5 – Traffic Impact Assessment

Spotto CONSULTING

people-oriented traffic and transport solutions

Traffic Impact Assessment

Apollo Fabrications

Telegraph Road
Young NSW

March 2021

Prepared by:

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For:

Apollo Fabrication Group

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P0109	A	21 December 2020	Client Review	SWS
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CONTENTS

1 INTRODUCTION

Spotto Consulting have been engaged by Apollo Fabrication Group to complete a Traffic Impact Assessment. The study is in response to a proposed development at 2-4 and 20 Telegraph Road, Young. The development involves construction of new industrial developments on two sites, including workshop and office space plus off-street car parking and access for heavy vehicles.

The purpose of the assessment is to review the existing conditions in the vicinity of the site, including traffic, site access and parking, as well as the performance of the surrounding network. An evaluation is then required of the traffic, access and parking requirements for the proposed development, and the impacts on the surrounding road network.

The assessment concluded that:

- Traffic data and modelling of nearby roads show that Telegraph Road, Murringo Road and Whiteman Avenue currently operate at an excellent Level of Service (LOS A, the highest level). Assessment of the nearby intersection of Telegraph Road with Murringo Road and Whiteman Avenue indicates that this also operate with minimal delays;
- The proposed development will generate an additional 744 vehicle trips per day, with 122 of these in the AM and PM peak periods, which will not have a significant impact on the performance of the surrounding road network (including nearby intersections);
- Access to the site is able to be provided from Telegraph Road and the Crown road between 12 and 20 Telegraph Road for both heavy and light vehicles, with adequate sight distance at all locations;
- The provision of 116 off-street parking spaces (including five designated for persons with a disability) across the site does not meet the numerical requirements of Hilltops Council's *Young Development Control Plan*, however the parking provided is considered adequate to cater for anticipated demand. The car parking and access driveways satisfactorily address all matters for consideration under the *Young DCP* and *Australian Standard AS2890*;
- Adequate provision has been made for persons with a disability;
- Adequate provision has been made for servicing and delivery vehicles; and
- Adequate provision has been made for pedestrians and cyclists.

The assessment recommended that:

- The intersection of Telegraph Road with Murringo Road and Whiteman Avenue be modified to incorporate BAL (Basic Left Turn) and CHR(S) (Channelised Right Turn – Short) lane treatments; and
- Heavy vehicles approaching the site from the east along Murringo Road be directed to turn left at the eastern intersection.

2 EXISTING CONDITIONS

2.1 Site

The site is located on the southern side of Telegraph Road, roughly 2km east of the Young Central Business District, as shown in Figure 2-1.

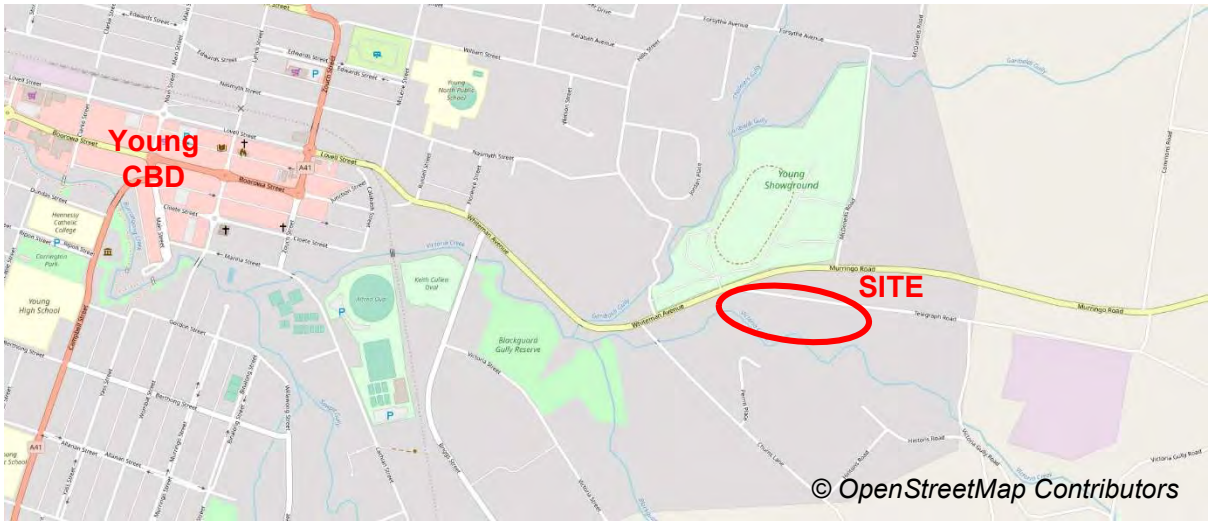


Figure 2-1: Locality Plan

A site inspection was undertaken on Monday 7 December 2020. This included the site and adjacent roads, as well as the surrounding transport network more broadly. The site comprises the following areas:

- Apollo Fabrications existing operations at 10-12 Telegraph Road (Lot 3 and 4 DP845187, Lot 12 DP1138027);
- Vacant land at 2 Telegraph Road (Lot 1 DP736225) and 20 Telegraph Road (Lot 1154, 1171 and 1199 DP754611, Lot 3 DP374948); and
- An existing residential dwelling at 4 Telegraph Road (Lot 2 DP 736225).

A Development Consent has been issued for expansion of the existing operations at 10-12 Telegraph Road (Hilltops Council 2019/DA-00035, October 2019). The operations at 10-12 Telegraph Road employ 10 office-based staff plus 24 workshop staff.

At the time of the site inspection, 2 Telegraph Road (Lot 1 DP736225) and 20 Telegraph Road (Lot 1171 and 1154 DP754611) were being used on a temporary basis only to manage materials (raw and finished) to facilitate this development, as well as those accumulated as a consequence of the impact of COVID-19.

Access to the site is provided directly from Telegraph Road via several access driveways paired with sliding doors into existing buildings, as well as from a 10m-wide road reserve located between 12 Telegraph Road and 20 Telegraph Road.

Figure 2-2: Looking south-west at Apollo Fabrications existing operations at 10-12 Telegraph Road

Figure 2-3: Looking south-west at vacant lot 20 Telegraph Road

2.2 Surrounding Land Use

The site and immediate surrounds are currently zoned a mixture of R1 General Residential, RE1 Public Recreation and RU4 Rural Small Holdings under the *Young Local Environmental Plan 2010* (as shown in Figure 2-4, below).

The surrounding area contains a mix of uses, including the Apollo Fabrications operations, other commercial operations (such as a stockfeeds operation at the eastern end of Telegraph Road), as well as residential and rural activities.

Areas further north-west are zoned RE1 Private Recreation, and include the Young showgrounds and harness racing club. Several of the properties on Telegraph Road have activities associated with this site.

