Traffic Impact Assessment

Proposed Mixed Use Development
Bankstown Compass Centre
83-99 North Terrace, Bankstown

Reference: 15.221r01v07 TRAFFIX TIA Report, October 2016

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Document Verification

Job Number:	15.221			
Project:	Compass Centre			
Client:	FIOSON Pty Ltd			
Revision	Date	Prepared By	Checked By	Signed
v04	08/02/2016	Kedar Ballurkar	Geoff Higgins	
v05	10/02/2016	Kedar Ballurkar	Geoff Higgins	
v06	17/10/2016	Kedar Ballurkar	Geoff Higgins	
v07	18/10/2016	Kedar Ballurkar	Geoff Higgins	

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Contents

1. Introduction

TRAFFIX has been engaged by FIOSON Pty Ltd to undertake a traffic impact assessment in support of a development application (DA) relating to the Bankstown Compass Centre located on North Terrace, Bankstown. The DA is for a mixed use development consisting of 471 residential apartments, 5,020 m^2 of retail space, 2,034 m^2 of commercial uses and 4,426 m^2 of commercial space dedicated to council use. The development is located within the Bankstown City Council LGA and has been assessed under that council's controls.

This report documents the findings of our investigations and should be read in the context of the Statement of Environmental Effects (SEE) prepared separately. The development is a major development and will require referral to the RMS under the provisions of SEPP (Infrastructure) 2007.

The report is structured as follows:

- Section 2: Describes the site and its location
- Section 3: Documents existing traffic conditions
- Section 4: Describes the proposed development
- Section 5: Assesses the parking requirements
- Section 6: Assesses traffic impacts
- Section 7: Discusses access and internal design aspects
- Section 8: Presents the overall study conclusions.

2. Location and Site

The site is situated on the northern side of North Terrace and accommodates the sector bounded by Fetherstone Street to the west, The Mall to the north and The Appian Way to the east with the exception of a residential building located at 3-7 Fetherstone Street. It is located approximately 50 metres northeast of Bankstown railway station, approximately 17 kilometres southwest of the Sydney CBD.

The site has an irregular configuration accommodating a number of retail and commercial lots which are currently in use and includes an at-grade car park to the north of site. It has a northern frontage of approximately 80 metres to The Mall, a southern site boundary of approximately 95 metres to North Terrace, an eastern frontage of approximately 120 metres to The Appian Way and a western boundary of approximately 125 metres to Fetherstone Street and the neighbouring residential development.

The existing site has five site accesses, described as follows:

- A 5.5 metre wide driveway crossing to The Mall which provides access to disabled parking within the former Bankstown City Library on the northernmost part of site;
- A 5.5 metre wide driveway crossing from The Appian Way providing access to the at-grade council parking associated with the former Library on the northern section of site;
- A 5.0 metre wide driveway crossing to the Fetherstone Street providing egress from the at-grade council parking associated with the Library on the northern section of site; and
- A pair of access driveways of 3m in width providing access to a loading bay from Fetherstone Street.

A Location Plan is presented in **Figure 1**, with a Site Plan presented in **Figure 2**. Reference should also be made to the Photographic Record presented in **Appendix A**, which provides an appreciation of the general character of roads and other key attributes in proximity to the site.

