

Appendix B

Traffic Impact Assessment

STOCKLAND

SSDA FOR BUILDING B AT
MACQUARIE MPARK, RESPONSE TO
TRAFFIC MATTERS RAISED BY
AUTHORITIES

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I. INTRODUCTION

- I.1 A SSDA for a data centre (Building B) at Macquarie MPark has been submitted to the Department of Planning, Industry and Environment (DPIE). The site location is shown in Figure I. In response to the SSDA submission, the following traffic matters have been raised by TfNSW and Council. Other traffic matters raised by the authorities are being addressed separately by Aecom.

TfNSW

The submitted Traffic Report is dated 8 August 2018 and this report has not been updated to reflect the subject development application. This is required to applicant to determine the potential traffic and transport impacts of the development including impacts at signalised intersections and to propose mitigation measures if required.

Council

The Environmental Impact Statement (EIS) prepared by AECOM as part of the SSD submission for a new data centre refers to the outcomes of the 2018 traffic study prepared by Ason Group, which was based on the previously approved internal road layout (See below for reference). The modified road configuration is expected to result in an altered trip distribution within the surrounding public roads in the immediate vicinity of the site. As access to buildings A, C and D are proposed to occur exclusively via Khartoum Road, it is anticipated that more traffic generated by the masterplan development will be concentrated on the intersection of Talavera Road and Khartoum Road, which will further exacerbate the poor level of service at this intersection. Consistent with the concept plan approval an updated traffic modelling assessment is therefore required to assess the implications of the revised trip assignment associated with the masterplan development (inclusive of the data centre) on the local road network. The updated traffic assessment is to consider appropriate mitigating measures to alleviate traffic impacts at poor performing intersections as a

consequence of traffic generated by the subject and adjacent developments in the area.

The future public road junction of Road 22 with Talavera Road, which will primarily service the data centre in the interim period is projected to operate with a poor level of service due to significant delays experienced by right turning vehicles exiting from Road 22 onto Talavera Road. The EIS is incorrect in stating that the data centre development will have negligible impact on this intersection. It is noted that the 2018 traffic study recommended access movements at this future road intersection be restricted to left in/left out. This measure will mean people travelling to the site from the west and departing the site to the east via Road 22 would be required to circulate within the local roads for longer periods to access the data centre site, which can lead to greater inconvenience to drivers to the site. An updated traffic assessment is therefore required to evaluate the merit of this intersection control and/or provide any alternative treatments that would result in a better traffic outcome for the intersection. The civil drawings need to be amended to reflect the design of future traffic control arrangement at the intersection of Talavera Road and Road 22.

1.2 At a meeting on 11 February 2021, TfNSW advised that the upgrade of the intersection of Talavera Road/Khartoum Road was not included in any current works program. On this basis, TfNSW requested that an assessment of the operation of the intersection without any upgrade be included in this traffic assessment. TfNSW also advised at the meeting that no contribution from Building B to the upgrade of the intersection would be required as:

- the traffic generated by Building B was low; and
- the traffic generated by Building B will be the same or less than generated by the existing uses on this part of the MPark site.

1.3 The following Chapter 2 addresses the above traffic matters.

2. TRAFFIC MATTERS

2.1. The traffic matters raised by authorities is set down through the following sections:

- ❑ concept development application;
- ❑ affected intersections;
- ❑ traffic generation;
- ❑ traffic distribution;
- ❑ traffic flows; and
- ❑ intersection analysis

Concept Development Application

2.2. The approved Concept Development Application (LDA2020/0229 - Modified 9 December 2020) for the site comprises:

- data centre building (Building B), located on the southeastern part of the site; and
- three commercial office buildings (Buildings A, C and D), located on the north western part of the site. Building A has development approval.

2.3. Condition 32(g) of the approved Concept Development Application sets out the following maximum number of parking spaces for each building:

- Building A – 304 spaces;
- Building B – 51 spaces;
- Building C – 264 spaces; and
- Building D – 261 spaces.

