

FABCOT PTY LTD

TRAFFIC REPORT FOR
PROPOSED SHOPPING CENTRE
DEVELOPMENT, 330-350 EIGHTH
AVENUE, AUSTRAL

JUNE 2023

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ATTACHMENT A - VEHICLE TURN PATHS

I. INTRODUCTION

- I.1. Colston Budd Rogers & Kafes Pty Ltd has been commissioned by Fabcot Pty Ltd to prepare a report on the traffic implications of a proposed shopping centre at 330-380 Eighth Avenue. Austral. The site forms part of future Eighth Avenue Neighbourhood Centre identified in the Liverpool Growth Centre DCP.
- I.2. The proposed development is for a shopping centre (some 7,460m²) comprising a supermarket, specialty shops, and commercial development. Some 303 parking spaces will be provided within an at-grade car park on the southern part of the site with access to new roads to the west and south.
- I.3. This report examines the traffic implications of the proposed development through the following chapters:
- Chapter 2 - describing the existing conditions; and
 - Chapter 3 - assessing the traffic implications of the proposed development.

2. EXISTING CONDITIONS

Site Location

- 2.1. The site is located on the south eastern corner of the intersection of Eighth Avenue and future collector road connecting Eighth Avenue to Bringelly Road, Austral, as shown in Figure 1. The site is currently rural land. Surrounding land use is new residential development which is replacing rural style residential lots.
- 2.2. The site forms part of the future Eighth Avenue Neighbourhood Centre identified in the Liverpool Growth Centre DCP. The Liverpool Contributions Plan 2014 (amended 10 June 2020) – Austral and Leppington North Precincts, sets out expected development in the area. Neighbourhood centres are identified as having retail floor space in the order of 10,000m².

Previous Studies

- 2.3. The site is within the Leppington North precinct in the South West Priority Growth Area. An indicative layout plan (ILP) and development control plan (DCP) have been prepared for the Austral and Leppington North precinct.
- 2.10 The Austral and Leppington North precincts are two of 19 precincts in the South West Priority Growth Area. The precincts comprise some 2,025 hectares and will ultimately provide:
- 17,350 dwellings;
 - 54,000 residents;

- 220 hectares of employment land;
- 135 hectares of open space and recreational areas;
- Leppington Major Centre with regional shopping, employment, cultural and community facilities;
- new Leppington railway station (constructed);
- three neighbourhood centres;
- new schools and upgrades to major roads; and
- walking and cycling routes.

2.11 In association with the rezoning of the precincts, transport studies^{1,2} were prepared. The studies assessed the transport requirements to accommodate a level of development generally described above. These studies recommended road and transport works to accommodate development of the precincts.

2.12 The DCP and Contributions Plan for the Austral and Leppington North Precincts identifies upgrades to Eighth Avenue (to a collector road) and design requirements for new roads in the area (collector and local roads), including a future collector road connecting Eighth Avenue to Bringelly Road (New West Road), a roundabout at the intersection of Eighth Avenue/New West Road and provision for buses, pedestrians, and cyclists.

2.13 In addition to these works, other major works within the South West Priority Growth Area, including upgrades to Bringelly Road, Camden Valley Way and South West Rail Link Extension, have been provided to accommodate future

¹ "Austral and Leppington North (ALN) Precincts Transport Assessment." Prepared by Aecom for NSW Department of Planning and Infrastructure, 11 August 2011.

² "Post Exhibition Traffic Report (Addendum)." Prepared by Aecom for NSW Department of Planning and Infrastructure, 4 July 2012.

development in the South West Growth Centre, including the Austral and Leppington North precincts and other surrounding areas. The overall transport and traffic planning for the area has therefore already identified works to cater for this development, with mechanisms in place to facilitate their implementation.

Road Network

- 2.4. The road network in the vicinity of the site is currently being constructed or upgraded as development occurs in the area. Eighth Avenue is located on the northern boundary of the site and connects the site with Fourth Avenue to the east. Currently, Eighth Avenue terminates at the western boundary of the site. The ILP shows Eighth Avenue extending west through to Kelly Street. Between the western boundary of the site and Fourth Avenue, the DCP and Contributions Plan identify Eighth Avenue as a collector road with a roundabout to be constructed at the intersection on the northwest corner of the site (with the New West Road). Currently Eighth Avenue comprises sections that are a rural two lane road with unsealed shoulders and sections either half or fully constructed as a two lane urban road with kerb and gutter.
- 2.5. Auger Street is located on the southern boundary of the site. The DCP identifies Auger Street as a local road. It has been half constructed along the southern boundary of the site, however it is not open to traffic. East of the site, Auger Street has been constructed as a two way local street with kerb and gutter.
- 2.6. The DCP and Contributions Plan identify a new collector road to be constructed along the western boundary of the site. Half of the new road will be located on the subject the site and other half to constructed on the adjacent sites to the west. This New West Road will connect Eighth Avenue to the Bringelly Road at the
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existing traffic signal controlled intersection with Eastwood Road. South of site, the eastern half of the New West Road has been constructed between Augur Street and Seventh Avenue, however it is not open to traffic.

- 2.7. Seventh Avenue is located south of the site and is a local road connecting Fourth Avenue with the New West Road. Similar to Eighth Avenue, there are sections that are a rural two lane road with unsealed shoulders and sections either half or fully constructed as a two lane urban road with kerb and gutter.
- 2.8. Fourth Avenue is located east of the site and provides the main north-south access road in the vicinity of the site. It connects to Bringelly Road to the south (at a traffic signal controlled intersection) and to Fifteenth Avenue to the north (at a traffic signal controlled intersection). The DCP and Contributions Plan identify Fourth Avenue as a collector road. Currently Fourth Avenue is a two lane rural road with unsealed shoulders with some sections upgraded with kerb and gutter. The intersections of Fourth Avenue with Eighth Avenue and Seventh Avenue are priority controlled four-way intersections with Fourth Avenue the major road. The DCP and Contributions Plan do not identify and upgrades to these two intersections.
- 2.9. West of the site, new residential lots are being developed. Access to this precinct is currently via Kelly Street which connects to Bringelly Road. Ultimately this precinct will connect to the New West Road via Little Street and Eighth Avenue. Little Street is a local road that would connect to the New West Road about midway between Seventh Avenue and Augur Street. Only a short section of Little Street (between Nemean Road and the New West Road) needs to be constructed to provide this connection.
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Traffic Conditions

- 2.10. In order to gauge traffic conditions, counts were undertaken during weekday morning and afternoon peak periods, which are busy times for the road network when traffic from the proposed development will combine with other commuter, school and retail traffic. The afternoon counts included the school pick up period. The traffic counts were undertaken at the following intersections:
- Fourth Avenue/Eighth Avenue;
 - Fourth Avenue/Seventh Avenue; and
 - Fourth Avenue/Bringelly Road.
- 2.11. Traffic counts were not undertaken on roads adjacent to the subject site as they were either not open to traffic (such as the western section Augur Street and the New West Road between Augur Street and Seventh Avenue) or carried low traffic flows (as shown by the traffic counts at the intersections on Fourth Avenue).
- 2.12. The results of the surveys are shown in Figures 2 and 3, and summarised in Table 2.1.

Table 2.1 : Summary of Existing Two-Way (sum of both directions) Peak Hour Traffic Flows		
Location	Vehicles Per Hour	
	Weekday Morning	Weekday Afternoon
Fourth Avenue		
– north of Eighth Avenue	783	1183
– south of Eighth Avenue	831	1229
– south of Seventh Avenue	870	1214
– north of Bringelly Road	1430	1282
Eighth Avenue		
– east of Fourth Avenue	146	72
– west of Fourth Avenue	52	34
Seventh Avenue		
– east of Fourth Avenue	31	30
– west of Fourth Avenue	61	77
Bringelly Road		
– east of Fourth Avenue	1855	1614
– west of Fourth Avenue	1427	1366

2.13. Examination of Table 2.1 reveals that:

- Fourth Avenue carried some 800 to 1,430 vehicles per hour (two way) in the weekday morning and afternoon peak hours;
- Eighth Avenue, west of Fourth Avenue carried some 35 to 50 vehicles per hour (two way) in the weekday morning and afternoon peak hours. East of Fourth Avenue, traffic flows were higher with some 70 to 145 vehicles per hour (two way) in the weekday morning and afternoon peak hour;
- Seventh Avenue, west of Fourth Avenue carried some 60 to 75 vehicles per hour (two way) in the weekday morning and afternoon peak hours. East of Fourth Avenue, traffic flows were lower with some 30 vehicles per hour (two way) in the weekday morning and afternoon peak hour; and
- Bringelly Road, carried some 1,400 to 1,850 vehicles per hour (two way) in the weekday morning and afternoon peak hours.

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- 2.14. The traffic counts on Eighth Avenue and Seventh Avenue (west of Fourth Avenue) represent the traffic generated by the existing development located in the precinct bounded by Seventh Avenue, Fourth Avenue, Eighth Avenue and the New West Road. Therefore, traffic on other existing roads in the precinct (that are open to traffic) would be low, typically in the range of 10 to 40 vehicles per hour (two way) in the weekday morning and afternoon peak hours.

