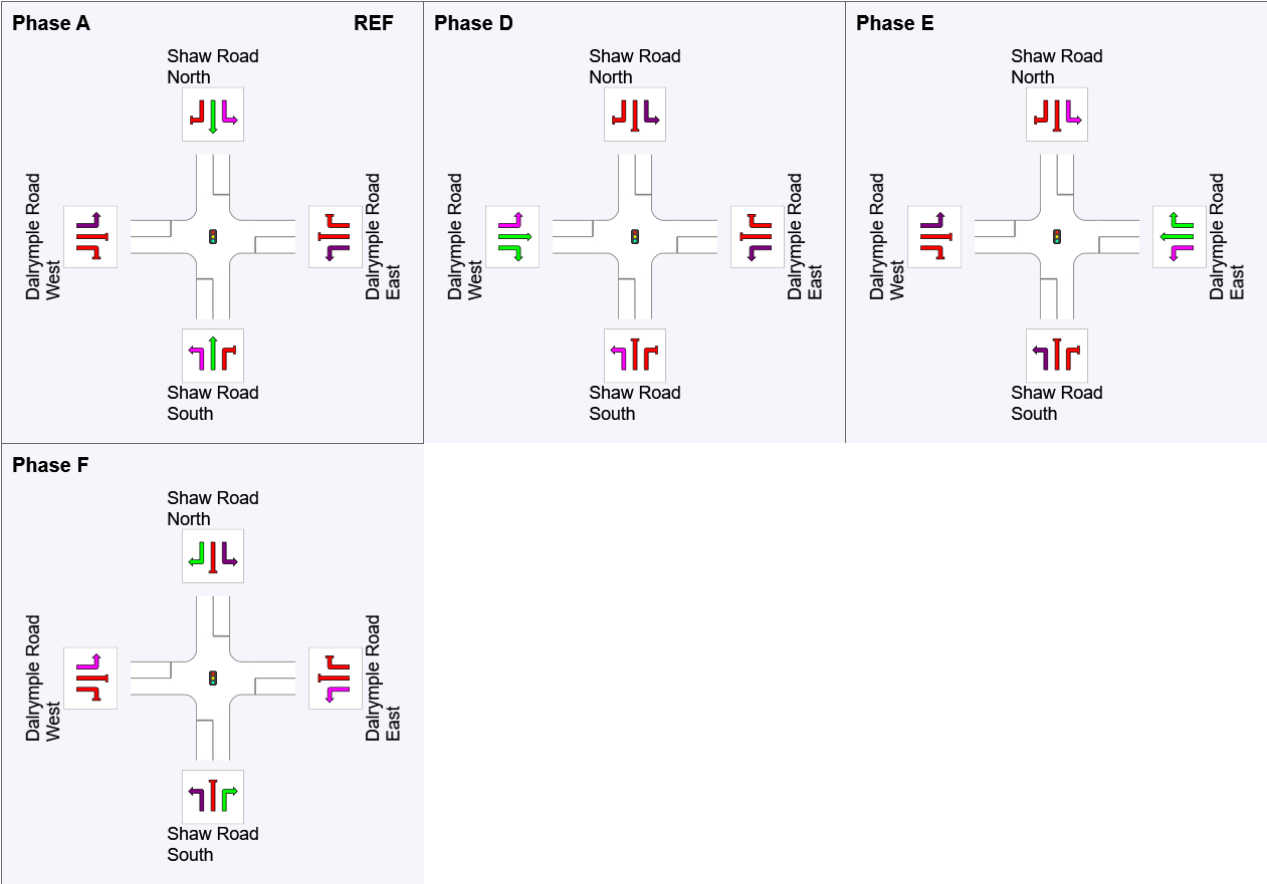
Timings based on settings in the Site Phasing & Timing dialog  
Phase Times determined by the program  
Phase Sequence: Phase1  
Input Phase Sequence: A, D, E, F  
Output Phase Sequence: A, D, E, F  
Reference Phase: Phase A

## Phase Timing Summary

| Phase                   | A     | D     | E     | F     |
|-------------------------|-------|-------|-------|-------|
| Phase Change Time (sec) | 0     | 38    | 72    | 105   |
| Green Time (sec)        | 32    | 28    | 27    | 9     |
| Phase Time (sec)        | 38    | 34    | 33    | 15    |
| Phase Split             | 32%   | 28%   | 28%   | 13%   |
| Phase Frequency (%)     | 100.0 | 100.0 | 100.0 | 100.0 |

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

## Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

|                                                                                   |                                   |                                                                                   |                          |
|-----------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------|--------------------------|
|  | Normal Movement                   |  | Permitted/Opposed        |
|  | Slip/Bypass-Lane Movement         |  | Opposed Slip/Bypass-Lane |
|  | Stopped Movement                  |  | Turn On Red              |
|  | Other Movement Class (MC) Running |  | Undetected Movement      |
|  | Mixed Running & Stopped MCs       |  | Continuous Movement      |
|  | Other Movement Class (MC) Stopped |  | Phase Transition Applied |



# MOVEMENT SUMMARY

 Site: 101 [Shaw / Dalrymple 2025 AM BG (Site Folder: DA  
SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 120 seconds (Site User-Given Cycle Time)