2.4. Building B provides 48 spaces. A S4.55 recently submitted to Council for Building A reduces the number of parking spaces from 304 to 301 spaces. The recently

submitted DA for Building C provides 192 spaces. A DA for Building D will be submitted in the near future. Plans for Building D are currently being developed, which may provide less than the maximum 261 spaces. However, in the following traffic analysis, we have been conservative and based the traffic assessment on the maximum 261 parking spaces. Hence the traffic assessment is based on a total of 754 spaces for Buildings A, C and D plus 48 spaces for Building B.

Affected Intersections

- 2.5. The traffic assessment of Building B takes into consideration 2031 traffic conditions including the approved Building A, recently submitted DA for Building C and proposed Building D. The assessment of the traffic effects of has considered intersections along Khartoum Road between (and including) the intersections with Waterloo Road and Talavera Road. This is based on the Council RFI for the amended concept DA, which requested an updated SIDRA network modelling assessment for traffic conditions at the intersections along Khartoum Road.
 - 2.6. The road network in the vicinity of the site includes Talavera Road, Khartoum Road, Waterloo Road and Banfield Road. Talavera Road is located adjacent to the north eastern boundary of the site and provides an undivided two-way road between Lane Cove Road and Culloden Road. Adjacent to the site, Talavera Road generally provides two traffic lanes in each direction, clear of intersections. Talavera Road intersects with Khartoum Road at a signalised intersection.
 - 2.7. Waterloo Road is located to the south-west of the site and provides a four lane divided road parallel to Talavera Road between Lane Cove Road and Herring Road. Waterloo Road provides two traffic lanes in each direction, clear of intersections.
 - 2.8. Khartoum Road is located adjacent to the north western boundary of the site and provides an undivided two-way road between Talavera Road and Waterloo Road. It generally provides one traffic lane and one parking lane in each direction, clear of
-

intersections. The intersection of Khartoum Road and Waterloo Road is controlled by a roundabout.

2.9. Banfield Road runs between Waterloo Road and Khartoum Road, providing access to development on the western side Khartoum Road. It provides one traffic lane in each direction with kerbside parking. The intersection of Khartoum Road and Banfield Road is a priority controlled t-intersection, with Khartoum Road the major road.

2.10. The traffic assessment is based on the following:

- access to Building B is via Talavera Road (all movements). Access to Buildings A, C and D is via Khartoum Road at two locations. The northern access on Khartoum Road would be limited to left in/left out and the southern access would allow for all turning movements. A Section 4.55 modification to the Building A approval has been submitted to Council to allow for all movements at the southern access to Khartoum Road;
- by 2031, the intersection of Khartoum Road/Talavera Road be upgraded as per the plan prepared by TfNSW (Figure 2) and that Stockland has entered into a transport infrastructure contribution agreement with TfNSW for \$600,000 for Building A. TfNSW advised at a meeting on 11 February 2021 that the upgrade of this intersection is not in any current works program;
- in 2031, the intersection of Khartoum Road/Waterloo Road remains a roundabout. TfNSW in an email dated 25 September 2020 noted that the Macquarie Park Stage 2 Bus Priority Improvement Program (BPIP) works, which replaced the roundabout with traffic signals, is not proceeding; and
- increases in background traffic flows through the intersections of Khartoum Road with Talavera Road and Waterloo Road of some 20% and 15% in the AM and PM peak hours respectively (as advised by TfNSW in an email dated 13 July 2020).

- 2.11. As requested by TfNSW the operation of the intersection of Talavera Road/Khartoum Road in 2031 without any upgrade has also been undertaken.

