231 Gurwood Street, Wagga Wagga
Medium Density Residential Development

Traffic Impact Assessment Report

Client:

Gurwood Pty Ltd

Project No. 180763

Final Report – 15/11/2019

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EXECUTIVE SUMMARY

Trafficworks has been engaged by Gurwood Pty Ltd to undertake a traffic impact assessment based on the revised masterplan for the proposed medium density residential development located at 231 Gurwood Street in Wagga Wagga.

A Traffic Impact Assessment was carried out to:

- Estimate traffic generation and distribution associated with the proposed residential development
- Determine the suitability of the proposed access locations onto the adjacent road network
- Determine the likely traffic impacts on the existing road network
- Identify any necessary mitigating works.

Provided the recommendations outlined in this report are implemented, there are no traffic related reasons that would prevent this development from occurring.

A summary for the site and the proposed development is shown below.

Address	231 Gurwood Street, Wagga Wagga
Zoning	Medium density residential zone (R3)
Proposed development	Medium density residential development, consisting of: • 45 residential dwellings • 36 terraces • 79 apartments.
Road Network	**Gurwood Street** • Currently an undivided two-lane, two-way local road **Kincaid Street** • Currently an undivided two-way collector road **Shaw Street** • Currently an undivided two-lane, two-way local road **Thomas Street** • Currently an undivided two-way local road
Traffic Generation	1,040 vehicles per day (vpd) to and from the proposed development 104 vehicles per hour (vph)

Recommendations	It is recommended that: • any landscaping or street furniture proposed in close proximity to intersections be located to ensure drivers' line of sight is not obscured • the laneways be provided with concrete vehicle crossings at their intersections with the local road to reinforce the priority • an increased kerb radius and increased splays be provided at corners within the subject site to accommodate vehicle swept paths • a 1.0 m extension beyond the property boundary be provided at each dead end laneway to allow vehicles to reverse out of property garages • the proposed on-street car parking spaces be modified to meet AS 2890.5 requirements • the proposed on-street car parking along Gurwood Street and Shaw Street be modified to ensure vehicle crossovers are kept clear.

Referenced Documents

References used in the preparation of this report include the following:

- *RTA Guide to Traffic Generating Developments, Version 2.2, October 2002*
- *Austroads Guide to Road Design - Part 4A: Unsignalised and Signalised Intersections*
- *Austroads Guide to Traffic Management Part 8: Local Area Traffic Management*
- *AS 2890.5 – Parking facilities - Part 5: On-street parking.*

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1 INTRODUCTION

Trafficworks has been engaged by Gurwood Pty Ltd to undertake a traffic impact assessment based on the revised masterplan for the proposed medium density residential development located at 231 Gurwood Street in Wagga Wagga.

A Traffic Impact Assessment was carried out to:

- Estimate traffic generation and distribution associated with the proposed residential development
- Determine the suitability of the proposed access locations onto the adjacent road network
- Determine the likely traffic impacts on the existing road network
- Identify any necessary mitigating works.

2 EXISTING CONDITIONS

2.1 Subject site

The residential development site is located at 231 Gurwood Street in Wagga Wagga, approximately 1.8 km east of the Wagga Wagga Central Business District (CBD). It is bounded by Kincaid Street to the north, Shaw Street to the east, Gurwood Street to the south and Thomas Street to the west.

The site is located within a Medium Density Residential Zone (R3), in the municipality of Wagga Wagga City Council.

The location of the site and its surrounding environment is shown in Figure 1 and Figure 2.

Figure 1: Location Plan (reproduced with permission from Google Maps).

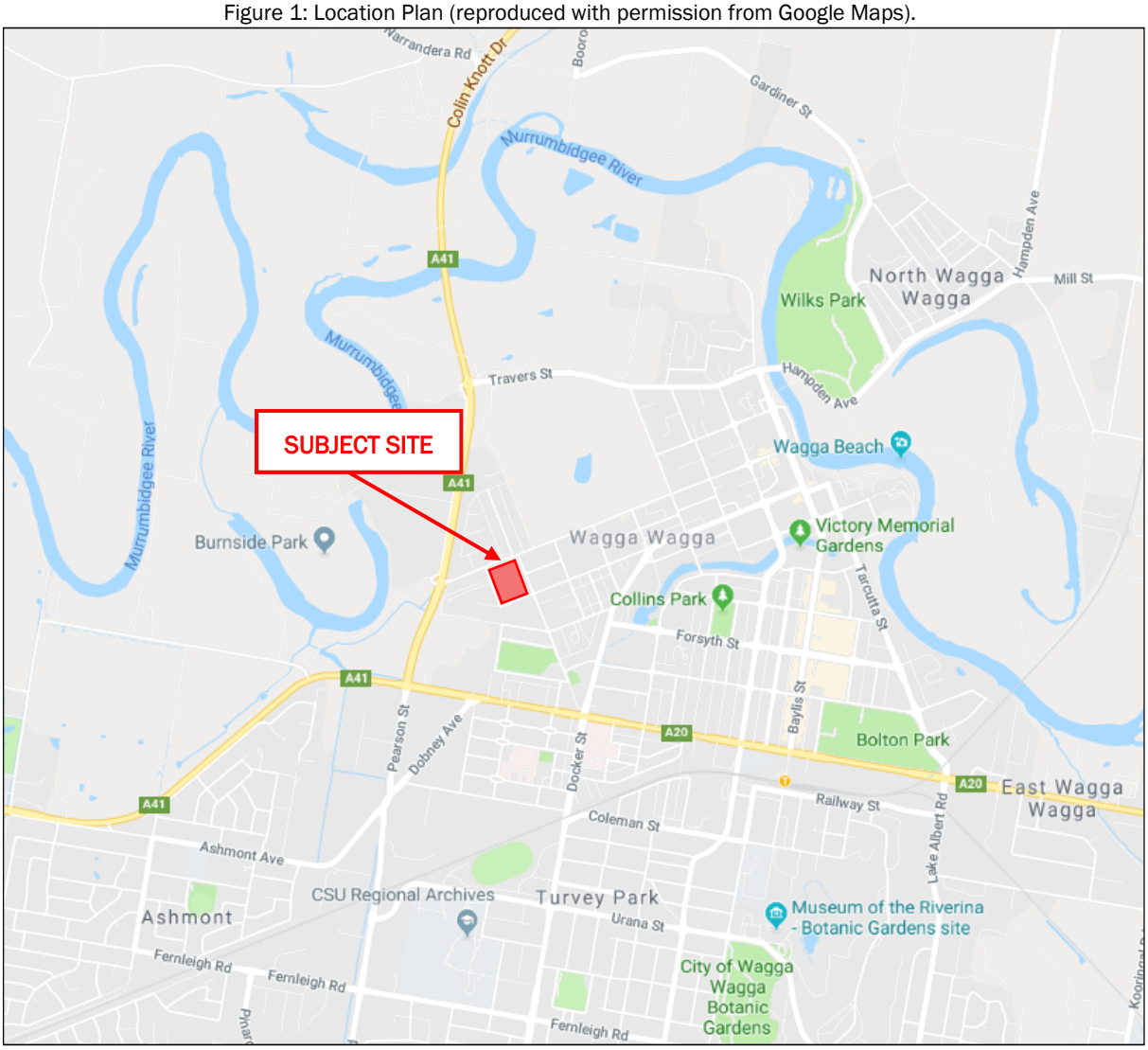
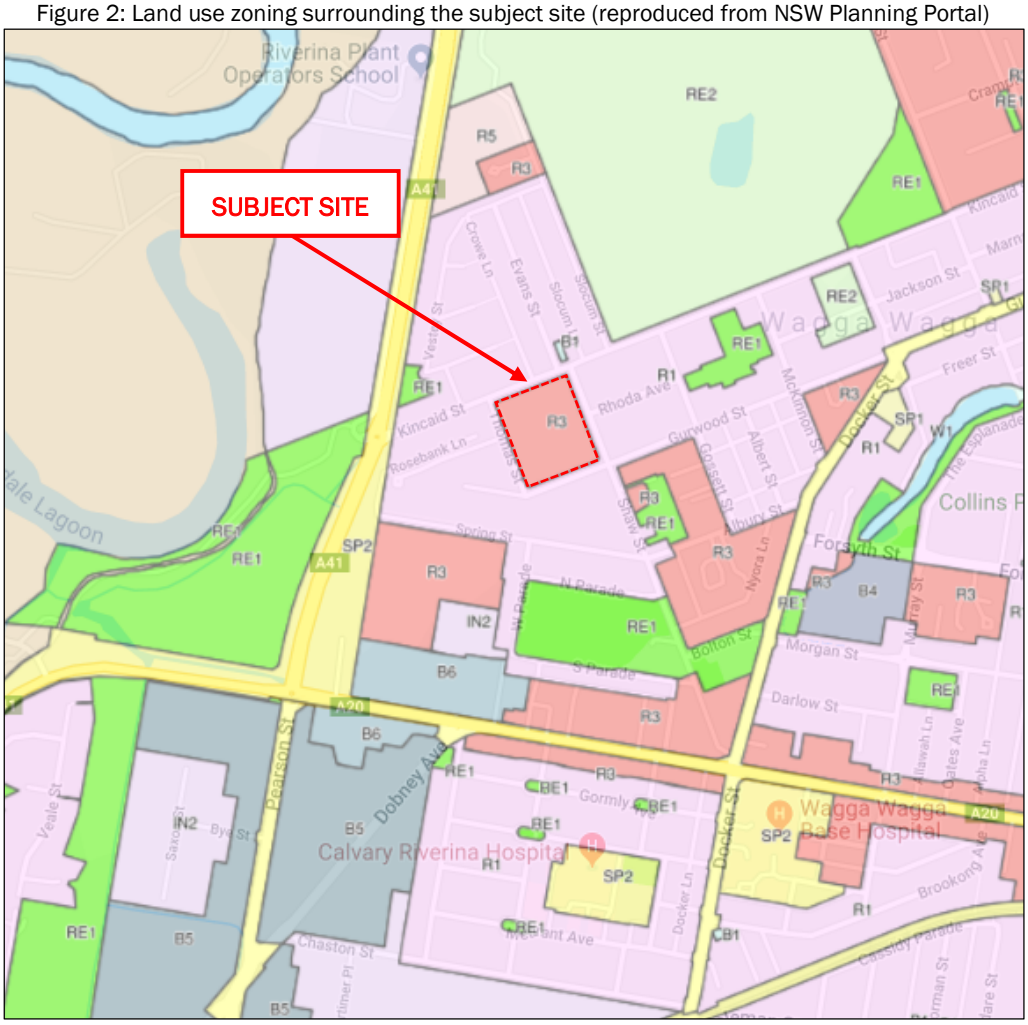


Figure 2: Land use zoning surrounding the subject site (reproduced from NSW Planning Portal)



2.2 Road network

2.2.1 Kincaid Street

Kincaid Street is a collector road managed by Wagga Wagga City Council. It is generally aligned in an east to west direction and provides a connection between Fitzmaurice Street to the east and the Olympic Highway to the west. In the vicinity of the subject site Kincaid Street is a two-way two-lane undivided carriageway with kerbside on-street parallel car parking.

The default speed limit along Kincaid Street is 50 km/h.

2.2.2 Gurwood Street

Gurwood Street is a local road managed by Wagga Wagga City Council. It is generally aligned in an east to west direction and provides connection between Fitzmaurice Street to the east and Docker Street to the west. In the vicinity of the subject site Gurwood Street is a two-way two-lane undivided carriageway with kerbside 45-degree angle car parking.

The default speed limit along Gurwood Street is 50 km/h.

2.2.3 Shaw Street

Shaw Street is a local road managed by Wagga Wagga City Council. It is generally aligned in a north to south direction and provides connection between Kincaid Street to the north and Docker Street to the south. In the vicinity of the subject site Shaw Street is a two-way two-lane undivided carriageway with kerbside on-street parallel car parking.

The default speed limit along Shaw Street is 50 km/h.

2.2.4 Thomas Street

Thomas Street is a local road managed by Wagga Wagga City Council. It is generally aligned in a north to south direction and provides connection between Kincaid Street to the north and Gurwood Street to the south. In the vicinity of the subject site Thomas Street is a two-way two-lane undivided carriageway with kerbside on-street parallel car parking on the western side. Parking is restricted on the eastern side of Thomas Street.

The default speed limit along Thomas Street is 50 km/h.

2.3 Traffic volumes

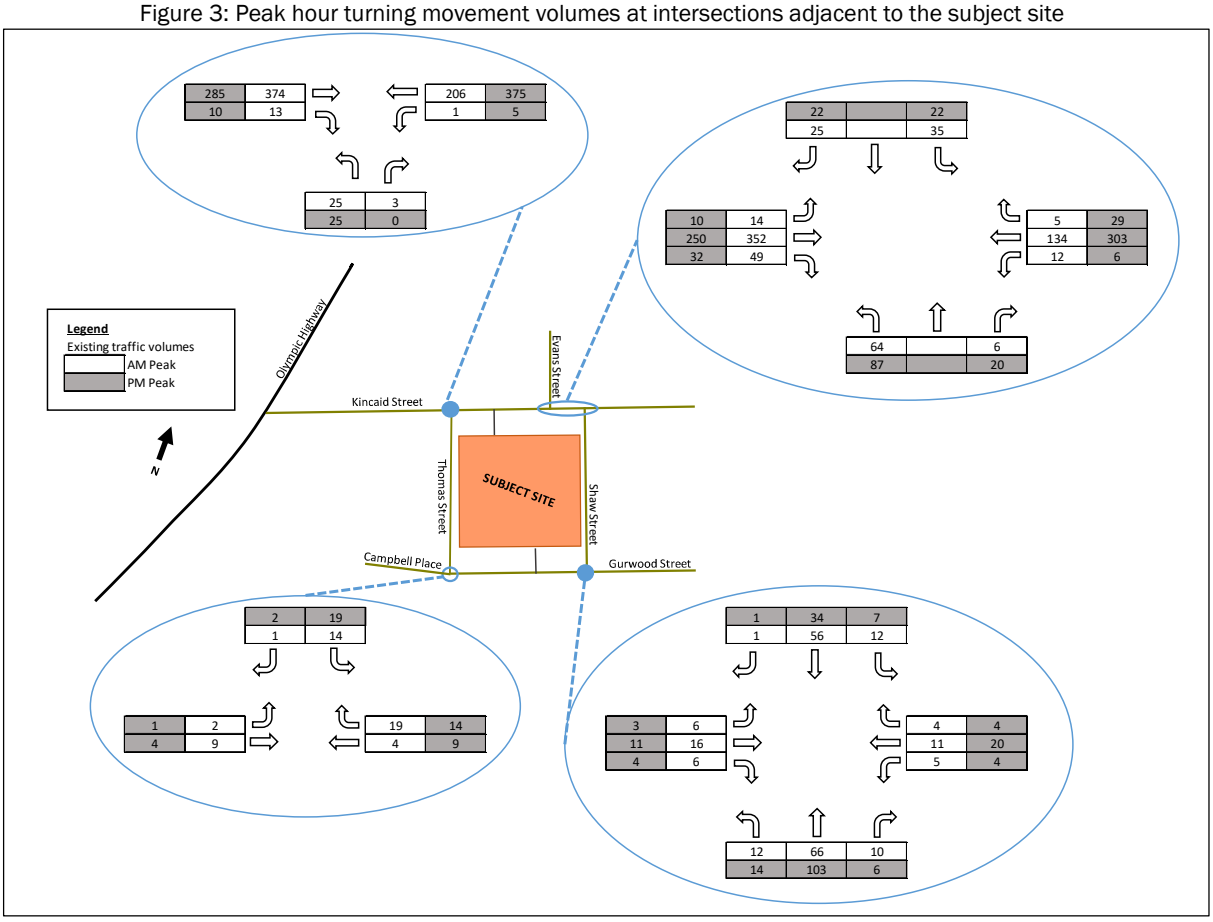
Traffic counts were undertaken on Friday 23 August 2019 from 7.30 am to 9.15 am and Wednesday 28 August 2019 from 4.30 pm to 6.15 pm the at the following intersections:

- Kincaid Street and Thomas Street
- Kincaid Street and Shaw Street / Evans Street
- Gurwood Street and Shaw Street
- Gurwood Street / Campbell Place and Thomas Street (AM peak count only).

Review of the traffic data revealed the AM peak hour occurs between 8.15 am – 9.15 am and the PM peak occurs between 4.45 pm – 5.45 pm. As PM peak hour traffic volumes at the Gurwood Street / Campbell Place and Thomas Street intersection were not surveyed, these volumes were estimated based on the surveyed AM peak hour traffic volumes and were applied in this report.

The peak hour turning movement volumes are shown in Figure 3.

Figure 3: Peak hour turning movement volumes at intersections adjacent to the subject site



3 PROPOSED DEVELOPMENT

3.1 Proposed development summary

The proposed development consists of the following:

- residential development, comprising:
  - 45 residential dwellings
  - 36 terraces
  - 79 apartments fronting Thomas Street.
- off-street car parking spaces (within individual lot garages) to accommodate the residential parking demand
- an internal road network of local roads and laneways
- an internal footpath network connecting the residential units to the existing external public footpath network.

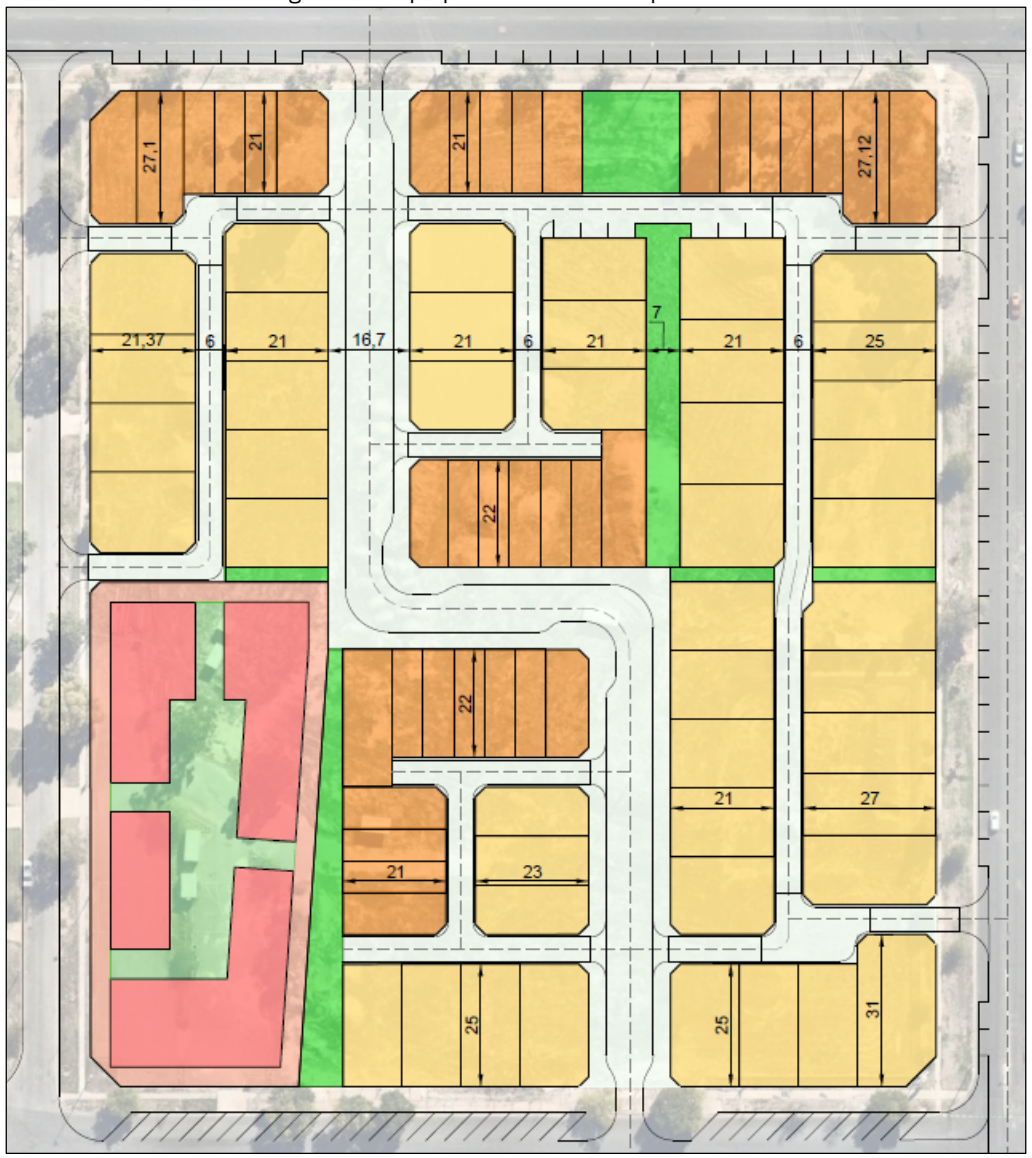
Main access to the subject site is via one local road connecting Kincaid Street with Gurwood Street, with additional access provided via the network of laneways providing connections between Thomas Street and Shaw Street.

The existing intersection at Gurwood Street and Shaw Street will provide access to the surrounding network to the south of the site. The existing intersection priority allocated to traffic along Gurwood Street will provide convenient direct access to the subject site.

Off-street car parking is proposed to be provided for each individual lot within garages and will accommodate the residential parking demand. Additional on-street car parking for use by visitors to the site is proposed to be provided along both sides of the internal access road and along the southern side of the laneway in the north-eastern corner of the site. In addition, visitor car parking can be accommodated along the subject site frontages along Shaw Street, Kincaid Street and Gurwood Street. To facilitate this, the existing angled car parking spaces along Gurwood Street and parallel car parking spaces along Shaw Street and Kincaid Street are proposed to be formalised with linemarking.

The proposed development plan is shown in Figure 4.