| Vehicle Movement Performance |      |           |                                         |      |                                          |      |                      |                        |                  |                                             |       |           |                |                     |                         |
|------------------------------|------|-----------|-----------------------------------------|------|------------------------------------------|------|----------------------|------------------------|------------------|---------------------------------------------|-------|-----------|----------------|---------------------|-------------------------|
| Mov ID                       | Turn | Mov Class | Demand Flows<br>[ Total HV ]<br>veh/h % |      | Arrival Flows<br>[ Total HV ]<br>veh/h % |      | Deg. Satn<br><br>v/c | Aver. Delay<br><br>sec | Level of Service | 95% Back Of Queue<br>[ Veh. Dist ]<br>veh m |       | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed<br><br>km/h |
| South: Shaw Road South       |      |           |                                         |      |                                          |      |                      |                        |                  |                                             |       |           |                |                     |                         |
| 1                            | L2   | All MCs   | 2                                       | 0.0  | 2                                        | 0.0  | 0.001                | 6.6                    | LOS A            | 0.0                                         | 0.1   | 0.17      | 0.56           | 0.17                | 49.5                    |
| 2                            | T1   | All MCs   | 414                                     | 14.0 | 414                                      | 14.0 | 0.499                | 40.2                   | LOS D            | 11.8                                        | 92.9  | 0.88      | 0.74           | 0.88                | 33.5                    |
| 3                            | R2   | All MCs   | 153                                     | 1.4  | 153                                      | 1.4  | * 0.553              | 66.5                   | LOS E            | 4.6                                         | 32.3  | 1.00      | 0.77           | 1.01                | 28.3                    |
| Approach                     |      |           | 568                                     | 10.6 | 568                                      | 10.6 | 0.553                | 47.1                   | LOS D            | 11.8                                        | 92.9  | 0.91      | 0.75           | 0.91                | 31.7                    |
| East: Dalrymple Road East    |      |           |                                         |      |                                          |      |                      |                        |                  |                                             |       |           |                |                     |                         |
| 4                            | L2   | All MCs   | 133                                     | 5.0  | 133                                      | 5.0  | 0.106                | 9.0                    | LOS A            | 1.6                                         | 11.3  | 0.27      | 0.62           | 0.27                | 51.1                    |
| 5                            | T1   | All MCs   | 125                                     | 2.6  | 125                                      | 2.6  | 0.438                | 43.4                   | LOS D            | 9.4                                         | 67.4  | 0.91      | 0.77           | 0.91                | 29.1                    |
| 6                            | R2   | All MCs   | 291                                     | 4.5  | 291                                      | 4.5  | * 0.571              | 50.6                   | LOS D            | 12.2                                        | 88.4  | 0.94      | 0.81           | 0.94                | 29.5                    |
| Approach                     |      |           | 548                                     | 4.2  | 548                                      | 4.2  | 0.571                | 38.9                   | LOS D            | 12.2                                        | 88.4  | 0.77      | 0.75           | 0.77                | 33.6                    |
| North: Shaw Road North       |      |           |                                         |      |                                          |      |                      |                        |                  |                                             |       |           |                |                     |                         |
| 7                            | L2   | All MCs   | 319                                     | 4.8  | 319                                      | 4.8  | 0.258                | 9.3                    | LOS A            | 4.8                                         | 35.2  | 0.34      | 0.66           | 0.34                | 48.5                    |
| 8                            | T1   | All MCs   | 471                                     | 11.4 | 471                                      | 11.4 | * 0.594              | 40.7                   | LOS D            | 14.8                                        | 113.5 | 0.90      | 0.76           | 0.90                | 33.2                    |
| 9                            | R2   | All MCs   | 23                                      | 9.5  | 23                                       | 9.5  | 0.178                | 64.2                   | LOS E            | 1.3                                         | 10.1  | 0.97      | 0.71           | 0.97                | 18.9                    |
| Approach                     |      |           | 813                                     | 8.8  | 813                                      | 8.8  | 0.594                | 29.1                   | LOS C            | 14.8                                        | 113.5 | 0.68      | 0.72           | 0.68                | 37.3                    |
| West: Dalrymple Road West    |      |           |                                         |      |                                          |      |                      |                        |                  |                                             |       |           |                |                     |                         |
| 10                           | L2   | All MCs   | 100                                     | 3.3  | 100                                      | 3.3  | 0.098                | 12.5                   | LOS B            | 1.7                                         | 12.4  | 0.37      | 0.65           | 0.37                | 41.7                    |
| 11                           | T1   | All MCs   | 508                                     | 2.2  | 508                                      | 2.2  | * 0.573              | 44.2                   | LOS D            | 13.4                                        | 95.8  | 0.94      | 0.79           | 0.94                | 29.4                    |
| 12                           | R2   | All MCs   | 5                                       | 20.0 | 5                                        | 20.0 | 0.573                | 50.0                   | LOS D            | 13.4                                        | 95.8  | 0.94      | 0.79           | 0.94                | 28.4                    |
| Approach                     |      |           | 614                                     | 2.5  | 614                                      | 2.5  | 0.573                | 39.0                   | LOS D            | 13.4                                        | 95.8  | 0.85      | 0.77           | 0.85                | 30.5                    |
| All Vehicles                 |      |           | 2543                                    | 6.7  | 2543                                     | 6.7  | 0.594                | 37.6                   | LOS D            | 14.8                                        | 113.5 | 0.79      | 0.74           | 0.79                | 33.5                    |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).  
Vehicle movement LOS values are based on average delay per movement.  
Intersection and Approach LOS values are based on average delay for all vehicle movements.  
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).  
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.  
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.  
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

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Project: C:\Projects\KIN0323\01\3. Deliverables\1. Reports\2. TIA\KIN0323-15.01.2024.sip9

# PHASING SUMMARY

 Site: 101 [Shaw / Dalrymple 2025 AM BG+Dev (Site Folder: DA  
SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 120 seconds (Site User-Given Cycle Time)

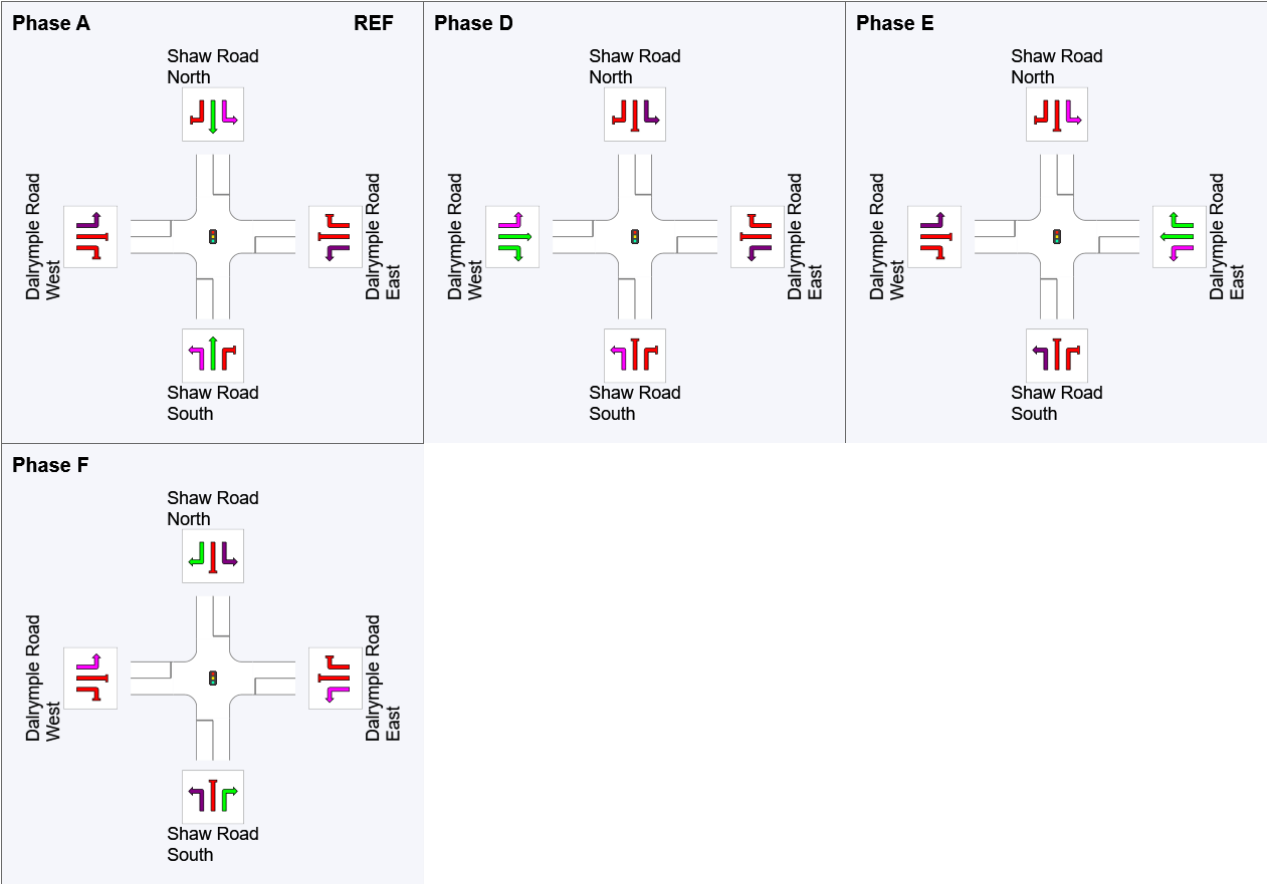
Timings based on settings in the Site Phasing & Timing dialog  
Phase Times determined by the program  
Phase Sequence: Phase1  
Input Phase Sequence: A, D, E, F  
Output Phase Sequence: A, D, E, F  
Reference Phase: Phase A