Traffic Generation

- 2.12. As per the Approved Concept DA, traffic generation for Buildings A, B, C and D have been based on generation rates of 0.45 and 0.36 two way vehicle trips per parking space in the weekday AM and PM peak hours respectively. These rates are based on surveys of 200 occupied parking spaces at 8 Khartoum Road. We understand that the survey was undertaken following liaison and agreement with City of Ryde (as set out the Masterplan Traffic Impact Assessment – Ason Group- August 2018).
- 2.13. Based on the above rates, the 48 spaces with access from Talavera Road (Building B) would generate some 25 and 20 to vehicles per hour two-way during the morning and afternoon respectively. The 754 spaces with access from Khartoum Road (Buildings A, C and D) would generate some 340 and 270 vehicles per hour two-way during the morning and afternoon respectively.
- 2.14. The existing uses on the sites generate some 145 and 100 vehicles per hour in the weekday AM and PM peak hours respectively. Thus the net increase in traffic is some 220 and 190 vehicles per hour in the weekday AM and PM peak hours respectively.

Traffic Distribution

- 2.15. The additional traffic has been assigned to the road network as set out below:

Inbound

- ❑ 35% from Talavera Road (west);
 - ❑ 25% from Talavera Road (east);
-

- ❑ 20% from Waterloo Road (west); and
- ❑ 20% from Waterloo Road (east).

Outbound

- ❑ 35% to Talavera Road (west);
- ❑ 25% to Khartoum Road (north);
- ❑ 20% to Waterloo Road (west); and
- ❑ 20% to Waterloo Road (east).

Traffic Flows

- 2.16 Existing traffic flows are shown in Figure 3. Base (2031 no development) and 2031 plus development (Buildings A, B, C and D) traffic flows along Khartoum Road are summarised in Table 2.1 and Figures 4 and 5

Table 2.1: Base + Development Weekday Morning and Afternoon Two Way (sum of both directions) Traffic Flows				
Location	Weekday AM		Weekday PM	
	Base	+ Dev	Base	+ Dev
Khartoum Road				
- north of Talavera Road	730	+5	1,005	+40
- south of Talavera Road	1,390	+155	1,170	+115
- north of Waterloo Road	1,450	+105	1,280	+55
Talavera Road				
- west of Khartoum Road	2,410	+55	2,385	+70
- east of Khartoum Road	1,780	+45	1,750	+45
- east of site access	1,805	+55	1,755	+10
Waterloo Road				
- west of Khartoum Road	1,915	+55	2,045	+25
- east of Khartoum Road	1,505	+50	2,145	+30
Stockland North Access				
- east of Khartoum Road	20	+80	20	+40
Stockland South Access				
- east of Khartoum Road	60	+185	85	+130
Stockland East Access				
- south of Talavera Road	65	-40	15	+5

2.17 Examination of Table 2.1 shows the following increases on the surrounding road network with development traffic (Buildings A, B, C and D) in place:

- ❑ traffic flows on Khartoum Road would increase by between 5 to 155 vehicles per hour in the weekday morning and afternoon peak hours;
- ❑ traffic flows on Talavera Road would increase by between 10 to 70 vehicles per hour in the weekday morning and afternoon peak hours;
- ❑ traffic flows on Waterloo Road would increase by some 25 to 55 vehicles per hour in the weekday morning and afternoon peak hours; and
- ❑ traffic flows on Talavera Road access (to Building B) would reduce by some 40 vehicles per hour in the weekday morning peak hour and increase by some 5 vehicles per hour in the weekday afternoon peak hour.

Intersection Analysis

2.18 A SIDRA 9 Network Model has been developed for the following intersections along Khartoum Road:

- ❑ Khartoum Road/Talavera Road;
- ❑ Khartoum Road/Northern Site Access
- ❑ Khartoum Road/Southern Site Access (including site access on the western side of Khartoum Road);
- ❑ Khartoum Road/Banfield Road;
- ❑ Khartoum Road/Waterloo Road; and
- ❑ Talavera Road/Site Access.