Intersection Operations

- 2.15. The capacity of the road network is largely determined by the ability of its intersections to cater for peak traffic flows. The surveyed intersections shown in Figures 2 and 3 have been analysed using the SIDRA program.
- 2.16. SIDRA simulates the operations of intersections to produce a number of measures. The most useful measure provided is average delay per vehicle expressed in seconds per vehicle.
- 2.17. 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 $\text{delay}/(\text{all vehicles})$, 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

- 2.18. 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.

- 2.19. The SIDRA analysis found that:

- the priority controlled intersection of Fourth Avenue/Eighth Avenue currently operates with average delays of less than 20 seconds per vehicle (for the movement with highest delay, right turn out of Eighth Avenue) in the weekday morning peak hour. This represents level of service B, an acceptable level of service with spare capacity. In the afternoon peak hour, the intersection operates with average delays of less than 35 seconds per vehicle (for the movement with highest delay, right turn out of Eighth Avenue). This represents level of service C, a satisfactory level of service;
- the priority controlled intersection of Fourth Avenue/Seventh Avenue currently operates with average delays of less than 20 seconds per vehicle (for the movement with highest delay, right turn out of Seventh Avenue) in the weekday morning peak hour. This represents level of service B, an acceptable level of service with spare capacity. In the afternoon peak hour, the intersection operates with average delays of less than 30 seconds per vehicle (for the movement with highest delay, right turn out of Seventh Avenue). This represents level of service B/C, a satisfactory level of service; and
- the traffic signal controlled intersection of Bringelly Road/Fourth Avenue currently operates with average delays of less than 40 seconds per vehicle in the weekday morning and afternoon peak hours. This represents level of service C, a satisfactory level of service,

2.20. A review of the crash history for the most recent five years data found only two crashes at the intersection of Eighth Avenue/Fourth Avenue and no crashes at the intersection of Fourth Avenue/Seventh Avenue.

Public and Active Transport

- 2.21. The site currently has limited access to public transport services. Interline operate the 861 service between Denham Court and Carnes Hill (via Austral). This operates along Tenth Street to the north, Kelly Street to the west and Sixth Avenue to south with the closet bus stop located on at the intersection of Fourth Avenue/Sixth Avenue. The DCP and Contributions Plan do not indicate any future bus routes in the area although this may change as development is completed in the area.
- 2.22. The Contributions Plan identifies provision of an off road cycleway (shared path) along Eighth Avenue (east of the New West Road) and the New West Road (south of Eighth Avenue). This would connect to a future off road cycleway (shared path) on Fourth Avenue and the existing cycle facilities on Bringelly Road (on road cycle lane and off road cycleway (shared path)).
- 2.23. Pedestrian access in the area will be provided by footpaths on the new roads. Collector roads will provide a minimum 2.5 metre wide shared path while local roads will provide minimum 1.5 metre wide footpath.

3. IMPLICATIONS OF PROPOSED DEVELOPMENT

3.1 The proposed development is for a shopping centre (some 7,460m²) comprising a supermarket (3,881m² including DTB), specialty shops (1,721m²), and commercial development (1,858m²). Some 303 parking spaces (including six DTB spaces) will be provided within an at-grade car park on the southern part of the site with access to new roads to the west and south (as per the ILP and DCP).

3.2 The traffic and parking implications of the proposed development have been assessed through the following sections:

- ❑ active and public transport;
- ❑ parking provision;
- ❑ access, servicing and internal layout;
- ❑ traffic effects; and
- ❑ summary.

Pedestrians, Cyclists and Public Transport

3.3 As previously discussed in Chapter 2, the site currently has limited access to existing public transport services. The DCP and Contributions Plan do not indicate any future bus routes in the area although this may change as development is completed in the area.

3.4 Access by active transport (cycling and walking) will be provided by future pedestrian and cycle paths as new roads are constructed. The DCP requires new collector roads (Eighth Avenue and New West Road) to provide an off an road

shared pedestrian/cycle path (2.5 metres wide) and new local roads a footpath 1.5 metres wide.

Parking Provision

3.5 The Liverpool City Council Growth Centre Precincts DCP includes the following car parking requirements:

- one space per 22m² GFA for retail > 200m²;
- one space per 30m² GFA for retail < 200m²; and
- one space per 40m² GFA for commercial.

3.6 The proposed development includes the following:

- 3,881m² retail > 200m²;
- 1,721m² retail < 200m²; (it is anticipated that specialty retail will be divided into tenancies less than 200m²); and
- 1,858m² commercial.

3.7 On this basis, the development would require 279 spaces. Should the two large areas shown as specialty shops (1,032m²) be divided in tenancies larger than 200m², parking required would increase to 292 spaces. Both requirements are satisfied by the provision of 303 spaces. The provision of the DTB facility has resulted in reduction in parking demand as customers using the DTB spend less time in the car park as customer shopping in store. No reduction in parking has been applied as result of the DTB.

3.8 The Liverpool City Council Growth Centre Precincts DCP 2021 provides no rates for bicycle parking for commercial and retail premises. Bicycle parking rates have

been adopted from Austroads Guide to Traffic Management: Bicycle Parking Facilities. The rates are as follows;

- 0.14 spaces per 100m² for supermarkets for employees;
- 0.57 spaces per 100m² for supermarkets for customers;
- 0.1 spaces per 100m² for specialty shops for employees;
- 0.4 spaces per 100m² for specialty shops for customers;
- 0.45 space per 100m² for commercial for employees; and
- 0.05 space per 100m² for commercial for visitors.

3.9 On this basis, the proposed development would require 45 bicycle spaces (15 employee spaces and 30 spaces for customers/visitors). However, it is noted that in the initial instillation stage it may be appropriate to make available 50 per cent of the recommended provision with space set aside for 100 per cent of the provision in the event that full demand for bicycle parking is realised. On this basis, it is recommended that 23 bicycle spaces be provided initially (8 employee and 15 customer/visitor). Employee bicycle parking should be provided in a secure location and customer/visitor parking in conveniently located racks.

3.10 Bicycle parking is proposed to be provided in accordance with these requirements. Four accessible spaces and four motor cycle spaces are provided in the at-grade car park.

Access, Servicing and Internal Layout

3.12 The Austral and Leppington North Precinct DCP indicates that Eighth Avenue and the New West Road will be collector roads and Auger Street will be a local road.

3.13 In accordance with the DCP the following works will be undertaken on the adjacent road network:

- construct the eastern half the New West Road along the western boundary of the site. Until the western half of the New West Road is constructed, the section of the New West Road between Eighth Avenue and Auger Street would operate one way southbound;
- reconstruct southern half of Eighth Avenue along the northern boundary of the site, noting the northern half of Eighth Avenue along the frontage of the site is currently being reconstructed. Thus, once the southern section is reconstructed, this section of Eighth Avenue will provide a collector road as per the DCP; and
- construct the northern half of Auger Street along the southern boundary of the site, noting the southern half of Auger Street along the frontage of the site has been constructed. Thus, once the northern section is constructed, this section of Auger Street will provide a local road as per the DCP.

3.14 In addition to the above works, Woolworths propose to construct the western half of the New West Road, between Auger Street and Little Street (located on Council land) and connect Little Street to the New West Road (both as per the DCP), noting that the eastern half of the New West Road between Auger Street and Seventh Avenue has been constructed. This would allow for two-way traffic flow between Little Street and Auger Street. These works are proposed via a Works in Kind agreement between Woolworths and Liverpool Council. Provision of this connection would improve access to the shopping centre by residents to the west of the site, reducing traffic on Bringelly Road, Fourth Avenue and Kelly Road.

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- 3.15 Access to the at grade car park will be via the New West Road and Auger Street. For a Class 3A car park with more than 300 parking spaces, AS2890.1-2004 requires provision of an access with two entry lanes and one exit lane separated by one to three metre median. The provision of two access points with a total of two entry lanes and three exit lanes is consistent with requirement.
- 3.16 Within parking areas, spaces should be a minimum 2.6 metres wide and a minimum of 5.4 metres long with 6.6 metre wide circulation aisles. Spaces with adjacent obstructions should be 0.3 metres wider to provide for doors to open. Disabled spaces should be provided at 2.4 metres wide, with an additional 2.4 metre wide adjacent area for loading /unloading wheelchairs. Height clearance should be a minimum 2.5 metres above disabled spaces and a minimum 2.2 metres elsewhere. These dimensions are for a Class 3A car park as set out in Australian Standard for Parking Facilities (Part 1: Off-street car parking), AS 2890.1:2004.
- 3.17 Six direct to boot (DTB) spaces for online orders from the supermarket are located on the northern part of the site with access from the east/west service road with traffic flow in a clockwise direction.
- 3.18 Provision will be included in the development for service vehicles, including garbage collection and deliveries, to enter the site, manoeuvre and exit the site in a forward direction. A loading dock on the western side of the development, with access from the New West Road. It has been designed to accommodate 19 metre long semi-trailers (for the supermarket) in accordance with the Australian Standard for Parking Facilities (Part 2: Off-street commercial vehicle facilities), AS 2890.2 – 2002. Trucks will access the loading dock from Eighth Avenue turning left into the loading dock (until the New West Road connects to Bringelly Road).
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- 3.19 Due to constraints in the adjoining road network, the size of truck and truck route exiting the site will be staged as set out below:
- Stage 1 – New West Road along western frontage of site one way southbound. Trucks will be limited to 14.4 metre long semi-trailers and exit the dock via a left turn onto the New West Road and then access Fourth Avenue via Seventh Avenue;
 - Stage 2 – New West Road along western frontage of site two way. Truck size increased to 19 metre long semi-trailers with trucks exiting the dock via a right turn onto the New West Road and then access Fourth Avenue via Eighth Avenue; and
 - Stage 3 – New West Road connects to Bringelly Road
19 metre long semi-trailers access the site and exit via a left turn onto the New West Road and then access Bringelly Road via the New West Road. Trucks would also have the option to access the site via this route.
- 3.20 Truck swept paths are provided in Attachment A. An additional two loading bays are recommended (6 metres long by 3 metres wide) in the north eastern corner of the at-grade car park. These bays will cater for vans and couriers servicing the specialty shops and commercial area.
- 3.21 Following DA approval, access arrangements, parking layouts, servicing and vehicle swept paths should be reviewed and confirmed for compliance certification.
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Traffic Effects