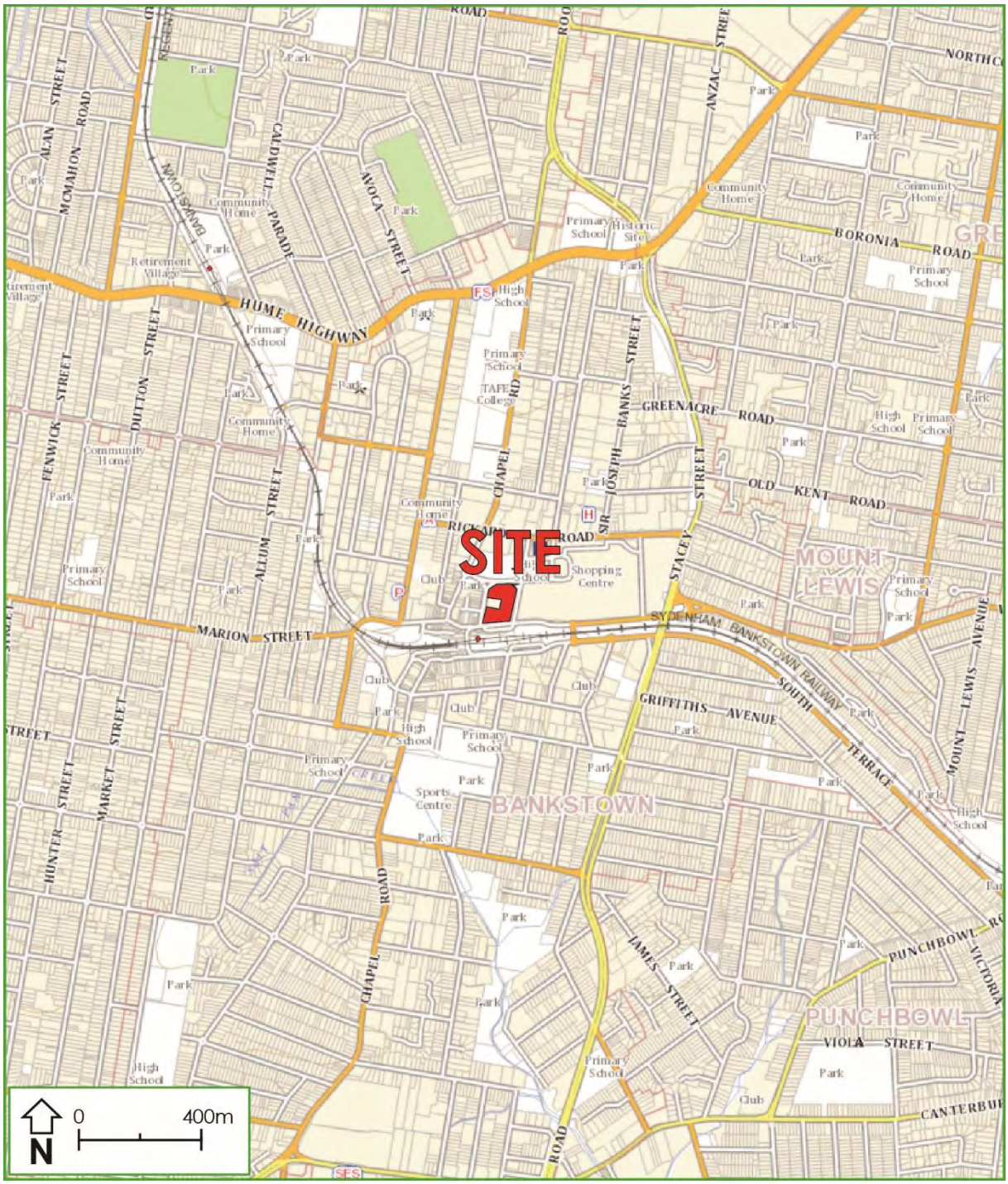


Figure 1: Location Plan

Figure 2: Site Plan

3. Existing Traffic Conditions

3.1 Road Network

The road hierarchy in the vicinity of the site is shown in **Figure 3** with the following roads of particular interest:

- Hume Highway: An RMS State Road (MR 2) and major arterial road that generally runs in an east-west direction providing the main link between Melbourne in the southwest and Sydney CBD in the northeast via the M5 Motorway. The Hume Highway carries approximately 63,000 vpd (2002) in the vicinity of the site and forms a signalised controlled intersection with Chapel Street. It is constructed with a 23 metre wide divided carriageway with three lanes of traffic in both directions and No Parking/No Stopping restrictions apply along either side. The Hume Highway is generally subject to 70km/h speed zoning in the vicinity of the site with 40km/h speed zoning applied on school days in applicable locations (8:00-9:30am and 2:30-4:00pm).

- Stacey Street: An RMS classified road (MR 190) to the east of site that generally runs in a north-south direction between Rookwood Road in the north and Davies Road in the south. Stacey Street carries 52,000 vpd in the vicinity of the site and provides connections to the M5 Motorway.

- North Terrace: A local council road that runs in an east-west direction from Wattle Street in the east and Fetherstone Street in the west. North Terrace is subject to a 40km/h speed zoning however an advisory of 25km/hr is posted on approach to the zebra crossing on the departure side of The Appian Way intersection. The road accommodates four lanes of traffic in a westbound direction in the vicinity of the site. A Taxi zone is provided on its northern kerbside restricting traffic movements to three lanes. Stopping restrictions generally apply along its southern kerbside within the vicinity of the site. Based upon peak hour traffic counts undertaken for the purpose of this study, The Appian Way carries approximately 700

vehicles in the morning peak hour, and 900 vehicles in the evening peak hour.

- Fetherstone Street: A local council road that runs in a north-south direction between North Terrace in the south and The Mall in the north. Fetherstone Street is generally constructed with a 13 metre wide carriageway accommodating four lanes of traffic in the northbound direction, however on street parking is permitted along both kerbs restricting traffic movements to two lanes. The kerbside parking is restricted to short term 15min stays during peak periods (8.30am to 6pm).

- The Mall: A local road that runs in an east-west direction between Chapel Road in the west and Jacobs Street in the east. The Mall is constructed with a 12 metre carriageway and has four lanes along the site frontage, however both kerbside lanes are used for parking. It therefore carries two lanes of through traffic. It is a one-way (eastbound) road along the site frontage, however operates two-way to the west of Fetherstone Street, and to the east of The Appian Way. It is posted at 40km/hr.