2.19 SIDRA 9 Network allows the analysis of a network of intersections and the interaction of traffic flows between intersections. It provides a number of performance measures. The most useful measure provided is average delay per

vehicle expressed in seconds per vehicle. Based on average delay per vehicle, SIDRA estimates the following levels of service (LOS):

- For traffic signals, the average delay per vehicle in seconds is calculated as delay/(all vehicles), for roundabouts the average delay per vehicle in seconds is selected for the movement with the highest average delay per vehicle, equivalent to the following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Good with minimal delays and spare capacity
29 to 42	=	"C"	Satisfactory with spare capacity
43 to 56	=	"D"	Satisfactory but operating near capacity
57 to 70	=	"E"	At capacity and incidents will cause excessive delays. Roundabouts require other control mode
>70	=	"F"	Unsatisfactory and requires additional capacity

- For give way and stop signs, the average delay per vehicle in seconds is selected from the movement with the highest average delay per vehicle, equivalent to following LOS

0 to 14	=	"A"	Good
15 to 28	=	"B"	Acceptable delays and spare capacity
29 to 42	=	"C"	Satisfactory but accident study required
43 to 56	=	"D"	Near capacity and accident study required
57 to 70	=	"E"	At capacity and requires other control mode
>70	=	"F"	Unsatisfactory and requires other control mode

- 2.20 It should be noted that for roundabouts, give way and stop signs, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle should also be taken into account. Thus, for example, an intersection where all movements are operating at a level of service A, except one which is at level of

service E, may not necessarily define the intersection level of service as E if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.

2.21 The results of the analysis are summarised below.

Base (2031 with no development)

- the intersection of Khartoum Road/Talavera Road (with intersection upgrade) would operate with average delays of some 40 seconds per vehicle in the weekday morning and afternoon peak periods. This represents level of service C, a satisfactory level of intersection operation;
 - the intersection of Khartoum Road/Talavera Road (without intersection upgrade) would operate with average delays of greater than 70 seconds per vehicle in the weekday morning peak period. This represents level of service F, an unsatisfactory level of intersection operation. In the weekday afternoon peak period, the intersection would operate with average delays of less than 50 seconds per vehicle. This represents level of service D, a satisfactory level of intersection operation;
 - the intersections of Khartoum Road with the northern access would operate with average delays of less than 15 seconds per vehicle (for the movement with the highest delay – right turn onto Khartoum Road), in the weekday morning and afternoon peak periods. This represents level of service A/B, a good level of intersection operation;
 - the intersections of Khartoum Road with the southern access would operate with average delays of less than 28 seconds per vehicle (for the movement with the highest delay – right turn onto Khartoum Road), in the weekday morning and afternoon peak periods. This represents level of service B, an acceptable level of intersection operation;
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- ❑ the intersections of Khartoum Road with Banfield Road would operate with average delays of less than 35 seconds per vehicle (for the movement with the highest delay – right turn onto Khartoum Road), in the weekday morning and afternoon peak periods. This represents level of service C, a satisfactory level of intersection operation;
- ❑ the intersection of Khartoum Road/Waterloo Road would operate with average delays of less than 28 seconds per vehicle in the weekday morning and afternoon peak periods. This represents level of service B, an acceptable level of intersection operation; and
- ❑ the intersection of Talavera Road and the site access would operate with average delays of less than 20 seconds per vehicle for all movements except the right turn out of the site. This movement would operate at capacity. However this movement is low (some five vehicle per hour). This low number of vehicles would be able to exit the site when gaps in traffic are created by signals either side of the access.

Base with Development (Buildings A, B, C and D)