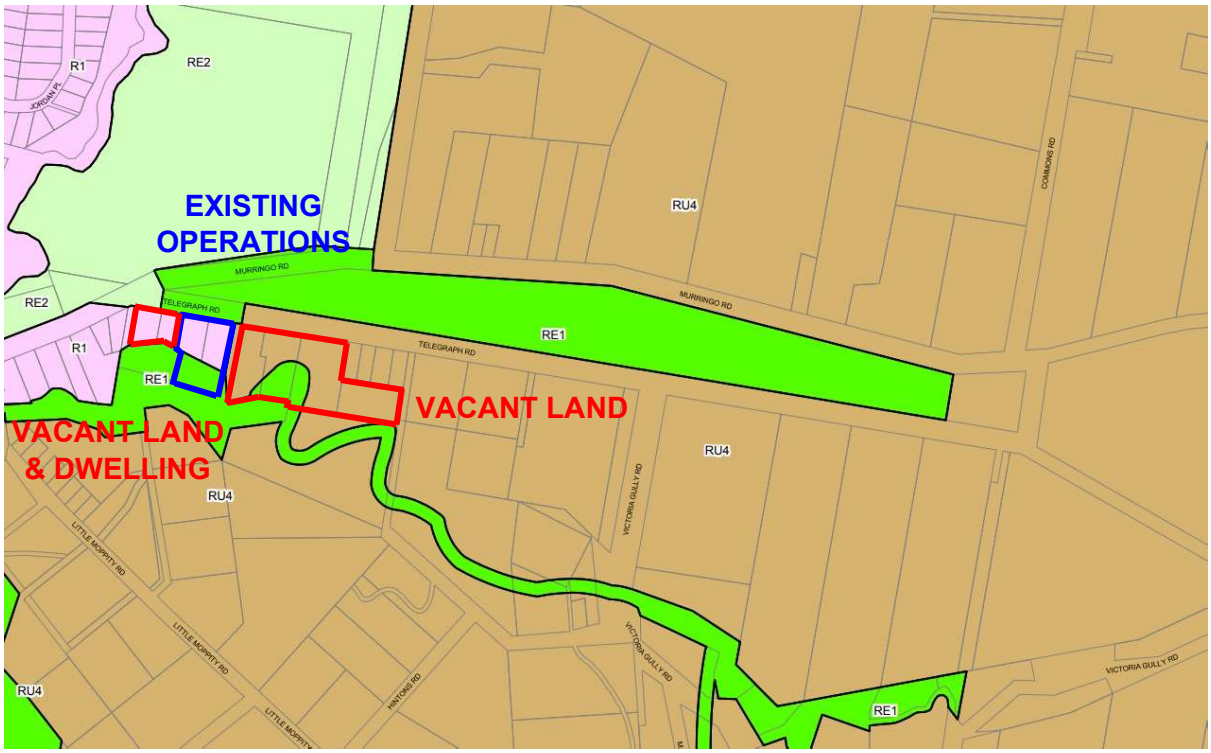


Figure 2-4: Land Zoning (Source: Griffith City Council)

2.3 Consultation

In preparing this report, consultation has been undertaken with officers from Hilltops Council and Transport for NSW (TfNSW). Spotto Consulting appreciates the opportunity to discuss key issues relating to the local transport network with these officers, and acknowledges the insights gained through this consultation.

2.4 Road Network

2.4.1 Telegraph Road

Telegraph Road runs roughly east/west from its intersection with Whiteman Avenue/Murringo Road west of the site to the east, where it intersects with Murringo Road. It is a local road under the control of Hilltops Council, and its role balances through movement with access.

In the vicinity of the site, Telegraph Road is a two-lane, two-way sealed rural road that runs roughly east/west and forms the northern boundary of the site. Contained within a 30m-wide road reserve, the main carriageway is of varying width (7.0-8.0m), incorporating a single lane in each direction plus sealed shoulders. Roadside verges contain vegetation, with overhead power poles located 8-10m from the edge of the pavement on the southern side of the road. A 3m-wide gravel track is located on the northern side of the road. The speed limit adjacent to the site is 60km/h.

Figure 2-5: Looking east along Telegraph Road, with the site on the right hand side

2.4.2 Whiteman Avenue/Murringo Road

Located approximately 200m west of the site, Whiteman Avenue and Murringo Road form part of a route that runs roughly east/west, from the Young CBD, past Telegraph Road to Murringo and Boorowa. It is a regional road, and so is under the joint management of Hilltops Council and TfNSW. It's role generally favours through movement over direct property access.

In the vicinity of the site, the road is a two-lane, two-way sealed rural road that runs roughly south-west/north-east. Contained within an easement of varying width (minimum 30m), the main carriageway contains a single 3.5m-wide through lane in each direction, with sealed shoulders of varying width. Roadside verges contain table drains and vegetation, with overhead power poles on the southern side of the road. The road is approved for travel by vehicles up to and including 26m B-Doubles. The speed limit is 60km/h, increasing to 80km/h further east.

Figure 2-6: Looking south-west along Murringo Road towards intersection with Telegraph Road (left) and access to Young Showground and Harness Racing Club (right)

2.4.3 Intersections

The intersection of Telegraph Road and Whiteman Avenue/Murringo Road is located west of the site. It is an at-grade intersection, with Give Way signage and associated linemarking on Telegraph Road giving priority to through vehicles on Whiteman Avenue/Murringo Road. The access into the Young Showground and Harness Racing Club is located opposite Telegraph Road. Sealed shoulders of 3-7m width are provided on Whiteman Avenue/Murringo Road to allow eastbound through traffic to pass vehicles turning right into Telegraph Road.

Figure 2-7: Looking north-east at intersection of Murringo Road/Whiteman Avenue with Telegraph Road (right) and Young Showground and Harness Racing Club (left)

Access to Telegraph Road from Murringo Road is also available via an intersection near Commons Road, approximately 1km east of the site. This is an at-grade intersection, with Give Way signage and associated linemarking giving priority to through traffic on Murringo Road. Shoulder widening is present on Murringo Road to facilitate movement for vehicles turning left.

Figure 2-8: Looking west along Murringo Road towards intersection with Telegraph Road access (left hand side) and Commons Road (right hand side)

2.5 Existing Traffic Conditions

2.5.1 Data Collection

Traffic volume data was sought from Hilltops Council, however no existing data was available to be provided in the vicinity of the site.

Turning movement counts were undertaken at the intersection of Telegraph Road and Whiteman Avenue/Murringo Road on Monday 7 December 2020, which was within NSW school term dates. These surveys were undertaken across the morning and evening peak periods, allowing the peak hour in each period to be determined.

The only other traffic data available is from the *Hilltops Freight and Transport Study Final Report*, which estimated that in 2018, the volume of traffic on Murringo Road between Murringo and Boorowa (approximately 35km east of the site) was 1,200 vehicles per day, with 12% heavy vehicles.

2.5.2 Intersections

Using the data detailed in Section 2.5.1, the traffic movements at key intersections in 2020 can be accurately determined. The turning movements for the busiest one-hour period in the AM and PM peak periods are summarised for the key intersection of Telegraph Road with Murringo Road and Whiteman Avenue in Figure 2-9, below.

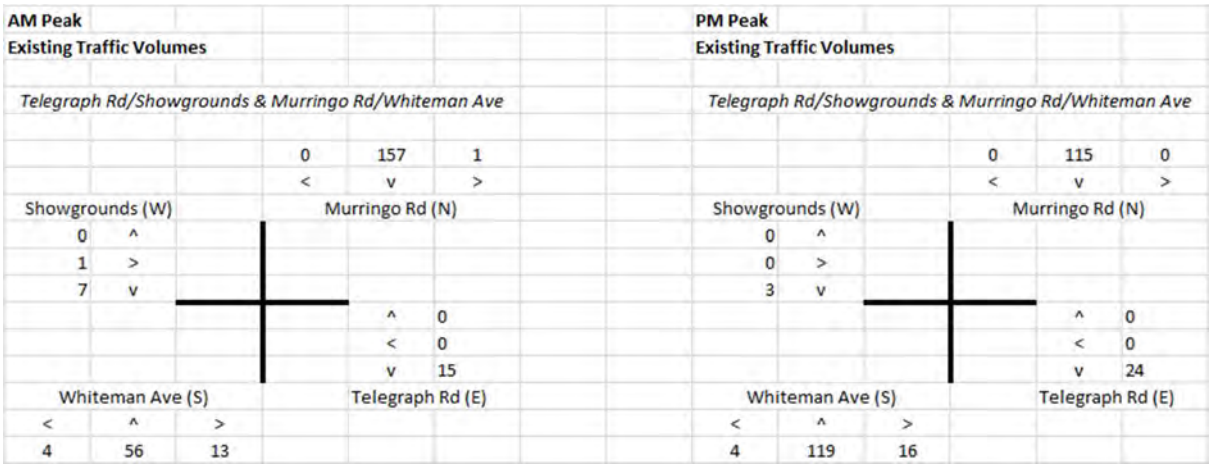


Figure 2-9: AM and PM Peak Hour Turning Movements - Existing Conditions

The performance of this intersection was modelled using the intersection analysis program SIDRA Intersection. Full results for the existing AM and PM peak periods are included in Appendix A, and summarised in Table 2-1 below.