## Phase Timing Summary

| Phase                   | A     | D     | E     | F     |
|-------------------------|-------|-------|-------|-------|
| Phase Change Time (sec) | 0     | 36    | 73    | 106   |
| Green Time (sec)        | 30    | 31    | 27    | 8     |
| Phase Time (sec)        | 36    | 37    | 33    | 14    |
| Phase Split             | 30%   | 31%   | 28%   | 12%   |
| Phase Frequency (%)     | 100.0 | 100.0 | 100.0 | 100.0 |

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

## Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

|                                                                                   |                                   |                                                                                   |                          |
|-----------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------|--------------------------|
|  | Normal Movement                   |  | Permitted/Opposed        |
|  | Slip/Bypass-Lane Movement         |  | Opposed Slip/Bypass-Lane |
|  | Stopped Movement                  |  | Turn On Red              |
|  | Other Movement Class (MC) Running |  | Undetected Movement      |
|  | Mixed Running & Stopped MCs       |  | Continuous Movement      |
|  | Other Movement Class (MC) Stopped |  | Phase Transition Applied |

# MOVEMENT SUMMARY

 Site: 101 [Shaw / Dalrymple 2025 AM BG+Dev (Site Folder: DA  
SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 120 seconds (Site User-Given Cycle Time)

| Vehicle Movement Performance |      |           |                                         |      |                                          |      |                      |                        |                  |                                                  |       |           |                |                     |                         |
|------------------------------|------|-----------|-----------------------------------------|------|------------------------------------------|------|----------------------|------------------------|------------------|--------------------------------------------------|-------|-----------|----------------|---------------------|-------------------------|
| Mov ID                       | Turn | Mov Class | Demand Flows<br>[ Total HV ]<br>veh/h % |      | Arrival Flows<br>[ Total HV ]<br>veh/h % |      | Deg. Satn<br><br>v/c | Aver. Delay<br><br>sec | Level of Service | 95% Back Of Queue<br>[ Veh. veh      Dist ]<br>m |       | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed<br><br>km/h |
| South: Shaw Road South       |      |           |                                         |      |                                          |      |                      |                        |                  |                                                  |       |           |                |                     |                         |
| 1                            | L2   | All MCs   | 4                                       | 0.0  | 4                                        | 0.0  | 0.003                | 6.6                    | LOS A            | 0.0                                              | 0.2   | 0.17      | 0.57           | 0.17                | 49.5                    |
| 2                            | T1   | All MCs   | 422                                     | 14.0 | 422                                      | 14.0 | 0.543                | 42.2                   | LOS D            | 12.4                                             | 97.5  | 0.90      | 0.76           | 0.90                | 32.7                    |
| 3                            | R2   | All MCs   | 145                                     | 1.4  | 145                                      | 1.4  | * 0.592              | 68.1                   | LOS E            | 4.4                                              | 31.2  | 1.00      | 0.79           | 1.04                | 27.9                    |
| Approach                     |      |           | 572                                     | 10.7 | 572                                      | 10.7 | 0.592                | 48.5                   | LOS D            | 12.4                                             | 97.5  | 0.92      | 0.76           | 0.93                | 31.2                    |
| East: Dalrymple Road East    |      |           |                                         |      |                                          |      |                      |                        |                  |                                                  |       |           |                |                     |                         |
| 4                            | L2   | All MCs   | 126                                     | 5.0  | 126                                      | 5.0  | 0.103                | 9.4                    | LOS A            | 1.6                                              | 11.7  | 0.29      | 0.63           | 0.29                | 50.8                    |
| 5                            | T1   | All MCs   | 135                                     | 2.6  | 135                                      | 2.6  | 0.450                | 43.5                   | LOS D            | 9.7                                              | 69.8  | 0.91      | 0.77           | 0.91                | 29.1                    |
| 6                            | R2   | All MCs   | 294                                     | 4.5  | 294                                      | 4.5  | * 0.587              | 50.8                   | LOS D            | 12.6                                             | 91.5  | 0.94      | 0.81           | 0.94                | 29.5                    |
| Approach                     |      |           | 555                                     | 4.2  | 555                                      | 4.2  | 0.587                | 39.6                   | LOS D            | 12.6                                             | 91.5  | 0.78      | 0.76           | 0.78                | 33.2                    |
| North: Shaw Road North       |      |           |                                         |      |                                          |      |                      |                        |                  |                                                  |       |           |                |                     |                         |
| 7                            | L2   | All MCs   | 304                                     | 4.8  | 304                                      | 4.8  | 0.253                | 9.6                    | LOS A            | 4.8                                              | 34.7  | 0.35      | 0.66           | 0.35                | 48.3                    |
| 8                            | T1   | All MCs   | 448                                     | 11.4 | 448                                      | 11.4 | * 0.604              | 42.4                   | LOS D            | 14.3                                             | 109.9 | 0.92      | 0.77           | 0.92                | 32.6                    |
| 9                            | R2   | All MCs   | 22                                      | 9.5  | 22                                       | 9.5  | 0.191                | 65.6                   | LOS E            | 1.3                                              | 9.7   | 0.98      | 0.71           | 0.98                | 18.7                    |
| Approach                     |      |           | 775                                     | 8.8  | 775                                      | 8.8  | 0.604                | 30.2                   | LOS C            | 14.3                                             | 109.9 | 0.70      | 0.72           | 0.70                | 36.8                    |
| West: Dalrymple Road West    |      |           |                                         |      |                                          |      |                      |                        |                  |                                                  |       |           |                |                     |                         |
| 10                           | L2   | All MCs   | 95                                      | 3.3  | 95                                       | 3.3  | 0.093                | 12.8                   | LOS B            | 1.7                                              | 12.1  | 0.38      | 0.65           | 0.38                | 41.4                    |
| 11                           | T1   | All MCs   | 538                                     | 2.2  | 538                                      | 2.2  | * 0.584              | 42.0                   | LOS D            | 14.9                                             | 106.3 | 0.93      | 0.79           | 0.93                | 30.1                    |
| 12                           | R2   | All MCs   | 36                                      | 20.0 | 36                                       | 20.0 | 0.584                | 47.9                   | LOS D            | 14.6                                             | 105.9 | 0.93      | 0.79           | 0.93                | 28.9                    |
| Approach                     |      |           | 668                                     | 3.3  | 668                                      | 3.3  | 0.584                | 38.2                   | LOS D            | 14.9                                             | 106.3 | 0.85      | 0.77           | 0.85                | 30.9                    |
| All Vehicles                 |      |           | 2569                                    | 6.8  | 2569                                     | 6.8  | 0.604                | 38.4                   | LOS D            | 14.9                                             | 109.9 | 0.81      | 0.75           | 0.81                | 33.2                    |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).  
Vehicle movement LOS values are based on average delay per movement.  
Intersection and Approach LOS values are based on average delay for all vehicle movements.  
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).  
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.  
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.  
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

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Project: C:\Projects\KIN0323\01\3. Deliverables\1. Reports\2. TIA\KIN0323-15.01.2024.sip9

# PHASING SUMMARY

 Site: 101 [Shaw / Dalrymple 2025 PM BG (Site Folder: DA  
SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 120 seconds (Site User-Given Cycle Time)