Figure 4: The proposed overall development site



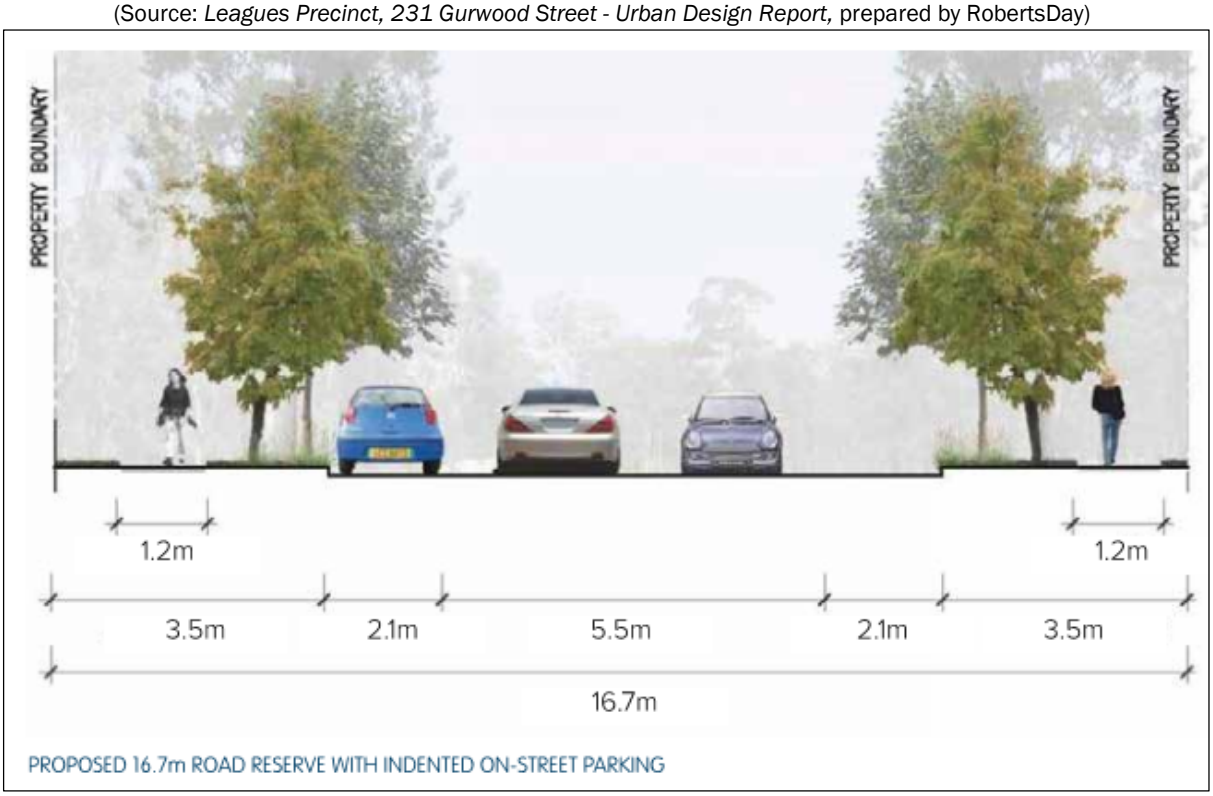
3.2 Proposed road cross sections

The subject site is proposed to have an internal road network comprising one local road and several laneways and staggered laneways providing rear access to properties.

The Local Road cross section is proposed to have a 16.7 m wide road reserve width, with a carriageway width of 5.5 m, consisting of two-way traffic lanes, 2.1 m wide indented car parking lanes and 1.2 m wide footpaths on both sides of the road (refer to Figure 5).

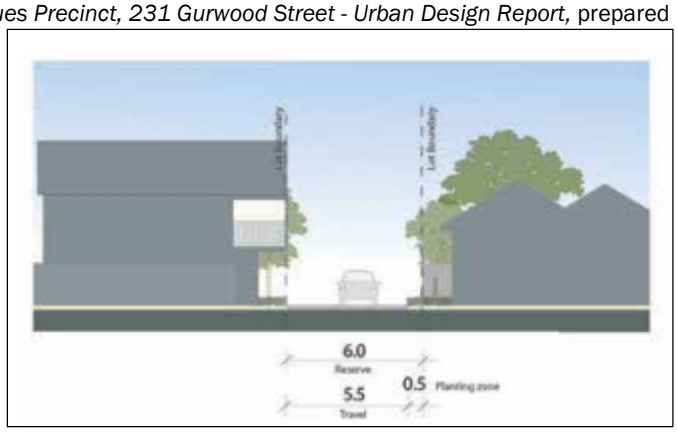
The provision of 2.1 m wide parking lanes along the Local Road is in accordance with on-street parallel car parking dimension requirements, as per AS 2890.5 *Parking Facilities: On Street Parking (1993)*, where there is a restricted roadway width, parking of wide vehicles is unlikely or where a continuously marked parking lane will aid traffic flow. The provision of a 2.1 m parking lane in this location is considered acceptable due to the residential land use of the subject site.

Figure 5: Local Road Cross Section
(Source: *Leagues Precinct, 231 Gurwood Street - Urban Design Report,* prepared by RobertsDay)



Each of the proposed properties will have rear access via laneways, which are proposed to have a 6.0 m wide road reserve width, a 5.5 m wide trafficable width, a 0.5 m width for planting and a garage set back of 1.0 m from the property boundary (refer to Figure 6). This cross section does not provide footpaths, as each of the properties will front either the internal Local Road, the green links through the site or the surrounding existing roads which will all have footpath provision.

Figure 6: Laneway Cross Section
(Source: *Leagues Precinct, 231 Gurwood Street - Urban Design Report,* prepared by RobertsDay)



4 ASSESSMENT

4.1 Traffic generation

The rates from the RMS (previously RTA) Guide to Traffic Generating Developments Section 3.3.2 Medium density residential flat building have been used. The applicable rates are as follows:

- Conservatively assuming, larger units and town houses with three or more bedrooms
  - a daily rate of 6.5 trips per dwelling
  - a weekday peak hour rate of 0.65 trips per dwelling.

The proposed development is estimated to yield 160 units / dwellings, which is estimated to result in a total traffic generation of 1,040 vehicles per day (vpd) to and from the development, with morning and afternoon peaks of 104 vehicles per hour (vph).

Table 1 shows the summary traffic generation from the proposed development.

Table 1: Daily and peak traffic flow for the proposed development – north-west corner

Land Use	Quantity	Unit	RMS Traffic Generation Rate		Development Traffic Generation	
			Daily Vehicle Trips (per unit)	Peak Vehicle Trips (per unit)	Daily Vehicle Trips (vpd)	Peak Vehicle Trips (vph)
Medium Density Residential	160	Dwelling	6.5	0.65	1,040	104
TOTAL					**1,040**	**104**

4.2 Traffic distribution onto the surrounding road network

Peak hour traffic flow for the proposed development would generally be distributed as follows:

AM peak	80% leaving	20% entering
PM peak	30% leaving	70% entering

The traffic generated by the development is assumed to access the surrounding road network either:

- directly onto Kincaid Street, via the proposed local access road
- directly onto Gurwood Street, via the proposed local access road
- indirectly onto Kincaid Street and Gurwood Street, via the proposed laneways and either Thomas Street or Shaw Street.

The distribution of traffic to / from each intersection depends on the proximity of the residential lots within the subject site to each intersection.

The directional distribution of traffic along Kincaid Street and Gurwood Street is as follows:

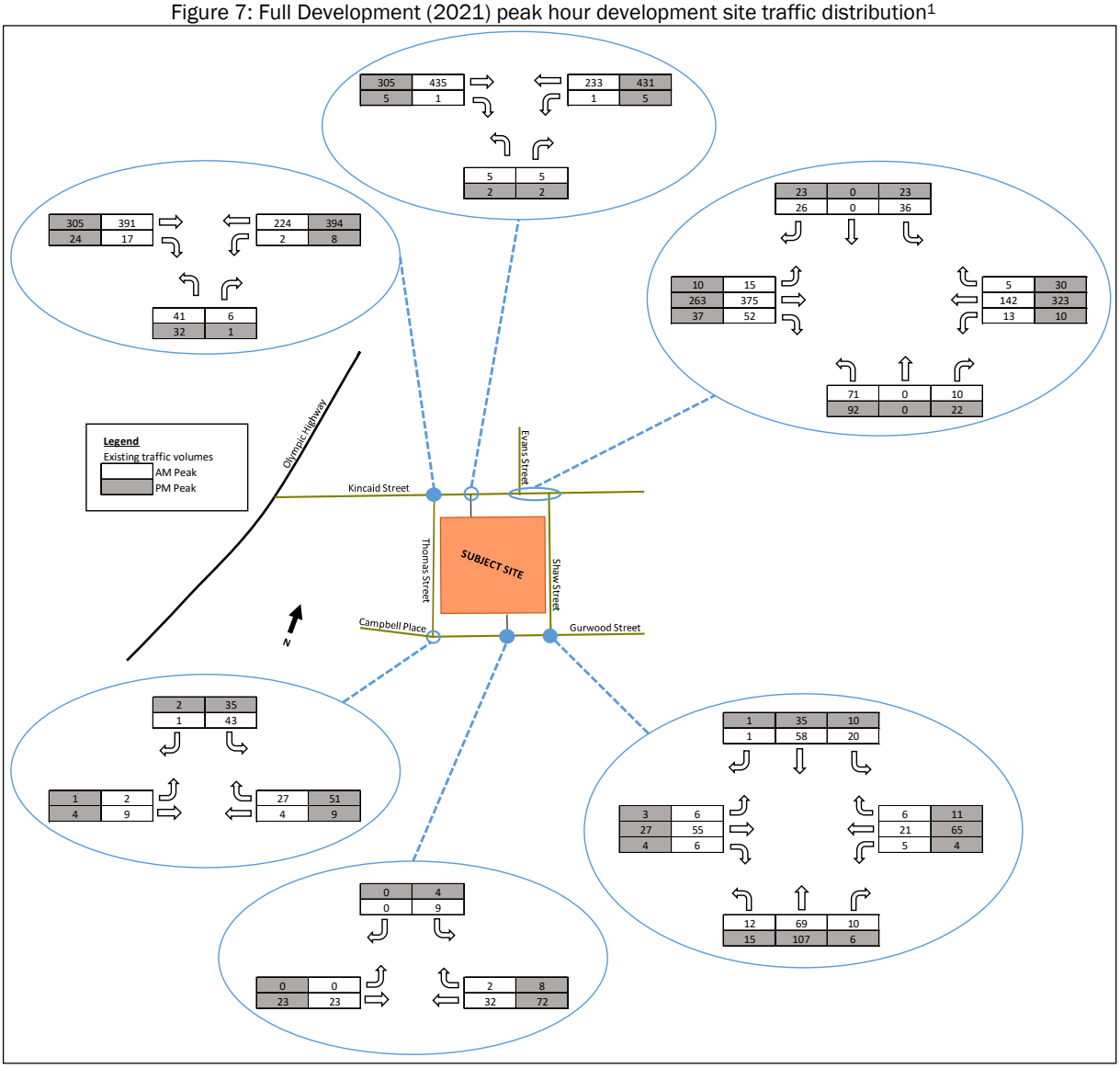
- of the traffic travelling towards Kincaid Street, 50% will travel east and the remaining 50% will travel west.
- of the traffic travelling towards Gurwood Street, it is assumed that 100% of traffic will travel east.

For the traffic that is generated by the apartments, it is assumed that 30% travel along Thomas Street towards Kincaid Street and 70% travel along Thomas Street towards Gurwood Street. Of the 30% travelling towards Kincaid Street, it is assumed that all traffic will travel west along Kincaid Street.

Full development is anticipated to occur by 2021. The existing 2019 volumes were projected to reflect 2021 conditions by applying a 2% compounded annual growth rate to all movements.

Figure 7 indicates the 2021 full development traffic volumes at the surrounding intersections, including both the generated turn movements from the development and projected 2021 traffic volumes.

Figure 7: Full Development (2021) peak hour development site traffic distribution[1]

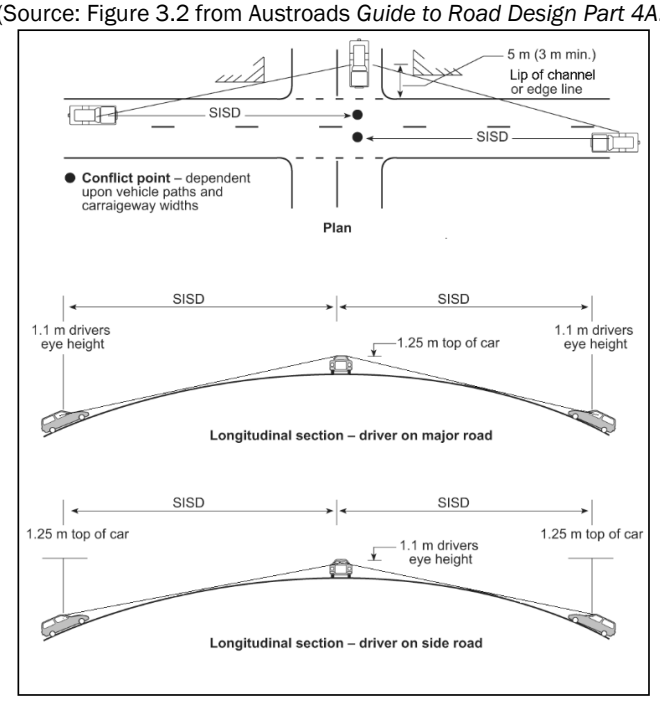


[1] While the traffic volumes distributed along the internal local road and directly onto Kincaid Street and Gurwood Street are low, the remainder of the generated traffic has been distributed onto Thomas Street and Shaw Street (via the laneways) and is included in the assessment at the Thomas Street and Shaw Street intersections with Kincaid Street and Gurwood Street. The traffic generated at each laneway has not been assessed as this is anticipated have negligible impact on traffic operations.

4.3 Intersection sight distance

The visibility criterion normally applied to intersections is Safe Intersection Sight Distance (SISD). This is nominated in the Austroads Guide to Road Design, Part 4A (AGRD4) as the minimum distance which should be provided on the major road at any intersection (refer to Section 3.2.2 in AGRD4A) and provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle from the minor access approach moving into a collision situation (e.g. in the worst case, stalling across the traffic lanes) and to decelerate to a stop before reaching the collision point (refer Figure 8 below.

Figure 8: Safe Intersection Sight Distance (SISD).
(Source: Figure 3.2 from Austroads *Guide to Road Design Part 4A*.)



The minimum SISD criterion specified in Table 3.2 of AGRD4A requires clear visibility for a desirable minimum distance of 97 m, relating to the general reaction time R_T of 2 seconds and a design speed of 50 km/h. This sight distance is applicable to the existing and proposed intersections with Kincaid Street and Gurwood Street. This sight distance is also applicable to the laneway intersections along Thomas Street and Shaw Street.

Kincaid Street, Gurwood Street, Thomas Street and Shaw Street all have straight and flat alignments which will ensure that adequate sightlines well in excess of 97 m will be provided.

There are currently minimal roadside trees on the carriageways, however, consideration should be given to the location of existing and proposed roadside trees to ensure adequate sight lines are retained and any landscaping will not obscure or obstruct drivers' line of sight.

There are several locations where staggered laneways are proposed within the internal road network of the development site. To ensure sight distance between vehicles entering / exiting garages and vehicles travelling along the laneways is maximised, the position of garages within the lot boundary should be located to maximise sight distance, where possible.

4.4 Intersection analysis

SIDRA software was utilised to analyse the proposed intersections from the development to determine the anticipated intersection operations once the proposed development has reached full development.

The program produces statistics and information on the operation of an intersection but typically the main characteristics used to assess the operation of the intersection are the Degree of Saturation (DOS), the 95th percentile queue lengths and average delays.

An explanation of the intersection operating characteristics is shown in Table 2.

Table 2: Definitions of intersection operation characteristics

Degree of Saturation (DOS)			Operation
Sign control	Roundabout	Traffic Signals	
< 0.6	< 0.6	< 0.6	Excellent operating conditions, minimal delays
0.6 - 0.699	0.6 - 0.699	0.6 - 0.699	Very good operating conditions, minimal delays
0.7 - 0.799	0.7 - 0.849	0.7 - 0.899	Good operating conditions, delays and queuing increasing
0.8 - 0.899	0.85 - 0.949	0.9 - 0.949	Fair operating conditions, delays and queues growing. Any interruption to flow such as minor incidents causes increasing delays
0.9 – 1.0	0.95 – 1.0	0.95 – 1.0	Poor operating conditions, flows starting to breakdown and queues and delays increase rapidly.
> 1.0	> 1.0	> 1.0	Very poor operating conditions with queues and delays increasing rapidly. Once queues develop it takes a significant time for queues to dissipate resulting in long delays to traffic movements

Intersection analysis was undertaken for the following intersections to determine the impact of the proposed development has on the adjacent road network:

- Intersection of Kincaid Street / Thomas Street
- Intersection of Kincaid Street / Local Road N
- Intersection of Kincaid Street / Shaw Street
- Intersection of Gurwood Street / Local Road S
- Intersection of Gurwood Street / Thomas Street / Campbell Place
- Intersection of Shaw Street / Gurwood Street.

It is understood that the intersection of Kincaid Street / Shaw Street is a staggered T-intersection. However, it has been modelled as a cross intersection due to the limitations within the SIDRA model. This is considered conservative, due to the increased number of conflict points at a cross intersection and the cross intersection priorities resulting in turning vehicles required to give way to additional movements when compared with a staggered T-intersection.

Refer to Table 3 for a summary of the SIDRA results and Attachment A for detailed SIDRA outputs.

Table 3: Summary of SIDRA results

	Movements	Anticipated 2021 Traffic Volumes						Design Life
		DOS		95% Queue (m)		Average Delay (sec)		
		AM	PM	AM	PM	AM	PM	No. of Years
Kincaid Street / Thomas Street	Thomas Street (south approach)	0.042	0.033	1.1	0.9	6.6	7.1	10+
	Kincaid Street (east approach)	0.126	0.224	0.0	0.0	0.1	0.1	
	Kincaid Street (west approach)	0.231	0.192	1.1	1.9	0.3	0.8	
Kincaid Street / Local Road N	Local Road N (south approach)	0.013	0.006	0.3	0.1	7.6	8.3	10+
	Kincaid Street (east approach)	0.130	0.243	0.0	0.0	0.0	0.1	
	Kincaid Street (west approach)	0.243	0.175	0.1	0.4	0.0	0.2	
Kincaid Street / Shaw Street	Shaw Street (south approach)	0.074	0.131	2.0	3.5	6.6	7.7	10+
	Kincaid Street (east approach)	0.091	0.209	0.5	2.3	0.8	0.9	
	Evans Street (north approach)	0.091	0.076	2.2	1.8	8.5	9.0	
	Kincaid Street (west approach)	0.253	0.183	3.5	2.8	1.0	1.3	
Gurwood Street / Campbell Place / Thomas Street	Gurwood Street (east approach)	0.018	0.035	0.6	1.1	4.8	4.6	10+
	Thomas Street (north approach)	0.029	0.024	0.8	0.7	5.6	5.6	
	Campbell Place (west approach)	0.006	0.003	0.0	0.0	1.0	1.1	
Gurwood Street / Local Road S	Gurwood Street (east approach)	0.019	0.045	0.1	0.4	0.3	0.6	10+
	Local Road S (north approach)	0.007	0.004	0.2	0.1	5.6	5.6	
	Gurwood Street (west approach)	0.013	0.013	0.0	0.0	0.2	0.2	
Gurwood Street / Shaw Street	Shaw Street (south approach)	0.079	0.111	2.0	3.0	4.9	4.8	10+
	Gurwood Street (east approach)	0.018	0.045	0.3	0.5	2.0	1.1	
	Shaw Street (north approach)	0.065	0.039	1.7	1.0	4.8	4.8	
	Gurwood Street (west approach)	0.038	0.019	0.3	0.2	1.0	1.2	

SIDRA analysis reveals, that upon completion of the subdivision in 2021, it is anticipated that all of the above intersections will operate with excellent operating conditions during both the AM and PM peak periods. Furthermore, it is anticipated that through traffic travelling along Kincaid Street and Gurwood Street will experience minimal delays, with average delays remaining below 0.3 seconds during both peak periods.

4.4.1 Sensitivity Analysis

A practical DOS of 0.80 for sign-controlled intersections was used as the maximum acceptable degree of saturation. A DOS below 0.80 for sign-controlled intersections results in acceptable or better operating conditions. Above 0.80, the intersection results in flows starting to breakdown and queues and delays increase rapidly.

SIDRA design life sensitivity analysis revealed that all intersections have an anticipated design life of greater than 10 years post development under existing configurations.

5 INTERNAL ROAD LAYOUT

5.1 Speed zoning and traffic calming

Austroads Guide to Traffic Management Part 8: Local Area Traffic Management indicates that street section lengths (i.e. between slow or near-stop conditions) should be kept below 200 m – 250 m for target speeds of around 50 km/h.

The internal road network of the subject site meets this guideline with maximum road lengths of approximately 200 m.

5.2 Intersection design

All intersections within the site are "T" intersections, which enhance safety and minimises potential confusion for motorists at intersections. The "T" intersections should be designed in locations to ensure suitable safe intersection sight distances can be provided.

The urban design layout indicates that some of the laneways are located opposite one another on either side of the local road and form a cross intersection. However, due to the lower classification of the laneways, the risk is reduced and it is recommended that the laneways be provided with concrete vehicle crossings at their intersections with the local road to reinforce the priority.

The minimum SISD criterion specified in AGRD4A requires clear visibility for a desirable minimum distance of 97 m, for a design speed of 50 km/h. This sight distance is applicable to each of the internal intersections proposed within the development site.

Generally, the internal intersections appear to be reasonably positioned in relation to sight distance. The exception to this is the two laneway intersections with the Local Road, located directly north and south of the 90 degree bends. Sight distance in these locations is restricted to 35 m – 45 m.

Due to the 90 degree bends, vehicle speeds on approach to the intersections are expected to be reduced to 20 - 25 km/h, relating to a reduced SISD requirement of 32 - 42 m. Hence, considering the anticipated speeds and the low volume of traffic accessing the laneways, the available sight distance is considered to be satisfactory.

Additionally, any landscaping or street furniture within the verge in close proximity to an intersection or 90 degree bend should be positioned so that it will not obscure or obstruct drivers' line of sight.

5.3 On-street car parking

On-street kerbside car parking is proposed along both sides of the internal local road, with no car parking generally permitted along the laneways / staggered laneways, with the exception of car parking spaces proposed in the north-eastern corner of the site, in the vicinity of the green link.

Car parking should be restricted on the approaches to intersections to ensure that adequate sight distances are provided in each direction along the frontage road. Additionally, car parking should be restricted on the outside of the 90 degree bends to accommodate vehicle swept paths (refer to Attachment B).

On-street parallel car parking is proposed to be formalised along the western side of Shaw Street and the southern side of Kincaid Street, along the subject site frontages. In addition, 45 degree angled car parking along Gurwood Street is proposed to be formalised.

On-street car parking spaces should be designed to comply with the dimensions set out in AS 2890.5 *Parking facilities - Part 5: On-street parking*, which specifies the following:

- parallel car parking spaces should be:
  - 2.1 m x 5.4 m, for spaces where vehicles may enter or leave the space directly
  - 2.1 m x 6.0 m, for an intermediate space
  - 2.1 m x 6.3 m, for an end space which is obstructed at one end by a kerb.
- 45 degree angled car parking spaces should be 2.4 m x 5.2 m, for a low turnover category car parking space.

There are six car parking spaces proposed in the vicinity of the green link, along the east-west aligned laneway in the north-east corner of the site. The dimensions of these spaces are proposed to be 3.0 m x 5.5 m. This does not meet AS 2890.5 requirements and it is recommended that the proposed car parking be modified accordingly. This will still result in a total of six spaces being provided in this location (refer to Attachment B).