Table 2-1: Intersection performance summary - existing conditions

Intersection	Total Flow (veh/h)	Degree of Saturation	Average Delay (sec)	Level of Service*
Telegraph Rd & Murringo Rd/ Whiteman Ave				
AM	272	0.089	1.1	A
PM	302	0.080	1.1	A

** Level of Service (LOS) is a qualitative assessment of the quantitative effect of factors such as speed, volume of traffic, geometric features, traffic interruptions, delays and freedom to manoeuvre. It ranges from A (best) to F (worst), and is calculated using average delay.*

The analysis demonstrates that under 2020 traffic volumes, the intersection currently operates at an excellent Level of Service (LOS A, the highest level) in both the AM and PM peak periods. This indicates an intersection operating with low levels of delay and saturation, and with ample spare capacity.

An assessment has not been carried out on the other intersection used to access the site (Murringo Road to the east), as the volume of traffic that uses that intersection is very low in comparison to the Murringo Road/Whiteman Avenue intersection.

2.5.3 Midblock

Traffic volumes midblock (ie. between intersections) can be determined for the peak periods based on the turning movement data. It is also possible to estimate daily midblock traffic volume using the turning movement data: *NSW RMS Traffic Modelling Guidelines* state that "in general, peak hour is assumed to be around 10% of AADT" (daily volume). The daily traffic volume for a road can therefore be estimated using the following equation:

$$Daily\ Volume = 10 \times \frac{AM\ Peak\ Hour\ Volume + PM\ Peak\ Hour\ Volume}{2}$$

A summary of the midblock data for the key sections of roads in the vicinity of the site, including weekday traffic volumes (in vehicles per day), peak hour traffic volumes (in vehicles per hour) and Level of Service (LOS) is provided in Table 2-2, below.

Table 2-2: Midblock traffic data – existing conditions

Location	Weekday	Weekday AM Peak		Weekday PM Peak	
	Veh/d	Veh/h	LOS*	Veh/h	LOS*
Telegraph Road (east of Murringo Rd)	370	30	A	43	A
Eastbound		15		19	
Westbound		15		24	
Murringo Road (north of Telegraph Road)	2,240	214	A	234	A
Northeastbound		158		115	
Southwestbound		56		119	
Whiteman Avenue (south of Telegraph Road)	2,670	252	A	281	A
Northeastbound		179		142	
Southwestbound		73		139	

** Level of Service calculated based on typical midblock capacities for two-lane, two-way roads from Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis.*

The level of service for all roads in the vicinity of the site is excellent (LOS A, the highest level), indicating the roads generally have adequate midblock capacity for the current levels of traffic observed in the road network.

2.6 Site Access and Parking

Vehicular access to Apollo Fabrications existing operations at 10-12 Telegraph Road is available via several driveways and gates from Telegraph Road. These are shown in Figure 2-2, above.

Vehicular access to the vacant lot at 20 Telegraph Road is available via an existing gate, as shown in Figure 2-10, below.

Figure 2-10: Looking south at access gate into 20 Telegraph Road

It is also noted that a road reserve is located between the two sites, providing access to both.

Combined with internal manoeuvring areas, these accesses allow vehicles to enter and exit the site in a forward direction using Telegraph Road.

Parking for light vehicles associated with Apollo Fabrications existing operations is via 90 degree angle parking on-street adjacent to the site. This will be further formalised as part of the approved development works for expansion of 10-12 Telegraph Road, including sealing, linemarking, signage and landscaping. Parking counts undertaken on 7 December 2020 identified that the peak parking demand in this area was 27 vehicles, with further investigation revealing this comprised 22 vehicles associated with existing operations (staff and visitors) and 5 vehicles associated with the site's expansion construction activities (ie. These 5 vehicles are not part of the site's regular parking demands).

2.7 Public Transport

There are no broad public transport services such as town buses in Young, although school buses do run, and a community transport services operate to provide door-to-door service for eligible community members in Young/Boorowa.

Buses provide regional connections from Young to Cootamundra and Bathurst, where rail services can then be accessed. The Young Coach Stop is located near the Young train station, approximately 2km west of the site.

2.8 Pedestrians and Cyclists

There are no formalised pedestrian and cyclist facilities located in the immediate vicinity of the site. The nearest is the 2.5m-wide shared path located on the northern side of Whiteman Avenue, approximately 150m west of the site. This provides a dedicated off-road facility for pedestrians and cyclists travelling west, and providing a connection to the Young CBD and the broader Young path network.

3 PROPOSED DEVELOPMENT

The intention of the proposed development is to amend planning provisions relating to land holdings, currently owned and controlled by Apollo Fabrications, that will enable the use of the land for industrial purposes, specifically steel fabrication. The planning proposal will also help inform the *Draft Hilltops Local Environmental Plan* that has received Gateway approval from NSW Department of Planning Industry & Environment (DPIE) and is currently on public exhibition.

In terms of the additional traffic impacts associated with the proposal, the proposed development can be separated into two main components:

- The eastern areas, covering the four lots which are listed as 20 Telegraph Road; and
- The western areas, covering the two lots which are listed as 2-4 Telegraph Road.

Development in the eastern areas will consist of construction of a new industrial development on 20 Telegraph Road to allow for expansion of Apollo Fabrications. This includes a workshop (GFA 10,800m^2) and office (GFA 1,683m^2), as well as off-street parking for 116 vehicles (including four designated for persons with a disability) plus vehicular access from Telegraph Road via the existing access gate and the road reserve to the west. It is anticipated that this development will employ up to 23 office-based staff and 90 workshop staff.

Development in the western areas will consist of demolition of the existing dwelling on 4 Telegraph Road, plus construction of a new industrial development on 2-4 Telegraph Road. This will include workshop (GFA 2,280m^2) and office facilities (GFA 360m^2), off-street parking for 17 vehicles (including one designated for persons with a disability) plus vehicular access from Telegraph Road. It is anticipated that this development will employ up to 10 office staff and 23 workshop staff.

Following completion of approved expansion works at 10-12 Telegraph Road, this part of the site will be integrated with operations on other parts of the site, however the impact of additional traffic and parking requirements for this component have been approved previously and do not form part of this assessment.

Plans of the proposed development are included in Appendix B.

4 IMPACT OF PROPOSED DEVELOPMENT

4.1 Traffic Generation and Impact on Road Network

4.1.1 Traffic Generation and Distribution

Traffic generation levels for proposed developments can typically be determined by reference to published standards such as the *RTA Guide to Traffic Generating Developments* (and its subsequent update *RMS Technical Direction TDT2013/04a Guide to Traffic Generating Developments – Updated Traffic Surveys*), or the *SA DPTI Trip Generation Rates for Assessment of Development Proposals 2014*. The SA DPTI rate is considered the most appropriate rate – the rates quoted in the RMS Guide are for business parks/industrial estates or office blocks, and are based primarily on surveys of sites in Sydney (and hence have different patterns to the proposed development).

The amount of traffic generated depends on the land use, and the relevant rates for each land use are summarised in Table 4-1, below.

Table 4-1: Traffic Generation Rates for Proposed Development

Element	Source	Trip Generation Rate	
		Peak Veh/h	Daily Veh/d
Workshop	SA DPTI 2014	0.62 trips per 100m^2 GFA	3.2 trips per 100m^2 GFA
Office	SA DPTI 2014	2.02 trips per 100m^2 GFA	15.9 trips per 100m^2 GFA

The total traffic generated by the proposed development is summarised in Table 4-2, below.