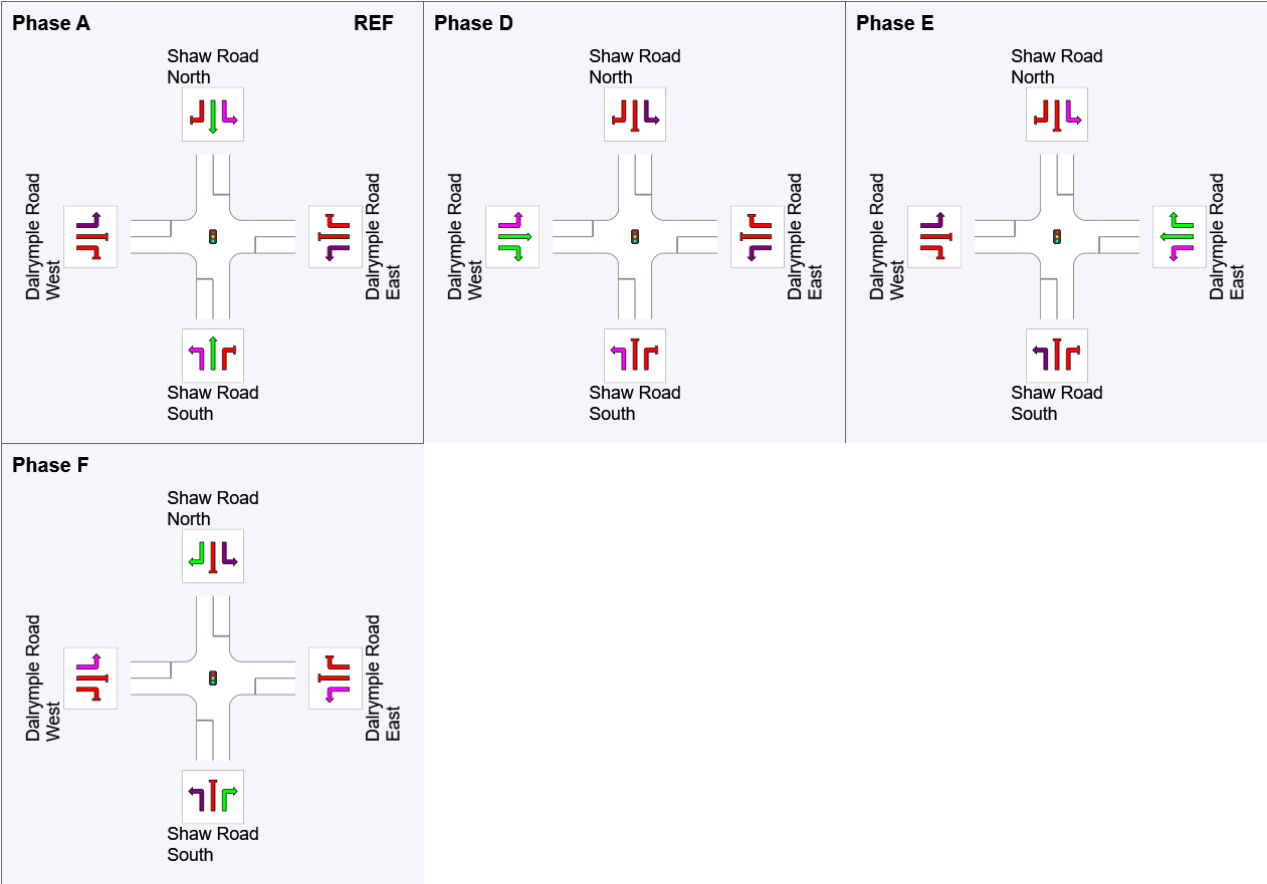
Timings based on settings in the Site Phasing & Timing dialog  
Phase Times determined by the program  
Phase Sequence: Phase1  
Input Phase Sequence: A, D, E, F  
Output Phase Sequence: A, D, E, F  
Reference Phase: Phase A

## Phase Timing Summary

| Phase                   | A     | D     | E     | F     |
|-------------------------|-------|-------|-------|-------|
| Phase Change Time (sec) | 0     | 43    | 59    | 104   |
| Green Time (sec)        | 37    | 10    | 39    | 10    |
| Phase Time (sec)        | 43    | 16    | 45    | 16    |
| Phase Split             | 36%   | 13%   | 38%   | 13%   |
| Phase Frequency (%)     | 100.0 | 100.0 | 100.0 | 100.0 |

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

## Output Phase Sequence



REF: Reference Phase



VAR: Variable Phase

|                                                                                   |                                   |                                                                                   |                          |
|-----------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------|--------------------------|
|  | Normal Movement                   |  | Permitted/Opposed        |
|  | Slip/Bypass-Lane Movement         |  | Opposed Slip/Bypass-Lane |
|  | Stopped Movement                  |  | Turn On Red              |
|  | Other Movement Class (MC) Running |  | Undetected Movement      |
|  | Mixed Running & Stopped MCs       |  | Continuous Movement      |
|  | Other Movement Class (MC) Stopped |  | Phase Transition Applied |

# MOVEMENT SUMMARY

 Site: 101 [Shaw / Dalrymple 2025 PM BG (Site Folder: DA  
SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 120 seconds (Site User-Given Cycle Time)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |          | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   | v/c       | sec         |                  | [ Veh. veh        | Dist ] m |           |                |                     | km/h        |
| South: Shaw Road South       |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 1                            | L2   | All MCs   | 1            | 0.0 | 1             | 0.0 | 0.001     | 8.5         | LOS A            | 0.0               | 0.1      | 0.26      | 0.57           | 0.26                | 47.8        |
| 2                            | T1   | All MCs   | 434          | 9.9 | 434           | 9.9 | 0.441     | 35.8        | LOS D            | 11.7              | 88.7     | 0.84      | 0.70           | 0.84                | 35.2        |
| 3                            | R2   | All MCs   | 102          | 2.2 | 102           | 2.2 | 0.335     | 63.9        | LOS E            | 2.9               | 21.0     | 0.98      | 0.75           | 0.98                | 28.8        |
| Approach                     |      |           | 537          | 8.4 | 537           | 8.4 | 0.441     | 41.1        | LOS D            | 11.7              | 88.7     | 0.86      | 0.71           | 0.86                | 33.6        |
| East: Dalrymple Road East    |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 4                            | L2   | All MCs   | 165          | 4.0 | 165           | 4.0 | 0.128     | 9.0         | LOS A            | 2.0               | 14.5     | 0.28      | 0.63           | 0.28                | 51.0        |
| 5                            | T1   | All MCs   | 299          | 1.1 | 299           | 1.1 | 0.475     | 34.7        | LOS C            | 13.9              | 98.4     | 0.85      | 0.73           | 0.85                | 33.1        |
| 6                            | R2   | All MCs   | 307          | 2.9 | 307           | 2.9 | * 0.520   | 41.0        | LOS D            | 14.6              | 104.7    | 0.87      | 0.82           | 0.87                | 32.3        |
| Approach                     |      |           | 772          | 2.4 | 772           | 2.4 | 0.520     | 31.7        | LOS C            | 14.6              | 104.7    | 0.73      | 0.74           | 0.73                | 36.1        |
| North: Shaw Road North       |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 7                            | L2   | All MCs   | 276          | 1.6 | 276           | 1.6 | 0.183     | 6.7         | LOS A            | 2.0               | 14.5     | 0.20      | 0.61           | 0.20                | 50.8        |
| 8                            | T1   | All MCs   | 501          | 4.4 | 501           | 4.4 | * 0.524   | 36.1        | LOS D            | 14.8              | 107.4    | 0.85      | 0.72           | 0.85                | 34.9        |
| 9                            | R2   | All MCs   | 79           | 0.0 | 79            | 0.0 | * 0.510   | 65.0        | LOS E            | 4.6               | 32.5     | 1.00      | 0.77           | 1.00                | 18.9        |
| Approach                     |      |           | 856          | 3.1 | 856           | 3.1 | 0.524     | 29.3        | LOS C            | 14.8              | 107.4    | 0.66      | 0.69           | 0.66                | 36.9        |
| West: Dalrymple Road West    |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 10                           | L2   | All MCs   | 42           | 0.0 | 42            | 0.0 | 0.047     | 12.9        | LOS B            | 0.7               | 5.1      | 0.37      | 0.63           | 0.37                | 41.5        |
| 11                           | T1   | All MCs   | 153          | 1.4 | 153           | 1.4 | * 0.481   | 59.1        | LOS E            | 4.5               | 32.1     | 1.00      | 0.76           | 1.00                | 25.1        |
| 12                           | R2   | All MCs   | 2            | 0.0 | 2             | 0.0 | 0.481     | 64.7        | LOS E            | 4.5               | 32.0     | 1.00      | 0.76           | 1.00                | 24.6        |
| Approach                     |      |           | 197          | 1.1 | 197           | 1.1 | 0.481     | 49.3        | LOS D            | 4.5               | 32.1     | 0.86      | 0.74           | 0.86                | 26.8        |
| All Vehicles                 |      |           | 2361         | 3.9 | 2361          | 3.9 | 0.524     | 34.4        | LOS C            | 14.8              | 107.4    | 0.75      | 0.72           | 0.75                | 34.9        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).  
Vehicle movement LOS values are based on average delay per movement.  
Intersection and Approach LOS values are based on average delay for all vehicle movements.  
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).  
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.  
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.  
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