The parallel and 45 degree car parking spaces proposed along existing streets surrounding the subject site are proposed as follows:

- Shaw Street (parallel spaces) – 2.1 m x 5.5 m
- Kincaid Street (parallel spaces) – 2.5 m x 5.5 m
- Gurwood Street (45 degree spaces) – 2.7 m x 5.6 m.

The parallel car parking spaces do not meet AS 2890.5 requirements and it is recommended that the dimensions of these spaces be modified accordingly. The dimensions of the 45-degree car parking spaces are provided in excess of the AS 2809.5 requirements and are considered satisfactory.

The on-street car parking proposed along Gurwood Street and Shaw Street is shown to extend through vehicle crossovers. Therefore, it is recommended that the car parking be further modified to ensure that marked car parking spaces are clear of all vehicle crossovers.

5.4 Vehicle access

All roads and laneways within the development need to provide sufficient space so that passenger vehicles can pass simultaneously around the 90 degree bends and at intersections within the internal road network.

A swept path assessment to demonstrate a B85 and a B99 design vehicle performing these manoeuvres was undertaken and revealed that:

- to accommodate vehicle swept paths, an increased kerb radius and increased splays are required at corners
- to allow vehicles to reverse out of property garages, a 1.0 m extension beyond the property boundary is required at each dead end laneway (currently ending in line with the adjacent property boundary).

It is noted that the above changes required to accommodate swept paths will marginally reduce the lot sizes at these locations.

Refer Attachment C for the swept path assessment.

5.5 Emergency and service vehicle access

All roads within the development need to provide sufficient space so that emergency vehicles, waste collection vehicles and street-cleaning vehicles can carry out their functions while travelling in a forward direction only.

Roads should be designed to cater for a 9.8 m long service vehicle negotiating the road network in a forward direction, specifically ensuring that service vehicles will be able to safely negotiate sharp curves in the road alignment and through all intersections within the site.

A swept path assessment has been undertaken for a 9.8 m long service vehicle, which indicates that the service vehicle can access the local road and each of the laneways / staggered laneways within the site.

The internal layout for the apartments fronting Thomas Street has not yet be prepared, hence a separate waste management plan is likely to be required.

Refer to Attachment C for the swept path assessment.

6 CONCLUSIONS AND RECOMMENDATIONS

The proposed development site is located at 231 Gurwood Street in Wagga Wagga and is proposed to yield 160 residential properties.

It is concluded that:

- the proposed development is estimated to yield 160 residential properties resulting in a traffic generation of approximately 1,040 vehicles per day (vpd) to and from the development, with morning and afternoon peaks of approximately 104 vehicles per hour (vph)
- main access to the subject site is via one local road connecting Kincaid Street with Gurwood Street
- adequate intersection sightlines will be provided at each of the access points to the subject site
- a 9.8 m long service vehicle will be able to negotiate along the local road and each of the laneways within the site
- a separate waste management plan is likely to be required for the apartments fronting Thomas Street.

It is recommended that:

- any landscaping or street furniture proposed in close proximity to intersections be located to ensure drivers' line of sight is not obscured
- the laneways be provided with concrete vehicle crossings at their intersections with the local road to reinforce the priority
- an increased kerb radius and increased splays be provided at corners within the subject site to accommodate vehicle swept paths
- a 1.0 m extension beyond the property boundary be provided at each dead end laneway to allow vehicles to reverse out of property garages
- the proposed on-street car parking spaces be modified to meet AS 2890.5 requirements
- the proposed on-street car parking along Gurwood Street and Shaw Street be modified to ensure vehicle crossovers are kept clear.

Provided the recommendations outlined in this report are implemented, there are no traffic related reasons that would prevent this development from occurring.

ATTACHMENT A – SIDRA OUTPUTS

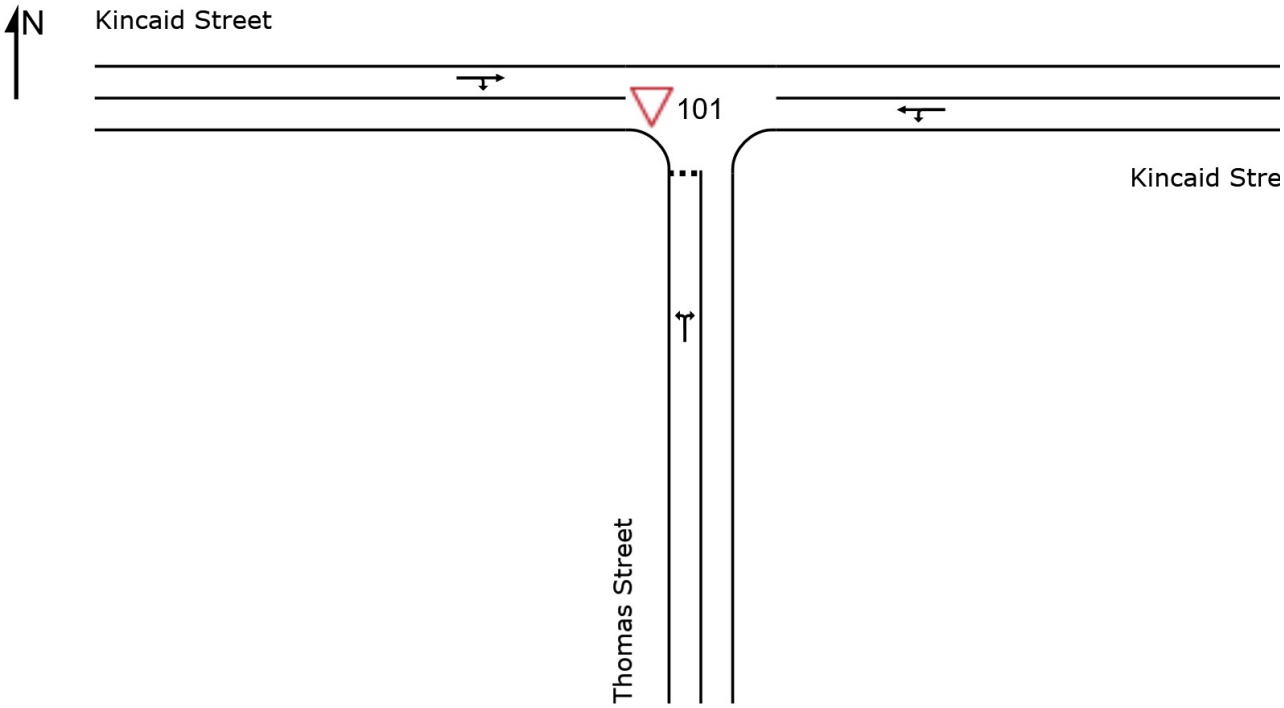
USER REPORT FOR SITE

Project: 180763_SIDRA Analysis_Anticipated 2021_190918 **Template: SIDRA Outputs**

Site: 101 [Kincaid Street / Thomas Street - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



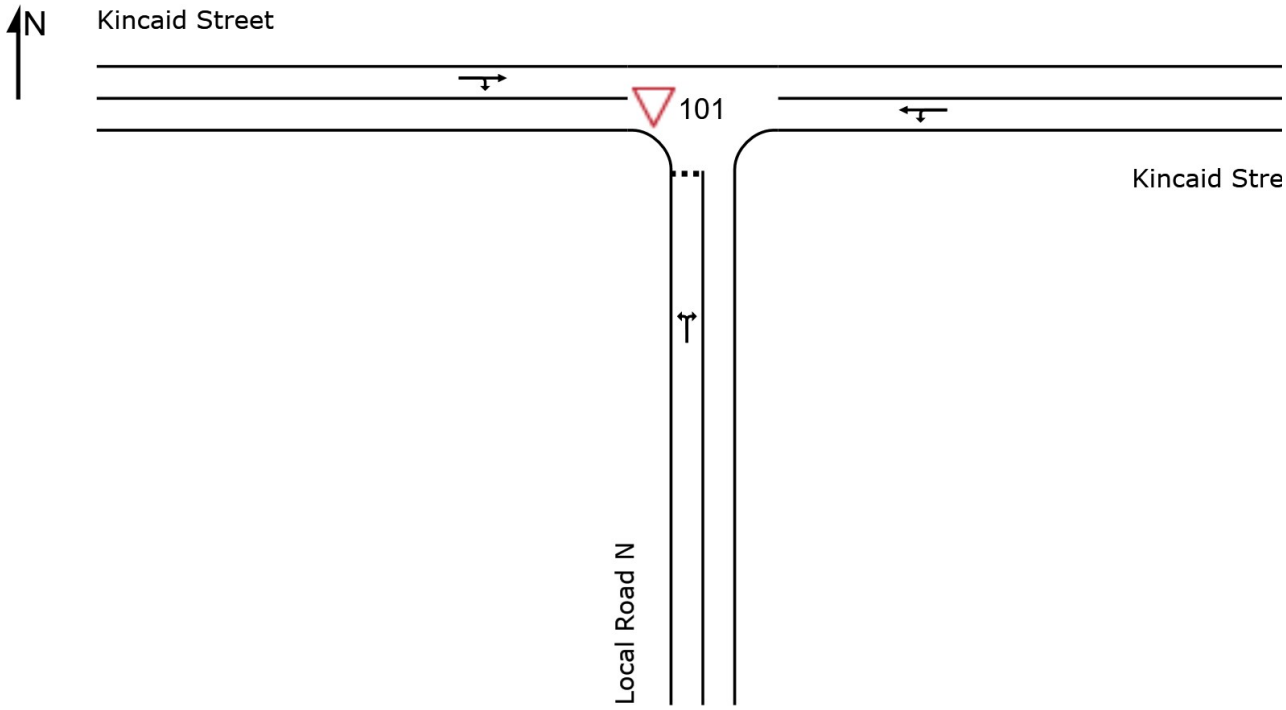
Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Thomas Street													
Lane 1	49	0.0	1167	0.042	100	6.6	LOS A	0.2	1.1	Full	230	0.0	0.0
Approach	49	0.0		0.042		6.6	LOS A	0.2	1.1				
East: Kincaid Street													
Lane 1	238	5.0	1888	0.126	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	238	5.0		0.126		0.1	NA	0.0	0.0				
West: Kincaid Street													
Lane 1	429	4.8	1863	0.231	100	0.3	LOS A	0.2	1.1	Full	250	0.0	0.0
Approach	429	4.8		0.231		0.3	NA	0.2	1.1				
Intersection	717	4.5		0.231		0.7	NA	0.2	1.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Kincaid Street / Local Road N - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Local Road N													
Lane 1	11	0.0	838	0.013	100	7.6	LOS A	0.0	0.3	Full	230	0.0	0.0
Approach	11	0.0		0.013		7.6	LOS A	0.0	0.3				
East: Kincaid Street													
Lane 1	246	5.0	1888	0.130	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	246	5.0		0.130		0.0	NA	0.0	0.0				
West: Kincaid Street													
Lane 1	459	5.0	1887	0.243	100	0.0	LOS A	0.0	0.1	Full	250	0.0	0.0
Approach	459	5.0		0.243		0.0	NA	0.0	0.1				
Intersection	716	4.9		0.243		0.1	NA	0.0	0.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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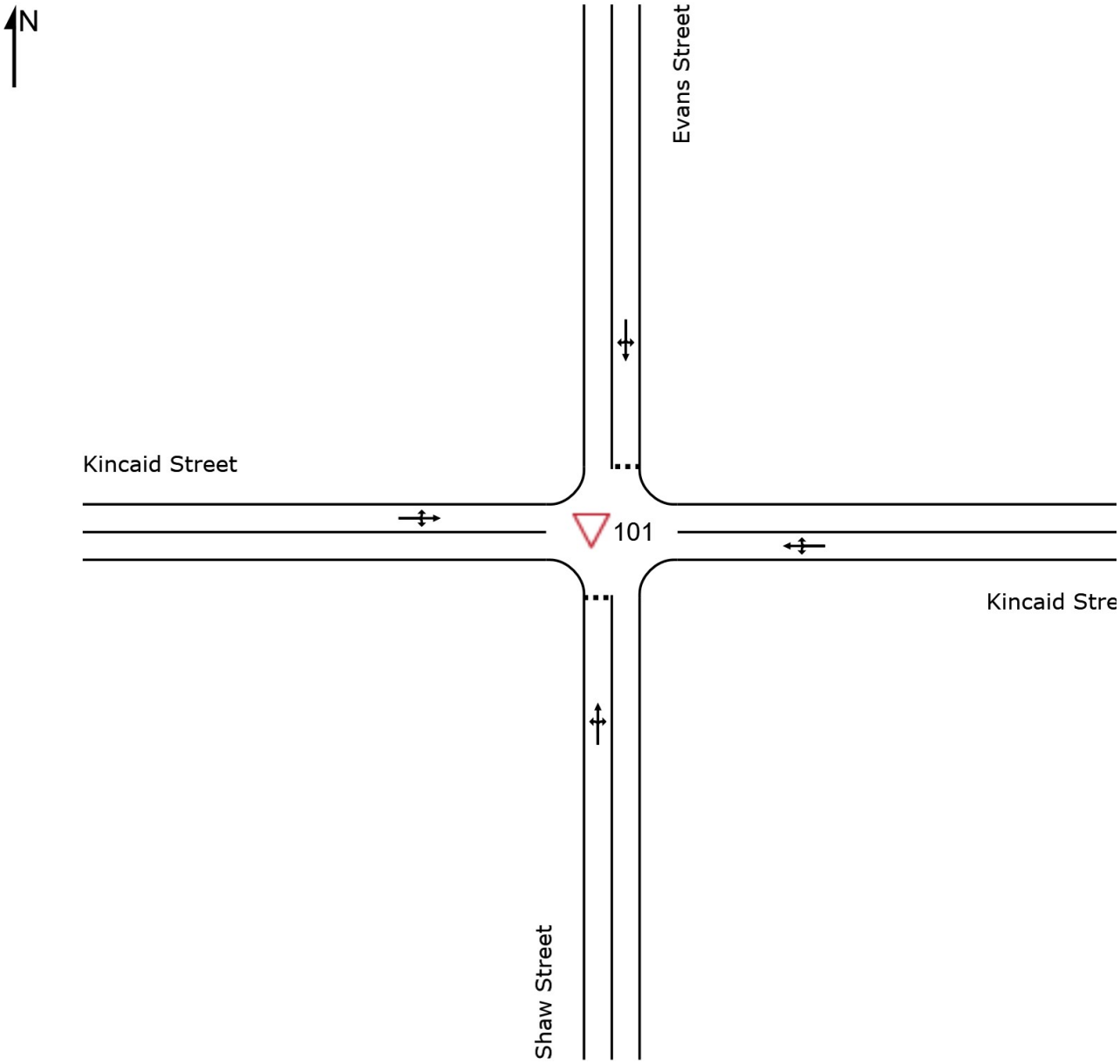
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Kincaid Street / Shaw Street - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