Table 4-2: Total Traffic Generation – Proposed Development

Element	Scale	Trip Generation Rate	
		Peak Veh/h	Daily Veh/d
20 Telegraph Rd			
Workshop	10,800m^2 GFA	67	346
Office	1,683m^2 GFA	34	268
Subtotal		101	614
2-4 Telegraph Rd			
Workshop	2,280m^2 GFA	14	73
Office	360m^2 GFA	7	57
Subtotal		21	130
Total		*122*	*744*

Other assumptions used to determine traffic generation and distribution for the site are that:

- Traffic will be split 90/10 between the western and eastern ends of Telegraph Road, reflecting the existing split in volumes between the two ends of the road by vehicles;
- Traffic using the western end of Telegraph Road will be split 90/10 between Murringo Road and Whiteman Avenue, reflecting the observation that the majority of traffic travels to/from the Young CBD via Whiteman Avenue;
- Traffic using the eastern end of Telegraph Road will be 100% left turn in or right turn out, reflecting the fact that the only traffic using this end of the road will be travelling to/from the east;
- Traffic will be split 80/20 between inbound and outbound traffic in the AM peak, reflecting the net inbound movement of staff. This will be reversed in the PM peak;
- Traffic will be split 50/50 between inbound and outbound traffic across the course of each day; and
- For the purposes of this assessment, it is assumed that the peak in staff movements correspond with the peak in vehicle movements on the road network. This is a conservative assumption, since many staff arrive at work earlier than the AM peak period – for example, typically workshop staff commence at 7AM and office staff at 8AM, both before the observed network peak of 8:00AM-9:00AM.

Based on these assumptions, the traffic generated by the proposed development at the nearby intersection of Telegraph Road and Murringo Road/Whiteman Avenue in the AM and PM peak periods is shown in Figure 4-1, below.

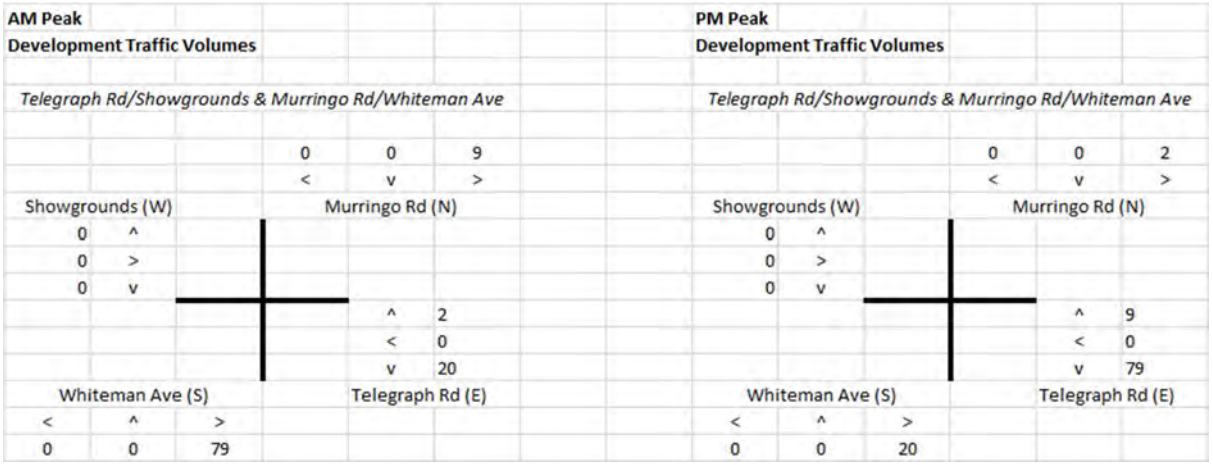


Figure 4-1: AM and PM Peak Hour Turning Movements – Generated by Development

4.1.2 Traffic Impact at Intersections

The additional traffic generated by the proposed development, as well as the anticipated growth in background traffic volumes, was added to the existing traffic flows at the nearby key intersection of Telegraph Road with Murringo Road and Whiteman Avenue. The total flows at this intersection in the AM and PM peak periods with the additional traffic generated by the proposed development is shown in Figure 4-2, below.

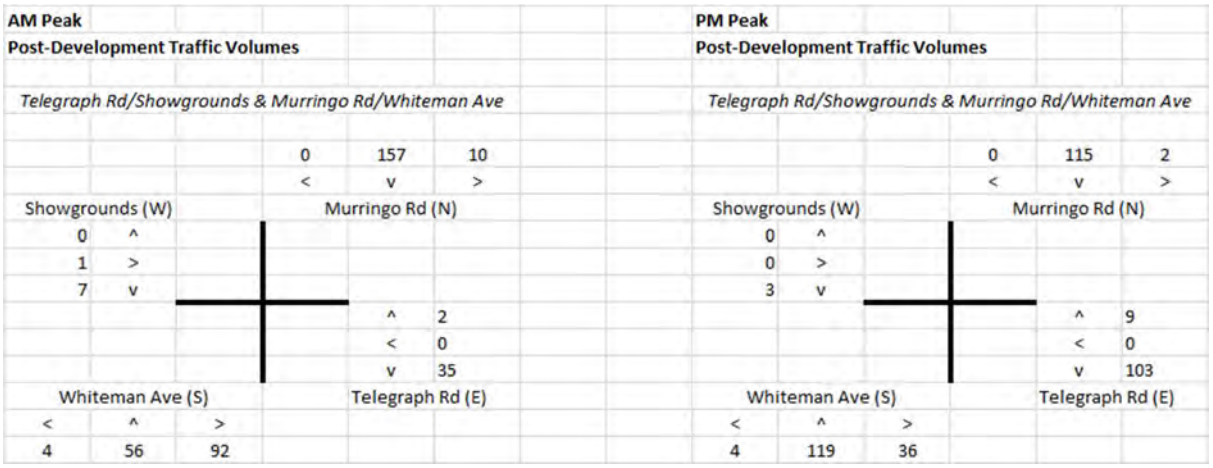


Figure 4-2: AM and PM Peak Hour Turning Movements – With Proposed Development

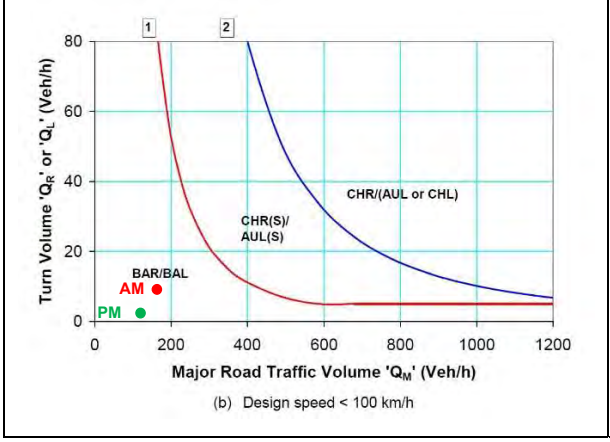
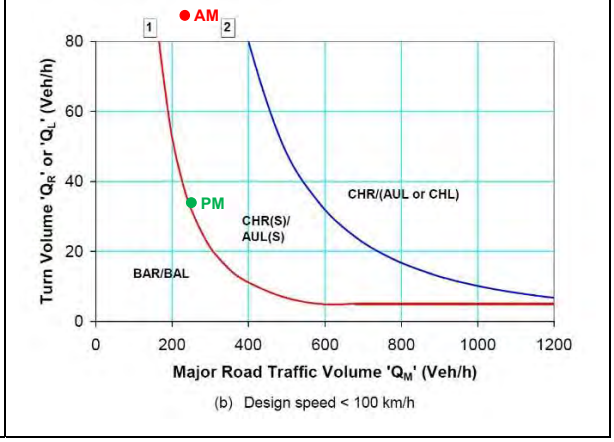
It is important to carry out an assessment to determine whether the volume of traffic associated with the proposed development that will use the intersection is sufficient to warrant provision of turning lanes, and if so, what type. This has been carried out in accordance with the procedure outlined in Appendix A.8 of the *Austroads Guide to Road Design Part 4: Intersections and Crossings – General*, using the turning movements from Figure 4-2, above. These movements can then be used to determine the major road and left/right turning volumes (Q_M, Q_L/Q_R, respectively), which can then be plotted onto Figure A 10 from the *Austroads Guide to Road Design Part 4* to determine what upgrades, if any, are warranted.