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Project: C:\Projects\KIN0323\01\3. Deliverables\1. Reports\2. TIA\KIN0323-15.01.2024.sip9

# PHASING SUMMARY

 Site: 101 [Shaw / Dalrymple 2025 PM BG+Dev (Site Folder: DA  
SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 120 seconds (Site User-Given Phase Times)

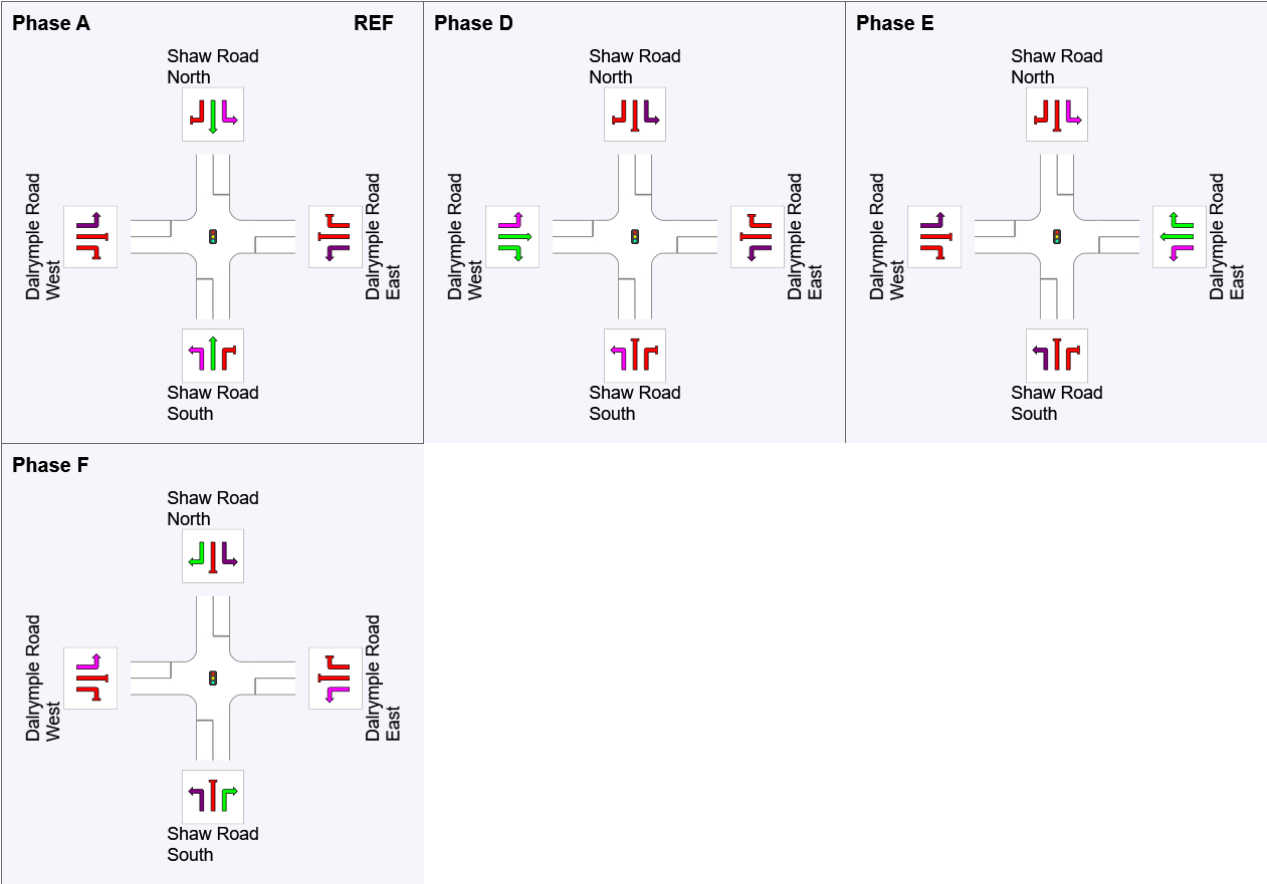
Timings based on settings in the Site Phasing & Timing dialog  
Phase Times specified by the user  
Phase Sequence: Phase1  
Input Phase Sequence: A, D, E, F  
Output Phase Sequence: A, D, E, F  
Reference Phase: Phase A

## Phase Timing Summary

| Phase                   | A     | D     | E     | F     |
|-------------------------|-------|-------|-------|-------|
| Phase Change Time (sec) | 0     | 43    | 59    | 104   |
| Green Time (sec)        | 37    | 10    | 39    | 10    |
| Phase Time (sec)        | 43    | 16    | 45    | 16    |
| Phase Split             | 36%   | 13%   | 38%   | 13%   |
| Phase Frequency (%)     | 100.0 | 100.0 | 100.0 | 100.0 |

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

## Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

|                                                                                   |                                   |                                                                                   |                          |
|-----------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------|--------------------------|
|  | Normal Movement                   |  | Permitted/Opposed        |
|  | Slip/Bypass-Lane Movement         |  | Opposed Slip/Bypass-Lane |
|  | Stopped Movement                  |  | Turn On Red              |
|  | Other Movement Class (MC) Running |  | Undetected Movement      |
|  | Mixed Running & Stopped MCs       |  | Continuous Movement      |
|  | Other Movement Class (MC) Stopped |  | Phase Transition Applied |