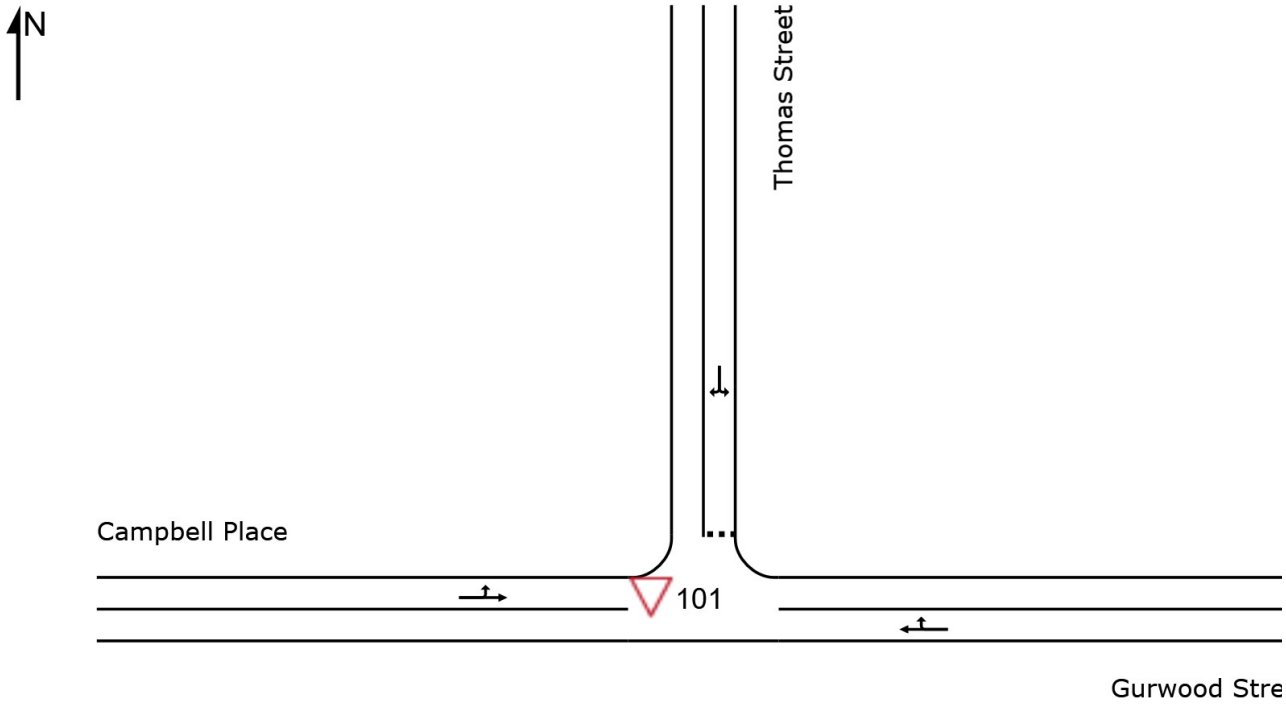
Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Shaw Street													
Lane 1	86	0.1	1168	0.074	100	6.6	LOS A	0.3	2.0	Full	230	0.0	0.0
Approach	86	0.1		0.074		6.6	LOS A	0.3	2.0				
East: Kincaid Street													
Lane 1	168	4.4	1851	0.091	100	0.8	LOS A	0.1	0.5	Full	500	0.0	0.0
Approach	168	4.4		0.091		0.8	NA	0.1	0.5				
North: Evans Street													
Lane 1	66	0.1	732	0.091	100	8.5	LOS A	0.3	2.2	Full	450	0.0	0.0
Approach	66	0.1		0.091		8.5	LOS A	0.3	2.2				
West: Kincaid Street													
Lane 1	465	4.2	1838	0.253	100	1.0	LOS A	0.5	3.5	Full	430	0.0	0.0
Approach	465	4.2		0.253		1.0	NA	0.5	3.5				
Intersection	786	3.5		0.253		2.2	NA	0.5	3.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Gurwood Street / Campbell Place / Thomas Street - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
East: Gurwood Street													
Lane 1	33	0.6	1792	0.018	100	4.8	LOS A	0.1	0.6	Full	500	0.0	0.0
Approach	33	0.6		0.018		4.8	NA	0.1	0.6				
North: Thomas Street													
Lane 1	46	0.0	1613	0.029	100	5.6	LOS A	0.1	0.8	Full	230	0.0	0.0
Approach	46	0.0		0.029		5.6	LOS A	0.1	0.8				
West: Campbell Place													
Lane 1	12	0.0	1932	0.006	100	1.0	LOS A	0.0	0.0	Full	140	0.0	0.0
Approach	12	0.0		0.006		1.0	NA	0.0	0.0				
Intersection	91	0.2		0.029		4.7	NA	0.1	0.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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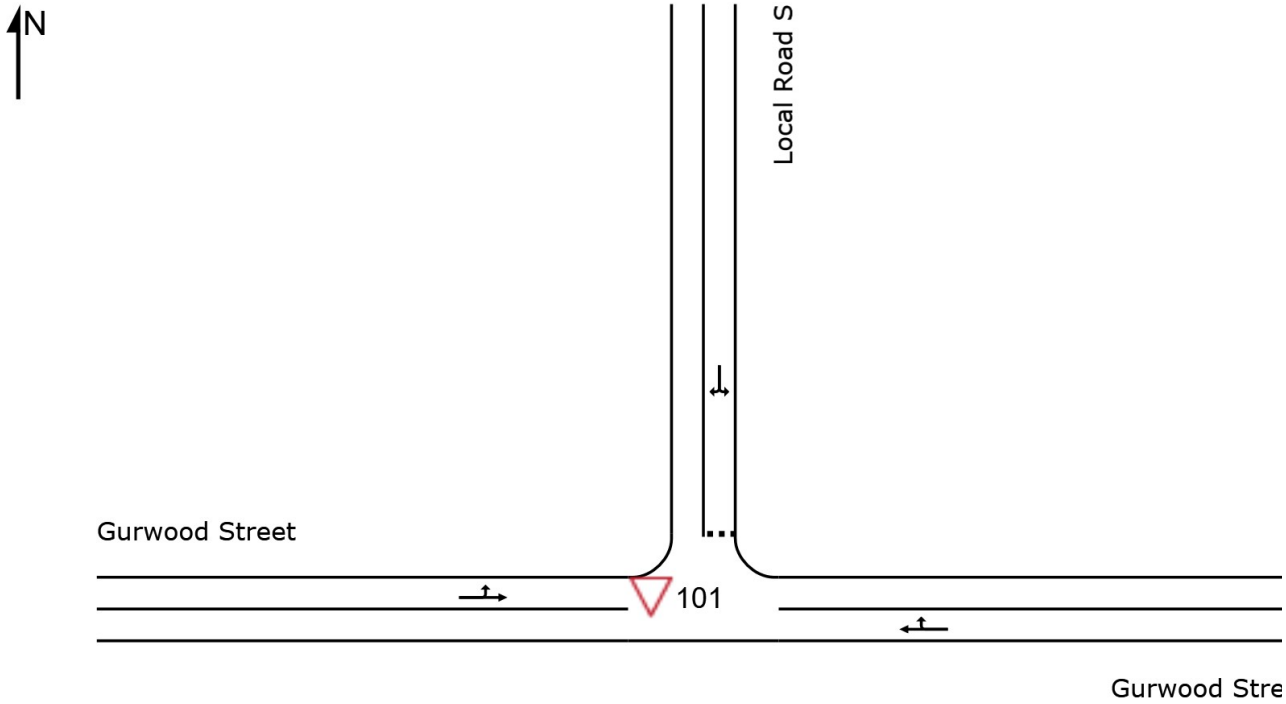
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Gurwood Street / Local Road S - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Gurwood Street													
Lane 1	36	4.7	1879	0.019	100	0.3	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	36	4.7		0.019		0.3	NA	0.0	0.1				
North: Local Road S													
Lane 1	11	0.0	1555	0.007	100	5.6	LOS A	0.0	0.2	Full	230	0.0	0.0
Approach	11	0.0		0.007		5.6	LOS A	0.0	0.2				
West: Gurwood Street													
Lane 1	25	4.8	1887	0.013	100	0.2	LOS A	0.0	0.0	Full	140	0.0	0.0
Approach	25	4.8		0.013		0.2	NA	0.0	0.0				
Intersection	72	4.0		0.019		1.1	NA	0.0	0.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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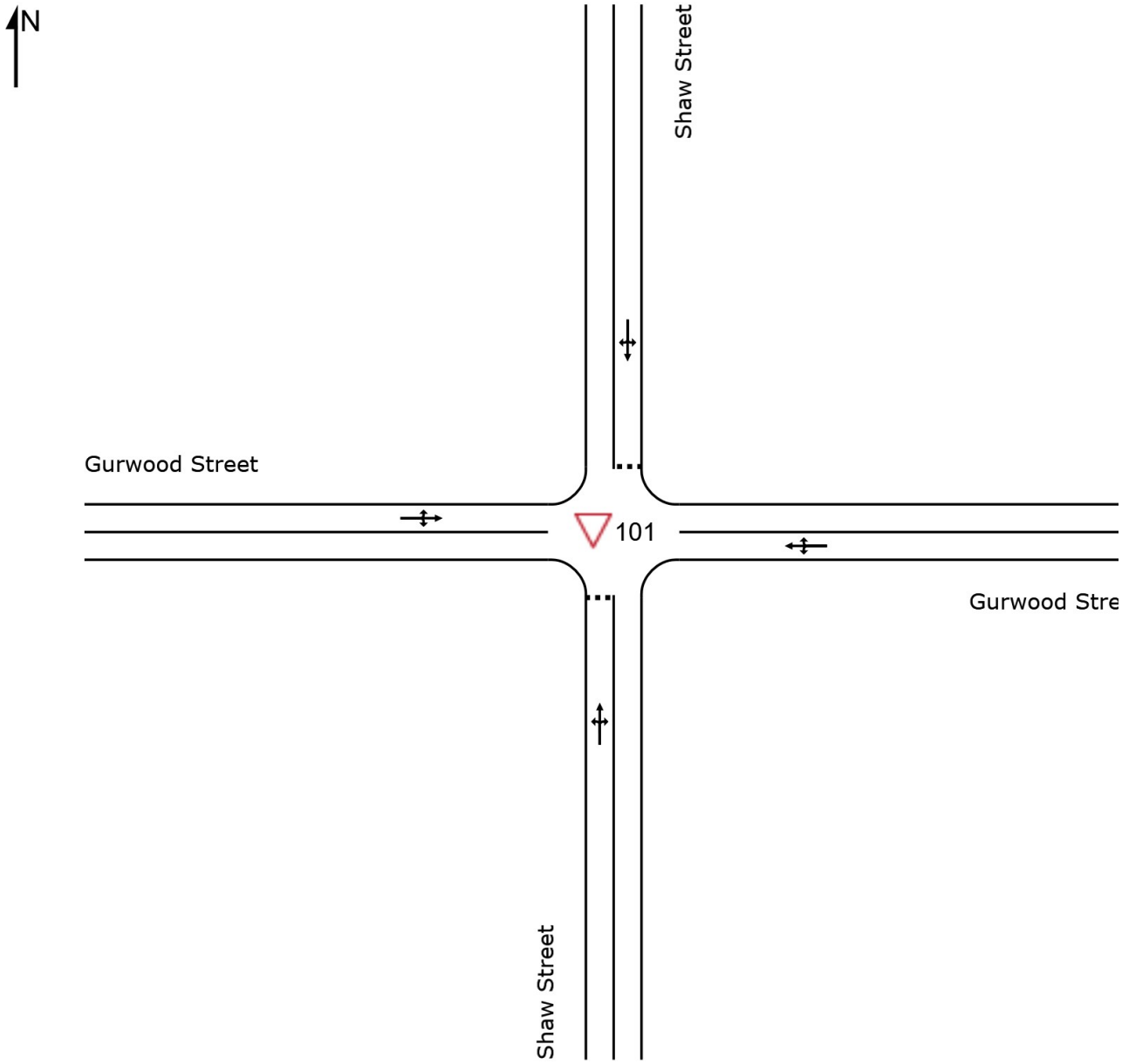
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Gurwood Street / Shaw Street - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Shaw Street													
Lane 1	96	0.0	1215	0.079	100	4.9	LOS A	0.3	2.0	Full	500	0.0	0.0
Approach	96	0.0		0.079		4.9	LOS A	0.3	2.0				
East: Gurwood Street													
Lane 1	34	3.3	1842	0.018	100	2.0	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	34	3.3		0.018		2.0	NA	0.0	0.3				
North: Shaw Street													
Lane 1	83	0.0	1282	0.065	100	4.8	LOS A	0.2	1.7	Full	230	0.0	0.0
Approach	83	0.0		0.065		4.8	LOS A	0.2	1.7				
West: Gurwood Street													
Lane 1	71	4.1	1871	0.038	100	1.0	LOS A	0.0	0.3	Full	140	0.0	0.0
Approach	71	4.1		0.038		1.0	NA	0.0	0.3				
Intersection	283	1.4		0.079		3.6	NA	0.3	2.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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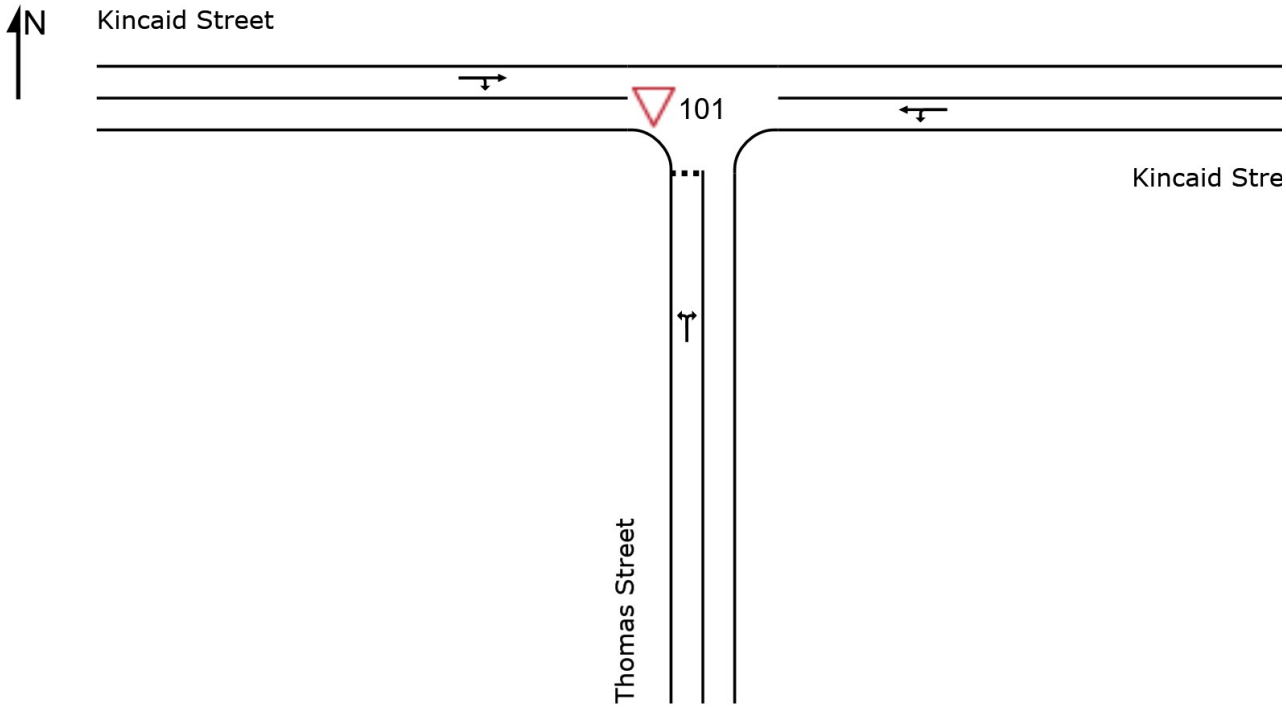
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Kincaid Street / Thomas Street - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Thomas Street													
Lane 1	35	0.0	1061	0.033	100	7.1	LOS A	0.1	0.9	Full	230	0.0	0.0
Approach	35	0.0		0.033		7.1	LOS A	0.1	0.9				
East: Kincaid Street													
Lane 1	423	4.9	1888	0.224	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	423	4.9		0.224		0.1	NA	0.0	0.0				
West: Kincaid Street													
Lane 1	346	4.6	1806	0.192	100	0.8	LOS A	0.3	1.9	Full	250	0.0	0.0
Approach	346	4.6		0.192		0.8	NA	0.3	1.9				
Intersection	804	4.6		0.224		0.7	NA	0.3	1.9				

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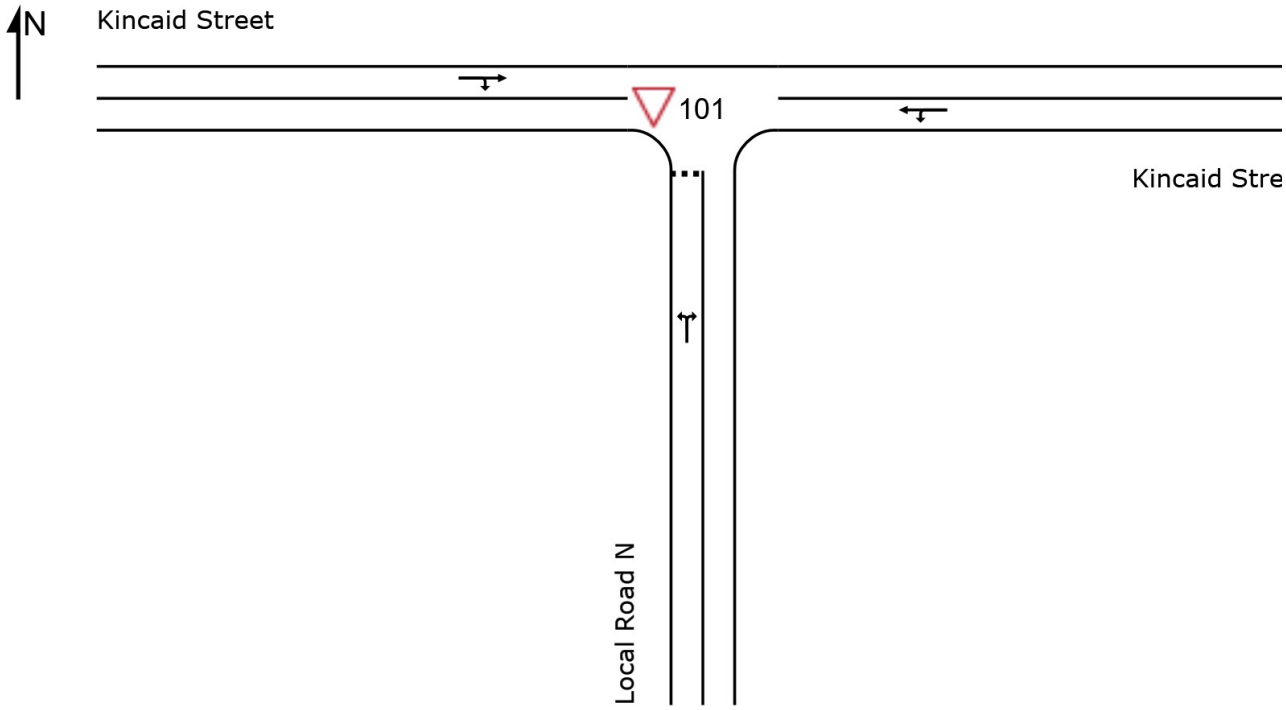
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Kincaid Street / Local Road N - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Local Road N													
Lane 1	4	0.0	730	0.006	100	8.3	LOS A	0.0	0.1	Full	230	0.0	0.0
Approach	4	0.0		0.006		8.3	LOS A	0.0	0.1				
East: Kincaid Street													
Lane 1	459	4.9	1888	0.243	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	459	4.9		0.243		0.1	NA	0.0	0.0				
West: Kincaid Street													
Lane 1	326	4.9	1868	0.175	100	0.2	LOS A	0.1	0.4	Full	250	0.0	0.0
Approach	326	4.9		0.175		0.2	NA	0.1	0.4				
Intersection	789	4.9		0.243		0.2	NA	0.1	0.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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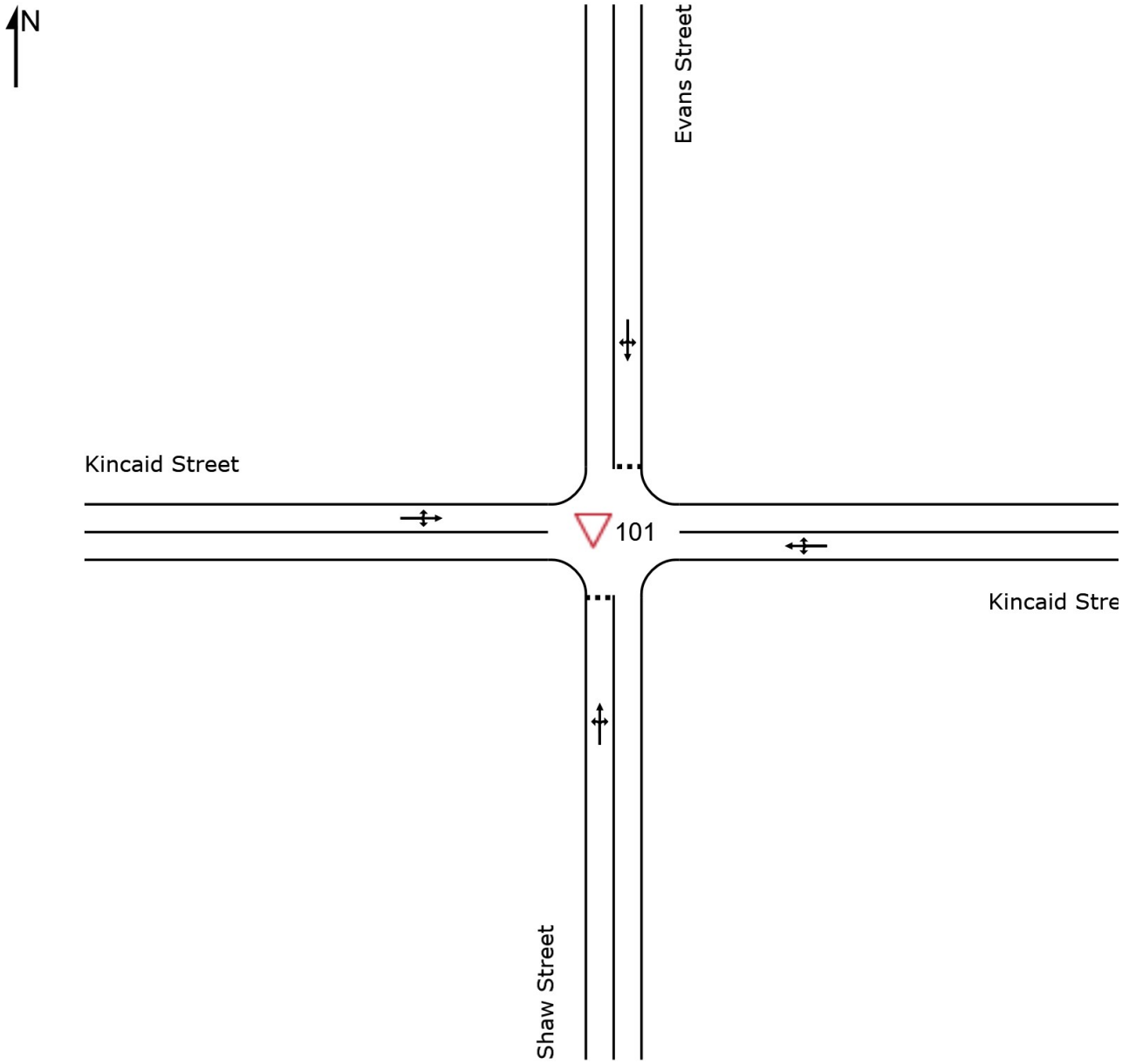
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Kincaid Street / Shaw Street - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Shaw Street													
Lane 1	121	0.0	922	0.131	100	7.7	LOS A	0.5	3.5	Full	230	0.0	0.0
Approach	121	0.0		0.131		7.7	LOS A	0.5	3.5				
East: Kincaid Street													
Lane 1	382	4.4	1828	0.209	100	0.9	LOS A	0.3	2.3	Full	500	0.0	0.0
Approach	382	4.4		0.209		0.9	NA	0.3	2.3				
North: Evans Street													
Lane 1	49	0.1	655	0.076	100	9.0	LOS A	0.3	1.8	Full	450	0.0	0.0
Approach	49	0.1		0.076		9.0	LOS A	0.3	1.8				
West: Kincaid Street													
Lane 1	326	4.2	1782	0.183	100	1.3	LOS A	0.4	2.8	Full	430	0.0	0.0
Approach	326	4.2		0.183		1.3	NA	0.4	2.8				
Intersection	879	3.5		0.209		2.4	NA	0.5	3.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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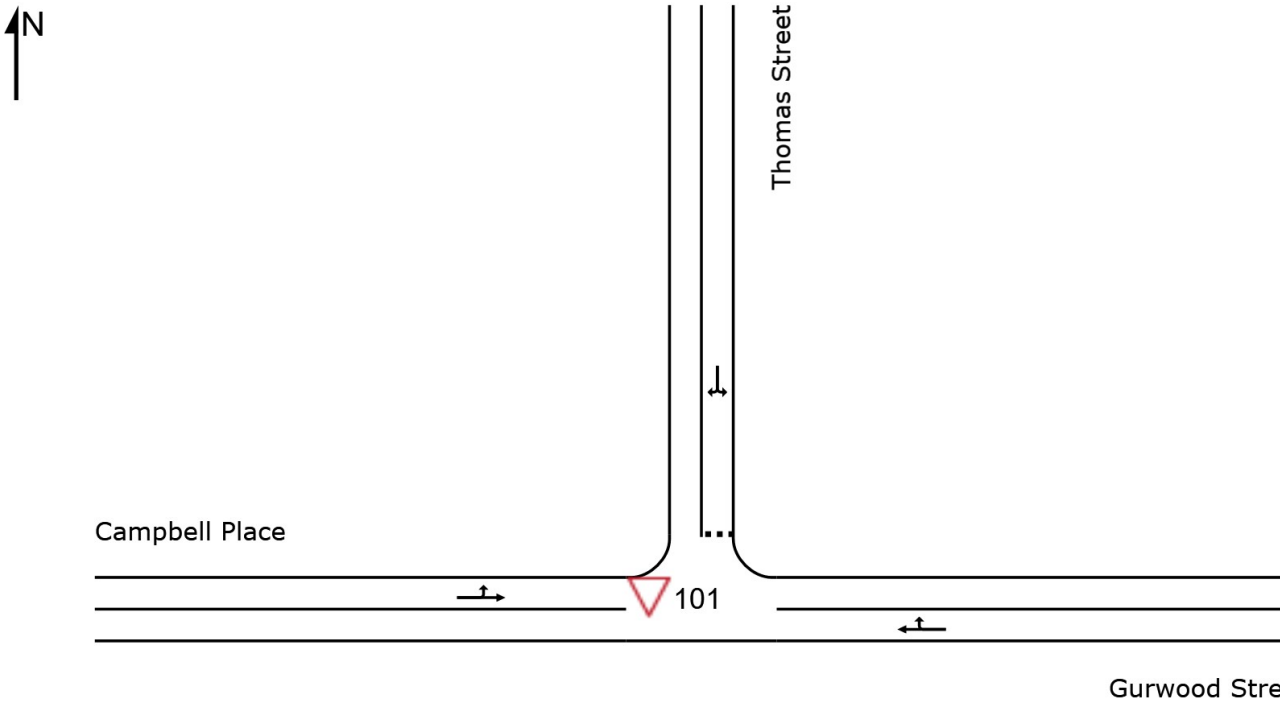
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Gurwood Street / Campbell Place / Thomas Street - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



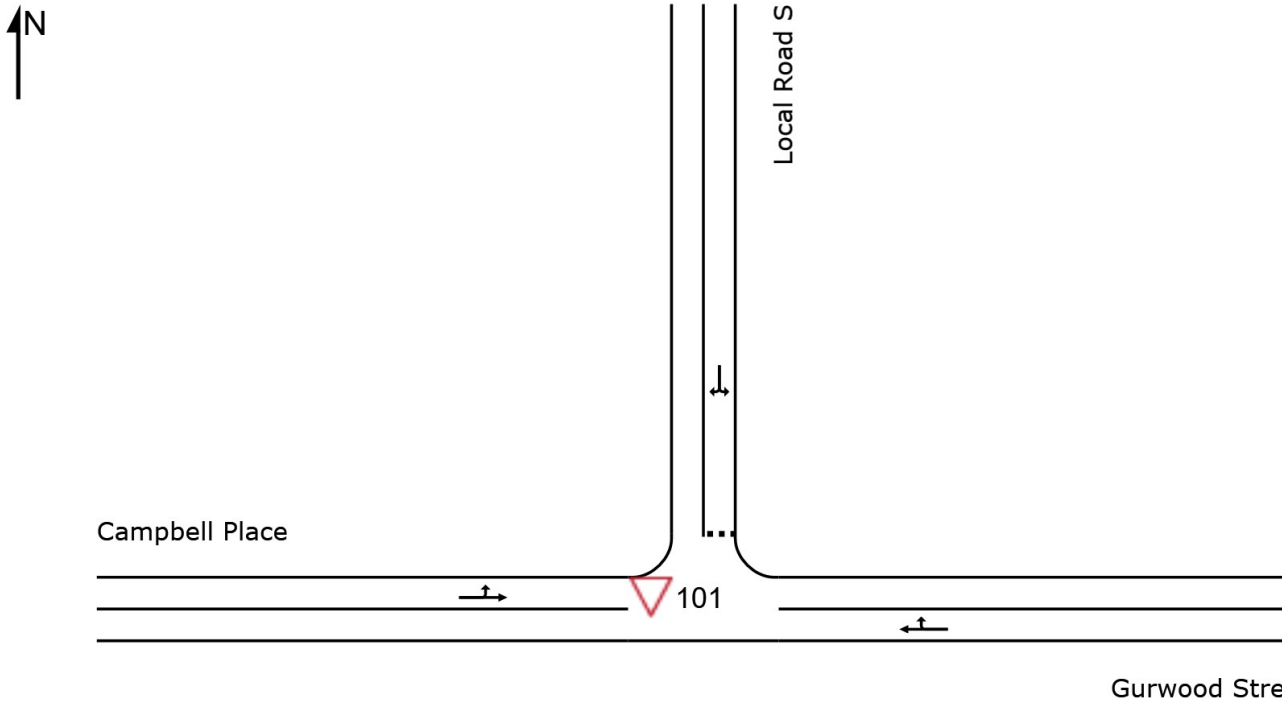
Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
East: Gurwood Street													
Lane 1	63	0.8	1802	0.035	100	4.6	LOS A	0.2	1.1	Full	500	0.0	0.0
Approach	63	0.8		0.035		4.6	NA	0.2	1.1				
North: Thomas Street													
Lane 1	39	0.0	1601	0.024	100	5.6	LOS A	0.1	0.7	Full	230	0.0	0.0
Approach	39	0.0		0.024		5.6	LOS A	0.1	0.7				
West: Campbell Place													
Lane 1	5	0.0	1931	0.003	100	1.1	LOS A	0.0	0.0	Full	140	0.0	0.0
Approach	5	0.0		0.003		1.1	NA	0.0	0.0				
Intersection	107	0.4		0.035		4.8	NA	0.2	1.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Gurwood Street / Local Road S - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