A summary of this assessment is included below, with turning movements in Table 4-3, and Figure A10 for the AM and PM peak periods at the intersection in Table 4-4.

Table 4-3: Key Turning Movements – With Proposed Development

Time Period	Left Turn			Right Turn		
	Q_L	Q_M	Treatment	Q_R	Q_M	Treatment
AM	10	157	BAL	92	223	CHR(S)
PM	2	115	BAL	36	236	CHR(S)

Table 4-4: Major road and turning volumes

Left Turn	Right Turn
	

The assessment demonstrates that the following treatments are warranted to cater for the additional traffic generated by the proposed development:

- Left turn from Murringo Road into Telegraph Road – BAL or Basic Left Turn; and
- Right turn from Whiteman Avenue into Telegraph Road – CHR(S) or Channelised Right Turn (Short).

Using the turning movements from Figure 4-2, and the lane configurations from Table 4-3, the performance of the nearby key intersection of Telegraph Road with Murringo Road and Whiteman Avenue was then modelled using the intersection analysis program SIDRA Intersection. Full results for the AM and PM peak periods are included in Appendix C and summarised in Table 4-5, below.

Table 4-5: Intersection performance summary – with proposed development

Intersection	Total Flow (veh/h)	Degree of Saturation	Average Delay (sec)	Level of Service
Telegraph Rd & Murringo Rd/ Whiteman Ave				
AM	386	0.095	2.4	A
PM	395	0.090	2.3	A

The analysis demonstrates that even with the additional traffic generated by the proposed development, the intersection will continue to operate at an excellent Level of Service (LOS A, the highest level) in both the AM and PM peak periods. This indicates the intersection will continue to operate with low levels of delay and saturation, and with ample spare capacity.

As noted in Section 2.4.3, above, the eastern intersection is used by very little traffic, and as the western intersection performs satisfactorily, the eastern intersection has not been assessed.

As vehicles travel further throughout the network, traffic generated by the proposed development becomes more dispersed, and hence has a lower net impact on other intersections. Hence if the impact at nearby key intersections is within acceptable limits, then beyond these the impact will be even lower.

It is concluded that the required auxiliary lane treatments are able to be catered for at the intersection of Telegraph Road with Murringo Road and Whiteman Avenue, that traffic from the proposed development can be accommodated at key intersections in the vicinity of the site, and that there will be no significant impacts on the performance of intersections as a result of the proposed development.

4.1.3 Traffic Impact Midblock

The additional traffic generated by the proposed development was added to the existing traffic volumes on nearby streets. A summary of the midblock data for the key sections of roads in the vicinity of the site, including weekday traffic volumes, peak hour traffic volumes and Level of Service with the proposed development is provided in Table 4-6, below.

Table 4-6: Midblock traffic data – with proposed development

Location	Weekday	Weekday AM Peak		Weekday PM Peak	
	Veh/d	Veh/h	LOS	Veh/h	LOS
Telegraph Road (east of Murringo Rd)	1,040	140	A	153	A
Eastbound		103		41	
Westbound		37		112	
Murringo Road (north of Telegraph Road)	2,310	224	A	245	A
Northeastbound		167		117	
Southwestbound		58		128	
Whiteman Avenue (south of Telegraph Road)	3,270	351	A	380	A
Northeastbound		199		221	
Southwestbound		152		159	

The analysis shows that levels of service for the segments of road analysed remain excellent, continuing operating at the highest (LOS A), even with the additional traffic generated by the proposed development.

Similar to impacts at intersections, as vehicles travel further throughout the network, traffic generated by the proposed development becomes more dispersed, and hence has a lower net impact on other roads. Hence if the impact on the roads in the vicinity of the site is within acceptable limits, then beyond these roads the impact will be even lower.

It is concluded that there will be no significant impact on roads in the vicinity of the site or further afield as a result of the proposed development.

4.2 Site Access

The following access arrangements are proposed:

- 20 Telegraph Road will be accessed via the existing 12m-wide access gate onto Telegraph Road, as well as by new access driveways onto the existing Crown road reserve located between 12 and 20 Telegraph Road; and
- 2-4 Telegraph Road will be accessed via the existing 8m-wide access gate onto Telegraph Road.

In addition, it is proposed to seal the areas between the edge of the Telegraph Road pavement and the site boundary to facilitate site access and off-street parking for all sites.

These driveway widths comply with the minimum requirement of 8-9m under Hilltops Council's *Young Development Control Plan* (Table 4.2 and 4.3, requiring a driveway Type 5, catering for articulated vehicles accessing off a minor road), and are able to meet the requirements of *Australian Standard AS2890 Part 2: Off-Street Commercial Vehicle Facilities* (Figure 3.1).

All vehicles will be able to enter and exit the site in a forward direction.

4.3 Car Parking Requirements and Impact

Hilltops Council's *Young Development Control Plan (2011, updated 2019)* applies to the site, and specifies the minimum number of parking spaces required for a development, depending on the land use. The relevant car parking rates for the land uses associated with the proposed development include:

- Office premises – 1 space per 50m^2 of gross leasable floor area; and
- Industries – 1 space per 2 staff employed or 1 space per 100m^2 of gross leasable floor area (whichever is the greatest).

The car parking requirements for the proposed development are summarised in Table 4-7, below.

Table 4-7: Car Parking Requirements – Young DCP

Area	Use	Rate	Unit	Car Parking Spaces Required
East (20)	Office Industry	1 space per 50m^2 GFA 1 space per 2 employees or 1 space per 100m^2 GFA	1,683m^2 GFA 90 employees or 10,800m^2 GFA	33.7 45.0 or 108.0
Subtotal				*141.7* *Round to 142*
West (2-4)	Office Industry	1 space per 50m^2 GFA 1 space per 2 employees Or 1 space per 100m^2 GFA	360m^2 GFA 23 employees or 2,280m^2 GFA	7.2 11.5 Or 22.8
Subtotal				*30.0* *Round to 26*

The proposed development incorporates 116 parking spaces in the eastern areas and 17 in the western areas, and therefore has a shortfall against the requirements of the Young DCP.

The Young DCP does allow for parking to be provided at an alternative rate, "subject to any qualifications or exceptions which may be applicable in the circumstances of the case".

As noted in Section 2.6, above, the peak parking demand associated with the existing operations at 10-12 Telegraph Road is 22 vehicles. The use of employee numbers is considered more relevant than floor area when determining parking rates, as increases in floor area in these types of development typically result in a more efficient use of space, and do not result in a corresponding increase in employee numbers. As demand for parking is primarily driven by the number of employees travelling to site by private motor vehicle, the number of employees is more relevant than the floor area. A smaller number of spaces should also be provided for visitors to the site.

Based on this, the recommended number of off-street parking spaces is:

- 1 space per 2 staff (whether office-based or warehouse-based); plus
- 1 visitor space per 10 staff.

The car parking requirements for the proposed development based on these criteria are summarised in Table 4-8, below.