# MOVEMENT SUMMARY

 Site: 101 [Shaw / Dalrymple 2025 PM BG+Dev (Site Folder: DA  
SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated    Cycle Time = 120 seconds (Site User-Given Phase Times)

| Vehicle Movement Performance |      |           |                                         |     |                                          |     |                      |                        |                  |                                                  |       |           |                |                     |                         |
|------------------------------|------|-----------|-----------------------------------------|-----|------------------------------------------|-----|----------------------|------------------------|------------------|--------------------------------------------------|-------|-----------|----------------|---------------------|-------------------------|
| Mov ID                       | Turn | Mov Class | Demand Flows<br>[ Total HV ]<br>veh/h % |     | Arrival Flows<br>[ Total HV ]<br>veh/h % |     | Deg. Satn<br><br>v/c | Aver. Delay<br><br>sec | Level of Service | 95% Back Of Queue<br>[ Veh. veh      Dist ]<br>m |       | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed<br><br>km/h |
| South: Shaw Road South       |      |           |                                         |     |                                          |     |                      |                        |                  |                                                  |       |           |                |                     |                         |
| 1                            | L2   | All MCs   | 3                                       | 0.0 | 3                                        | 0.0 | 0.002                | 8.7                    | LOS A            | 0.0                                              | 0.3   | 0.27      | 0.58           | 0.27                | 47.5                    |
| 2                            | T1   | All MCs   | 440                                     | 9.9 | 440                                      | 9.9 | 0.448                | 35.9                   | LOS D            | 11.9                                             | 90.2  | 0.84      | 0.70           | 0.84                | 35.2                    |
| 3                            | R2   | All MCs   | 97                                      | 2.2 | 97                                       | 2.2 | 0.318                | 63.8                   | LOS E            | 2.8                                              | 19.9  | 0.98      | 0.74           | 0.98                | 28.9                    |
| Approach                     |      |           | 540                                     | 8.4 | 540                                      | 8.4 | 0.448                | 40.7                   | LOS D            | 11.9                                             | 90.2  | 0.86      | 0.71           | 0.86                | 33.7                    |
| East: Dalrymple Road East    |      |           |                                         |     |                                          |     |                      |                        |                  |                                                  |       |           |                |                     |                         |
| 4                            | L2   | All MCs   | 157                                     | 4.0 | 157                                      | 4.0 | 0.123                | 9.3                    | LOS A            | 2.0                                              | 14.3  | 0.28      | 0.63           | 0.28                | 50.9                    |
| 5                            | T1   | All MCs   | 312                                     | 1.1 | 312                                      | 1.1 | 0.495                | 35.0                   | LOS C            | 14.6                                             | 103.4 | 0.86      | 0.73           | 0.86                | 32.9                    |
| 6                            | R2   | All MCs   | 312                                     | 2.9 | 312                                      | 2.9 | * 0.527              | 41.1                   | LOS D            | 14.8                                             | 106.5 | 0.87      | 0.82           | 0.87                | 32.2                    |
| Approach                     |      |           | 780                                     | 2.4 | 780                                      | 2.4 | 0.527                | 32.3                   | LOS C            | 14.8                                             | 106.5 | 0.75      | 0.75           | 0.75                | 35.8                    |
| North: Shaw Road North       |      |           |                                         |     |                                          |     |                      |                        |                  |                                                  |       |           |                |                     |                         |
| 7                            | L2   | All MCs   | 262                                     | 1.6 | 262                                      | 1.6 | 0.176                | 7.0                    | LOS A            | 2.2                                              | 15.7  | 0.22      | 0.62           | 0.22                | 50.5                    |
| 8                            | T1   | All MCs   | 477                                     | 4.4 | 477                                      | 4.4 | * 0.499              | 35.9                   | LOS D            | 13.9                                             | 101.3 | 0.85      | 0.72           | 0.85                | 35.0                    |
| 9                            | R2   | All MCs   | 75                                      | 0.0 | 75                                       | 0.0 | * 0.483              | 64.9                   | LOS E            | 4.4                                              | 30.7  | 1.00      | 0.77           | 1.00                | 19.0                    |
| Approach                     |      |           | 814                                     | 3.1 | 814                                      | 3.1 | 0.499                | 29.2                   | LOS C            | 13.9                                             | 101.3 | 0.66      | 0.69           | 0.66                | 37.0                    |
| West: Dalrymple Road West    |      |           |                                         |     |                                          |     |                      |                        |                  |                                                  |       |           |                |                     |                         |
| 10                           | L2   | All MCs   | 40                                      | 0.0 | 40                                       | 0.0 | 0.045                | 13.3                   | LOS B            | 0.7                                              | 5.0   | 0.38      | 0.63           | 0.38                | 41.3                    |
| 11                           | T1   | All MCs   | 179                                     | 1.4 | 179                                      | 1.4 | * 0.678              | 61.3                   | LOS E            | 6.6                                              | 46.8  | 1.00      | 0.84           | 1.09                | 24.4                    |
| 12                           | R2   | All MCs   | 38                                      | 0.0 | 38                                       | 0.0 | 0.678                | 66.9                   | LOS E            | 6.5                                              | 46.0  | 1.00      | 0.84           | 1.09                | 23.7                    |
| Approach                     |      |           | 257                                     | 1.0 | 257                                      | 1.0 | 0.678                | 54.6                   | LOS D            | 6.6                                              | 46.8  | 0.90      | 0.81           | 0.98                | 25.5                    |
| All Vehicles                 |      |           | 2391                                    | 3.8 | 2391                                     | 3.8 | 0.678                | 35.5                   | LOS D            | 14.8                                             | 106.5 | 0.76      | 0.72           | 0.77                | 34.4                    |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).  
Vehicle movement LOS values are based on average delay per movement.  
Intersection and Approach LOS values are based on average delay for all vehicle movements.  
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).  
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.  
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.  
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

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Project: C:\Projects\KIN0323\01\3. Deliverables\1. Reports\2. TIA\KIN0323-15.01.2024.sip9



# SITE LAYOUT

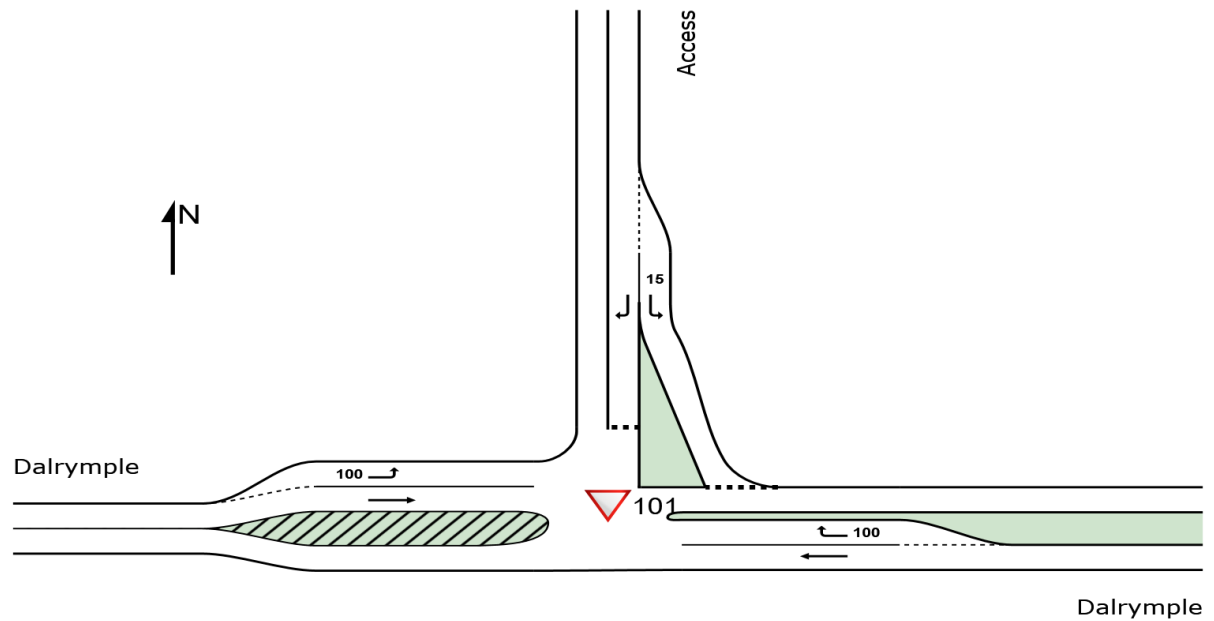
▽ Site: 101 [2035 AM BG + Dev (Site Folder: DA SIDRA - RFI)]