- 3.22 The overall traffic effects of the development have been assessed in previous studies for the Austral and Leppington North growth centres. However, to consider the traffic effects in the short term, an assessment of the impact of the proposed development on the short term road network has been undertaken.
- 3.23 Traffic generated by the proposed development would have its greatest effects during weekday afternoon and Saturday lunchtime peak periods when it combines with commuter and retail traffic on the surrounding road network.
- 3.24 The RMS's "Guide to Traffic Generating Developments" indicates the following two-way peak hour traffic generation rates:
- supermarkets: 15.5 vehicles per hour per 100m² on weekday afternoon;
 - specialty retail: 4.6 vehicles per hour per 100m² on weekday; and
 - commercial: two vehicles per hour per 100m² on weekday afternoons.
- 3.25 On this basis, the proposed development would have traffic generations of some 700 vehicles per hour two-way during weekday afternoon peak hour. Weekday morning peak hour traffic generation would be about half the afternoon peak hour (some 350 vehicles per hour two-way). Woolworths has advised that due to the surrounding area not being fully developed and the constraints in the road network that will limit access to the site, in the short term the shopping centre is likely to generate some 50% of the traffic generated when the area is fully developed. On this basis the estimated morning and afternoon peak hour traffic
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generation is expected to be some 180 and 350 vehicles per hour (two-way) respectively.

- 3.26 TfNSW guidelines indicate that some 25 per cent of retail traffic will be passing trade, i.e., traffic which would have driven past the centre, regardless of its visit to the centre. This reduction has only been applied to development traffic accessing the site from Fourth Avenue.
- 3.27 Additional development traffic has been assigned to the surrounding road network taking into account the proposed access arrangements and road network described in Sections 3.13 and 3.14. Existing peak hour flows plus the additional development traffic at the intersections along Fourth Avenue are shown in Figures 2 and 3, and summarised in Table 3.1.

Table 3.1 : Summary of Existing + Development Two-Way (sum of both directions) Peak Hour Traffic Flows				
Location	Vehicles Per Hour			
	Weekday Morning		Weekday Afternoon	
	Existing	+ Dev	Existing	+ Dev
Fourth Avenue				
– north of Eighth Avenue	783	+50	1183	+100
– south of Eighth Avenue	831	-20	1229	-30
– south of Seventh Avenue	870	+50	1214	+100
– north of Bringelly Road	1430	+50	1282	+100
Eighth Avenue				
– east of Fourth Avenue	146	+0	72	+0
– west of Fourth Avenue	52	+70	34	+130
Seventh Avenue				
– east of Fourth Avenue	31	+0	30	+0
– west of Fourth Avenue	61	+70	77	+130
Bringelly Road				
– east of Fourth Avenue	1855	+20	1614	+40
– west of Fourth Avenue	1427	+10	1366	+20

- 3.28 Examination of Table 3.1 shows that:

- traffic flows on Fourth Avenue, north of Eighth Avenue and south of Seventh Avenue, would increase by some 50 to 100 vehicles per hour (two way) in the weekday morning and afternoon peak hours;
- traffic flows on Seventh and Eighth Avenue, west of Fourth Avenue, would increase by some 70 to 130 vehicles per hour (two way) in the weekday morning and afternoon peak hours; and
- traffic flows on Bringelly Road would increase by some 10 to 40 vehicles per hour in the weekday morning and afternoon peak hours.

3.29 The intersections along Fourth Avenue have been reanalysed with development traffic in place. The analysis found that:

- the priority controlled intersection of Fourth Avenue/Eighth Avenue would continue to operate with average delays of less than 20 seconds per vehicle (for the movement with highest delay, right turn out of Eighth Avenue) in the weekday morning peak hour. This represents level of service B, an acceptable level of service with spare capacity. In the afternoon peak hour, the intersection would operate with average delays of less than 40 seconds per vehicle (for the movement with highest delay, right turn out of Eighth Avenue). This represents level of service C, a satisfactory level of service;
 - the priority controlled intersection of Fourth Avenue/Seventh Avenue currently operates with average delays of less 20 seconds per vehicle (for the movement with highest delay, right turn out of Seventh Avenue) in the weekday morning peak hour. This represents level of service B, an acceptable level of service with spare capacity. In the afternoon peak hour, the intersection would operate with average delays of less than 35 seconds per
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vehicle (for the movement with highest delay, right turn out of Seventh Avenue). This represents level of service C, a satisfactory level of service; and

- the traffic signal controlled intersection of Bringelly Road/Fourth Avenue would continue to operate with average delays of less than 40 seconds per vehicle in the weekday morning and afternoon peak hours. This represents level of service C, a satisfactory level of service.

3.30 Figures 4 and 5 show estimated development traffic flows on the road network adjacent to the site taking into account the proposed access arrangements and road network described in Sections 3.13 and 3.14. As noted in Chapter 2 a number of these roads are not open traffic, not constructed or currently carry low traffic flows (10 to 40 vehicles per hour, two way). Examination of Figures 4 and 5 show that:

- The New West Road would carry additional traffic flows of some 35 to 150 vehicles per hour (two way);
- Auger Street would carry additional traffic flows of some 55 to 105 vehicles per hour (two way); and
- Little Street would carry additional traffic flows of some 30 to 70 vehicles per hour (two way).

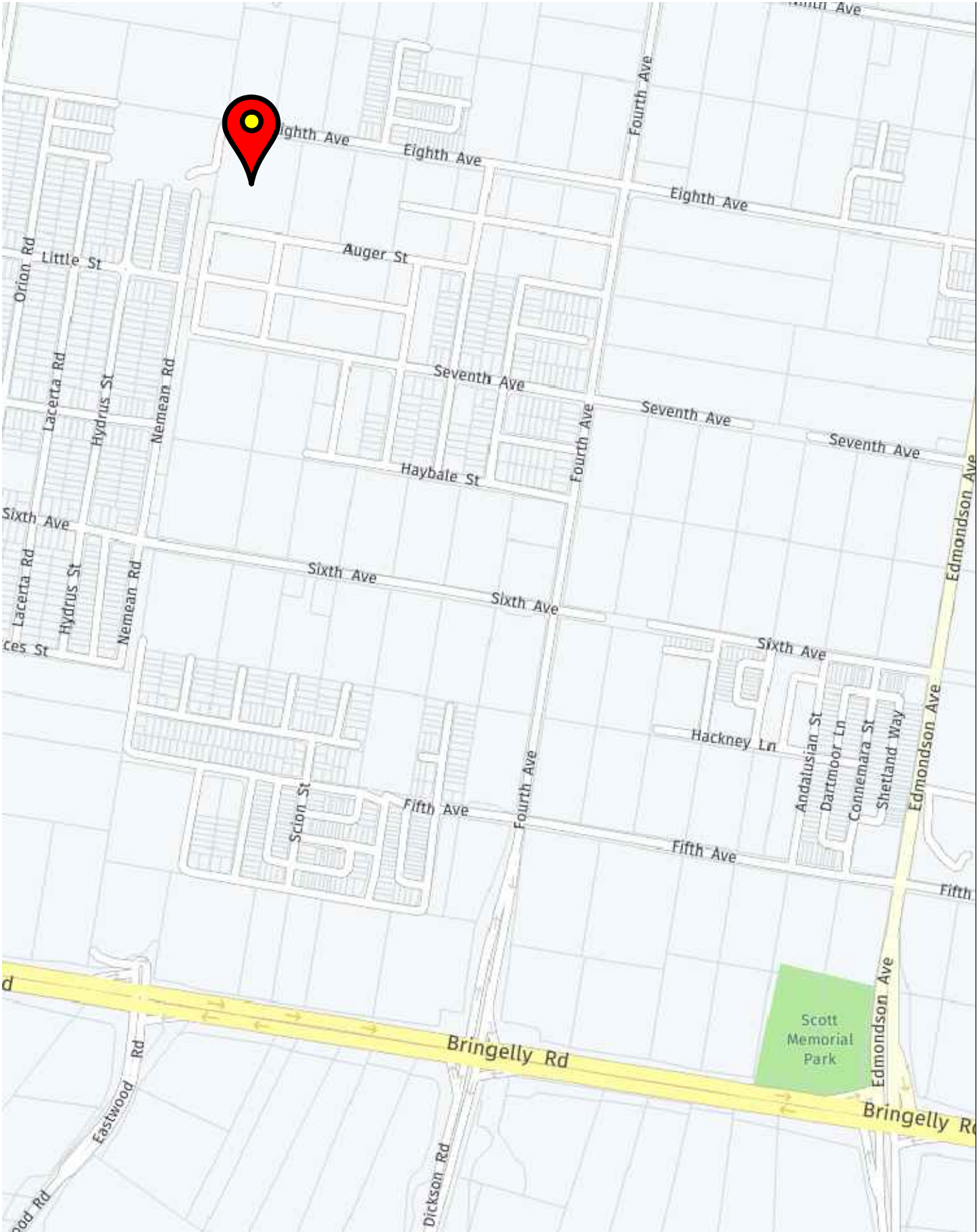
3.31 When the above traffic is added to the low traffic flows on existing roads (some 10 to 40 vehicles per hour, two way on Narrami Street and the eastern section of Auger Street), traffic flows would be less than 200 vehicles per hour (two way), the environmental goal for a local street. Thus, the impact of the additional traffic would be acceptable.