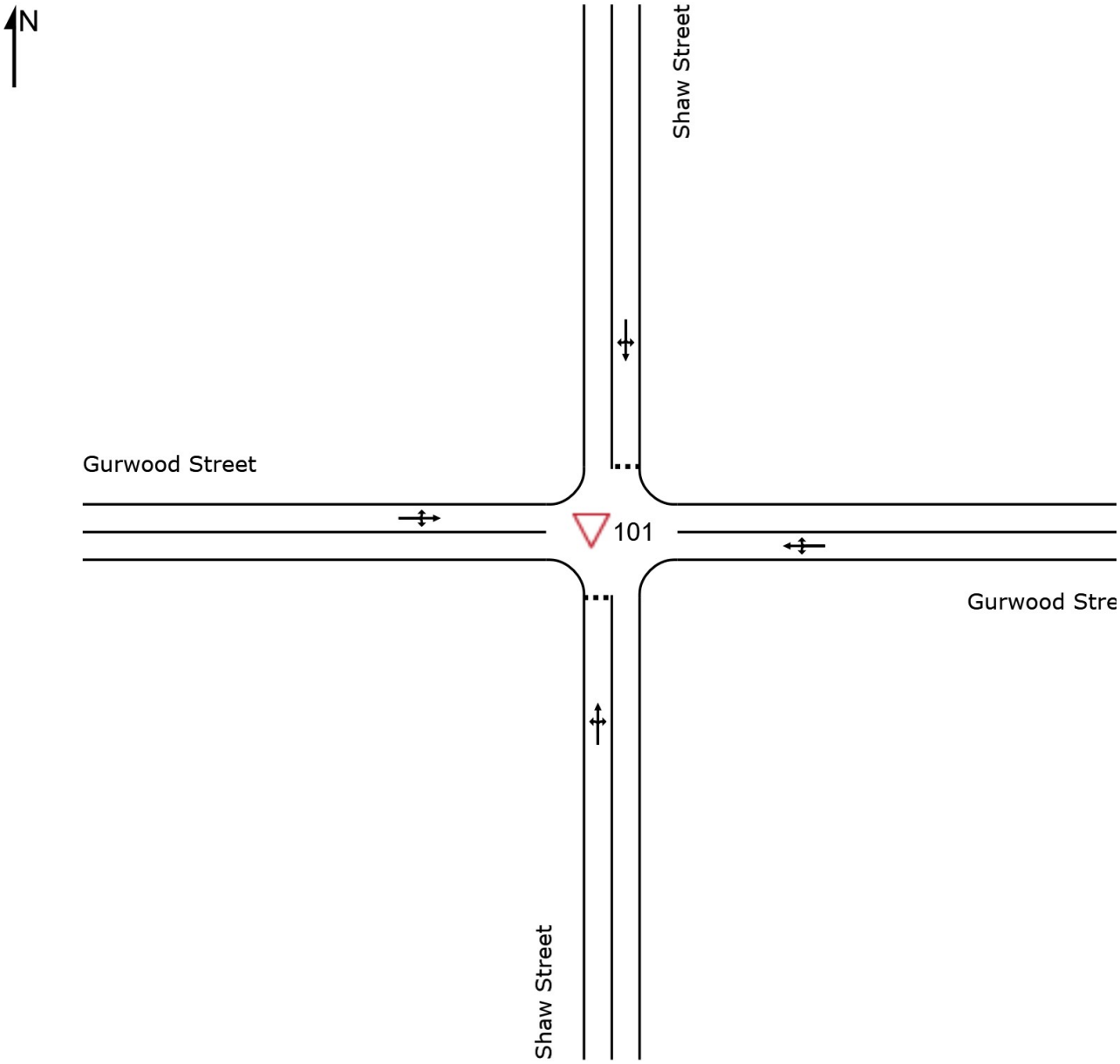
Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
East: Gurwood Street													
Lane 1	84	4.5	1872	0.045	100	0.6	LOS A	0.0	0.4	Full	500	0.0	0.0
Approach	84	4.5		0.045		0.6	NA	0.0	0.4				
North: Local Road S													
Lane 1	5	0.0	1493	0.004	100	5.6	LOS A	0.0	0.1	Full	230	0.0	0.0
Approach	5	0.0		0.004		5.6	LOS A	0.0	0.1				
West: Campbell Place													
Lane 1	25	4.8	1887	0.013	100	0.2	LOS A	0.0	0.0	Full	140	0.0	0.0
Approach	25	4.8		0.013		0.2	NA	0.0	0.0				
Intersection	115	4.4		0.045		0.7	NA	0.0	0.4				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Gurwood Street / Shaw Street - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)

Site Layout



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Shaw Street													
Lane 1	135	0.0	1213	0.111	100	4.8	LOS A	0.4	3.0	Full	500	0.0	0.0
Approach	135	0.0		0.111		4.8	LOS A	0.4	3.0				
East: Gurwood Street													
Lane 1	84	4.1	1863	0.045	100	1.1	LOS A	0.1	0.5	Full	500	0.0	0.0
Approach	84	4.1		0.045		1.1	NA	0.1	0.5				
North: Shaw Street													
Lane 1	48	0.0	1254	0.039	100	4.8	LOS A	0.1	1.0	Full	230	0.0	0.0
Approach	48	0.0		0.039		4.8	LOS A	0.1	1.0				
West: Gurwood Street													
Lane 1	36	4.0	1857	0.019	100	1.2	LOS A	0.0	0.2	Full	140	0.0	0.0
Approach	36	4.0		0.019		1.2	NA	0.0	0.2				
Intersection	303	1.6		0.111		3.4	NA	0.4	3.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

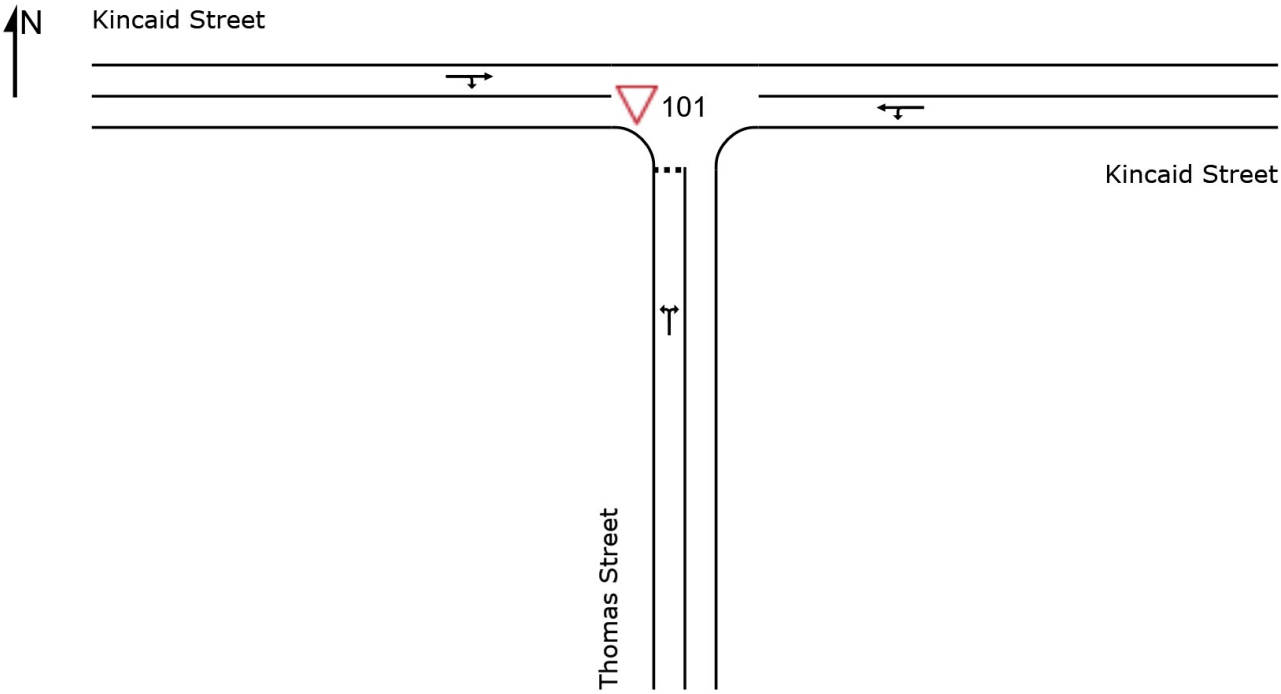
USER REPORT FOR SITE

Project: 180763_SIDRA Analysis_Design Life_190918 **Template: SIDRA Outputs**

Site: 101 [Kincaid Street / Thomas Street - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 56 years

Site Layout



Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Thomas Street													
Lane 1	150	0.0	188	0.797	100	56.8	LOS F[11]	4.5	31.2	Full	230	0.0	0.0
Approach	150	0.0		0.797		56.8	LOS F[11]	4.5	31.2				
East: Kincaid Street													
Lane 1	721	5.0	1888	0.382	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	721	5.0		0.382		0.1	NA	0.0	0.0				
West: Kincaid Street													
Lane 1	1302	4.8	1780	0.731	100	2.1	LOS A	3.1	22.6	Full	250	0.0	0.0
Approach	1302	4.8		0.731		2.1	NA	3.1	22.6				
Intersection	2173	4.5		0.797		5.2	NA	4.5	31.2				

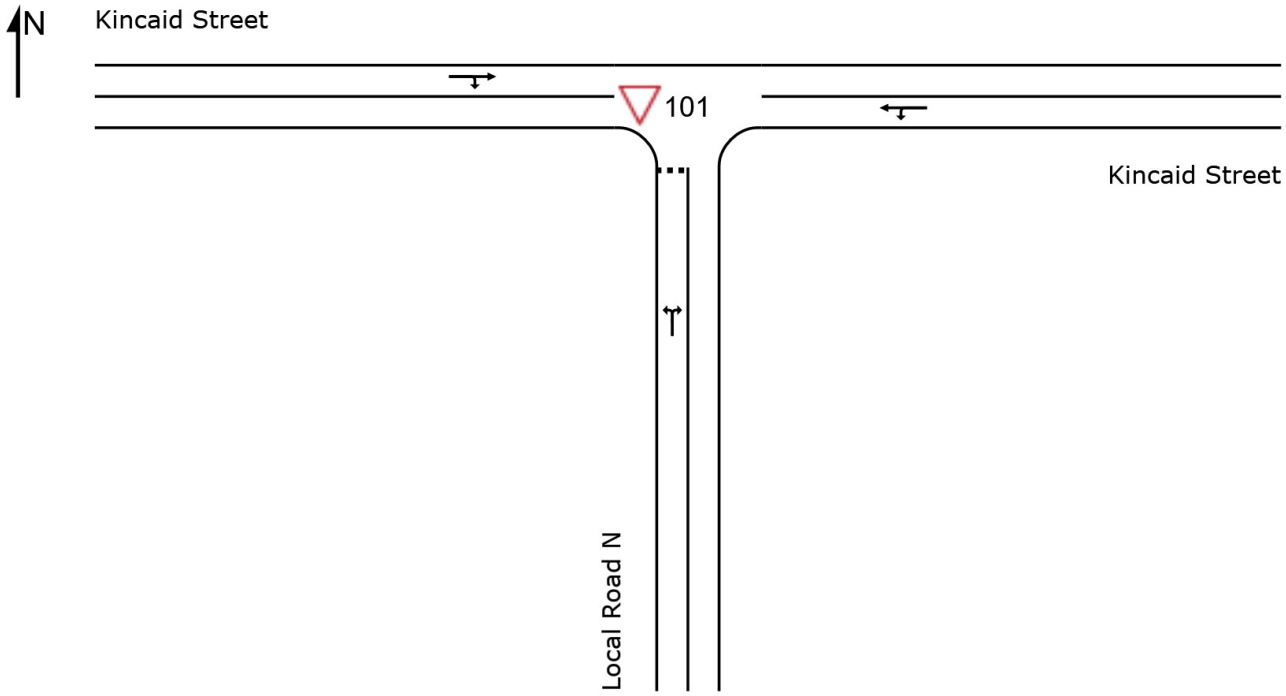
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Site: 101 [Kincaid Street / Local Road N - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 55 years

Site Layout



Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Local Road N													
Lane 1	31	0.0	43	0.730	100	170.6	LOS F[11]	2.2	15.3	Full	230	0.0	0.0
Approach	31	0.0		0.730		170.6	LOS F[11]	2.2	15.3				
East: Kincaid Street													
Lane 1	732	5.0	1888	0.388	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	732	5.0		0.388		0.1	NA	0.0	0.0				
West: Kincaid Street													
Lane 1	1364	5.0	1882	0.725	100	0.1	LOS A	0.2	1.5	Full	250	0.0	0.0
Approach	1364	5.0		0.725		0.1	NA	0.2	1.5				
Intersection	2127	4.9		0.730		2.6	NA	2.2	15.3				

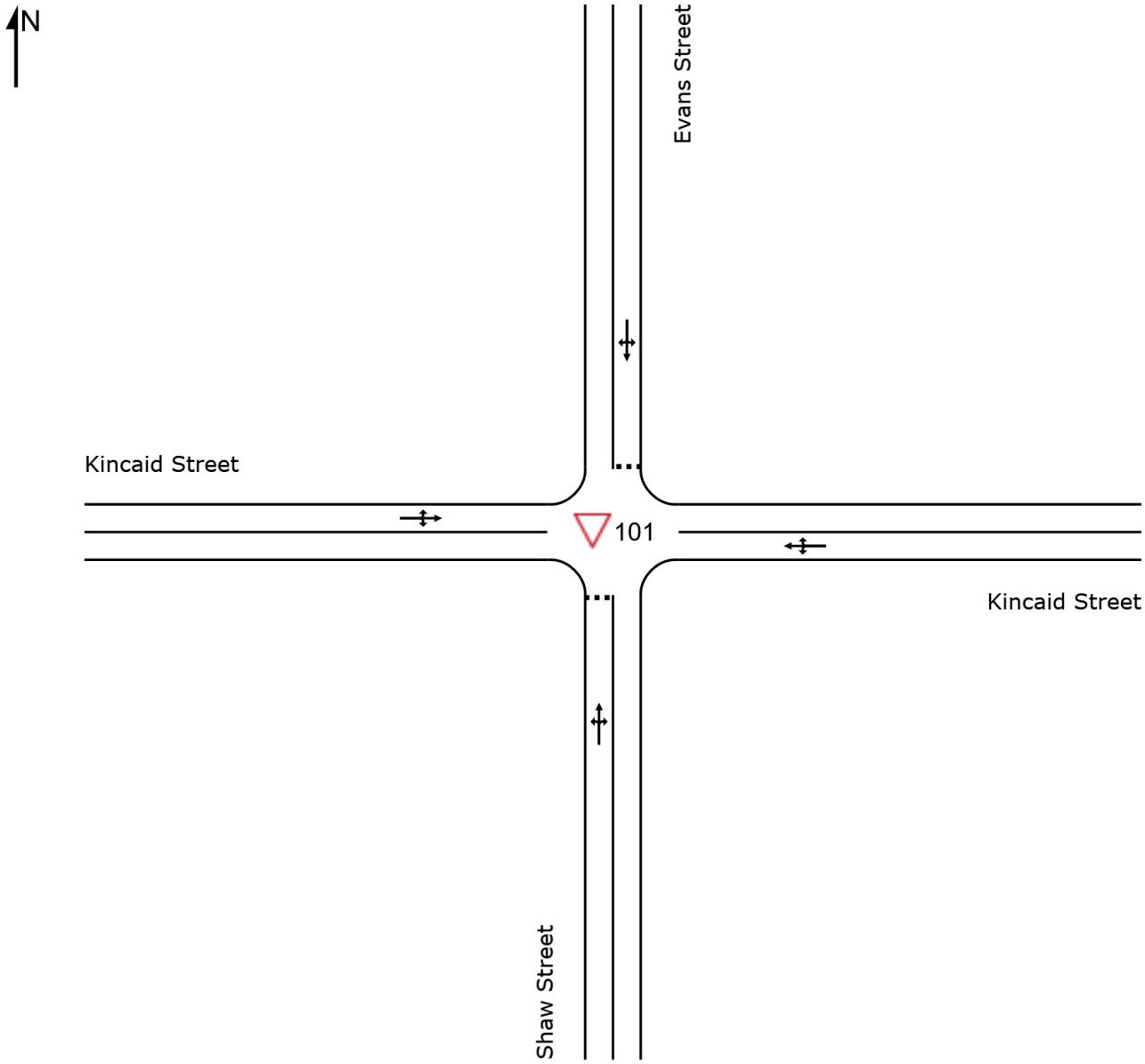
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Site: 101 [Kincaid Street / Shaw Street - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 40 years

Site Layout



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Shaw Street													
Lane 1	191	0.1	550	0.346	100	12.0	LOS B	1.5	10.4	Full	230	0.0	0.0
Approach	191	0.1		0.346		12.0	LOS B	1.5	10.4				
East: Kincaid Street													
Lane 1	372	4.4	1753	0.212	100	1.8	LOS A	0.4	3.2	Full	500	0.0	0.0
Approach	372	4.4		0.212		1.8	NA	0.4	3.2				
North: Evans Street													
Lane 1	146	0.1	195	0.750	100	43.5	LOS E[11]	3.6	25.2	Full	450	0.0	0.0
Approach	146	0.1		0.750		43.5	LOS E[11]	3.6	25.2				
West: Kincaid Street													
Lane 1	1027	4.2	1781	0.577	100	2.1	LOS A	3.0	21.4	Full	430	0.0	0.0
Approach	1027	4.2		0.577		2.1	NA	3.0	21.4				
Intersection	1736	3.5		0.750		6.6	NA	3.6	25.2				

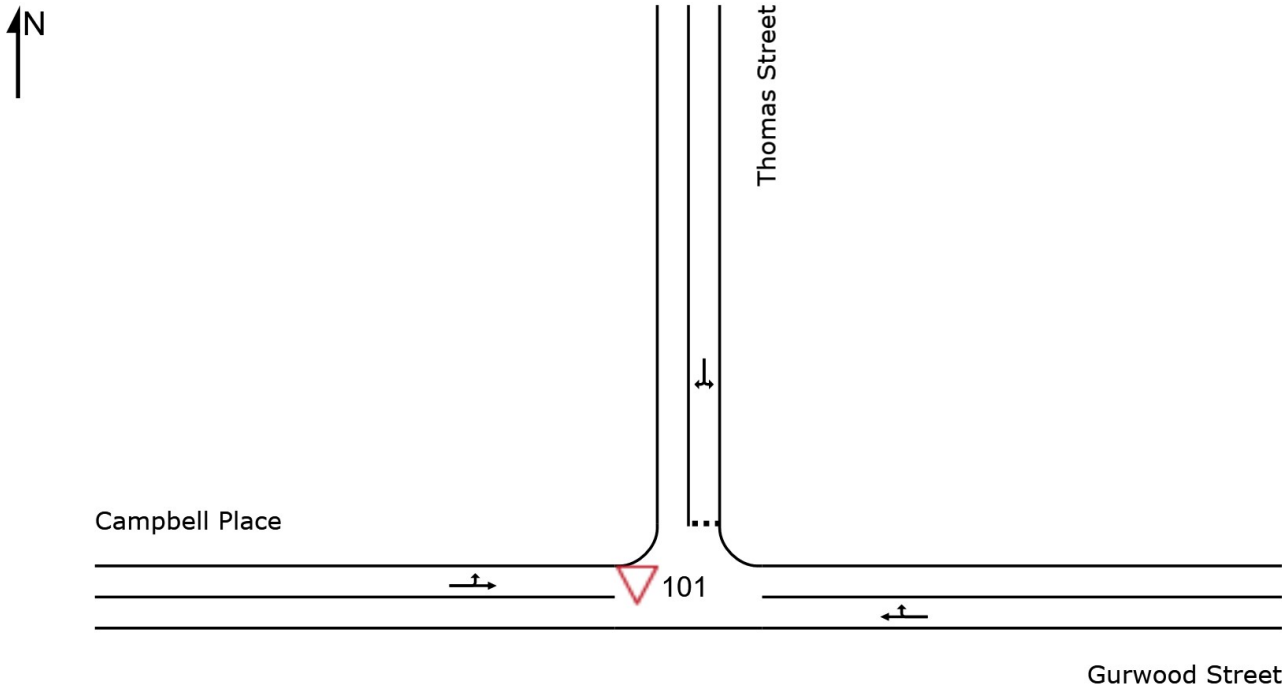
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Site: 101 [Gurwood Street / Campbell Place / Thomas Street - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 100 years