- ❑ the intersection of Khartoum Road/Talavera Road would operate with average delays of some 42 seconds per vehicle in the weekday morning and afternoon peak periods. This represents level of service C, a satisfactory level of intersection operation;
 - ❑ the intersection of Khartoum Road/Talavera Road (without intersection upgrade) would operate with average delays of greater than 70 seconds per vehicle in the weekday morning peak period. This represents level of service F, an unsatisfactory level of intersection operation. In the weekday afternoon peak period, the intersection would operate with average delays of less than 60 seconds per vehicle. This represents level of service E, at capacity;
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- ❑ the intersections of Khartoum Road with the northern access would operate with average delays of less than 15 seconds per vehicle (for the movement with the highest delay – right turn onto Khartoum Road), in the weekday morning and afternoon peak periods. This represents level of service A/B, a good level of intersection operation;
- ❑ the intersections of Khartoum Road with the southern access would operate with average delays of less than 35 seconds per vehicle (for the movement with the highest delay – right turn onto Khartoum Road), in the weekday morning and afternoon peak periods. This represents level of service C, a satisfactory level of intersection operation;
- ❑ the intersections of Khartoum Road with Banfield Road would operate with average delays of less than 35 seconds per vehicle (for the movement with the highest delay – right turn onto Khartoum Road), in the weekday morning and afternoon peak periods. This represents level of service C, a satisfactory level of intersection operation;
- ❑ the intersection of Khartoum Road/Waterloo Road would operate with average delays of less than 28 seconds per vehicle in the weekday morning and afternoon peak periods. This represents level of service B, an acceptable level of intersection operation; and
- ❑ the intersection of Talavera Road and the site access would operate with average delays of less than 20 seconds per vehicle for all movements except the right turn out of the site. This movement would operate at capacity. However this movement is low (some five vehicle per hour). This low number of vehicles would be able to exit the site when gaps in traffic are created by signals either side of the access.

- 2.22 Therefore the surrounding road network (with the upgrade of the intersection of Khartoum Road/Talavera Road) would be able to cater for the additional traffic generated by the development (Buildings A, B, C and D). Without the upgrade of the intersection of Khartoum Road/Talavera Road, with the exception of this intersection, the surrounding road network would be able to cater for the additional traffic generated by the development (Buildings A, B, C and D). The intersection of Khartoum Road/Talavera Road would operate at capacity.
- 2.23 An assessment of queuing in Khartoum Road in 2031 has been undertaken with development (Buildings A, B, C and D) traffic in place. Table 2.2 below summarises SIDRA analysis 95% back of queues (with right turns at the southern site access) on Khartoum Road from the intersections with Talavera Road and Waterloo Road.

Table 2.2 95% Back of Queue on Khartoum Road (m) in 2031				
Queue	Base		Base + Dev	
	AM	PM	AM	PM
Northbound	65	55	85	65
Southbound	75	50	80	65

- 2.24 Examination of Table 2.2 shows that with right turns at the southern site access, queues do not extend back to this access in 2031.
- 2.25 Overall the SIDRA analysis found that there would be minimal change in the operation of intersections along Khartoum Road with development (Buildings A, B, C and D) traffic in place.

Summary

- 2.26 The traffic matters raised by TfNSW and Council are addressed in the above sections. Key points include:

- the revised access arrangements for the approved concept plan (access to Building B via Talavera Road and access to Buildings A, C and D) via Khartoum Road are taken into account;
- with development traffic in place (Buildings A, B, C and D) and the revised access arrangements, there would be minimal change in the operation of intersections along Khartoum Road;
- the traffic generation of Building B is some 20 to 25 vehicles per hour, two way in the weekday AM and PM peak hours. Compared to existing flows, this results in less traffic using the Talavera Road access in the weekday morning peak hour (reduction of some 40 vehicles per hour, two way) and a minor increase (some 5 vehicles per hour, two way) in the weekday afternoon peak hour; and
- the intersection of Talavera Road and the site access (Road 22) would operate with average delays of less than 20 seconds per vehicle for all movements except the right turn out of the site. This movement would operate at capacity. However this movement is low (some five vehicle per hour). This low number of vehicles would be able to exit the site when gaps in traffic are created by signals either side of the access.

2.1 With regards to upgrading of the intersection of Talavera Road and Khartoum Road, TfNSW advised at the meeting on 11 February, 2021 that no contribution from Building B would be required as:

- the traffic generated by Building B was low; and
 - the traffic generated by Building B will be the same or less than generated by the existing uses on this part of the MPark site.
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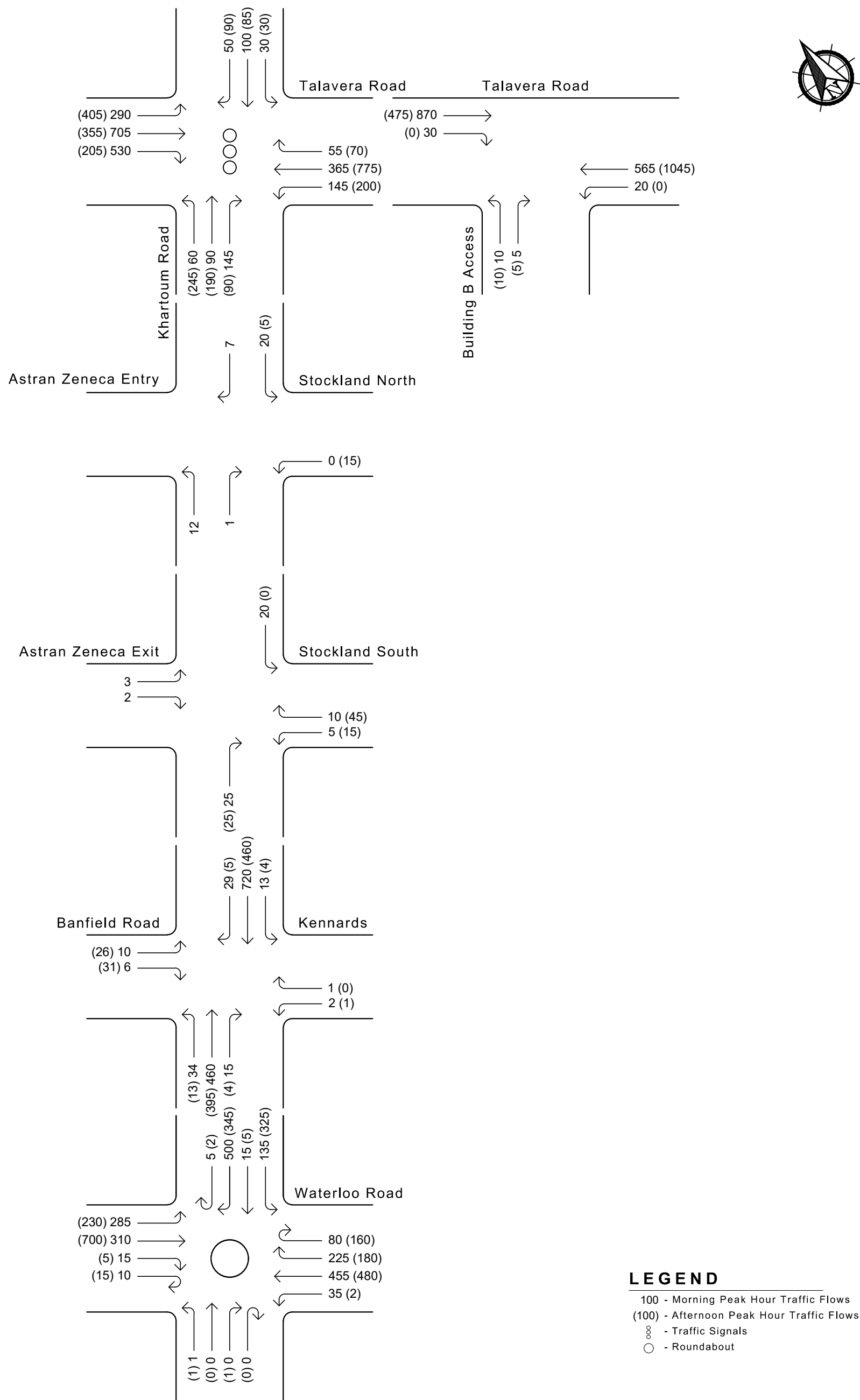