- 3.32 Based on these low traffic flows and the intersections within the adjacent local road network priority controlled t-intersections, the intersections would operate at level of service A/B, a good level of service with only minor delays to turning traffic.
- 3.33 As the surrounding road network is completed, traffic from the proposed development would transfer from local roads such as Auger Street, Narrami Street and Seventh Avenue to the designated collector roads (Eighth Avenue and New West Road).

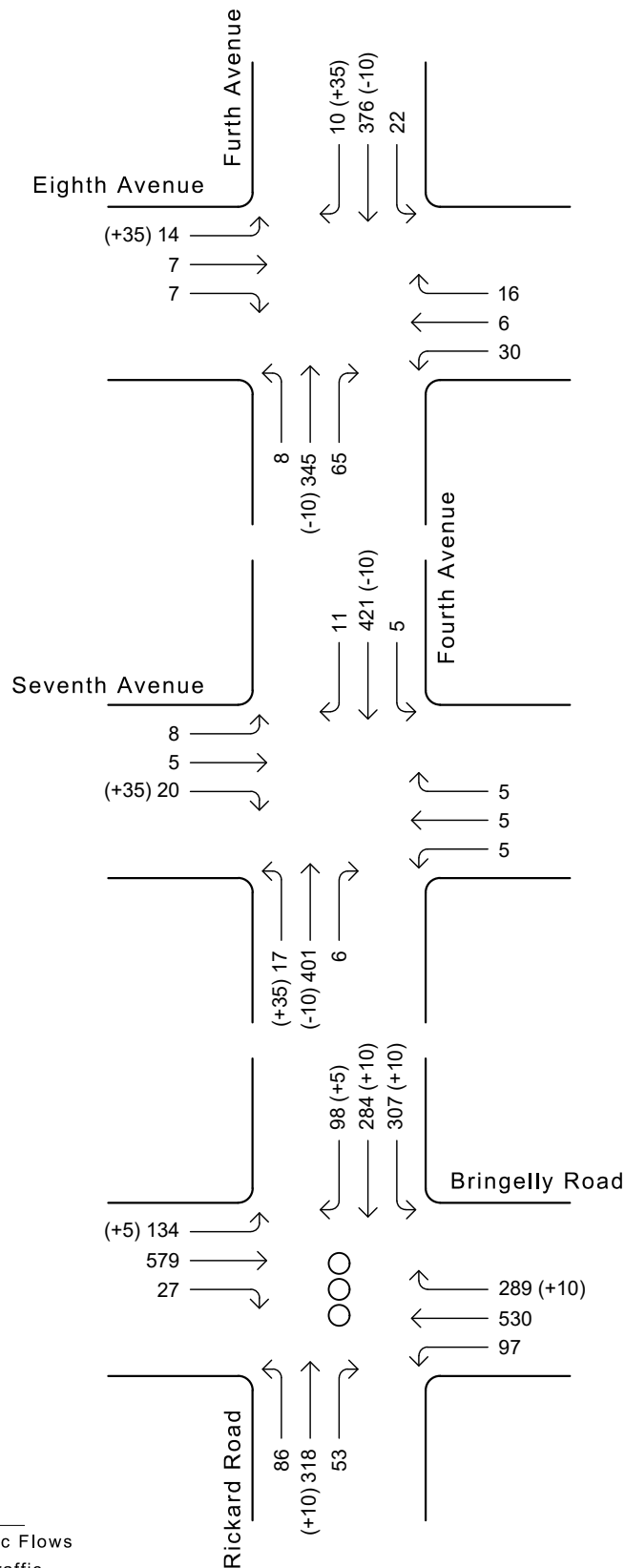
Summary

- 3.34 In summary, the main points relating to the traffic implications of the proposed shopping centre are as follows:
- i) the site is identified for development as part of the future Eighth Avenue Neighbourhood Centre identified in the Liverpool Growth Centre DC;
 - ii) the proposed development has limited access to public transport services in the area;
 - iii) the proposed parking provision is considered appropriate;
 - iv) access, on site circulation and servicing arrangements are considered appropriate;

- v) following DA approval, access arrangements, parking layout, servicing and vehicle swept paths should be reviewed and confirmed for compliance certification;
- vi) a series of road, transport and intersection works has been identified to cater for traffic from future development in Austral, including the subject site;
- vii) as the area continues to develop, the upgraded road network and intersections will be able to cater for future traffic growth, including traffic from the proposed development; and
- viii) In the short term, the existing road network can cater for the additional development traffic generated by the proposed development.



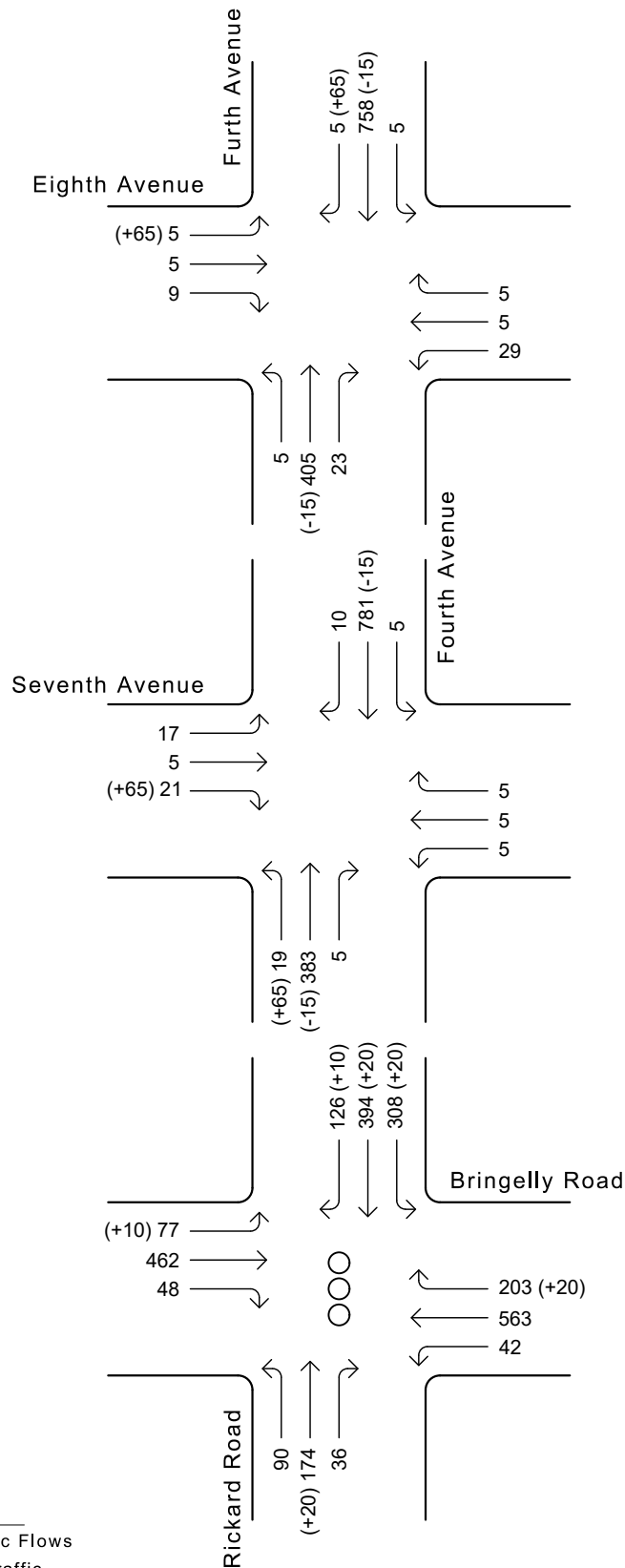
Location Plan



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- 100 - Existing Peak Hour Traffic Flows
- (+10) - Additional Development Traffic
- ∞ - Traffic Signals