Site Layout



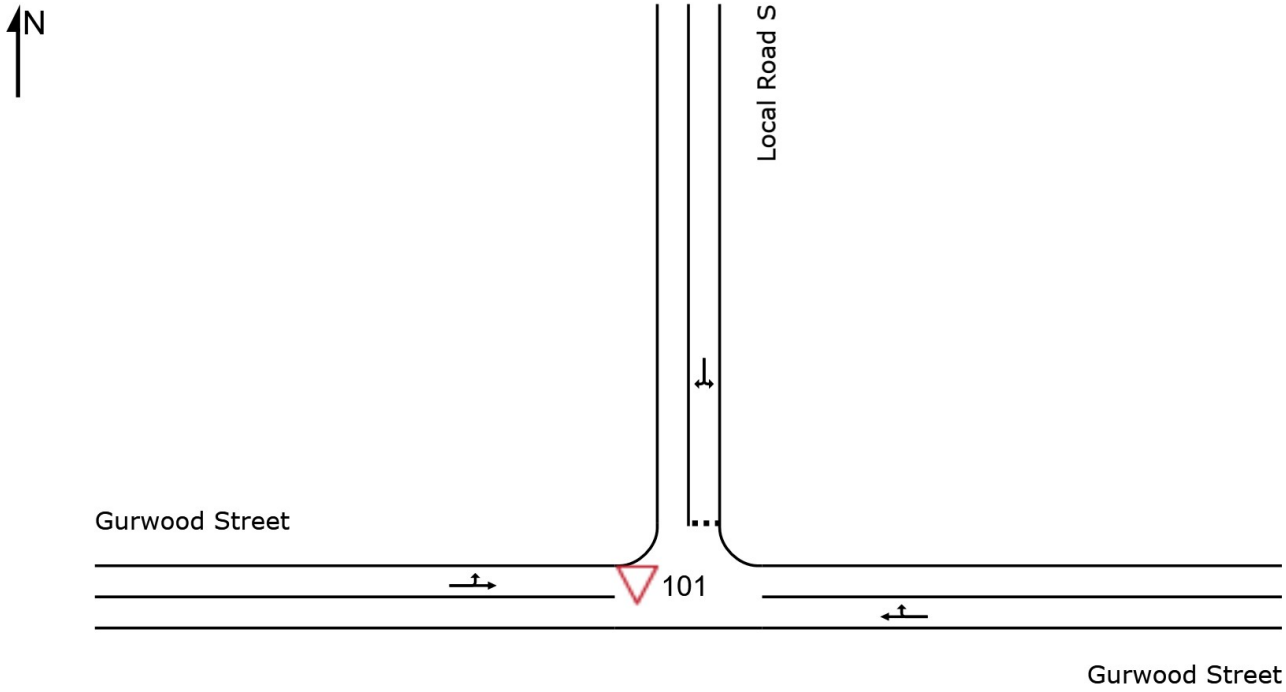
Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Gurwood Street													
Lane 1	236	0.6	1697	0.139	100	5.0	LOS A	0.7	4.9	Full	500	0.0	0.0
Approach	236	0.6		0.139		5.0	NA	0.7	4.9				
North: Thomas Street													
Lane 1	336	0.0	1526	0.220	100	5.8	LOS A	1.0	7.3	Full	230	0.0	0.0
Approach	336	0.0		0.220		5.8	LOS A	1.0	7.3				
West: Campbell Place													
Lane 1	84	0.0	1932	0.043	100	1.0	LOS A	0.0	0.0	Full	140	0.0	0.0
Approach	84	0.0		0.043		1.0	NA	0.0	0.0				
Intersection	656	0.2		0.220		4.9	NA	1.0	7.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Gurwood Street / Local Road S - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 100 years

Site Layout



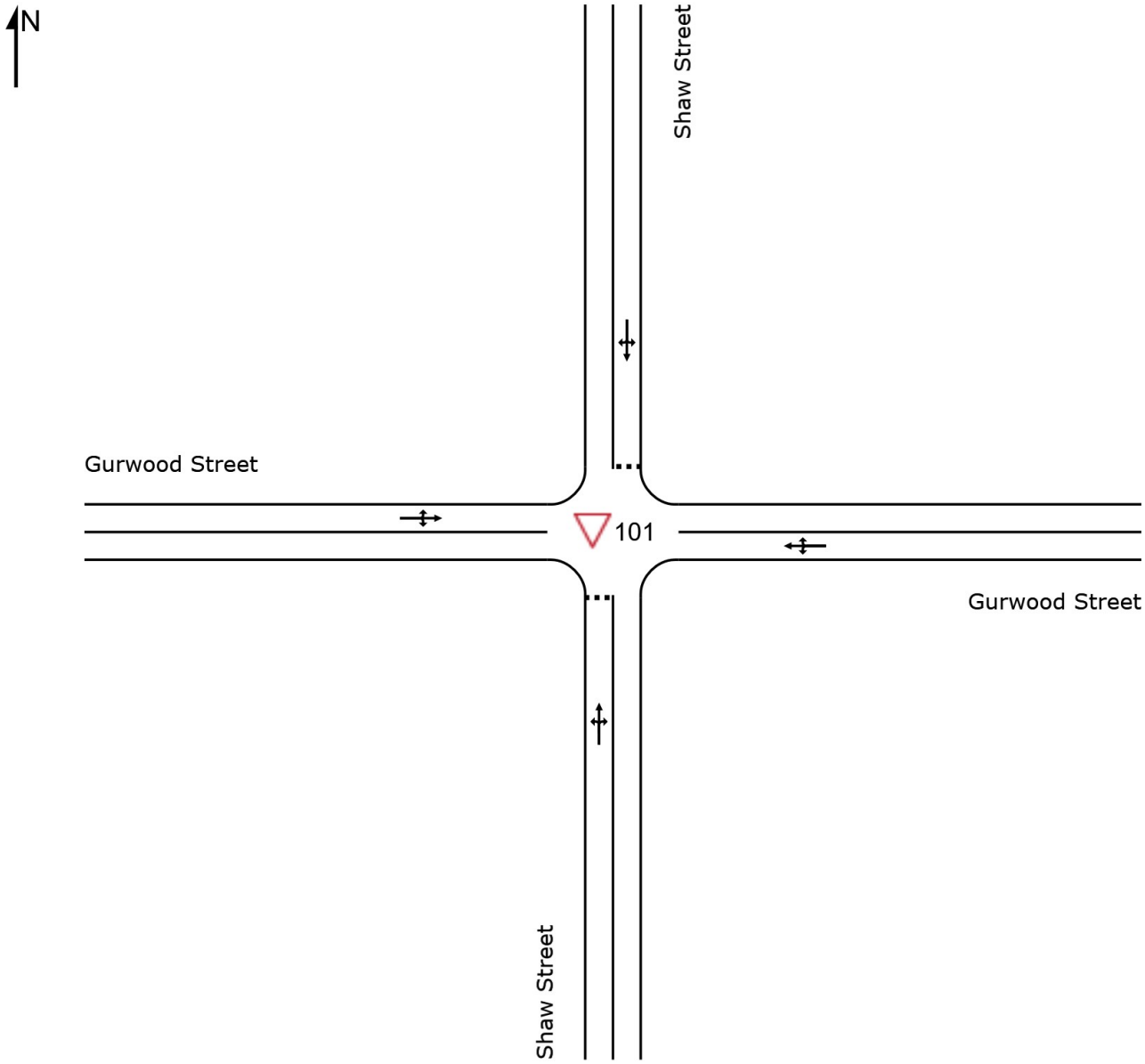
Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Gurwood Street													
Lane 1	259	4.7	1861	0.139	100	0.4	LOS A	0.1	0.8	Full	500	0.0	0.0
Approach	259	4.7		0.139		0.4	NA	0.1	0.8				
North: Local Road S													
Lane 1	76	0.0	1316	0.058	100	6.2	LOS A	0.2	1.6	Full	230	0.0	0.0
Approach	76	0.0		0.058		6.2	LOS A	0.2	1.6				
West: Gurwood Street													
Lane 1	183	4.8	1887	0.097	100	0.2	LOS A	0.0	0.0	Full	140	0.0	0.0
Approach	183	4.8		0.097		0.2	NA	0.0	0.0				
Intersection	519	4.0		0.139		1.2	NA	0.2	1.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Gurwood Street / Shaw Street - AM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 87 years

Site Layout



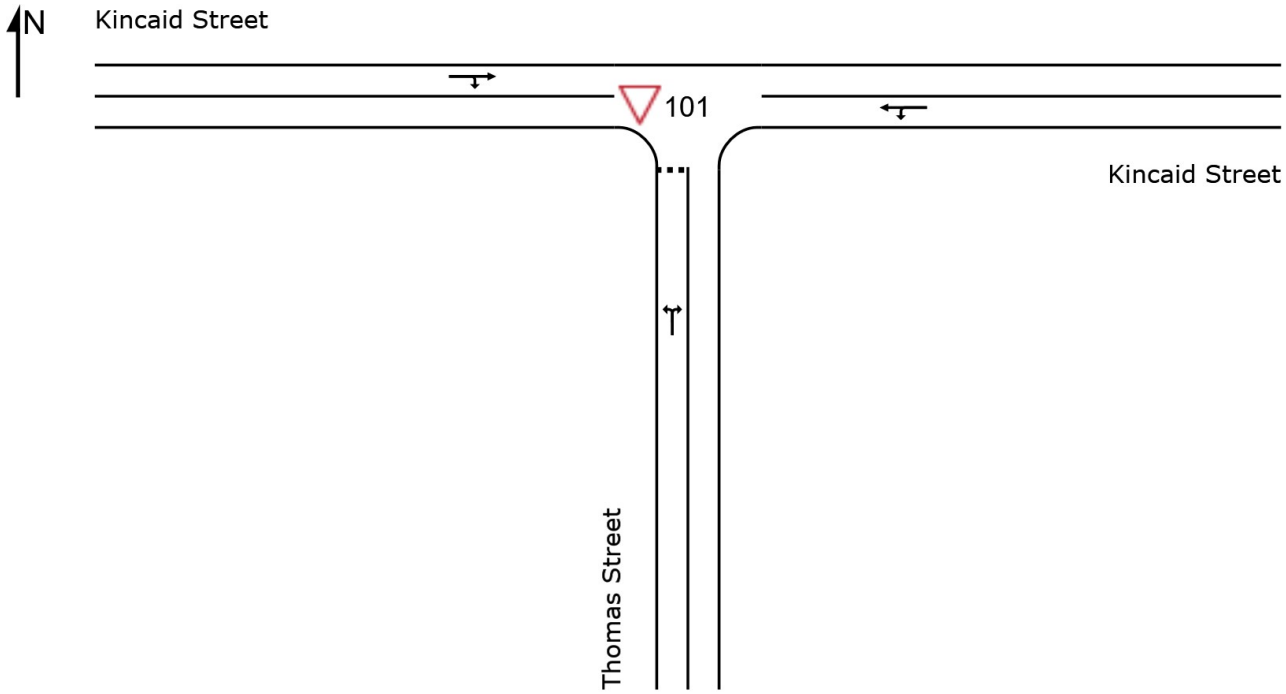
Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Shaw Street													
Lane 1	536	0.0	682	0.787	100	16.1	LOS C	8.7	60.6	Full	500	0.0	0.0
Approach	536	0.0		0.787		16.1	LOS C	8.7	60.6				
East: Gurwood Street													
Lane 1	189	3.3	1721	0.110	100	2.6	LOS A	0.4	2.5	Full	500	0.0	0.0
Approach	189	3.3		0.110		2.6	NA	0.4	2.5				
North: Shaw Street													
Lane 1	466	0.0	795	0.586	100	10.4	LOS B	4.4	30.6	Full	230	0.0	0.0
Approach	466	0.0		0.586		10.4	LOS B	4.4	30.6				
West: Gurwood Street													
Lane 1	395	4.1	1850	0.214	100	1.1	LOS A	0.3	2.4	Full	140	0.0	0.0
Approach	395	4.1		0.214		1.1	NA	0.3	2.4				
Intersection	1586	1.4		0.787		9.1	NA	8.7	60.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Kincaid Street / Thomas Street - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 56 years

Site Layout



Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Thomas Street													
Lane 1	105	0.0	150	0.703	100	49.0	LOS E[11]	2.7	18.6	Full	230	0.0	0.0
Approach	105	0.0		0.703		49.0	LOS E[11]	2.7	18.6				
East: Kincaid Street													
Lane 1	1283	4.9	1888	0.679	100	0.3	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1283	4.9		0.679		0.3	NA	0.0	0.0				
West: Kincaid Street													
Lane 1	1050	4.6	1170	0.897	100	26.0	LOS D	26.5	192.9	Full	250	0.0	0.0
Approach	1050	4.6		0.897		26.0	NA	26.5	192.9				
Intersection	2438	4.6		0.897		13.5	NA	26.5	192.9				

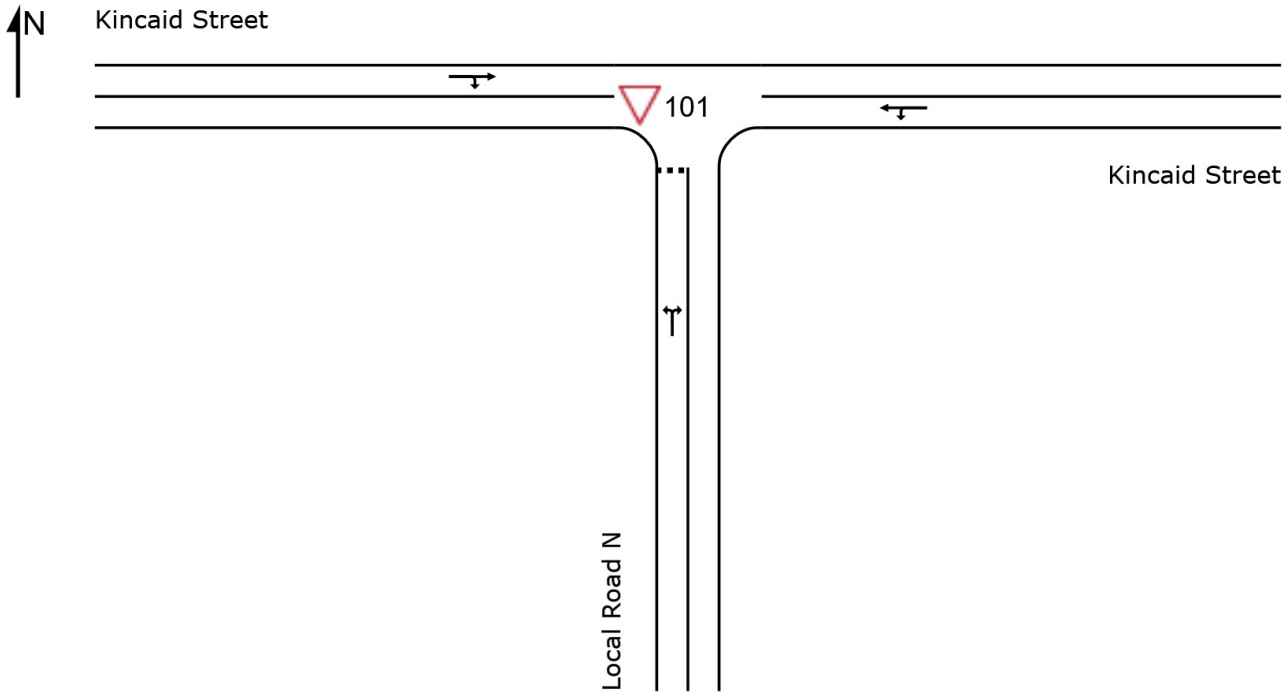
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Site: 101 [Kincaid Street / Local Road N - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 56 years

Site Layout



Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Local Road N													
Lane 1	13	0.0	17	0.733	100	354.1	LOS F[11]	1.8	12.9	Full	230	0.0	0.0
Approach	13	0.0		0.733		354.1	LOS F[11]	1.8	12.9				
East: Kincaid Street													
Lane 1	1391	4.9	1888	0.737	100	0.3	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1391	4.9		0.737		0.3	NA	0.0	0.0				
West: Kincaid Street													
Lane 1	989	4.9	1552	0.637	100	9.1	LOS A	21.8	158.8	Full	250	0.0	0.0
Approach	989	4.9		0.637		9.1	NA	21.8	158.8				
Intersection	2393	4.9		0.737		5.8	NA	21.8	158.8				

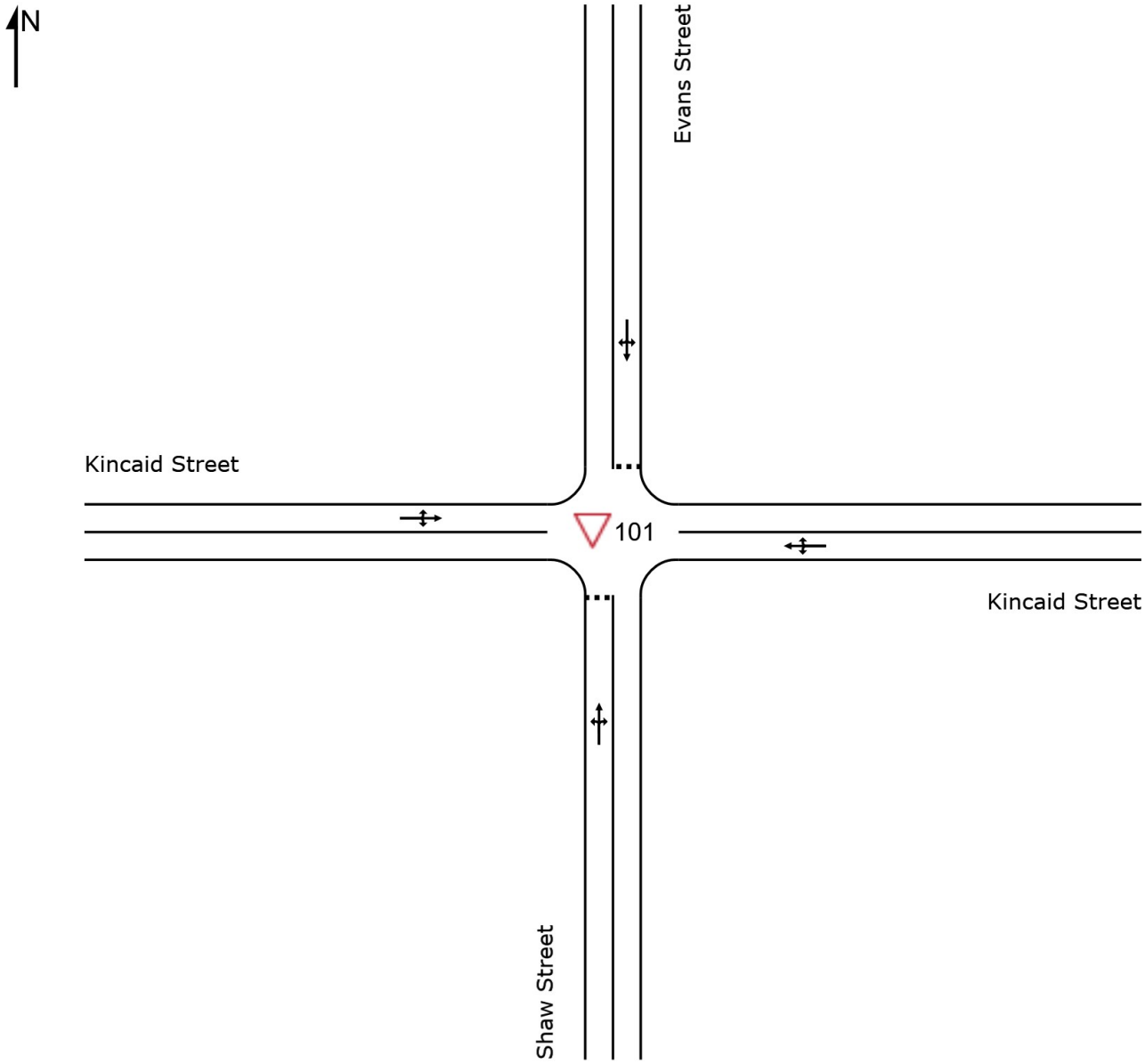
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Site: 101 [Kincaid Street / Shaw Street - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 39 years

Site Layout



Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Shaw Street													
Lane 1	262	0.0	338	0.776	100	30.5	LOS D	5.2	36.3	Full	230	0.0	0.0
Approach	262	0.0		0.776		30.5	LOS D	5.2	36.3				
East: Kincaid Street													
Lane 1	827	4.4	1729	0.478	100	2.1	LOS A	1.9	13.8	Full	500	0.0	0.0
Approach	827	4.4		0.478		2.1	NA	1.9	13.8				
North: Evans Street													
Lane 1	107	0.1	155	0.691	100	50.1	LOS F[11]	3.0	20.7	Full	450	0.0	0.0
Approach	107	0.1		0.691		50.1	LOS F[11]	3.0	20.7				
West: Kincaid Street													
Lane 1	706	4.2	1582	0.446	100	3.7	LOS A	2.5	18.4	Full	430	0.0	0.0
Approach	706	4.2		0.446		3.7	NA	2.5	18.4				
Intersection	1903	3.5		0.776		9.3	NA	5.2	36.3				

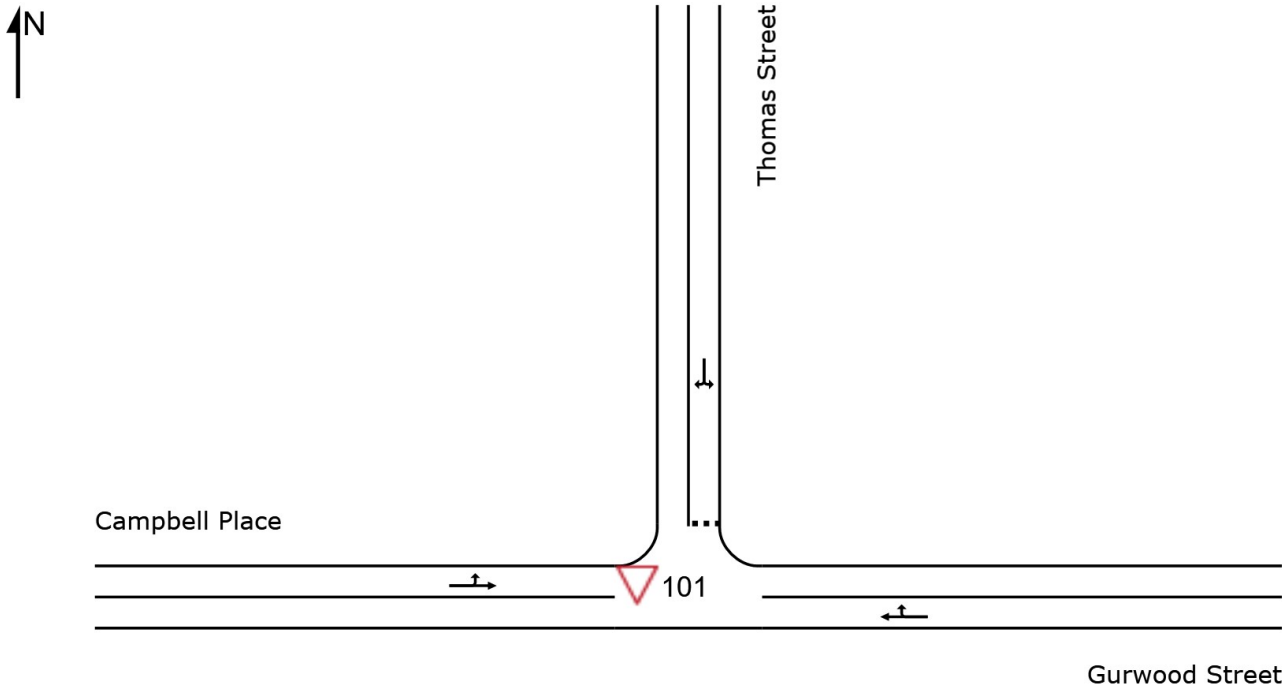
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Site: 101 [Gurwood Street / Campbell Place / Thomas Street - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 100 years