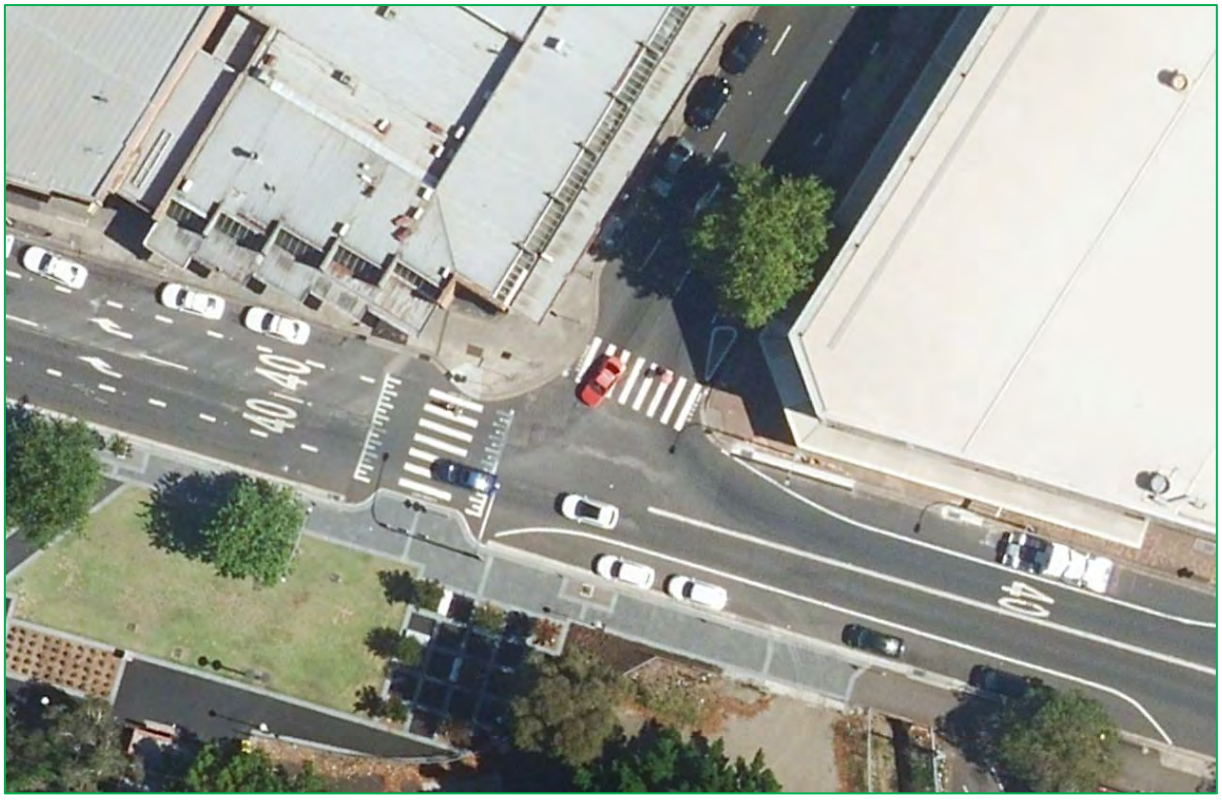
- The Appian Way: is a one-way (southbound) road, which connects from The Mall to North Terrace. It is posted at 40km/hr, and has a signalised pedestrian crossing approximately midway along its length, connecting from Bankstown Central to the subject site. The Appian Way has four lanes, however the right hand lane is utilised for kerbside parking, and the left hand lane is used for kerbside parking (north of the signalised pedestrian crossing) and as a bus zone (south of the signalised pedestrian crossing). It therefore carries two lanes of through traffic. Based upon peak hour traffic counts undertaken for the purpose of this study, The Appian Way carries approximately 700 vehicles in the morning peak hour, and 900 vehicles in the evening peak hour.

It can be seen from **Figure 3** that the site is conveniently located with respect to the arterial and local road systems serving the region. It is therefore able to effectively distribute traffic onto the wider road network, minimising traffic impacts.

Figure 3: Road Hierarchy

3.2 Key Intersections

The key intersections in the vicinity of the site are shown below and provide an understanding of the existing road geometry and alignment in the area:



Source: Google Earth

Figure 4: Intersection of North Terrace and The Appian Way

It can be seen from **Figure 4** that North Terrace forms a priority controlled intersection with The Appian Way in the south east corner of the site. Pedestrian zebra crossings are in place on both carriageways.

Source: Google Earth

Figure 5: Intersection of North Terrace and Fetherstone Street

It can be seen from **Figure 5** that North Terrace forms a signal controlled intersection with Fetherstone Street in the south west corner of the site. A dedicated bus lane is in operation for the westbound movement with the majority of traffic restricted to northbound movements.

Source: Google Earth

Figure 6: Intersection of The Mall and Chapel Street

It can be seen from **Figure 6** that The Mall forms a priority roundabout controlled intersection with Chapel Street to the northwest of site. All vehicle movements are permitted with crossing pedestrians required to give way to vehicle traffic.

3.3 Public Transport

The existing bus and train services that operate in the locality are shown in **Figure 5**. It is evident that the site is only 50 metres northeast of Bankstown Station which provides direct services to key destinations including Central Station, Sydney City Circle including Town Hall, Wynyard, Circular Quay, St James, and Museum Stations, Sydenham, and Liverpool to the west. Train services through Bankstown Station run approximately every 5 – 7 minutes on average during the commuter peak hours.

In addition, the site is in close proximity to a number of bus stops, including:

- The Appian Way (eastern side), within 50m of site (Stop ID: 220040)
- North Terrace (southern side), within 50m of site (Stop ID: 2200157)
- Bankstown Interchange, within 300m of site (Multiple Stops)

These stops are serviced by a considerable number of routes which are operated by Sydney Buses (State Transit Authority of NSW) as well as local bus operators under contract to Transport for NSW, and which travel to key destinations including Liverpool, Lidcombe, Hurstville, Parramatta, and Sutherland.

Overall, the subject site is exceptionally well serviced by existing public transport services.