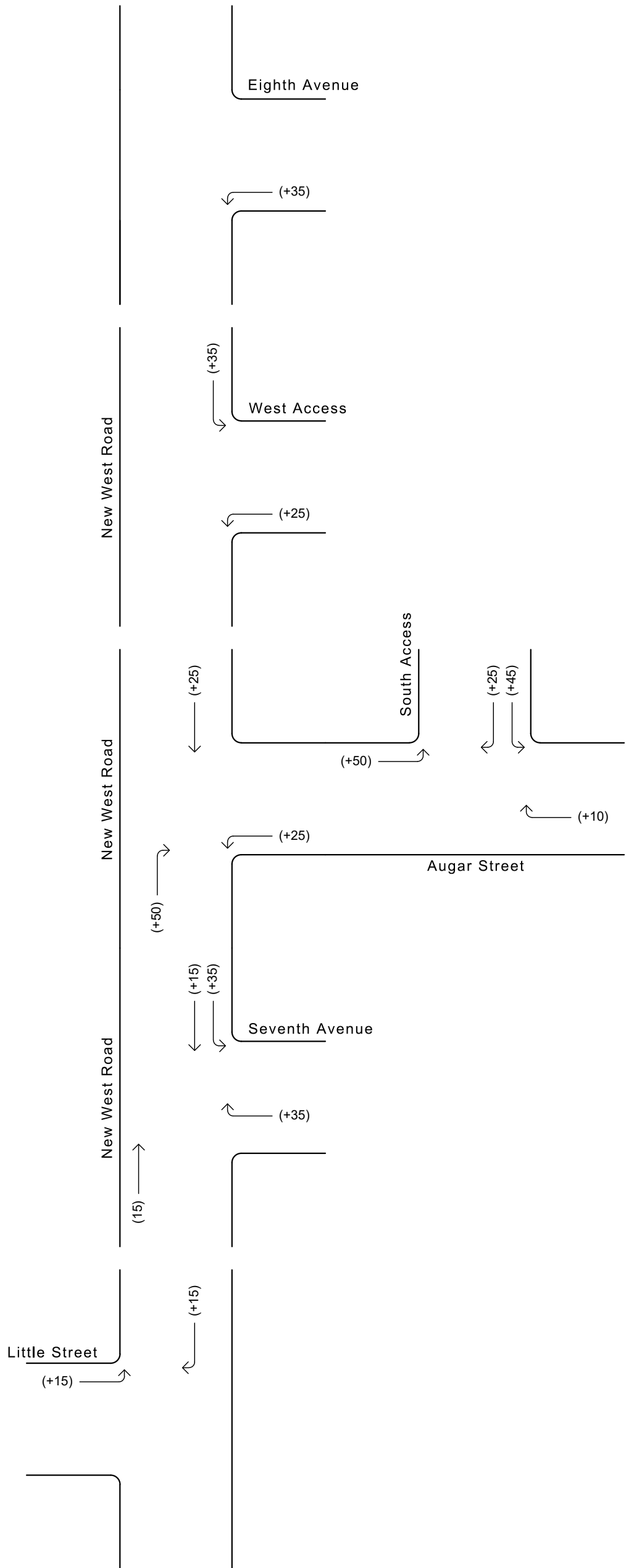
**Existing weekday morning
peak hour traffic flows plus
development traffic
Figure 2**



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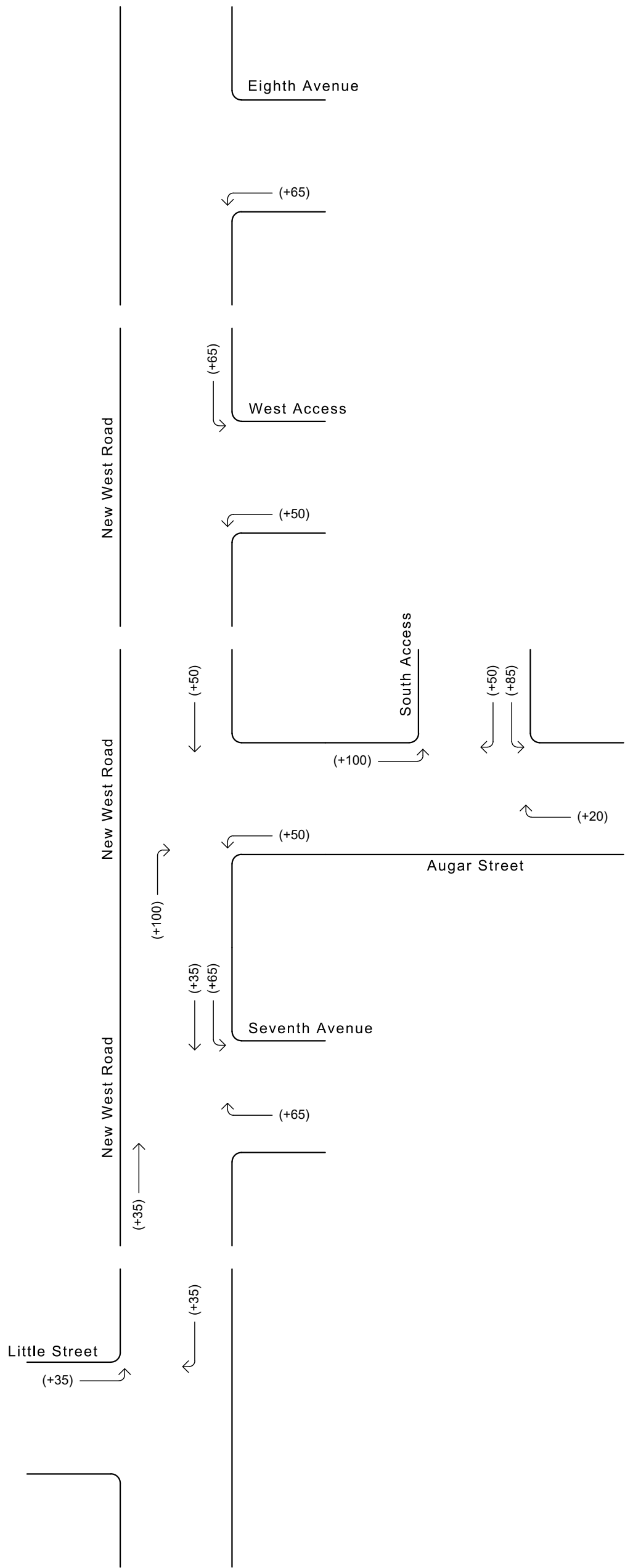
- 100 - Existing Peak Hour Traffic Flows
- (+10) - Additional Development Traffic
- ⊗ - Traffic Signals