Site Layout



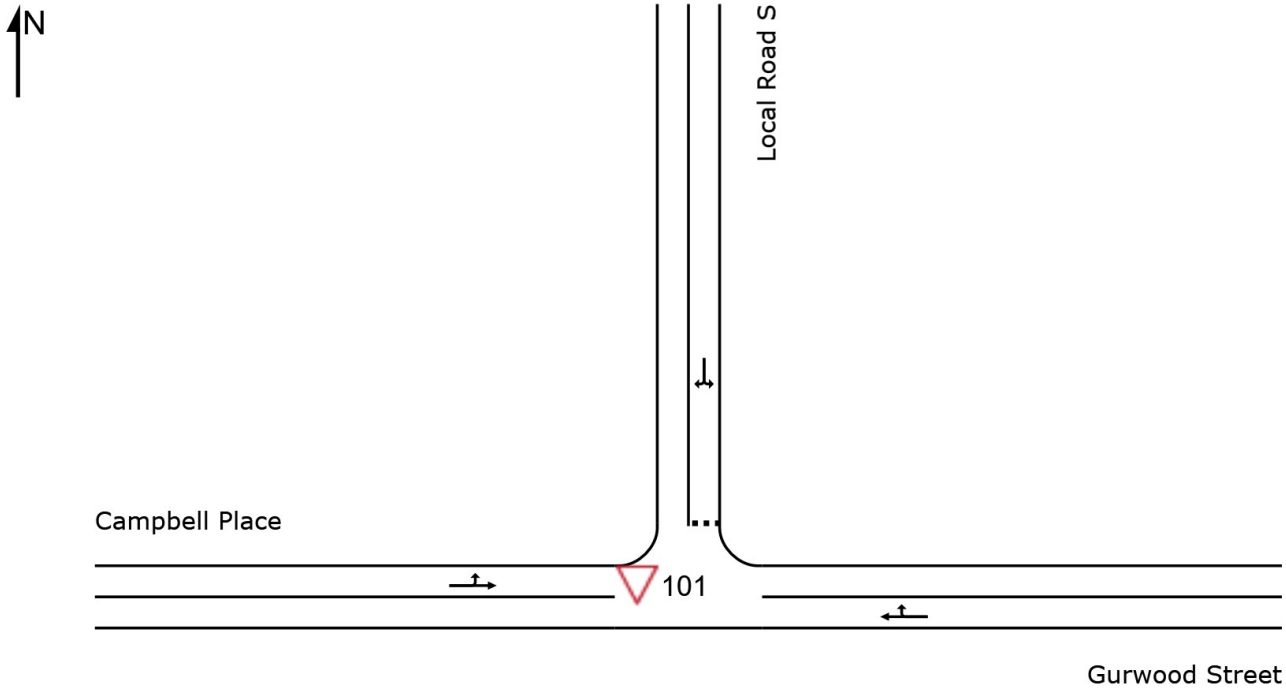
Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
East: Gurwood Street													
Lane 1	458	0.8	1760	0.260	100	4.8	LOS A	1.5	10.5	Full	500	0.0	0.0
Approach	458	0.8		0.260		4.8	NA	1.5	10.5				
North: Thomas Street													
Lane 1	282	0.0	1514	0.186	100	5.8	LOS A	0.8	5.9	Full	230	0.0	0.0
Approach	282	0.0		0.186		5.8	LOS A	0.8	5.9				
West: Campbell Place													
Lane 1	38	0.0	1931	0.020	100	1.1	LOS A	0.0	0.0	Full	140	0.0	0.0
Approach	38	0.0		0.020		1.1	NA	0.0	0.0				
Intersection	778	0.4		0.260		5.0	NA	1.5	10.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Gurwood Street / Local Road S - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 100 years

Site Layout



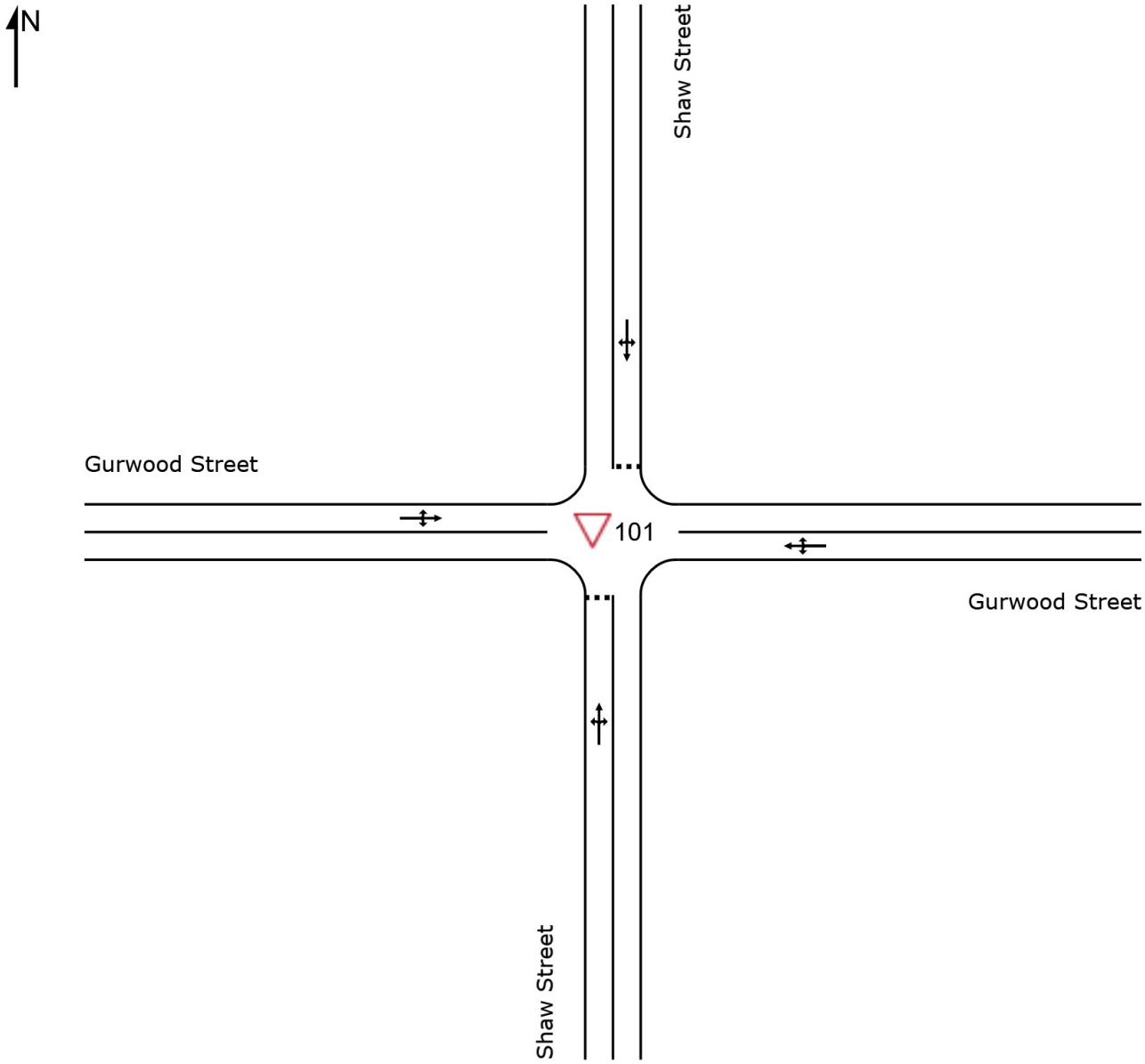
Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
East: Gurwood Street													
Lane 1	610	4.5	1842	0.331	100	0.7	LOS A	0.6	4.0	Full	500	0.0	0.0
Approach	610	4.5		0.331		0.7	NA	0.6	4.0				
North: Local Road S													
Lane 1	38	0.0	1061	0.036	100	6.9	LOS A	0.1	0.9	Full	230	0.0	0.0
Approach	38	0.0		0.036		6.9	LOS A	0.1	0.9				
West: Campbell Place													
Lane 1	183	4.8	1887	0.097	100	0.2	LOS A	0.0	0.0	Full	140	0.0	0.0
Approach	183	4.8		0.097		0.2	NA	0.0	0.0				
Intersection	831	4.4		0.331		0.9	NA	0.6	4.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Gurwood Street / Shaw Street - PM]

New Site
Site Category: Anticipated 2021
Giveway / Yield (Two-Way)
Design Life Analysis (Practical Capacity): Results for 76 years

Site Layout



Lane Use and Performance													
	Demand Flows		Cap.	Deg. Satn	Lane Util.	Average Delay	Level of Service	95% Back of Queue		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	Total	HV						Veh	Dist				
	veh/h	%	veh/h	v/c	%	sec			m		m	%	%
South: Shaw Street													
Lane 1	607	0.0	773	0.786	100	14.1	LOS B	9.2	64.3	Full	500	0.0	0.0
Approach	607	0.0		0.786		14.1	LOS B	9.2	64.3				
East: Gurwood Street													
Lane 1	379	4.1	1835	0.207	100	1.2	LOS A	0.4	3.1	Full	500	0.0	0.0
Approach	379	4.1		0.207		1.2	NA	0.4	3.1				
North: Shaw Street													
Lane 1	218	0.0	811	0.269	100	7.4	LOS A	1.1	7.6	Full	230	0.0	0.0
Approach	218	0.0		0.269		7.4	LOS A	1.1	7.6				
West: Gurwood Street													
Lane 1	161	4.0	1790	0.090	100	1.5	LOS A	0.2	1.3	Full	140	0.0	0.0
Approach	161	4.0		0.090		1.5	NA	0.2	1.3				
Intersection	1365	1.6		0.786		8.0	NA	9.2	64.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Minor Road Approach LOS values are based on average delay for all lanes.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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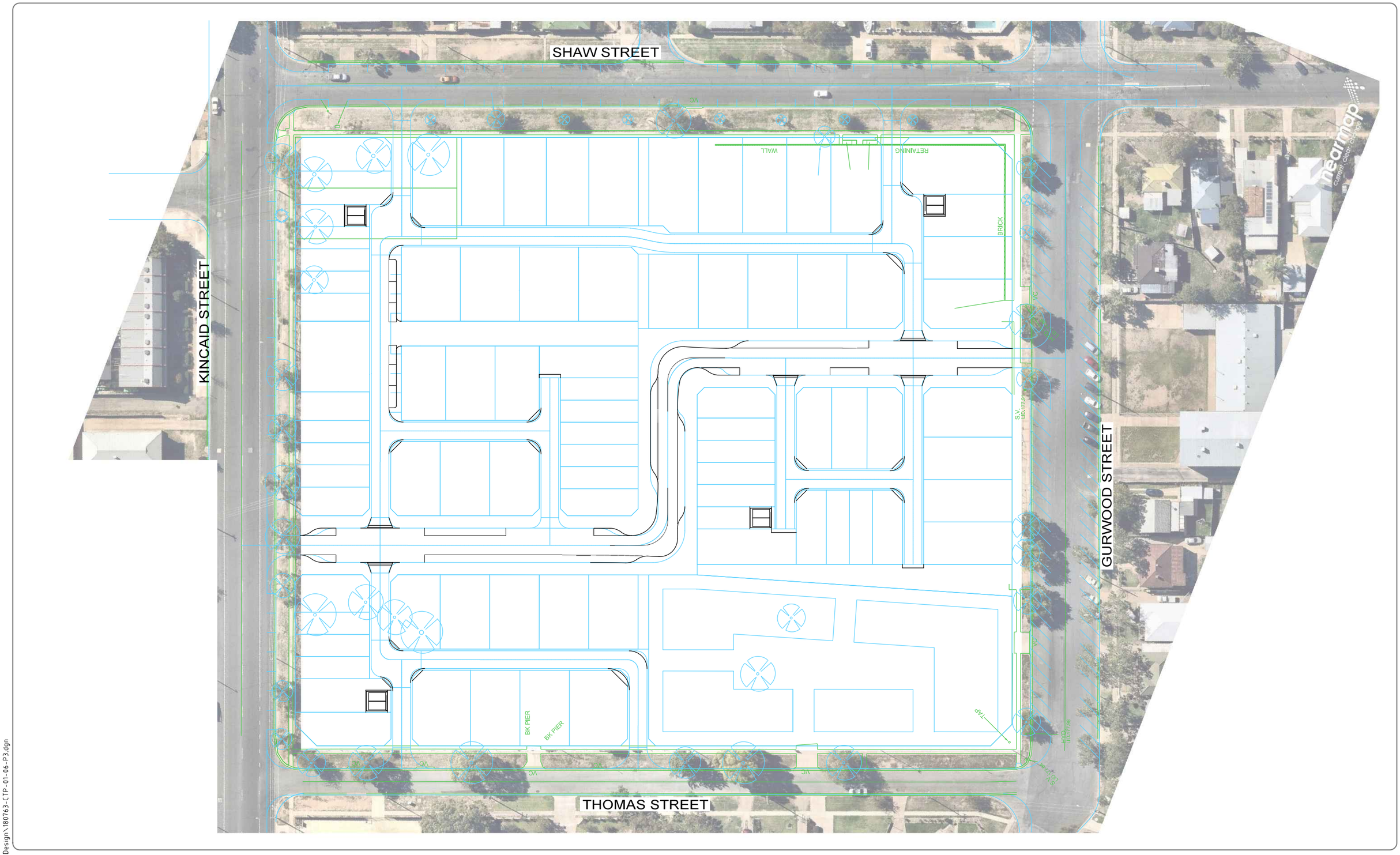
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ATTACHMENT B – MODIFIED SITE PLAN



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ISSUE	DRAWN	APP'D	DATE	AMENDMENT
P3	GD	AA	17.09.19	CLIENT COMMENTS

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Notes & Legend

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CLIENT
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9	180763-CTP-09	P3

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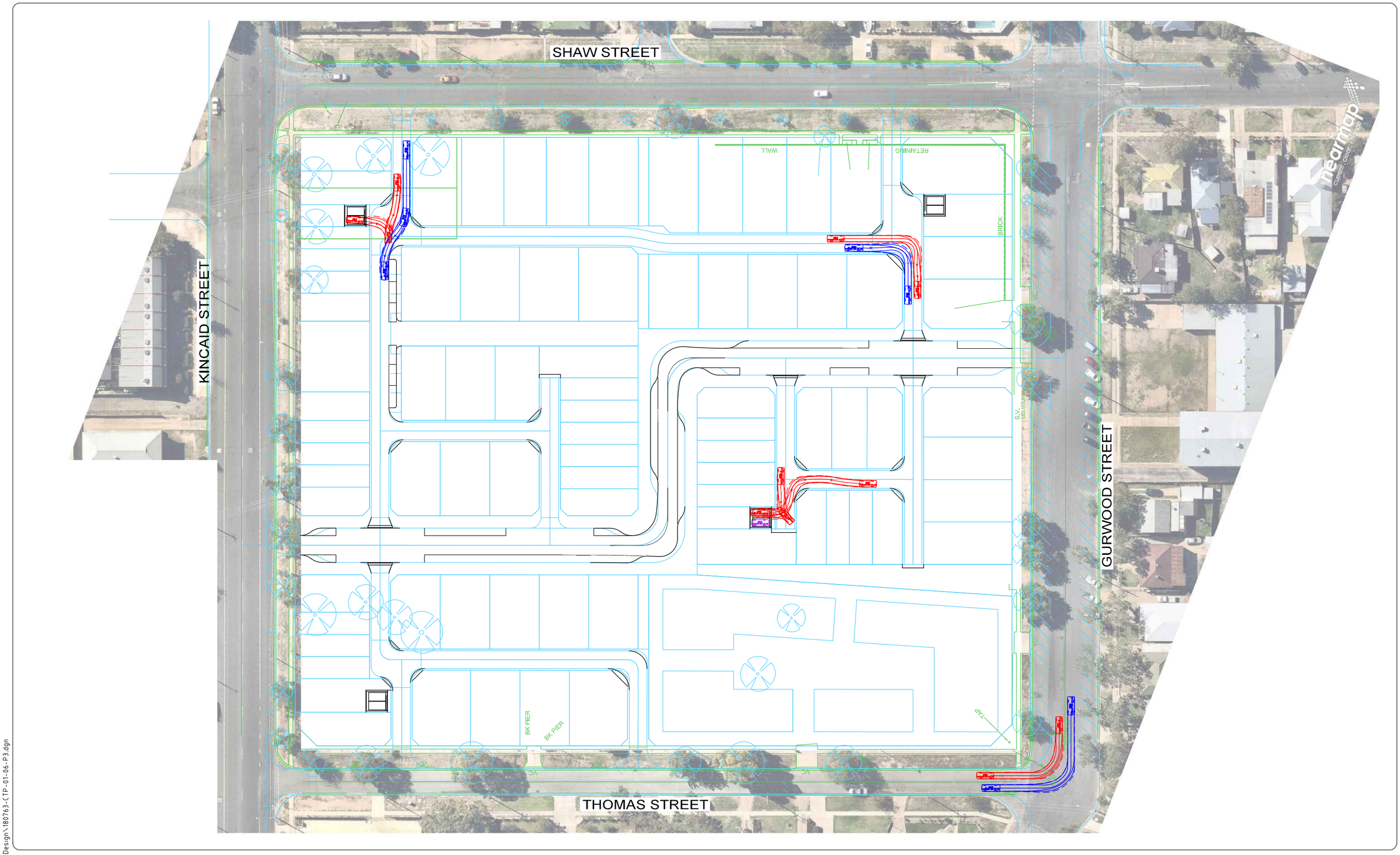
ATTACHMENT C – SWEPT PATH ASSESSMENT



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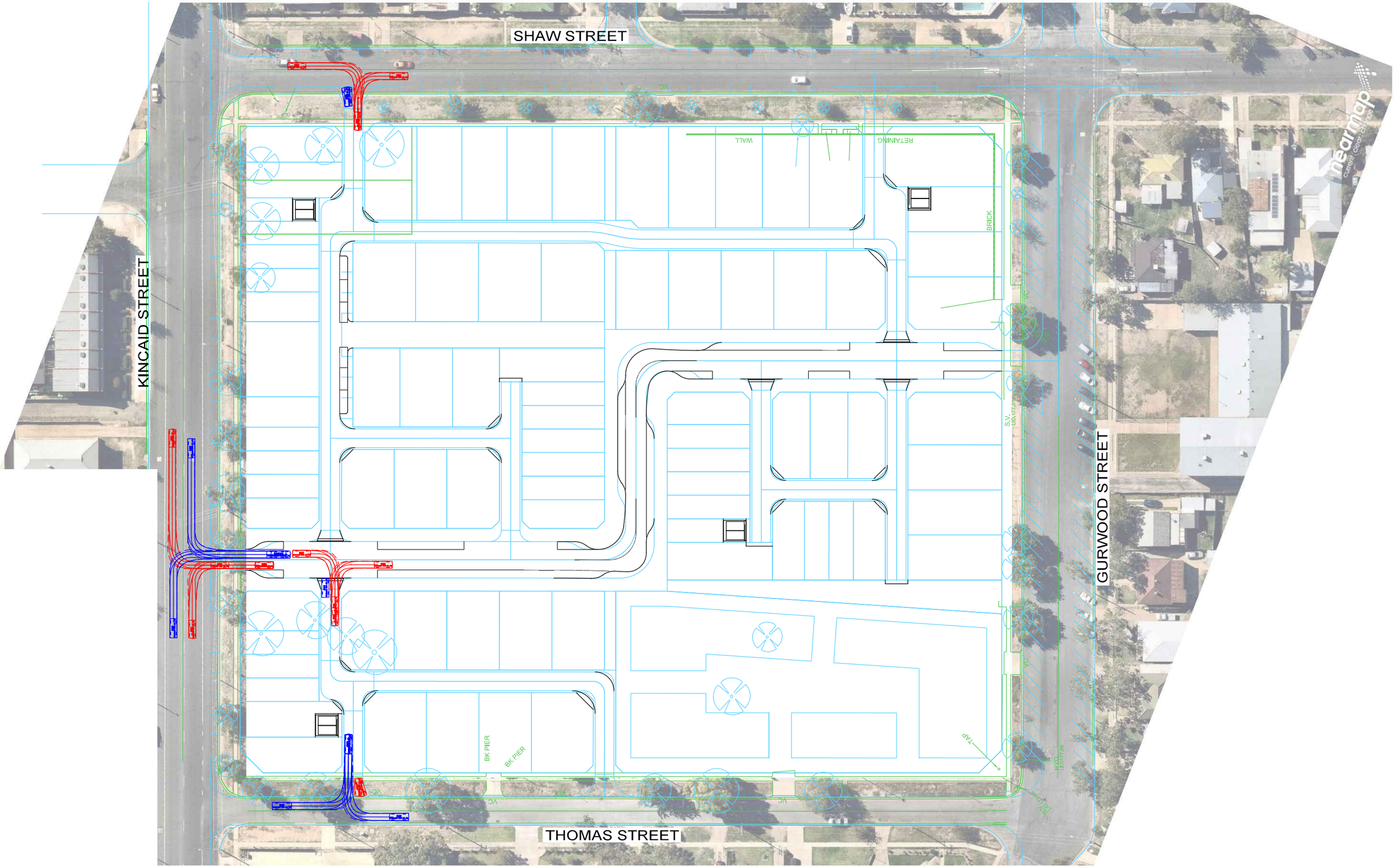