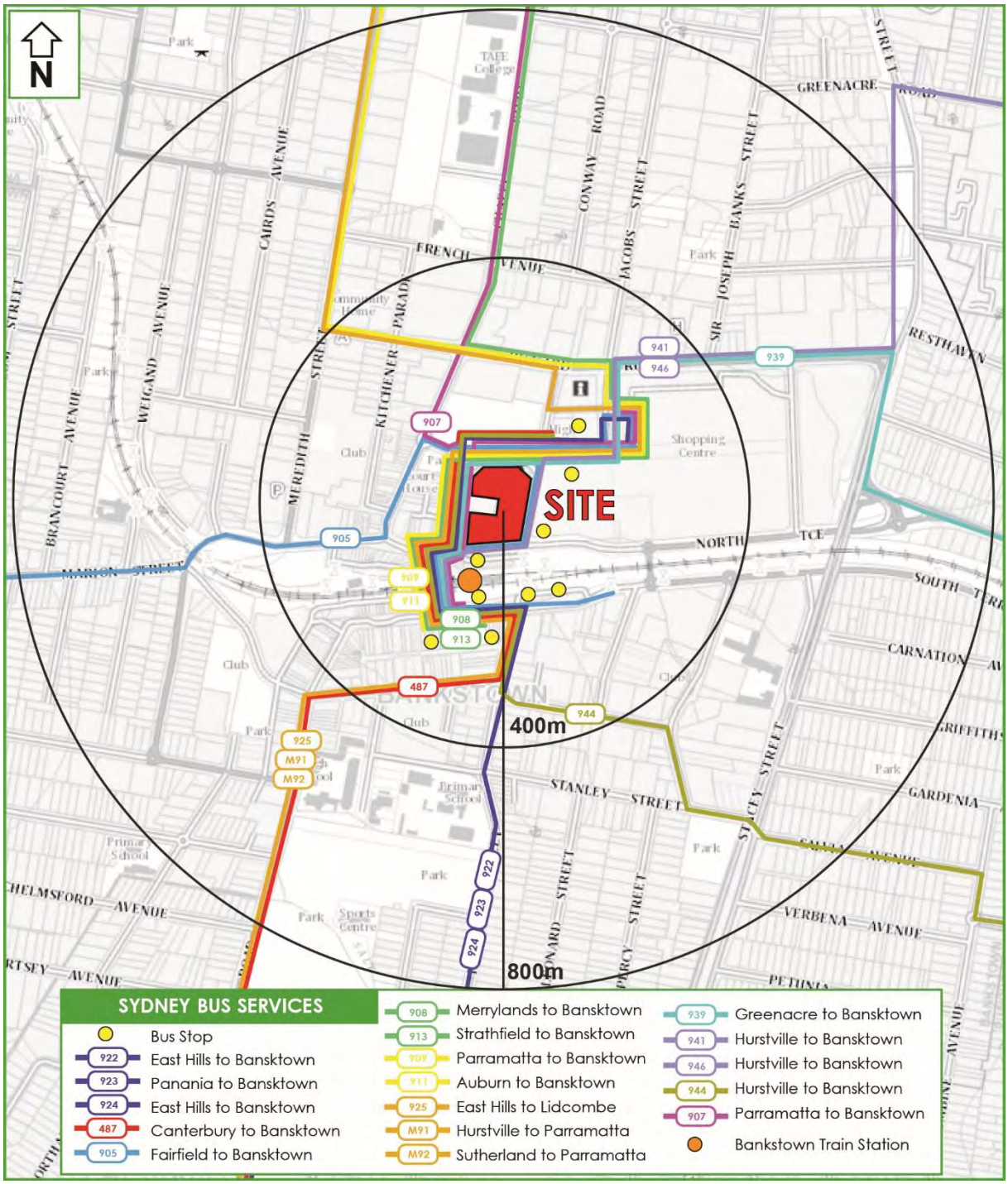


Figure 7: Public Transport

3.4 Existing Site Generation

The subject site is predominantly occupied by retail tenancies including grocery stores, fast food outlets and clothing stores with a total floor area of approximately 5,000m^2. In addition the site accommodates a fitness centre of 400m^2, an office block of 6 stories with a total floor area of approximately 3,000m^2 and the former Bankstown Council library with 3 floors and a total area of approximately 2,500m^2.

It is expected that the traffic generation relating to the existing use of the subject site would be significant, with vehicles expected to use the existing on-site and on street parking in the vicinity to access these services.

3.5 Existing Intersection Performance

For the purposes of assessing the existing network performance surveys were undertaken of the critical intersections identified in Section 3.2. These were undertaken on Tuesday the 4th of August 2015 between the network peak periods of 7.00-9.00AM and 4.00-6.00PM to assess the development impact on the critical weekday peak periods.

The results of these surveys were analysed using the SIDRA computer program to determine their performance characteristics under existing traffic conditions. The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below:

Table 1: Intersection Performance Indicators

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

A summary of the modelled results are provided below. Reference should also be made to the SIDRA outputs provided in **Appendix B** which provide detailed results for individual lanes and approaches. For priority intersections **Table 2** reports the highest delays for the most disadvantaged movement, which is not representative of the overall intersection performance.

Table 2: Existing Intersection Performance: AM and PM Peak Hour

Intersection Description	Control Type	Period	Degree of Saturation	Intersection Delay	Level of Service
North Terrace / The Appian Way	Give-way	AM	0.209	7.2	A
	Give-way	PM	0.321	7.7	A
North Terrace / Fetherstone Street	Signals	AM	0.512	15.4	B
	Signals	PM	0.530	15.4	B
The Mall / Chapel Street	Roundabout	AM	0.720	13.2	A
	Roundabout	PM	0.754	15.1	B

It can be seen from **Table 2** that the key intersections operate satisfactorily under the existing 'base case' scenario, with moderate delays and Level of Service at A or B, during the weekday AM and PM peak periods.

Nevertheless, it is stressed that the most relevant use of this analysis is to compare the relative change in the performance parameters as a result of the proposed development. This is discussed further in **Section 6**.

4. Description of Proposed Development

A detailed description of the proposed development is provided in the Statement of Environmental Effects prepared separately. In summary, the development for which approval is now sought comprises the following components:

- Demolition of all existing structures;
- Construction of a new mixed use building with the following characteristics:
    - 471 residential apartments
        - 145 x one-bed
        - 285 x two-bed
        - 27 x three-bed
        - 14 x four-bed;
    - 5,020 m² retail space;
    - 4,426 m² commercial space (for Bankstown City Council);
    - 2,034 m² additional commercial space
- The provision of two basement levels and three podium levels of car parking containing 794 spaces for the development;

The traffic and parking impacts arising from the development are discussed in **Sections 5** and **6**. Reference should be made to the plans submitted separately to Council which are presented at reduced scale in **Appendix C.**

5. Parking Requirements

5.1 Council Controls

The subject site is zoned B4 Mixed Use and the Bankstown Development Control Plan (DCP) 2015 provides the direction regarding appropriate levels of parking for the relevant uses within this zone within the Bankstown CBD. In addition, the site is located within 800 metres of Bankstown Railway Station, as such the *State Environmental Planning Policy No 65 - Design Quality of Residential Apartment Development* (SEPP 65) applies to the residential component of this development.