**Existing weekday afternoon
peak hour traffic flows plus
development traffic**
Figure 3



Future weekday morning
traffic generation

Figure 4

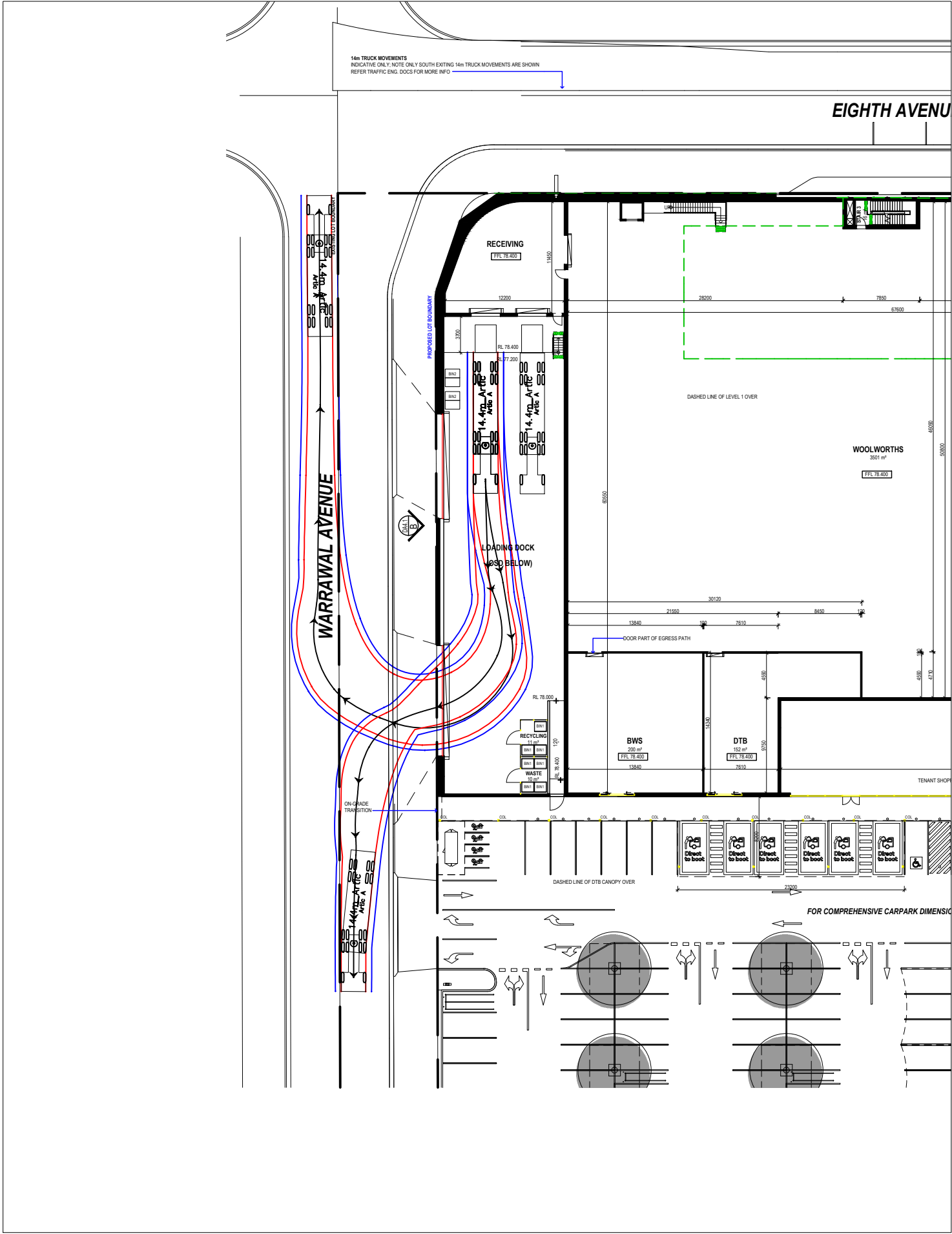
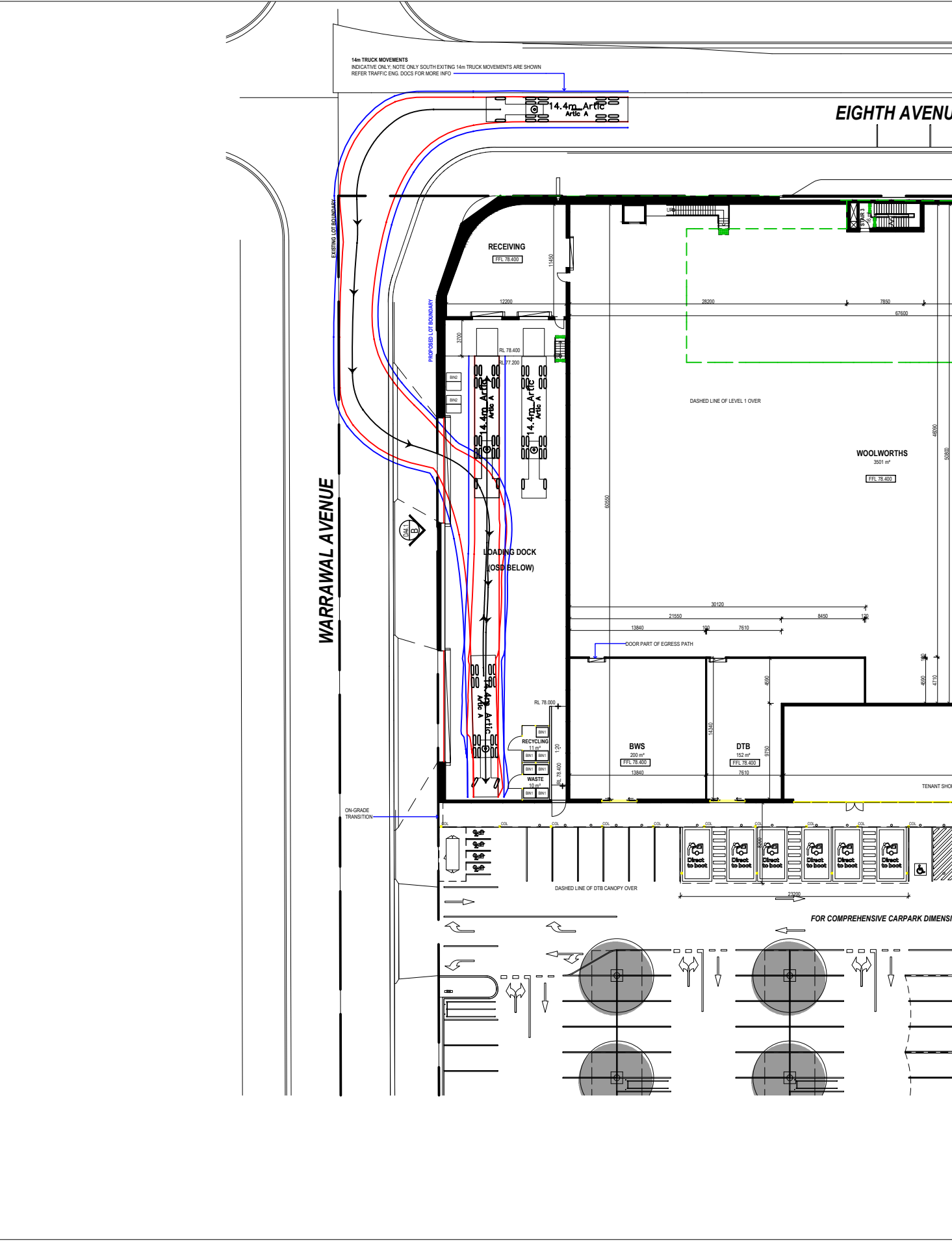


Future weekday afternoon
traffic generation

Figure 5

ATTACHMENT A

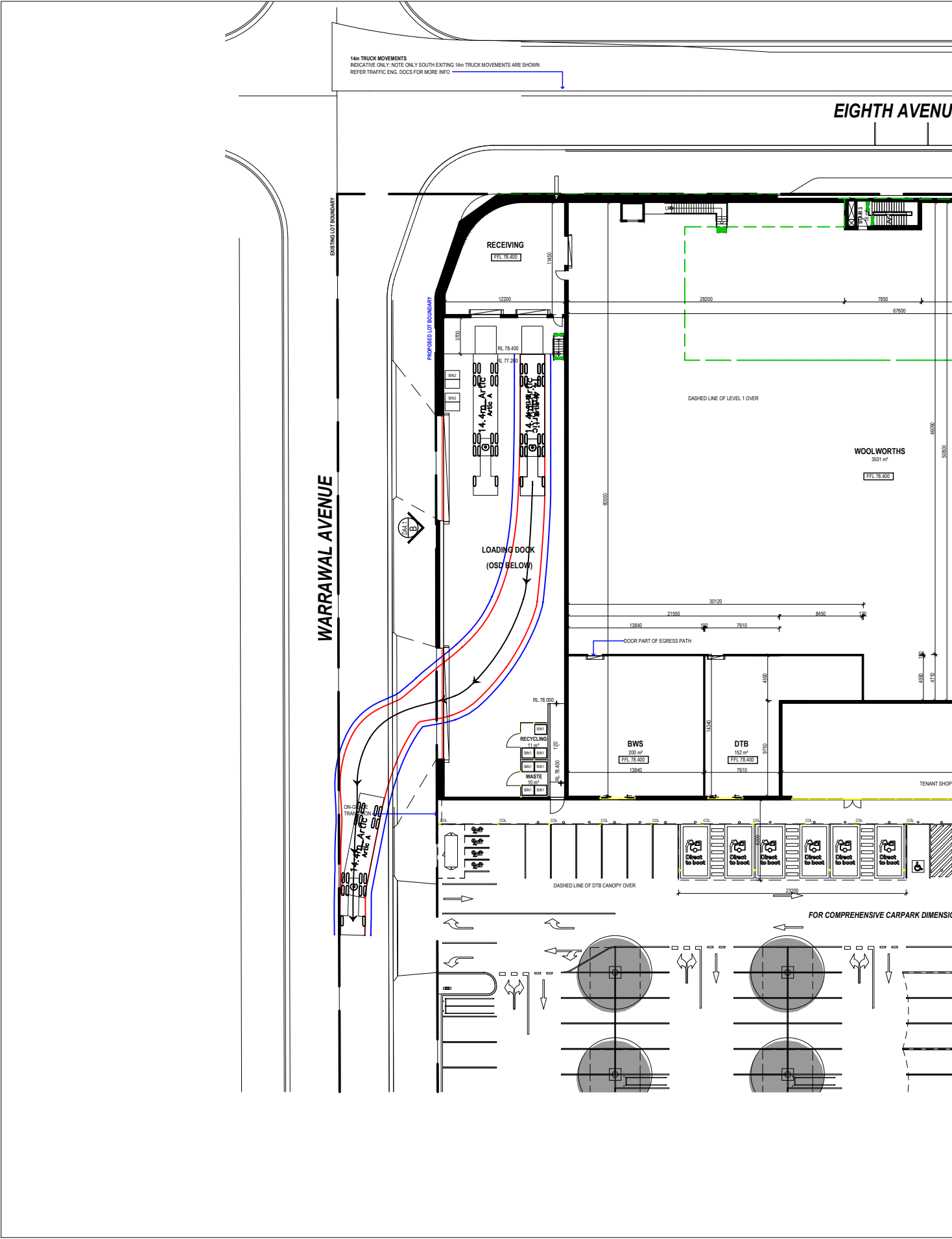
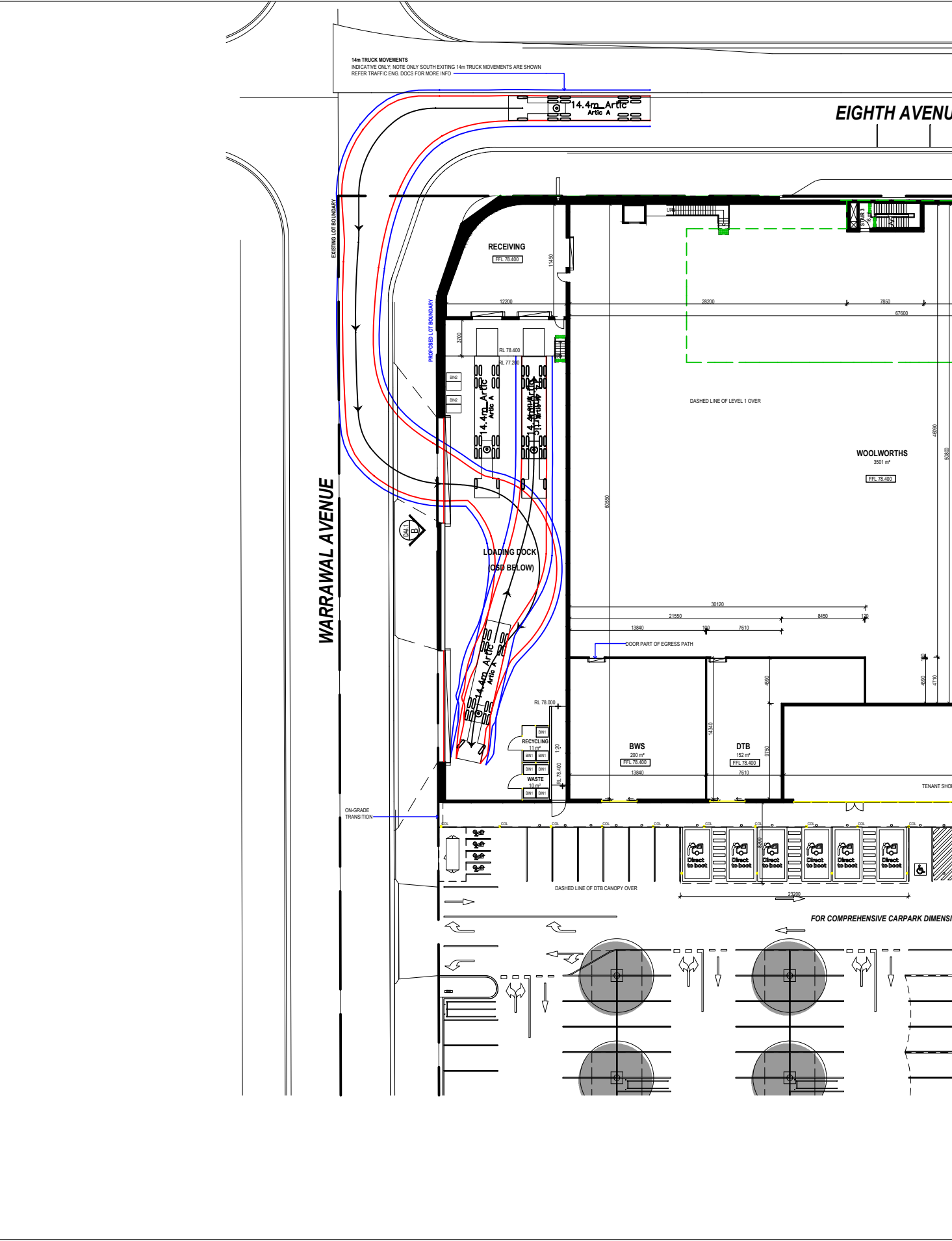
VEHICLE TURN PATHS