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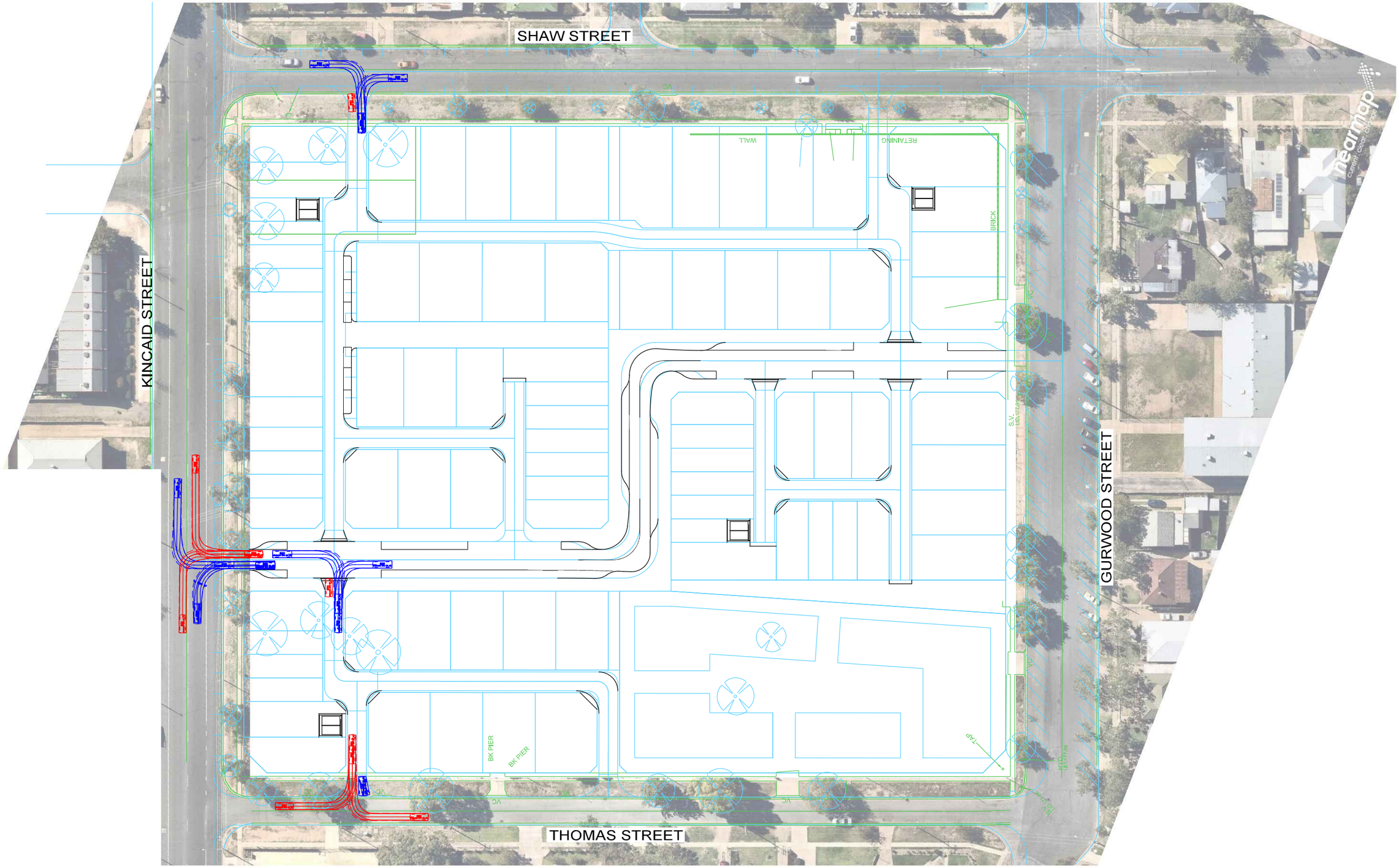

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P3	GD	AA	17.09.19	CLIENT COMMENTS

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SHEET NO.	DRAWING NO.	ISSUE
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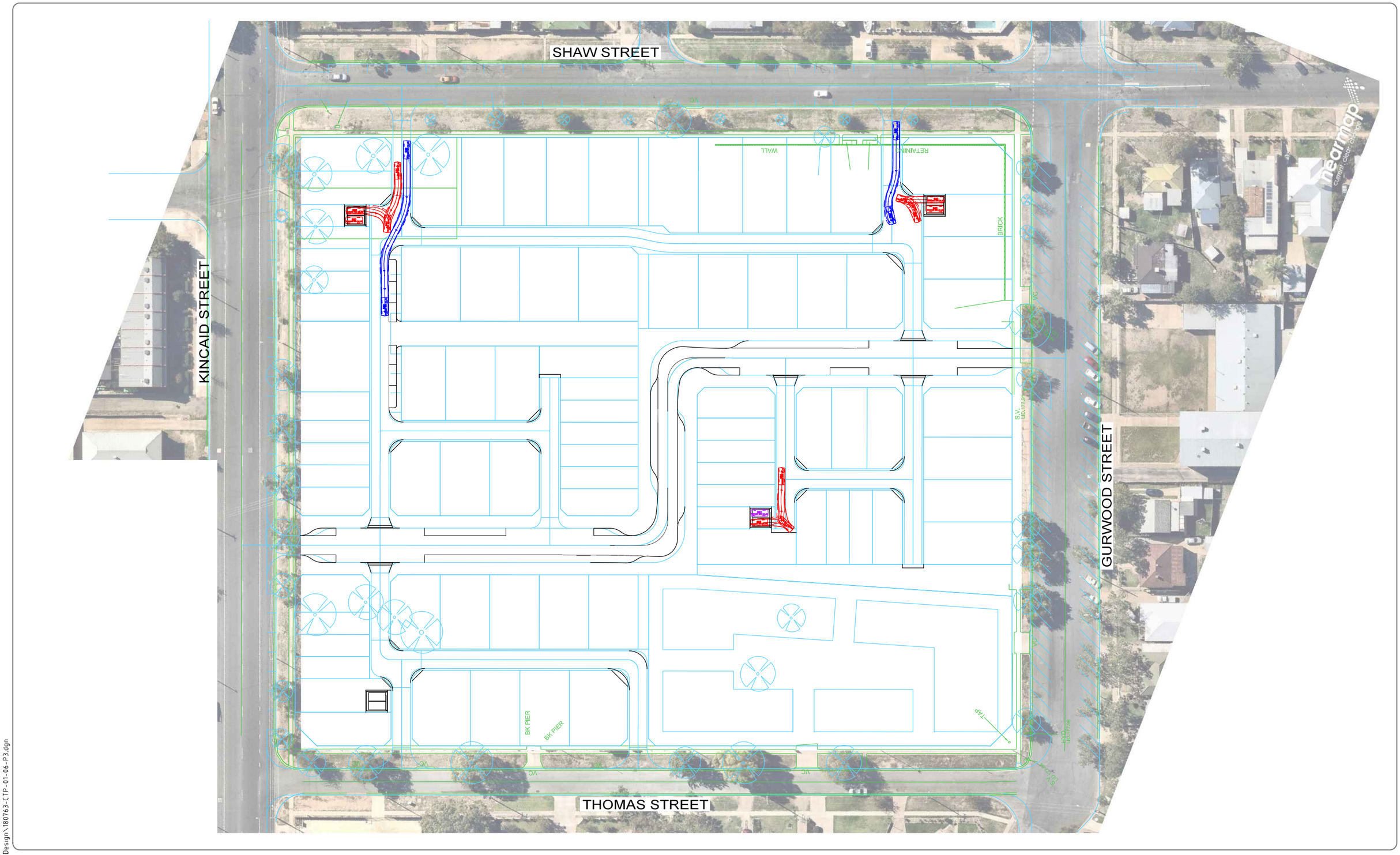

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ISSUE	DRAWN	APP'D	DATE	AMENDMENT
P3	GD	AA	17.09.19	CLIENT COMMENTS

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SHEET NO.	DRAWING NO.	ISSUE
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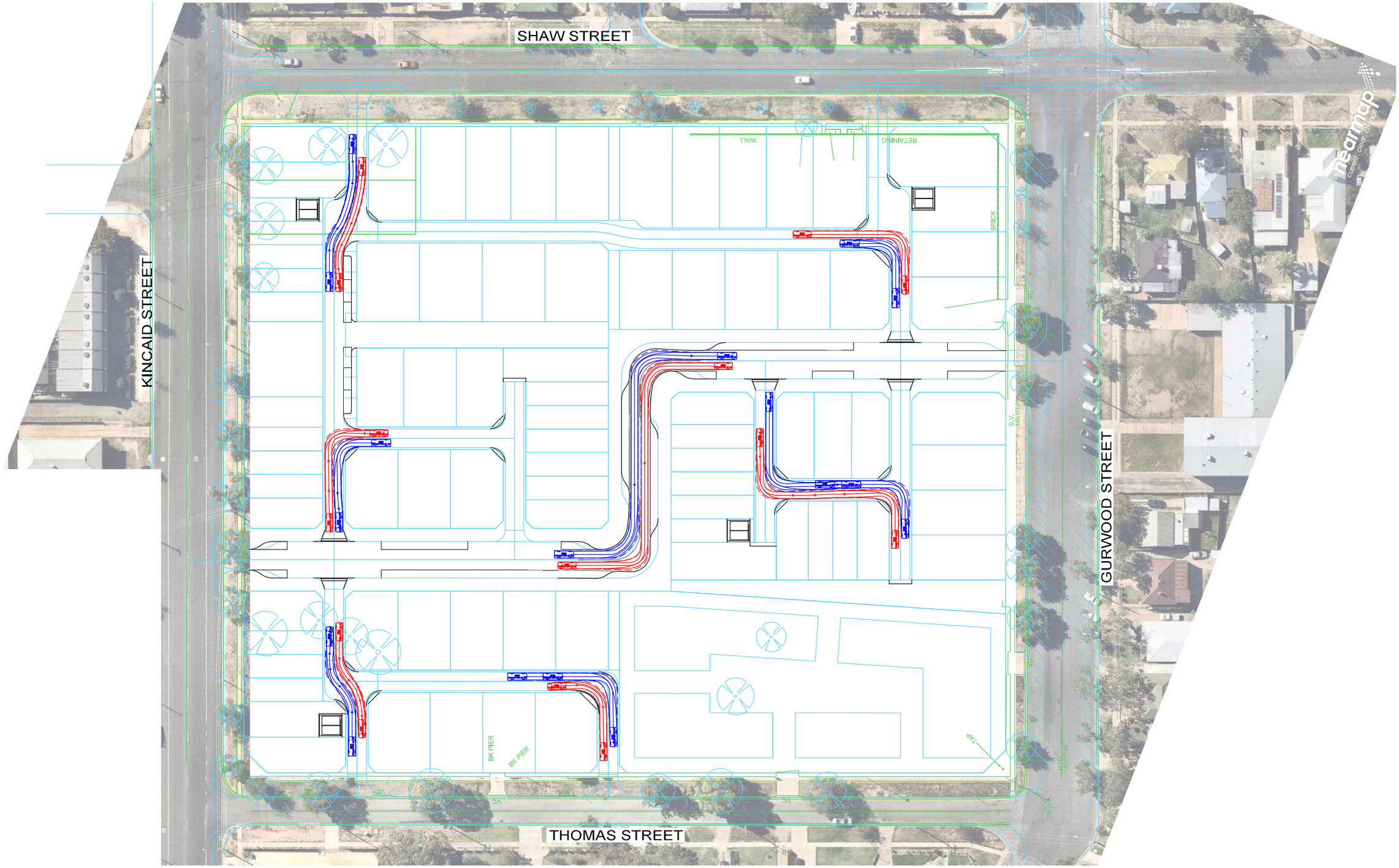

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ISSUE	DRAWN	APP'D	DATE	AMENDMENT
P3	GD	AA	17.09.19	CLIENT COMMENTS

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SHEET NO.	DRAWING NO.	ISSUE
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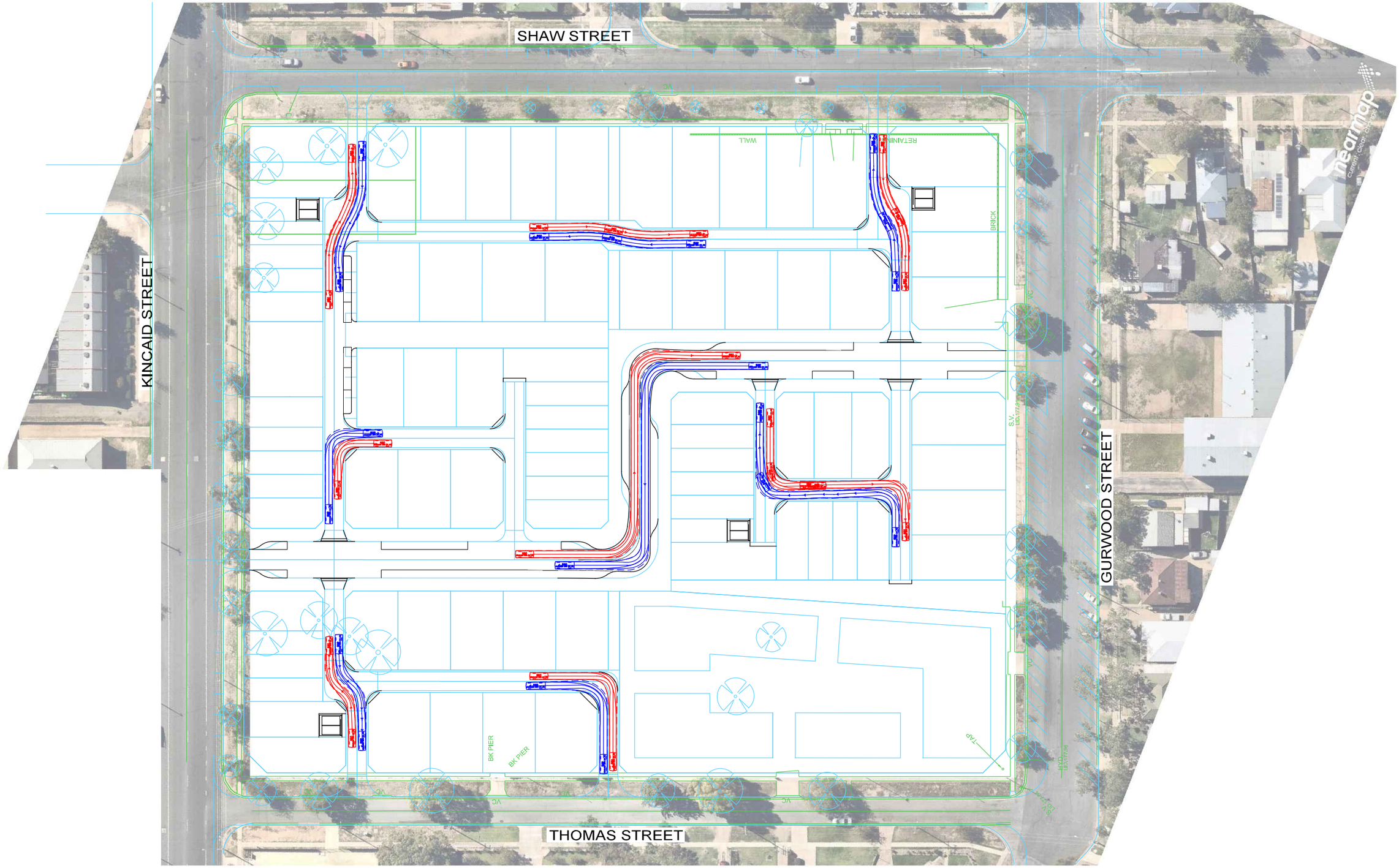

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ISSUE	DRAWN	APP'D	DATE	AMENDMENT
P3	GD	AA	17.09.19	CLIENT COMMENTS

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SHEET NO.	DRAWING NO.	ISSUE
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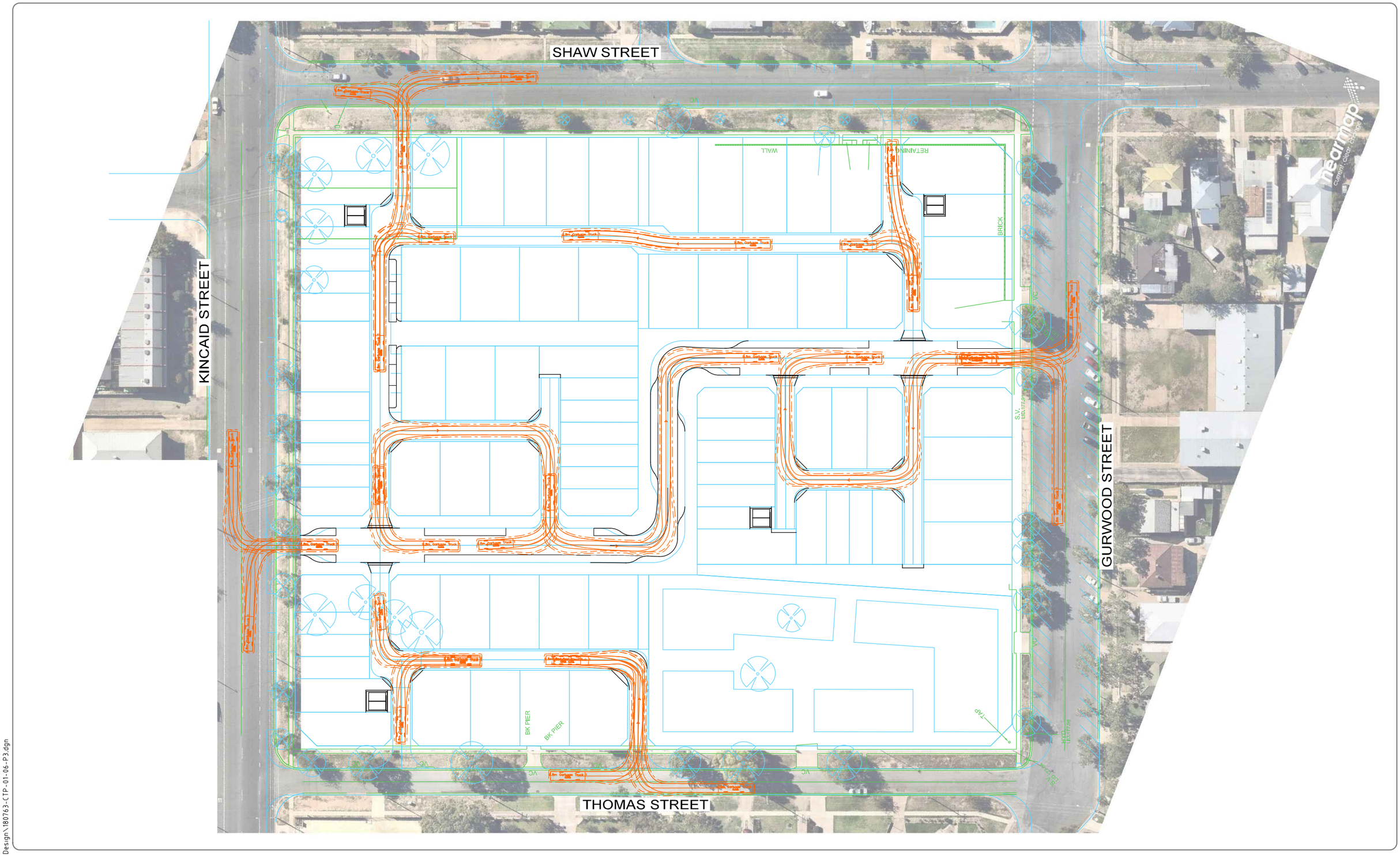

Drawing Record

ISSUE	DRAWN	APP'D	DATE	AMENDMENT
P3	GD	AA	17.09.19	CLIENT COMMENTS

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SHEET NO.	DRAWING NO.	ISSUE
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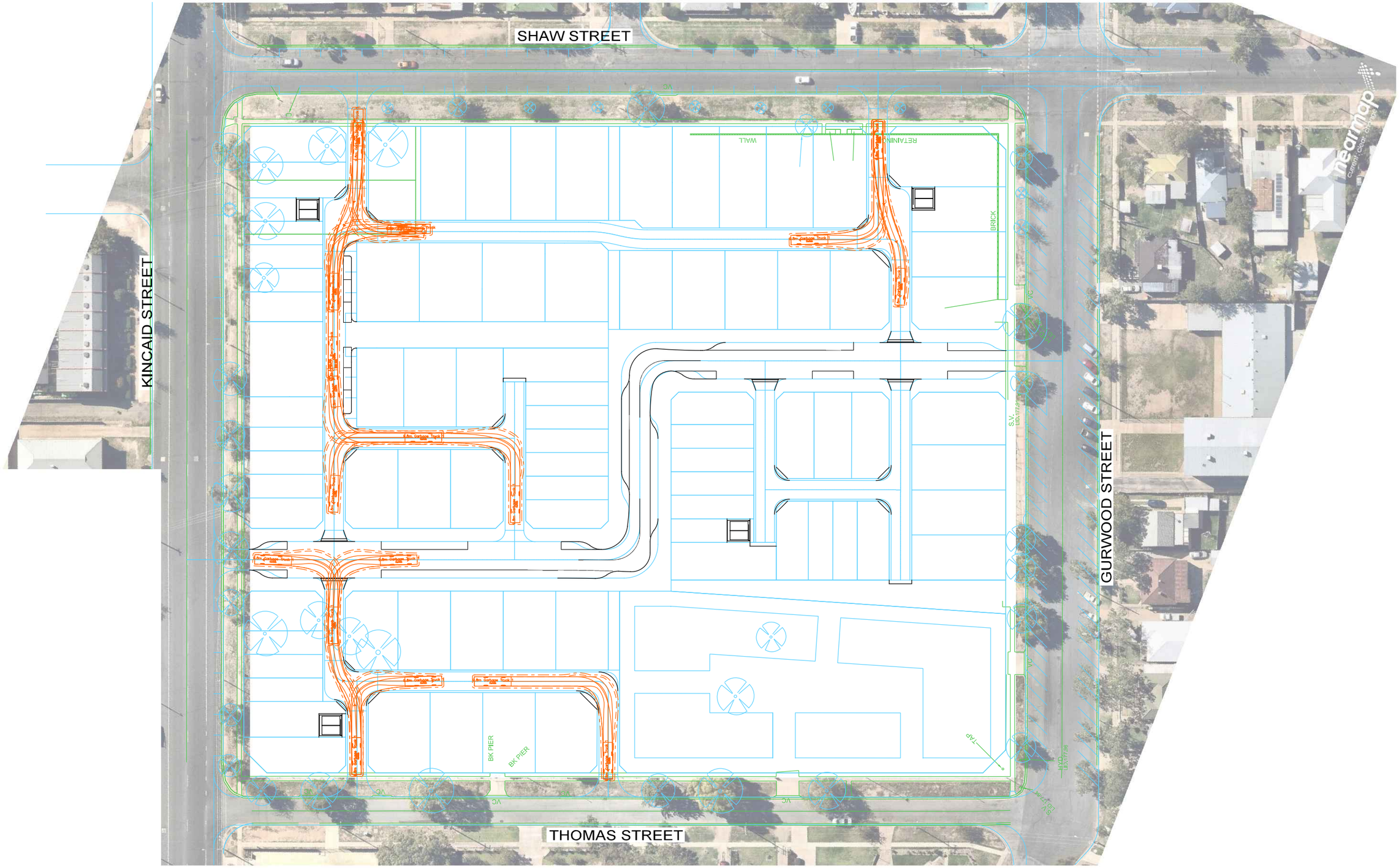

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Drawing Record

ISSUE	DRAWN	APP'D	DATE	AMENDMENT
P3	GD	AA	17.09.19	CLIENT COMMENTS

WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

PRELIMINARY PLAN
FOR DISCUSSION PURPOSES ONLY
SUBJECT TO CHANGE WITHOUT NOTIFICATION
DATE OF ISSUE: 17/09/19

Notes & Legend

1. AERIAL IMAGE FROM NEARMAP UNDER LICENSE AGREEMENT WITH TRAFFICWORKS PTY LTD.
2. ALL DIMENSIONS ARE TO FACE OF KERB UNLESS SHOWN OTHERWISE.

TRAFFICWORKS PTY LTD
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P.O. Box 417 IVANHOE VIC. 3079
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CLIENT
Chris Nash

SCALE OF METRES
0 10 20

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Swept Path Assessment

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