Bankstown has been identified as a metropolitan reginal centre by the NSW Department of Planning and Environment and as such the parking requirements for the residential component of the development are governed by the rates as set out in Section 5.4.3 of the RMS Guide to Traffic Generating Developments. These rates along with the council DCP rates for the remaining land uses have been summarised in **Table 3**:

Table 3: Parking Requirements

Type	No. /GFA	Parking Rate	DCP Parking Spaces Required[1]	Parking Spaces Provided
Site Residents (Residential Flat Buildings)				
1 Bedroom	145	1 space per unit	471	471
2 Bedroom	285			
3 Bedroom +	27			
4 Bedroom	14			
Site Visitors (Residential, Retail and Commercial)				
Residential Visitor	471	1 space per 5 dwellings	94	45
Retail Tenancies[2]	5,020m^2	Parking assessment to be carried out by applicant.	113	192
General Commercial[3]	2,034m^2	1 space per 40m^2 of half the gross floor area of the premises; and a planning agreement is considered on the remaining 50% of parking requirements for the purpose of public parking.	51	
Council	4,426m^2	Council parking provision to be 86 spaces in accordance with prior Council agreement.	86	86
		Total	**815**	**794**

[1] Parking spaces rounded to the nearest whole number in accordance with DCP provisions.
[2] Guidance adopted for developments equal to or exceeding 4,000m^2 GFA.
[3] Parking rates adopted for developments within the Bankstown CBD.

It can be seen in **Table 3** that the proposed development is nominally required to provide 471 car spaces dedicated to residential tenant parking. In response the development provides 471 spaces, equating to 1 per unit and meeting the requirements of Council's DCP.

For the Council parking a provision of 86 spaces has been agreed. This provision represents a rate of 1 space per 51m^2. It is considered that this restrained parking provision will encourage alternative and sustainable transport modes for visitors and staff, in line with State Government and Council objectives.

Furthermore it is noted that this parking will be available for visitors to the site in the evening and weekends.

For this reason a parking assessment is required to develop the appropriate provision of parking for visitors. The assessment process is detailed in **Section 5.2**.

5.2 Parking Assessment

A parking assessment has been undertaken to derive the appropriate level of car parking for the development, as required under the Council DCP. This assessment has taken into consideration the following:

- The mixed-use nature of the facility and the likelihood that people associated with one use on the site (e.g. staff of the commercial uses) will use other facilities on the site (e.g. shop at the retail tenancies), effecting a reduction in the overall parking demand;
- The short-term parking demands generated by some uses (i.e. a café or retail convenience store);
- The proximity of the site with respect to public transport options, which would increase the mode share to public transport and reduce the dependency upon private vehicle, particularly for visitors to site and staff working within the development;
- The proximity of the site with respect to local services and attractions, such that a reasonable proportion of residents / staff / customers would be likely to walk to/from the site to/from surrounding developments, such as Bankstown Central, which is immediately to the east of the site;
- The efficiencies which are gained as a result of differing peak parking demand periods (for example, the residential visitor peak parking demand is expected to occur in the evening or on weekends, and is therefore unlikely to coincide with the commercial peak parking demand period which would occur during the day); and
- The aim to manage or supress on-site parking demand through the implementation of a paid parking scheme (with first two hours free)

On the basis of the above, there will be a substantial reduction in parking demands. Reference should be made to **Appendix D** which demonstrates the reduced peak parking demand that is expected to occur (267 council and visitor spaces on a weekday daytime), having regard for the varying times of peak activity associated with individual uses.

This assessment assumed a general reduction in base demands to non-resident uses by 10% to account for the reduced car dependence having regard for the close proximity of public transport services (based on review of Journey-to-Work data).

In this regard, the proposed parking provision of 323 visitor spaces is considered appropriate to meet the peak parking demands of the subject development with surplus parking anticipated.

5.3 Disabled Parking

Disabled parking is provided on each of the car park levels, with spaces located adjacent to the lift accesses. In total 18 disabled spaces have been provided, representing 2.3% of the total parking provision. This provision meets the council requirement for 1% of parking to be reserved as accessible parking. The 18 spaces have been allocated in the following manner between the three carpark uses:

- 10 spaces for the residential component;
- 1 spaces for the council carpark; and
- 7 spaces for the retail / commercial carpark;

The disabled spaces have been provided with a width of 2.4 metres and a length of 5.8m with a 2.4 metre wide shared area adjacent, meeting the requirements of AS 2890.6 (2009).

In this regard the disabled parking provision is considered acceptable, meeting the requirements of Council and the Australian Standards.

5.4 Bicycle Parking

With respect to bicycle parking, it is noted that Council's DCP states that 'Council may require development to provide appropriate bicycle parking facilities either on–site or close to the development as identified in Australian Standard 2890.3–Bicycle Parking Facilities'.

In response the following measures have been adopted:

- Resident bicycle parking be provided for by way of secure cages in the resident basement parking areas (i.e. Class 1) at a rate of one space per 4 flats; and
- Rails for commercial/retail employees have been provided in the secure basement parking areas (i.e. Class 2) with space for 24 bicycles provided in the council parking area and 26 spaces located in the area reserved for retail employees.

Given the nature and location of the proposed development, it is anticipated that bicycle parking demands would be relatively low, however should Council require additional bicycle parking the requirement for a provision could be included as a condition of consent.