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Location Plan

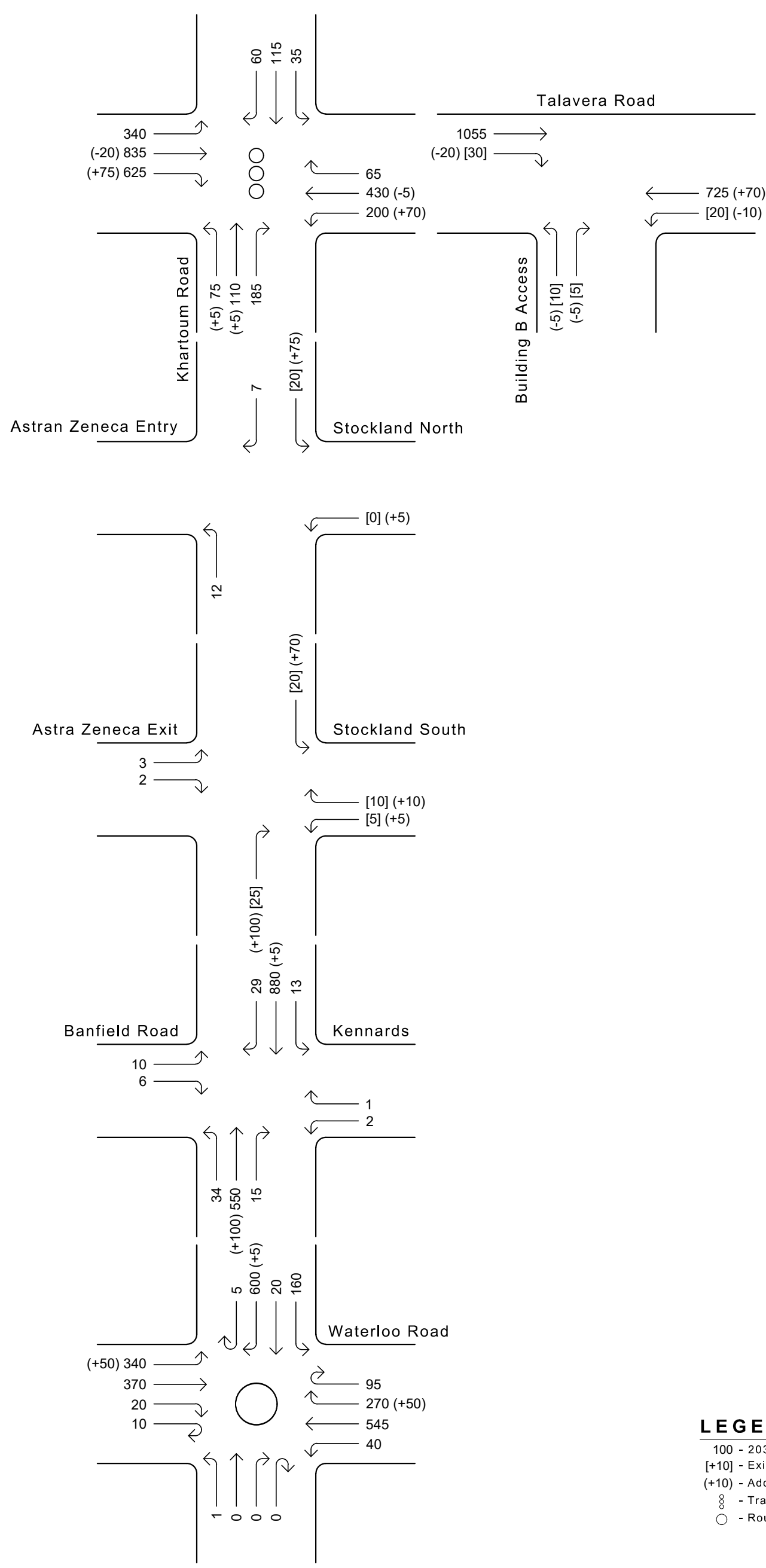


Upgrade of Talavera Road /
Khartoum Road Intersection



Existing weekday morning
and afternoon peak hour
traffic flows

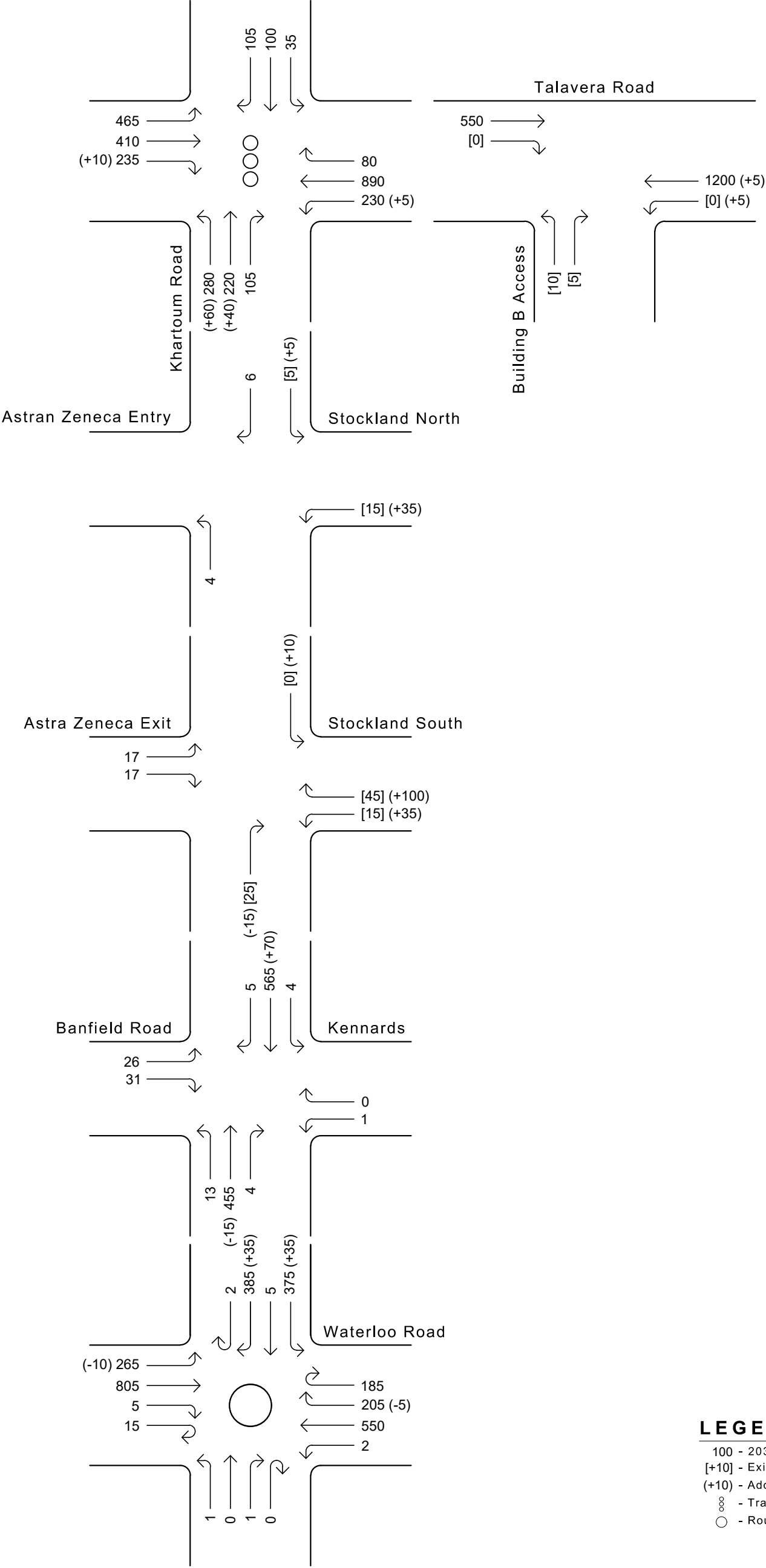
Figure 3



- LEGEND**
- 100 - 2031 Base Peak Hour Traffic Flows
 - [+10] - Existing Site Traffic Generation
 - (+10) - Additional Development Traffic
 - ⊗ - Traffic Signals
 - - Roundabout

2031 weekday morning peak
hour traffic flows plus
development traffic

Figure 4



2031 weekday afternoon peak
hour traffic flows plus
development traffic

Figure 5