Table 4-8: Car Parking Requirements – Recommended

Area	Use	Rate	Unit	Car Parking Spaces Required
East (20)	Employee Visitor	1 space per 2 employees 1 space per 10 employees	113 employees 113 employees	56.5 11.3
Subtotal				*67.8* *Round to 68*
West (2-4)	Employee Visitor	1 space per 2 employees 1 space per 10 employees	33 employees 33 employees	16.5 3.8
Subtotal				*20.3* *Round to 20*
Total				*88*

Overall the eastern and western areas provide a total of 116 parking spaces, and proposed development therefore has sufficient off-street car parking to accommodate anticipated peak parking demands for a typical weekday's operations.

The off-street car parking is proposed to be developed as 90 degree angle parking, directly accessible from Telegraph Road. This is consistent with the layout of existing parking for Apollo Fabrications, including their existing operations and approved expansion works at 10-12 Telegraph Road.

The off-street car park is classified as a mix of User Class 1 and 3 under *Australian Standard AS2890 Part 1: Off-street car parking* (owing to the use of the car park by employees and short term parking by visitors), with User Class 1 being the predominant user. Figure 2.2 of AS2890 specifies minimum parking space dimensions of 2.4m wide x 5.4m long with an aisle width of 6.2m for 90 degree angle parking catering for this class of user. All parking spaces meet this requirement, while the area between the edge of the Telegraph Road pavement and the car parking bays is approximately 11m in width, which is ample for the required aisle width of 6.2m.

Five of the 116 off-street parking spaces are designated for persons with a disability. This meets the requirement of a minimum of one space in 50 that would normally be required for this type of building under the Building Code of Australia.

It is concluded that although the proposed development does not provide adequate numbers of off-street parking spaces to meet the requirements of the *Young DCP*, it does provide adequate parking to meet anticipated demand. The layout of the off-street parking area and access driveways is consistent with existing arrangements on Telegraph Road, generally complies with the requirements of the *Young DCP* and *AS2890*, and has adequate provision for persons with a disability.

4.4 Service and Delivery Vehicles

Service and delivery vehicles include deliveries of goods and services such as trades or maintenance persons, as well as collection of refuse.

As discussed in Section 4.2, deliveries of inbound material, collection of outbound material and other services such as waste collection are likely to occur in rigid trucks or articulated vehicles. All vehicles are able to enter and exit the site in a forward direction, with adequate room on site to stand clear of other vehicles when parked. It is noted that the number of such vehicles arriving and departing across the course of a day (no more than 20 per day) mean it is unlikely that multiple vehicles will be on-site at the same time.

Deliveries of goods and services in standard vehicles or small trucks are able to park in bays in the off-street car park. It is anticipated these will number no more than 30 per day. Vehicles would also be able to enter the site and workshop buildings, and would not have a significant impact on the availability of on-street car parking.

It is considered that the development provides appropriate facilities for service vehicles.

4.5 Pedestrian and Cyclist Impact

Access into the site for pedestrians and cyclists is available from Telegraph Road. It is not proposed to make any change to pedestrian or cyclist infrastructure in the vicinity of the site.

It is concluded that adequate provision has been made for pedestrians and cyclists within the site, and it is not anticipated that there would be any significant adverse effect on pedestrians or cyclists as a result of the proposed development.

5 CONCLUSIONS AND RECOMMENDATIONS

It is concluded that:

- Traffic data and modelling of nearby roads show that Telegraph Road, Murringo Road and Whiteman Avenue currently operate at an excellent Level of Service (LOS A, the highest level). Assessment of the nearby intersection of Telegraph Road with Murringo Road and Whiteman Avenue indicates that this also operate with minimal delays;
- The proposed development will generate an additional 744 vehicle trips per day, with 122 of these in the AM and PM peak periods, which will not have a significant impact on the performance of the surrounding road network (including nearby intersections);
- Access to the site is able to be provided from Telegraph Road and the Crown road between 12 and 20 Telegraph Road for both heavy and light vehicles, with adequate sight distance at all locations;
- The provision of 116 off-street parking spaces (including five designated for persons with a disability) across the site does not meet the numerical requirements of Hilltops Council's *Young Development Control Plan*, however the parking provided is considered adequate to cater for anticipated demand. The car parking and access driveways satisfactorily address all matters for consideration under the *Young DCP* and *Australian Standard AS2890*;
- Adequate provision has been made for persons with a disability;
- Adequate provision has been made for servicing and delivery vehicles; and
- Adequate provision has been made for pedestrians and cyclists.

It is recommended that:

- The intersection of Telegraph Road with Murringo Road and Whiteman Avenue be modified to incorporate BAL (Basic Left Turn) and CHR(S) (Channelised Right Turn – Short) lane treatments; and
- Heavy vehicles approaching the site from the east along Murringo Road be directed to turn left at the eastern intersection.

APPENDIX A – INTERSECTION ANALYSIS – EXISTING

LANE SUMMARY

Site: [Telegraph Rd & Murringo Rd/Whiteman Ave_AM_Existing (Site Folder: General)]

Telegraph Road and Murringo Road/Whiteman Avenue, Young
AM Peak Period
Existing Conditions
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Telegraph													
Lane 1	18	5.0	1301	0.014	100	5.9	LOS A	0.1	0.4	Full	500	0.0	0.0
Approach	18	5.0		0.014		5.9	LOS A	0.1	0.4				
NorthEast: Murringo													
Lane 1	167	5.0	1884	0.089	100	0.1	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	167	5.0		0.089		0.1	NA	0.0	0.1				
West: Showgrounds													
Lane 1	9	5.0	896	0.011	100	6.9	LOS A	0.0	0.3	Full	500	0.0	0.0
Approach	9	5.0		0.011		6.9	LOS A	0.0	0.3				
SouthWest: Whiteman													
Lane 1	77	5.0	1785	0.043	100	1.4	LOS A	0.1	0.7	Full	500	0.0	0.0
Approach	77	5.0		0.043		1.4	NA	0.1	0.7				
Intersection	272	5.0		0.089		1.1	NA	0.1	0.7				

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

Approach Lane Flows (veh/h)

East: Telegraph

Mov. From E To Exit:	L1 SW	T1 W	R3 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	16	1	1	18	5.0	1301	0.014	100	NA	NA
Approach	16	1	1	18	5.0		0.014			

NorthEast: Murringo

Mov. From NE To Exit:	L3 E	T1 SW	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	165	1	167	5.0	1884	0.089	100	NA	NA
Approach	1	165	1	167	5.0		0.089			

West: Showgrounds

Mov. From W	L1	T1	R3	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

To Exit:	NE	E	SW			veh/h	v/c	%	%	No.
Lane 1	1	1	7	9	5.0	896	0.011	100	NA	NA
Approach	1	1	7	9	5.0		0.011			

SouthWest: Whiteman

Mov. From SW To Exit:	L3 W	T1 NE	R1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	4	59	14	77	5.0	1785	0.043	100	NA	NA
Approach	4	59	14	77	5.0		0.043			

	Total	%HV	Deg.Satn (v/c)
Intersection	272	5.0	0.089

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
East Exit: Telegraph Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Murringo Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Showgrounds Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
SouthWest Exit: Whiteman Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: [Telegraph Rd & Murringo Rd/Whiteman Ave_PM_Existing (Site Folder: General)]

Telegraph Road and Murringo Road/Whiteman Avenue, Young
PM Peak Period
Existing Conditions
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Telegraph													
Lane 1	27	5.0	1372	0.020	100	5.8	LOS A	0.1	0.6	Full	500	0.0	0.0
Approach	27	5.0		0.020		5.8	LOS A	0.1	0.6				
NorthEast: Murringo													
Lane 1	123	5.0	1882	0.065	100	0.1	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	123	5.0		0.065		0.1	NA	0.0	0.1				
West: Showgrounds													
Lane 1	5	5.0	919	0.006	100	6.7	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	5	5.0		0.006		6.7	LOS A	0.0	0.1				
SouthWest: Whiteman													
Lane 1	146	5.0	1832	0.080	100	0.8	LOS A	0.1	0.9	Full	500	0.0	0.0
Approach	146	5.0		0.080		0.8	NA	0.1	0.9				
Intersection	302	5.0		0.080		1.1	NA	0.1	0.9				