5.5 Servicing

All servicing, including garbage collection, of the site will be undertaken from the loading area located within basement level 1. The loading area shall be accessed from The Appian Way. A turning bay has been provided on site ensuring all access and egress is undertaken in a forward direction. Swept path analysis demonstrates the satisfactory operation of this access arrangement by the largest design vehicle to enter the site, being a 12.5m Heavy Rigid Vehicle (HRV). This swept path assessment can be viewed in **Appendix E**.

Council's DCP does not provide a rate for the provision of loading bays, an assessment has been made of the loading requirements for the mixed use development. In response the development proposes a loading dock capable of accommodating up to three large service vehicles (e.g. one heavy rigid vehicle and two medium rigid vehicles concurrently).

This is considered to be an appropriate level of provision based upon the nature and scale of the development, and the efficiencies gained through the use of a single consolidated servicing area for multiples uses / tenancies with different peak servicing demand periods.

5.6 On-Street Parking

With a substantial onsite parking and loading provision in comparison to the existing site it is anticipated there would be a reduced demand for the existing on street parking and loading provision currently servicing the existing development. As such, it is recommended the existing on street loading zones located in Featherstone Street and The Appian Way be returned to on-street parking to further reduce pressure for parking in the vicinity of site, providing an improved outcome for the community.

6. Traffic Impacts

6.1 Trip Generation

The impacts of the proposed development on the external road network have been assessed having regard for the indicative yield scenarios as summarised in **Section 4** above. This assessment has been undertaken in accordance with the requirements of the RMS Guideline to Traffic Generating Developments (2002) and as such, the traffic generation rates published in the RMS Guide have been adopted for each individual land use. The result of this assessment is summarised below.

6.1.1 Residential

In August 2013, RMS released Technical Direction TDT 2013/04a, which provides revised trip generation advice for a number of land uses based on survey data obtained since 2009. One of the land uses covered by TDT 2013/04a is high density residential development. The average Sydney weekday trip rates provided by TDT 2013/04a have been adopted for assessing the traffic generating potential of the subject development. The relevant trip rates are as follows:

- 0.19 vehicle trips per unit during the morning peak hour; and
- 0.15 vehicle trips per unit during the evening peak hour.

Application of these trip rates to the 471 residential units proposed, results in the following predicted trip generation volumes:

- 89 veh/hr (18 in, 71 out) during the morning peak hour; and
- 71 veh/hr (57 in, 14 out) during the evening peak hour.

6.1.2 Retail

The RMS *Guide to Traffic Generating Developments* provides traffic generation rates for secondary retail uses, which it defines to be stores that tend not to be primary attractors to the development. It recommends an hourly trip generation rate of 4.6 vehicle trips per 100m^2 gross leasable floor area (assumed to be equivalent to GFA) during the PM peak period. Whilst no trip generation rates are provided during the AM peak period, this is assumed to be 20% of the PM peak period generation, mainly accounting for staff arrivals. The proposed 5,020m^2 gross floor area of retail space is therefore expected to generate the following traffic:

- 46 veh/hr in the AM peak (37 in, 9 out) assuming 20% of the PM peak, associated mainly with staff arrivals; and
- 231 veh/hr (115 in, 116 out) during the Thursday evening peak hour.

6.1.3 Commercial

The RMS Technical Direction TDT 2013/04a also provides traffic generation rates for commercial developments based upon surveys conducted during 2010. It recommends an hourly trip generation rate of 1.6 vehicle trips per 100m^2 gross floor area during the AM peak period and 1.2 vehicle trips per hour 100m^2 gross floor area, during the PM peak period. Application of these rates to the combined 6,460m^2 gross floor area of Council and general commercial space results in the following traffic generation:

- 104 veh/hr (72 in, 32 out) in the morning peak; and
- 78 veh/h (24 in, 54 out) in the evening peak.

6.1.4 Combined Generation

Having regard for the above, the proposed development is expected to generate the following traffic:

- 239 veh/hr (127 in, 112 out) in the morning peak; and
- 380 veh/h (196 in, 184 out) in the evening peak.

To ensure a conservative assessment these volumes will be used in **Section 6.2** to assess the impact on the local network, however it is emphasised that these volumes are **not net** increases as the approximately 5,000m^2 of retail and commercial uses operating on the existing site are currently generating a significant volume of traffic within the network.

6.2 Peak Period Intersection Performance

The expected traffic generation estimated above has been distributed across the local network in line with the traffic distribution recoded in the surveys discussed in **Section 3.5**. These trips access the site from the Fetherstone Street frontage and circulate site clockwise via the one way network in operation for Fetherstone Street and Appian Way. The resulting network distribution from the subject site can be seen in **Figures 8 and 9**.