NOTE:
SKETCH PLAN ONLY. PROPERTY BOUNDARIES,
UTILITIES, KERBLINES & DIMENSIONS ARE SUBJECT TO
SURVEY AND FINAL DESIGN. TRAFFIC MEASURES
PROPOSED IN THIS PLAN ARE CONCEPT ONLY AND
ARE SUBJECT TO FINAL DESIGN BY CIVIL ENGINEERS.

— Swept Path of Vehicle Body
— Swept Path of Clearance to Vehicle Body

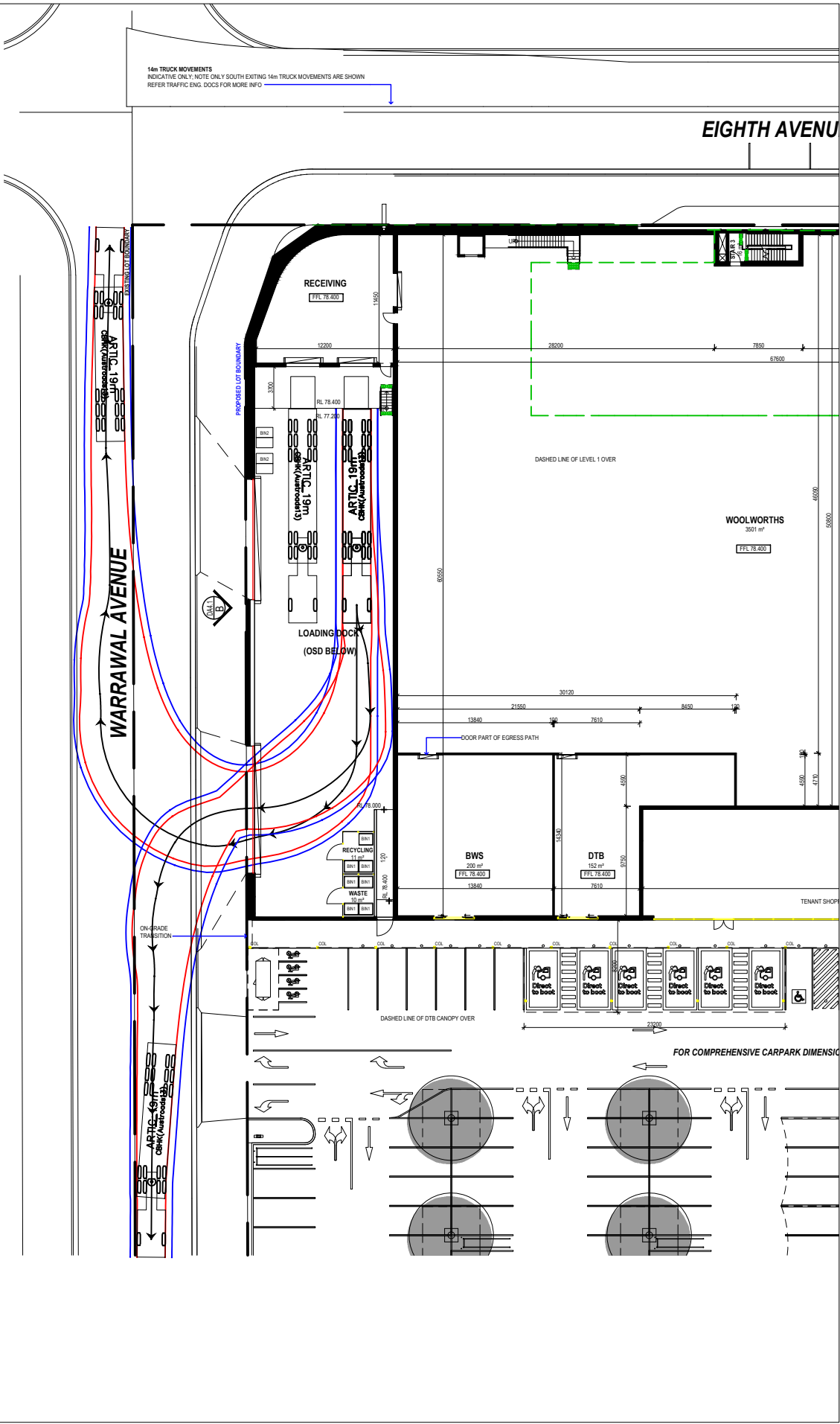
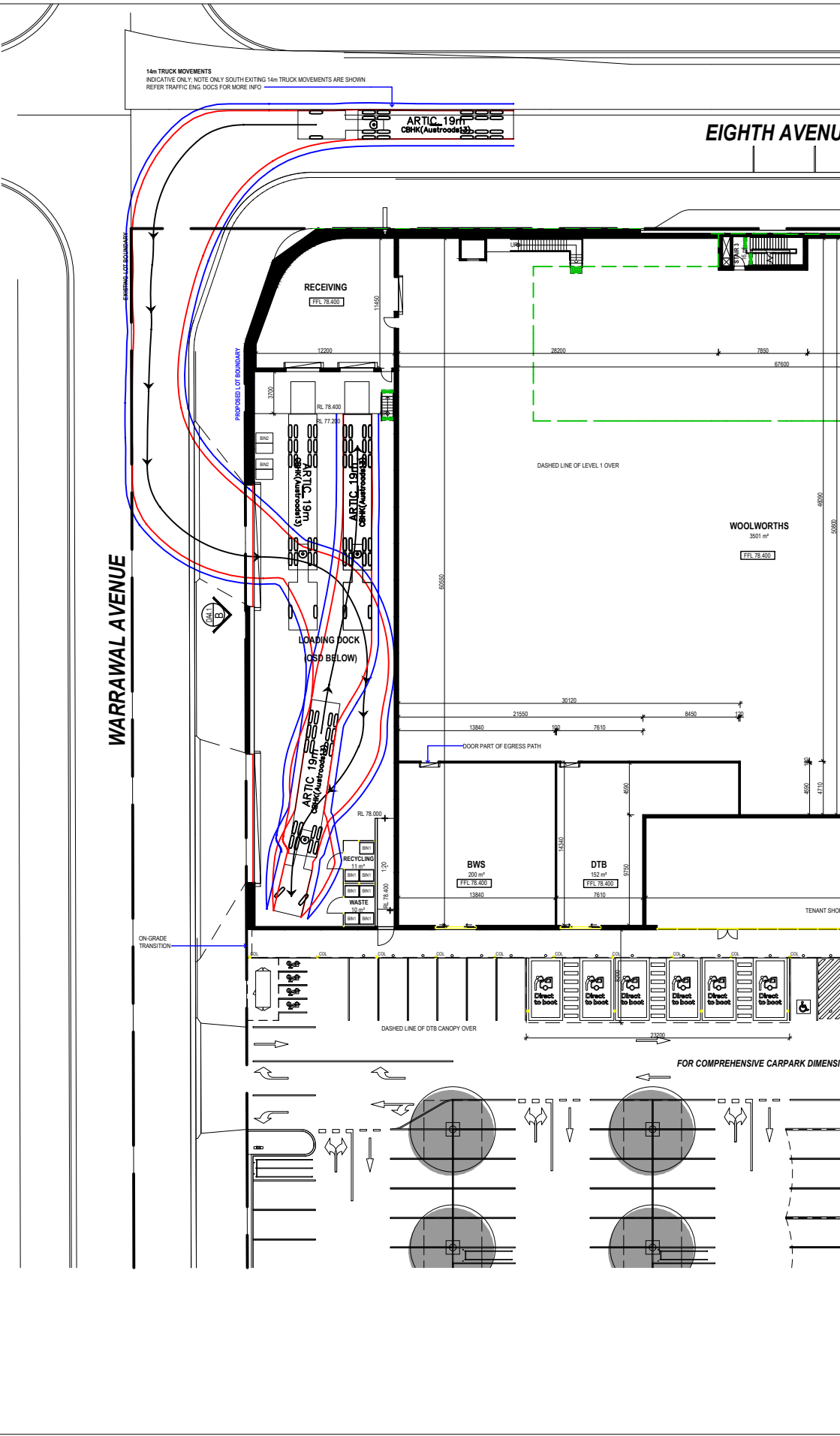
14.4m ARTICULATED
VEHICLE SWEEP PATHS