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

Approach Lane Flows (veh/h)

East: Telegraph

Mov. From E To Exit:	L1 SW	T1 W	R3 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	25	1	1	27	5.0	1372	0.020	100	NA	NA
Approach	25	1	1	27	5.0		0.020			

NorthEast: Murringo

Mov. From NE To Exit:	L3 E	T1 SW	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	121	1	123	5.0	1882	0.065	100	NA	NA
Approach	1	121	1	123	5.0		0.065			

West: Showgrounds

Mov. From W	L1	T1	R3	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane

To Exit:	NE	E	SW			veh/h	v/c	%	%	No.
Lane 1	1	1	3	5	5.0	919	0.006	100	NA	NA
Approach	1	1	3	5	5.0		0.006			

SouthWest: Whiteman

Mov. From SW To Exit:	L3 W	T1 NE	R1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	4	125	17	146	5.0	1832	0.080	100	NA	NA
Approach	4	125	17	146	5.0		0.080			

	Total	%HV	Deg.Satn (v/c)
Intersection	302	5.0	0.080

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
East Exit: Telegraph Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Murringo Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Showgrounds Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
SouthWest Exit: Whiteman Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

APPENDIX B – PLANS OF PROPOSED DEVELOPMENT

APOLLO FABRICATION GROUP Pty Ltd

PROPOSED ADDITION
2 - 20 Telegraph road, Young

SHEET	*SHEET TITLE*	*DATE*
A 1.0	COVER SHEET	11.03.2021
A 1.1	PROPOSED SITE PLAN	11.03.2021
A 1.2	PROPOSED ELEVATIONS	11.03.2021
A 1.3	ARCHITECTURAL VISUALIZATIONS	11.03.2021

ISSUE	DATE	REASON FOR REVISION
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UNIQUE CAD EXPERIENCE

Client: APOLLO FABRICATION GROUP Pty Ltd

Project: PROPOSED ADDITION
2 - 20 Telegraph road, Young

Drawing: COVER SHEET

Job Number:

No. in Set: 1

Sheet No.: A 1.0

Scale:

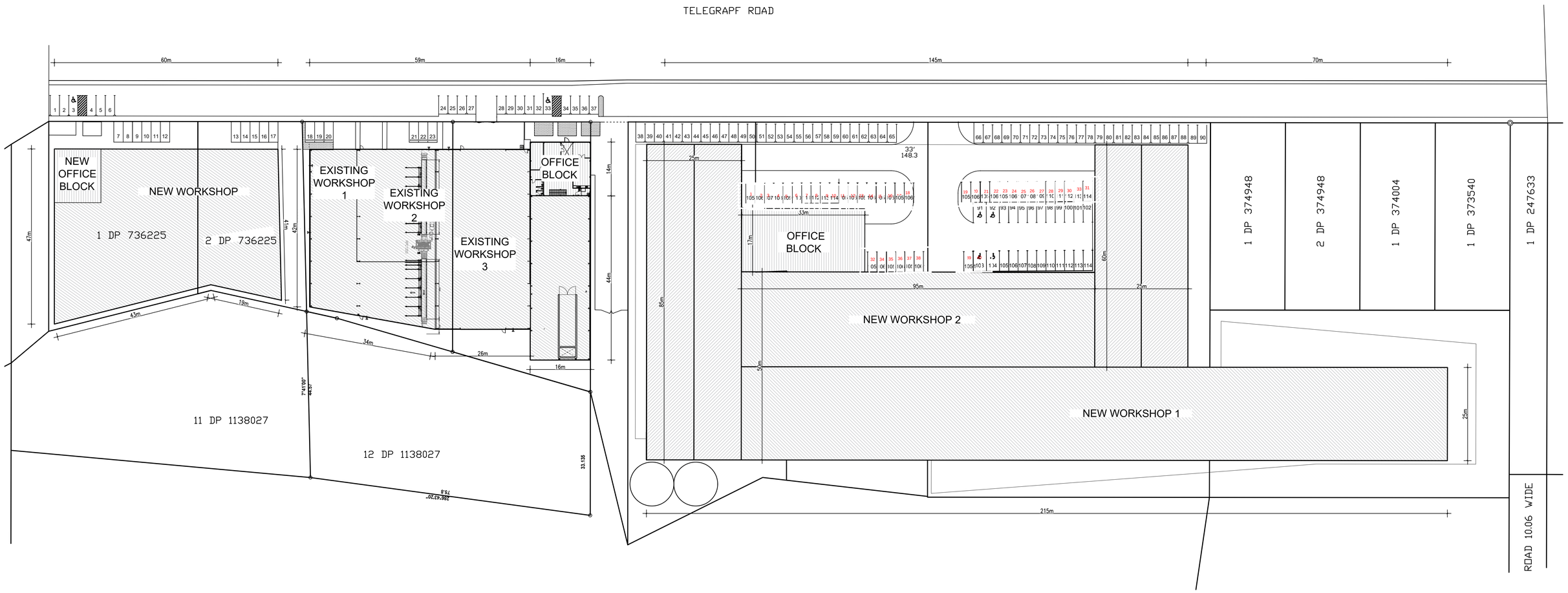
Revision No.:

Date: 11.03.2021

Revision Date.:

Drawn: MG

A2



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UNIQUE CAD EXPERIENCE

Client: APOLLO FABRICATION GROUP Pty Ltd

Project: PROPOSED ADDITION
2 - 20 Telegraph road, Young

Drawing: PROPOSED SITE PLAN

Job Number:

No. in Set: 2

Sheet No.: A 1.1

Scale: 1 : 750

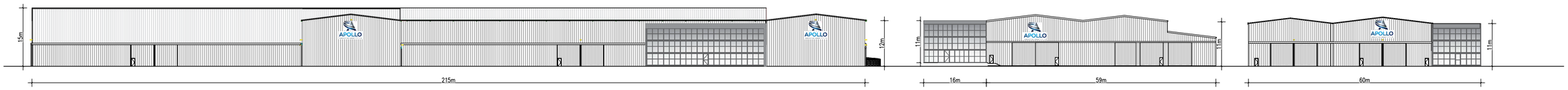
Revision No.:

Date: 11.03.2021

Revision Date.:

Drawn: MG

A2



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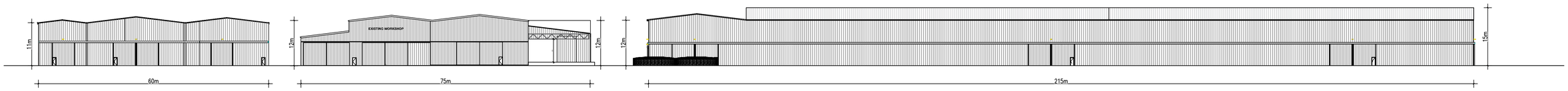

2 / A 1.2 SOUTH ELEVATION
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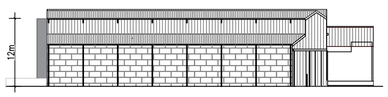
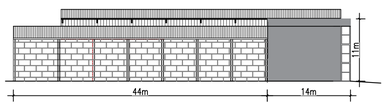


3 / A 1.2 SIDE ELEVATION
SCALE= 1:750



4 / A 1.2 SIDE ELEVATION
SCALE= 1:750

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UNIQUE CAD EXPERIENCE

Client: APOLLO FABRICATION GROUP Pty Ltd

Project: PROPOSED ADDITION
2 - 20 Telegraph road, Young

Drawing: PROPOSED ELEVATIONS

Job Number:

No. in Set: 3

Sheet No.: A 1.2

Scale: 1 : 750

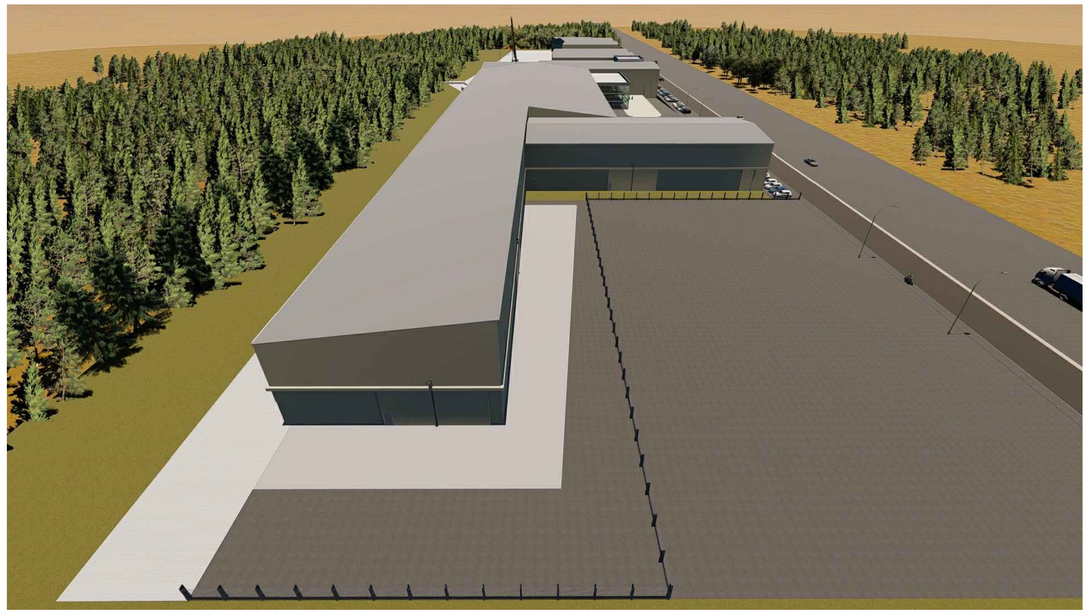
Revision No.:

Date: 11.03.2021

Revision Date.:

Drawn: MG

A2



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UNIQUE CAD EXPERIENCE

Client: APOLLO FABRICATION GROUP Pty Ltd

Project: PROPOSED ADDITION
2 - 20 Telegraph road, Young

Drawing: ARCHITECTURAL VISUALIZATIONS

Job Number:

No. in Set: 4

Sheet No.: A 1.2

Scale:

Revision No.:

Date: 11.03.2021

Revision Date.:

Drawn: MG

A2

APPENDIX C – INTERSECTION ANALYSIS – WITH DEVELOPMENT

LANE SUMMARY

Site: [Telegraph Rd & Murringo Rd/Whiteman Ave_AM_With Development (Site Folder: General)]

Telegraph Road and Murringo Road/Whiteman Avenue, Young
AM Peak Period
With Proposed Development
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Telegraph													
Lane 1	40	5.0	1277	0.031	100	5.7	LOS A	0.1	0.9	Full	500	0.0	0.0
Approach	40	5.0		0.031		5.7	LOS A	0.1	0.9				
NorthEast: Murringo													
Lane 1	177	5.0	1865	0.095	100	0.4	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	177	5.0		0.095		0.4	NA	0.0	0.1				
West: Showgrounds													
Lane 1	9	5.0	688	0.014	100	8.5	LOS A	0.1	0.4	Full	500	0.0	0.0
Approach	9	5.0		0.014		8.5	LOS A	0.1	0.4				
SouthWest: Whiteman													
Lane 1	63	5.0	1851	0.034	100	0.4	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	97	5.0	1489	0.065	100	5.2	LOS A	0.3	2.2	Short	60	0.0	NA
Approach	160	5.0		0.065		3.3	NA	0.3	2.2				
Intersection	386	5.0		0.095		2.4	NA	0.3	2.2				

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

Approach Lane Flows (veh/h)

East: Telegraph

Mov. From E To Exit:	L1 SW	T1 W	R3 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	37	1	2	40	5.0	1277	0.031	100	NA	NA
Approach	37	1	2	40	5.0		0.031			

NorthEast: Murringo

Mov. From NE To Exit:	L3 E	T1 SW	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	11	165	1	177	5.0	1865	0.095	100	NA	NA
Approach	11	165	1	177	5.0		0.095			

West: Showgrounds

Mov.	L1	T1	R3	Total	%HV		Deg.	Lane	Prob.	Ov.

From W To Exit:	NE	E	SW			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	1	1	7	9	5.0	688	0.014	100	NA	NA
Approach	1	1	7	9	5.0		0.014			
SouthWest: Whiteman										
Mov. From SW To Exit:	L3 W	T1 NE	R1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	4	59	-	63	5.0	1851	0.034	100	NA	NA
Lane 2	-	-	97	97	5.0	1489	0.065	100	0.0	1
Approach	4	59	97	160	5.0		0.065			

	Total	%HV	Deg.Satn (v/c)
Intersection	386	5.0	0.095

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	 pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
East Exit: Telegraph Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Murringo Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Showgrounds Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
SouthWest Exit: Whiteman Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

LANE SUMMARY

Site: [Telegraph Rd & Murringo Rd/Whiteman Ave_PM_With Development (Site Folder: General)]

Telegraph Road and Murringo Road/Whiteman Avenue, Young
PM Peak Period
With Proposed Development
Site Category: (None)
Give-Way (Two-Way)

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
East: Telegraph													
Lane 1	119	5.0	1316	0.090	100	5.7	LOS A	0.4	2.7	Full	500	0.0	0.0
Approach	119	5.0		0.090		5.7	LOS A	0.4	2.7				
NorthEast: Murringo													
Lane 1	124	5.0	1879	0.066	100	0.2	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	124	5.0		0.066		0.2	NA	0.0	0.1				
West: Showgrounds													
Lane 1	5	5.0	726	0.007	100	8.0	LOS A	0.0	0.2	Full	500	0.0	0.0
Approach	5	5.0		0.007		8.0	LOS A	0.0	0.2				
SouthWest: Whiteman													
Lane 1	129	5.0	1862	0.070	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	38	5.0	1568	0.024	100	5.0	LOS A	0.1	0.8	Short	60	0.0	NA
Approach	167	5.0		0.070		1.3	NA	0.1	0.8				
Intersection	416	5.0		0.090		2.3	NA	0.4	2.7				

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

Approach Lane Flows (veh/h)

East: Telegraph

Mov. From E To Exit:	L1 SW	T1 W	R3 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	108	1	9	119	5.0	1316	0.090	100	NA	NA
Approach	108	1	9	119	5.0		0.090			

NorthEast: Murringo

Mov. From NE To Exit:	L3 E	T1 SW	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	2	121	1	124	5.0	1879	0.066	100	NA	NA
Approach	2	121	1	124	5.0		0.066			

West: Showgrounds

Mov.	L1	T1	R3	Total	%HV		Deg.	Lane	Prob.	Ov.

From W To Exit:	NE	E	SW			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.
Lane 1	1	1	3	5	5.0	726	0.007	100	NA	NA
Approach	1	1	3	5	5.0		0.007			
SouthWest: Whiteman										
Mov. From SW To Exit:	L3 W	T1 NE	R1 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	4	125	-	129	5.0	1862	0.070	100	NA	NA
Lane 2	-	-	38	38	5.0	1568	0.024	100	0.0	1
Approach	4	125	38	167	5.0		0.070			
	Total	%HV	Deg.Satn (v/c)							
Intersection	416	5.0		0.090						

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
East Exit: Telegraph Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Murringo Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Showgrounds Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
SouthWest Exit: Whiteman Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										