New Site

Site Category: (None)

Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: C:\Projects\KIN0323\01\3. Deliverables\1. Reports\2. TIA\KIN0323-15.01.2024.sip9

# MOVEMENT SUMMARY

Site: 101 [2035 AM BG + Dev (Site Folder: DA SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |          | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   |           |             |                  | [ Veh. veh        | Dist ] m |           |                |                     |             |
| East: Dalrymple              |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 5                            | T1   | All MCs   | 173          | 3.7 | 173           | 3.7 | 0.091     | 0.0         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 60.0        |
| 6                            | R2   | All MCs   | 18           | 1.0 | 18            | 1.0 | 0.031     | 10.2        | LOS B            | 0.1               | 0.6      | 0.61      | 0.77           | 0.61                | 49.4        |
| Approach                     |      |           | 191          | 3.4 | 191           | 3.4 | 0.091     | 1.0         | NA               | 0.1               | 0.6      | 0.06      | 0.07           | 0.06                | 58.8        |
| North: Access                |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 7                            | L2   | All MCs   | 84           | 1.0 | 84            | 1.0 | 0.153     | 10.6        | LOS B            | 0.5               | 3.6      | 0.62      | 0.83           | 0.62                | 49.6        |
| 9                            | R2   | All MCs   | 14           | 1.0 | 14            | 1.0 | 0.052     | 17.9        | LOS C            | 0.2               | 1.2      | 0.76      | 0.90           | 0.76                | 44.9        |
| Approach                     |      |           | 98           | 1.0 | 98            | 1.0 | 0.153     | 11.6        | LOS B            | 0.5               | 3.6      | 0.64      | 0.84           | 0.64                | 48.9        |
| West: Dalrymple              |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 10                           | L2   | All MCs   | 34           | 1.0 | 34            | 1.0 | 0.018     | 5.6         | LOS A            | 0.0               | 0.0      | 0.00      | 0.58           | 0.00                | 52.8        |
| 11                           | T1   | All MCs   | 702          | 2.5 | 702           | 2.5 | 0.366     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.8        |
| Approach                     |      |           | 736          | 2.4 | 736           | 2.4 | 0.366     | 0.4         | NA               | 0.0               | 0.0      | 0.00      | 0.03           | 0.00                | 59.4        |
| All Vehicles                 |      |           | 1024         | 2.5 | 1024          | 2.5 | 0.366     | 1.6         | NA               | 0.5               | 3.6      | 0.07      | 0.11           | 0.07                | 58.1        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).  
Two-Way Sign Control Capacity Model: SIDRA Standard.  
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).  
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.  
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.  
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

# MOVEMENT SUMMARY

Site: 101 [2035 PM BG + Dev (Site Folder: DA SIDRA - RFI)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site  
Site Category: (None)  
Give-Way (Two-Way)

| Vehicle Movement Performance |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
|------------------------------|------|-----------|--------------|-----|---------------|-----|-----------|-------------|------------------|-------------------|----------|-----------|----------------|---------------------|-------------|
| Mov ID                       | Turn | Mov Class | Demand Flows |     | Arrival Flows |     | Deg. Satn | Aver. Delay | Level of Service | 95% Back Of Queue |          | Prop. Que | Eff. Stop Rate | Aver. No. of Cycles | Aver. Speed |
|                              |      |           | [ Total HV ] | %   | [ Total HV ]  | %   |           |             |                  | [ Veh. veh        | Dist ] m |           |                |                     |             |
| East: Dalrymple              |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 5                            | T1   | All MCs   | 436          | 0.9 | 436           | 0.9 | 0.225     | 0.1         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.9        |
| 6                            | R2   | All MCs   | 29           | 1.0 | 29            | 1.0 | 0.026     | 6.5         | LOS A            | 0.1               | 0.6      | 0.26      | 0.58           | 0.26                | 52.0        |
| Approach                     |      |           | 465          | 0.9 | 465           | 0.9 | 0.225     | 0.5         | NA               | 0.1               | 0.6      | 0.02      | 0.04           | 0.02                | 59.3        |
| North: Access                |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 7                            | L2   | All MCs   | 71           | 1.0 | 71            | 1.0 | 0.066     | 6.6         | LOS A            | 0.2               | 1.7      | 0.31      | 0.57           | 0.31                | 52.1        |
| 9                            | R2   | All MCs   | 25           | 1.0 | 25            | 1.0 | 0.056     | 11.8        | LOS B            | 0.2               | 1.4      | 0.60      | 0.78           | 0.60                | 48.6        |
| Approach                     |      |           | 96           | 1.0 | 96            | 1.0 | 0.066     | 7.9         | LOS A            | 0.2               | 1.7      | 0.39      | 0.63           | 0.39                | 51.1        |
| West: Dalrymple              |      |           |              |     |               |     |           |             |                  |                   |          |           |                |                     |             |
| 10                           | L2   | All MCs   | 15           | 1.0 | 15            | 1.0 | 0.008     | 5.6         | LOS A            | 0.0               | 0.0      | 0.00      | 0.58           | 0.00                | 52.9        |
| 11                           | T1   | All MCs   | 224          | 1.1 | 224           | 1.1 | 0.116     | 0.0         | LOS A            | 0.0               | 0.0      | 0.00      | 0.00           | 0.00                | 59.9        |
| Approach                     |      |           | 239          | 1.1 | 239           | 1.1 | 0.116     | 0.4         | NA               | 0.0               | 0.0      | 0.00      | 0.04           | 0.00                | 59.5        |
| All Vehicles                 |      |           | 800          | 1.0 | 800           | 1.0 | 0.225     | 1.3         | NA               | 0.2               | 1.7      | 0.06      | 0.11           | 0.06                | 58.2        |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).  
Two-Way Sign Control Capacity Model: SIDRA Standard.  
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).  
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.  
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).  
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.  
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