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— Swept Path of Vehicle Body
— Swept Path of Clearance to Vehicle Body

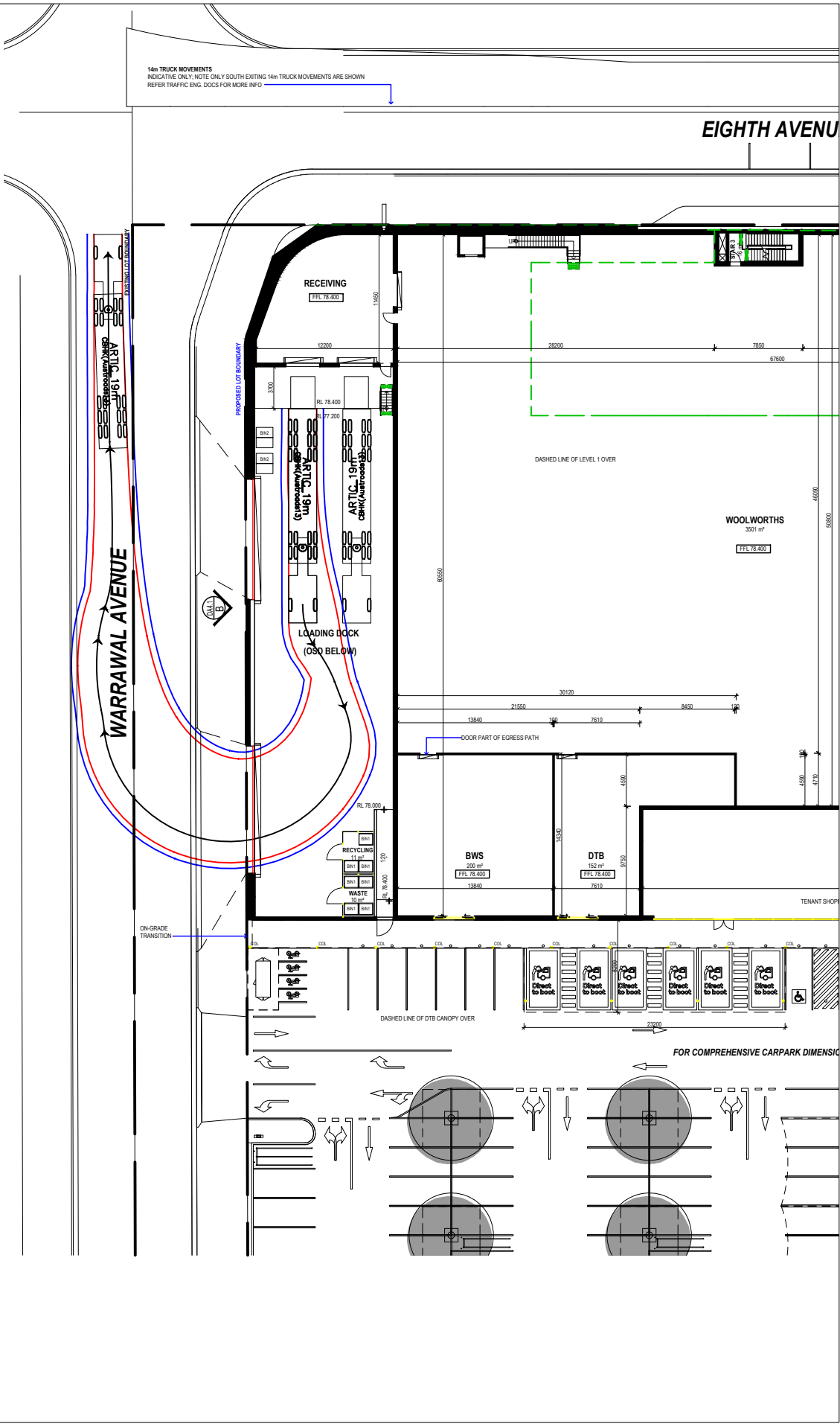
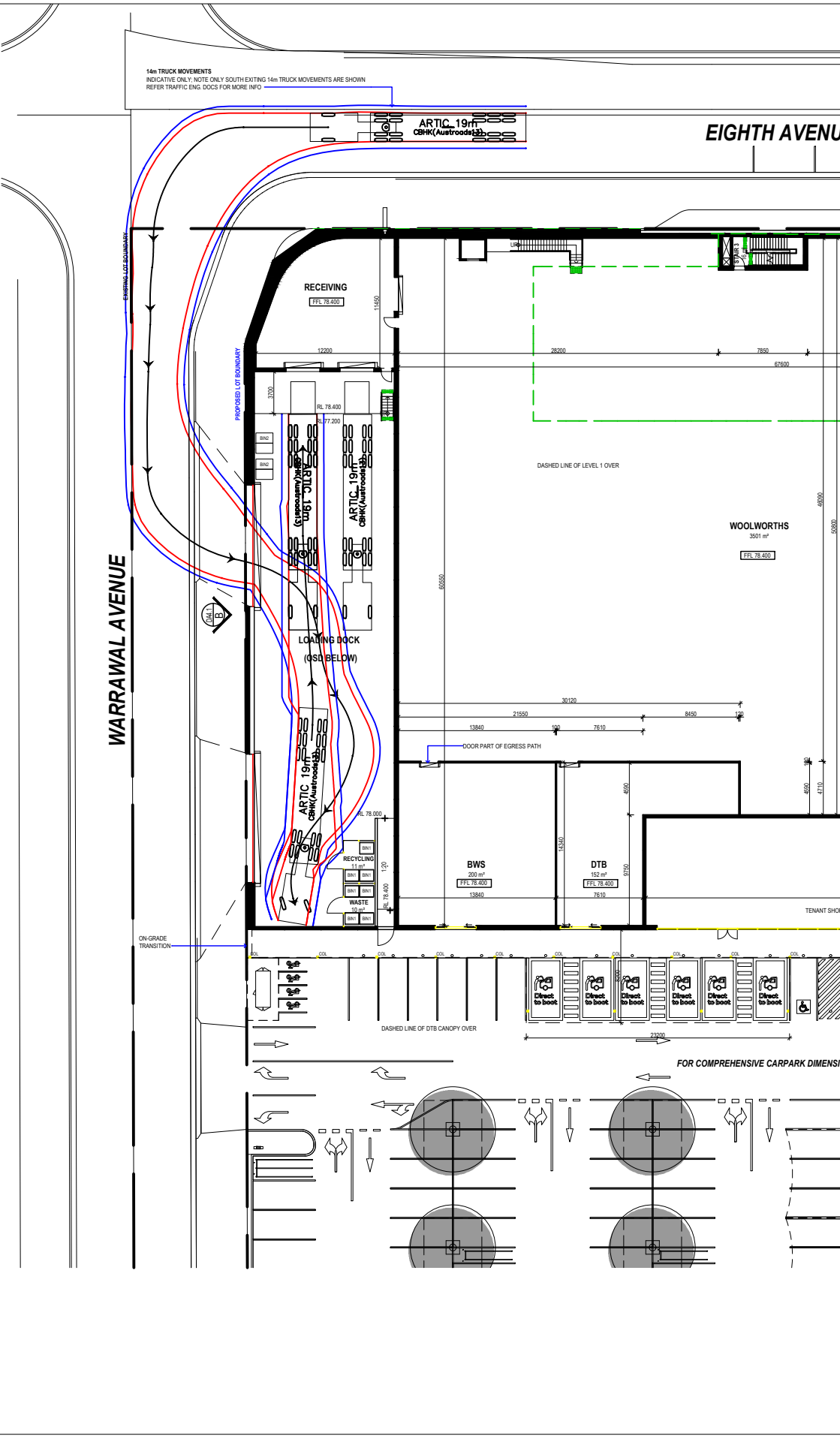
14.4m ARTICULATED
VEHICLE SWEEP PATHS



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— Swept Path of Vehicle Body
— Swept Path of Clearance to Vehicle Body

19.0m ARTICULATED
VEHICLE SWEEP PATHS



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— Swept Path of Vehicle Body
— Swept Path of Clearance to Vehicle Body

19.0m ARTICULATED VEHICLE SWEEP PATHS