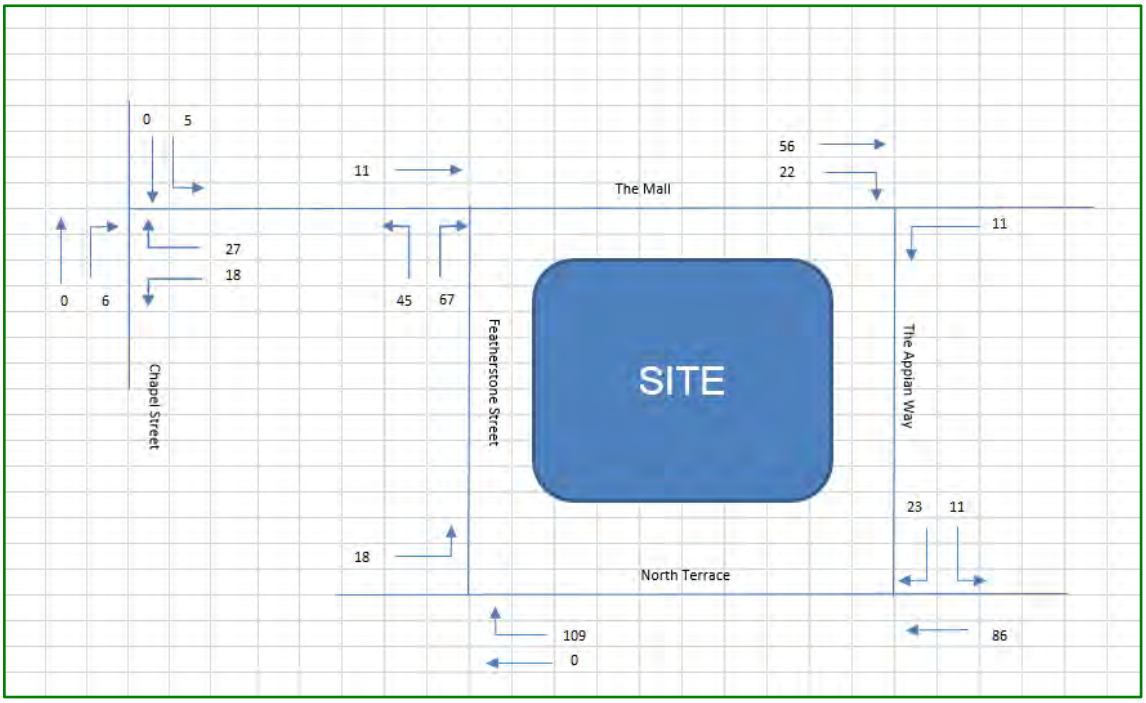


Figure 8: AM Peak Hour Traffic Generation

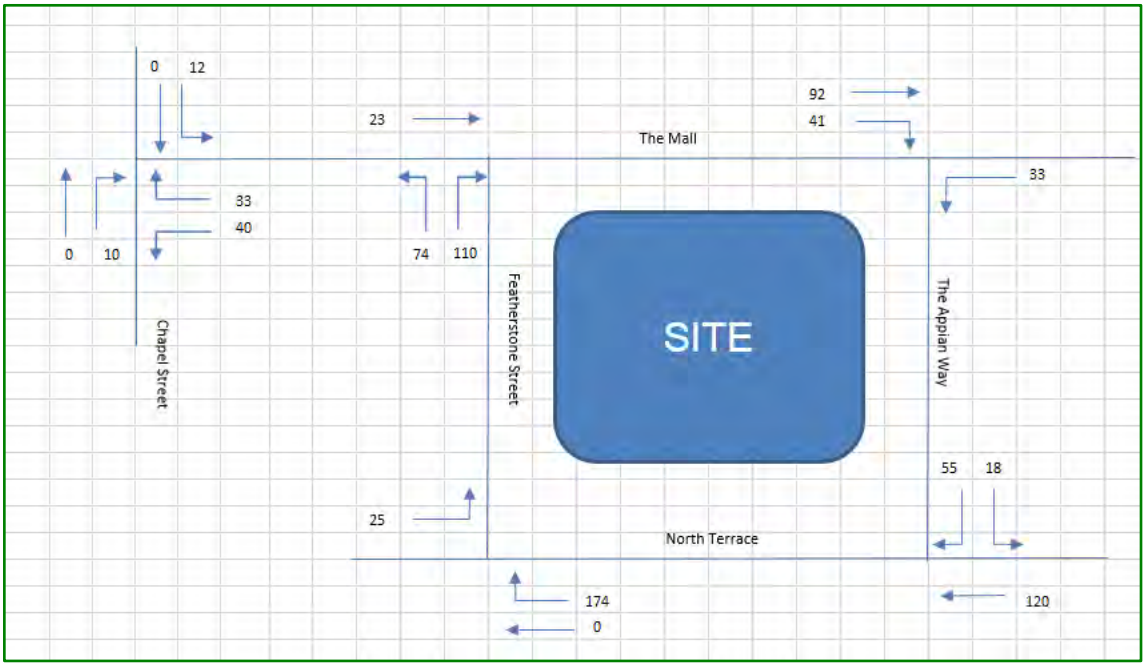


Figure 9: PM Peak Hour Traffic Generation

The impact of these additional trips on the critical intersections in the vicinity of the site has been analysed using SIDRA, with a summary of the results provided below in **Table 4**. **Table 4** also provides a comparison against the existing intersection performances, with these results extracted from **Table 1**. The full range of SIDRA outputs can be viewed in **Appendix B.**

Table 4: Existing & Future Intersection Performance: PM Peak Hour

Intersection	Control Type	Period	Scenario	Degree of Saturation	Intersection Delay	Level of Service
North Terrace / The Appian Way	Give-way	AM	Existing	0.209	7.2	A
			Proposed	0.246	7.7	A
		PM	Existing	0.321	7.7	A
			Proposed	0.433	9.1	A
North Terrace / Fetherstone Street	Signals	AM	Existing	0.512	15.4	B
			Proposed	0.548	15.5	B
		PM	Existing	0.530	15.4	B
			Proposed	0.626	16.1	B
The Mall / Chapel Street	Roundabout	AM	Existing	0.720	13.2	A
			Proposed	0.774	15.6	B
		PM	Existing	0.754	15.1	B
			Proposed	0.789	16.5	B

It is evident that the proposed development will have moderate impacts on the operation of critical intersections in the vicinity of the site, with only minor increases in intersection delays and the Degree of Saturation. The level of service under the development scenario records an acceptable level of service of B at the worst intersection movement. As such, all critical intersections assessed will continue to operate satisfactorily with moderate delays in the AM and PM peak hours.

In addition, it is emphasised that this assessment has not accounted for the traffic generation of the existing retail and commercial units currently operating on the subject site and hence can be considered

a ‘worst case’ scenario. The traffic impact of the development is therefore moderate and can be readily accommodated by the existing road network, with no external improvements required. The traffic impacts of the development are therefore considered acceptable.