## APPENDIX I

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### Aggregate Delay Assessment

| <i>SIDRA Delay</i>                      |                         |      |      |  |      |      |      |  |       |      |      |  |      |      |      |  |
|-----------------------------------------|-------------------------|------|------|--|------|------|------|--|-------|------|------|--|------|------|------|--|
| Intersection                            | Average Delay (seconds) |      |      |  |      |      |      |  |       |      |      |  |      |      |      |  |
|                                         | South                   |      |      |  | East |      |      |  | North |      |      |  | West |      |      |  |
| Shaw / Dalrymple                        | L                       | T    | R    |  | L    | T    | R    |  | L     | T    | R    |  | L    | T    | R    |  |
| <i>Base Case (2025 BG)</i>              |                         |      |      |  |      |      |      |  |       |      |      |  |      |      |      |  |
| AM Peak                                 | 6.6                     | 40.2 | 66.5 |  | 9.0  | 43.4 | 50.6 |  | 9.3   | 40.7 | 64.2 |  | 12.5 | 44.2 | 50.0 |  |
| PM Peak                                 | 8.5                     | 35.8 | 63.9 |  | 9.0  | 34.7 | 41.0 |  | 6.7   | 36.1 | 65.0 |  | 12.9 | 59.1 | 64.7 |  |
| WE Peak                                 |                         |      |      |  |      |      |      |  |       |      |      |  |      |      |      |  |
| <i>With Development (2025 BG + Dev)</i> |                         |      |      |  |      |      |      |  |       |      |      |  |      |      |      |  |
| AM Peak                                 | 6.6                     | 42.2 | 68.1 |  | 9.4  | 43.5 | 50.8 |  | 9.6   | 42.4 | 65.6 |  | 12.8 | 42.0 | 47.9 |  |
| PM Peak                                 | 8.7                     | 35.9 | 63.8 |  | 9.3  | 35.0 | 41.1 |  | 7.0   | 35.9 | 64.9 |  | 13.3 | 61.3 | 66.9 |  |
| WE Peak                                 |                         |      |      |  |      |      |      |  |       |      |      |  |      |      |      |  |

| <i>Background Volumes</i>  |         |     |     |  |      |     |     |  |       |     |    |  |      |     |   |  |
|----------------------------|---------|-----|-----|--|------|-----|-----|--|-------|-----|----|--|------|-----|---|--|
| Intersection               | Volumes |     |     |  |      |     |     |  |       |     |    |  |      |     |   |  |
|                            | South   |     |     |  | East |     |     |  | North |     |    |  | West |     |   |  |
| Shaw / Dalrymple           | L       | T   | R   |  | L    | T   | R   |  | L     | T   | R  |  | L    | T   | R |  |
| <i>Base Case (2025 BG)</i> |         |     |     |  |      |     |     |  |       |     |    |  |      |     |   |  |
| AM Peak                    | 2       | 414 | 153 |  | 133  | 125 | 291 |  | 319   | 471 | 23 |  | 100  | 508 | 5 |  |
| PM Peak                    | 1       | 434 | 102 |  | 165  | 299 | 307 |  | 276   | 501 | 79 |  | 42   | 153 | 2 |  |
| WE Peak                    |         |     |     |  |      |     |     |  |       |     |    |  |      |     |   |  |

|                                         |           |         |
|-----------------------------------------|-----------|---------|
| <i>Total Network Delay</i>              |           | Σ Delay |
| <i>Base Case (2025 BG)</i>              |           |         |
| AM Peak                                 |           | 95743.7 |
| PM Peak                                 |           | 81294.6 |
| <i>With Development (2025 BG + Dev)</i> |           |         |
| AM Peak                                 |           | 96770.9 |
| PM Peak                                 |           | 81830.4 |
| <i>ID</i>                               |           |         |
| AM Peak                                 | Δ seconds | 1027.2  |
|                                         | Δ %       | 1.1%    |
| PM Peak                                 | Δ seconds | 535.8   |
|                                         | Δ %       | 0.7%    |
| Total                                   | Δ seconds | 1563.0  |
|                                         | Δ %       | 0.9%    |

| GTIA Delay Calculation           |             |         |         |       |        |         |         |      |        |         |        |       |        |         |         |       |         |
|----------------------------------|-------------|---------|---------|-------|--------|---------|---------|------|--------|---------|--------|-------|--------|---------|---------|-------|---------|
| Intersection                     | Total Delay |         |         |       |        |         |         |      |        |         |        |       |        |         |         |       | Σ Delay |
|                                  | South       |         |         |       | East   |         |         |      | North  |         |        |       | West   |         |         |       |         |
| Shaw / Dalrymple                 | L           | T       | R       |       | L      | T       | R       |      | L      | T       | R      |       | L      | T       | R       |       |         |
| Base Case (2025 BG)              |             |         |         |       |        |         |         |      |        |         |        |       |        |         |         |       |         |
| AM Peak                          | 13.2        | 16642.8 | 10174.5 |       | 1197.0 | 5425.0  | 14724.6 |      | 2966.7 | 19169.7 | 1476.6 |       | 1250.0 | 22453.6 | 250.0   |       | 95743.7 |
| PM Peak                          | 8.5         | 15537.2 | 6517.8  |       | 1485.0 | 10375.3 | 12587.0 |      | 1849.2 | 18086.1 | 5135.0 |       | 541.8  | 9042.3  | 129.4   |       | 81294.6 |
| WE Peak                          | 0.0         | 0.0     | 0.0     |       | 0.0    | 0.0     | 0.0     |      | 0.0    | 0.0     | 0.0    |       | 0.0    | 0.0     | 0.0     |       | 0.0     |
| With Development (2025 BG + Dev) |             |         |         |       |        |         |         |      |        |         |        |       |        |         |         |       |         |
| AM Peak                          | 13.2        | 17470.8 | 10419.3 |       | 1250.2 | 5437.5  | 14782.8 |      | 3062.4 | 19970.4 | 1508.8 |       | 1280.0 | 21336.0 | 239.5   |       | 96770.9 |
| PM Peak                          | 8.7         | 15580.6 | 6507.6  |       | 1534.5 | 10465.0 | 12617.7 |      | 1932.0 | 17985.9 | 5127.1 |       | 558.6  | 9378.9  | 133.8   |       | 81830.4 |
| WE Peak                          | 0.0         | 0.0     | 0.0     |       | 0.0    | 0.0     | 0.0     |      | 0.0    | 0.0     | 0.0    |       | 0.0    | 0.0     | 0.0     |       | 0.0     |
| ID                               |             |         |         |       |        |         |         |      |        |         |        |       |        |         |         |       |         |
| AM Peak                          | Δ seconds   | 0.0     | 828.0   | 244.8 |        | 53.2    | 12.5    | 58.2 |        | 95.7    | 800.7  | 32.2  |        | 30.0    | -1117.6 | -10.5 | 1027.2  |
|                                  | Δ %         | 0.0%    | 5.0%    | 2.4%  |        | 4.4%    | 0.2%    | 0.4% |        | 3.2%    | 4.2%   | 2.2%  |        | 2.4%    | -5.0%   | -4.2% | 1.1%    |
| PM Peak                          | Δ seconds   | 0.2     | 43.4    | -10.2 |        | 49.5    | 89.7    | 30.7 |        | 82.8    | -100.2 | -7.9  |        | 16.8    | 336.6   | 4.4   | 535.8   |
|                                  | Δ %         | 2.4%    | 0.3%    | -0.2% |        | 3.3%    | 0.9%    | 0.2% |        | 4.5%    | -0.6%  | -0.2% |        | 3.1%    | 3.7%    | 3.4%  | 0.7%    |
| WE Peak                          | Δ seconds   |         |         |       |        |         |         |      |        |         |        |       |        |         |         |       |         |
|                                  | Δ %         |         |         |       |        |         |         |      |        |         |        |       |        |         |         |       |         |





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