7. Access & Internal Design Aspects

7.1 Access

The following three accesses are proposed for the subject site:

- A 7.6 metre wide access is proposed on Fetherstone Street for the commercial and a proportion of the residential component, with movements restricted to right in and right out only.
- A similar 14.4 metre wide access is proposed on Featherstone for the retail and a proportion of the residential component, with movements restricted to right in and right out;
- The third driveway access is located on The Appian Way and provides access to the loading dock. It has a width of 9.3 metres and swept path analysis has confirmed it is capable of accommodating a HRV, the largest design vehicle expected on site.

Under Table 3.1 of AS 2890.1 (2004) a driveway with access to a local road servicing 130 'Class 3' spaces (retail) and 345 'Class 1A' (residential / employee) spaces requires a Category 4 Driveway, this being separate entry-exit driveways with an entry width of 6.0 to 8.0 metres and an exit width of 6.0 to 8.0 metres, separated by a median of 1-3m. Whilst the driveway servicing 317 'Class 1A' spaces (residential / employee) requires a Category 3 driveway, being separate entry exit driveways, with an entry width of 6.0 metres and an exit width of 4.0 to 6.0 metre.

In response, the development proposes a 6.3m entry lane and a 4.1m exit lane for the access servicing 'Class 3' retail spaces, separated by a 1m median. For the 'Class 1A' residential / commercial access the development proposes entry and exit lanes lane of 3.3 metres in width, separated by a median of 1m.

These provisions are considered acceptable as the access movements are restricted to right in and right out onto a one way road, overcoming the need for vehicles entering to give way to oncoming traffic, whilst exiting vehicles can merge into the nearside lane. These access arrangements improve amenity for pedestrians by providing a reduced access width of 7.6m and 14.4m respectively.

Swept path analysis has been undertaken of the site access, as is permissible under AS 2890.1 (2004), demonstrating satisfactory operation and this is included in **Appendix E**. As such, the design complies with the requirements of AS 2890.1 (2004) and will ensure satisfactory operation.

7.2 Internal Design

The internal basement car park generally complies with the requirements of AS 2890.1 (2004) and the following characteristics are noteworthy:

7.2.1 Parking Modules

- All regular parking spaces (including residential and employee spaces) have been designed to meet the requirements of a Class 3 user (Short term town centre parking) and are provided with a minimum space length of 5.4m a minimum width of 2.6m and a minimum aisle width of 6.0m.
- All small parking spaces have been design in accordance with AS2890.1, including a minimum space width of 2.3m and a minimum space length of 5.0m.
- All spaces located adjacent to obstructions of greater than 150mm in height are provided with an additional width of 300mm.
- Dead-end aisles are provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.
- All disabled parking spaces are designed in accordance with AS2890.6. Spaces are provided with a clear width of 2.4m and located adjacent to a minimum shared area of 2.4m.

7.2.2 Ramps

- All ramps accessing the basement and podium car parks have a maximum gradient of 20% (1 in 5) with appropriate transitions of 12.5% (1 in 8) and 15% (1 in 6.7) where required. The site has a maximum gradient of 5% (1 in 20) for the 6m over the property boundary, satisfying the requirements of AS 2890.1 (2004) for all car park levels;
- The service area entrance ramp has undergone a vertical clearance test, with an HRV having satisfactory ground clearance under the provisions of AS2890.2. These results are presented in **Appendix E**.

7.2.3 Clear Head heights

- A minimum clear head height of 2.2m is to be provided for all areas within the basement car park as required by AS2890.1. A clear head height of 2.5m is to be provided above all disabled spaces as required by AS2890.6.

- A minimum clear head height of 4.5m is to be provided for all areas traversed by service vehicles as required by AS2890.2.

7.2.4 Other Considerations

- The development proposes a ticketless parking system, permitting the free flow of entering traffic preventing potential queuing effects in accordance with section 3.4 of AS2890.1.

- All columns are required to be located outside of the parking space design envelope shown in Figure 5.2 of AS 2890.1 (2004).

- Appropriate visual splays have been provided in accordance with the requirements of Figure 3.3 of AS2890.1 at all accesses.

- A swept path analysis of all critical movements has been undertaken to confirm geometry and compliance with the relevant standards. The swept path assessment is included in **Appendix E**.

7.2.5 Service Area Design

- The internal design of the service area has been undertaken in accordance with the requirements of AS28090.2 for the maximum length vehicle permissible on-site being a 8.8m HRV

- A minimum clear head height of 4.5m is provided within the service area

- A minimum bay width of 3.5m is provided for all service bays.

- A swept path analysis has been undertaken as permissible under AS2890.2 and confirms the internal design. The swept path assessment is included in **Appendix E**.

In summary the internal configuration of the basement car park and loading areas have been designed in accordance with AS2890.1, AS2890.2 and AS2890.6. It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

8. Conclusions

In summary:

- The DA proposes a mixed use development consisting of 471 residential apartments, 7,054 m^2 of retail / commercial uses and 4,426 m^2 dedicated to council use.
- The traffic generation arising from the proposed development has been assessed to be 239 trips in the AM Peak and 380 trips in the PM peak. These trips can be readily accommodated, with minimal impacts on the surrounding road system;
- With 794 off-street parking spaces, the development will meet the peak parking demand, containing all parking demands within the site.
- The proposed car park complies with the requirements of AS 2890.1 (2004), AS 2890.2 (2002) and AS 2890.6 (2009). The car park has also been assessed using the computer program Auto Track, as permitted by AS 2890.1 (2004) and operates safely and efficiently;

It is therefore concluded that the proposed development is supportable on traffic planning grounds and will operate satisfactorily.

Appendix A

Photographic Record

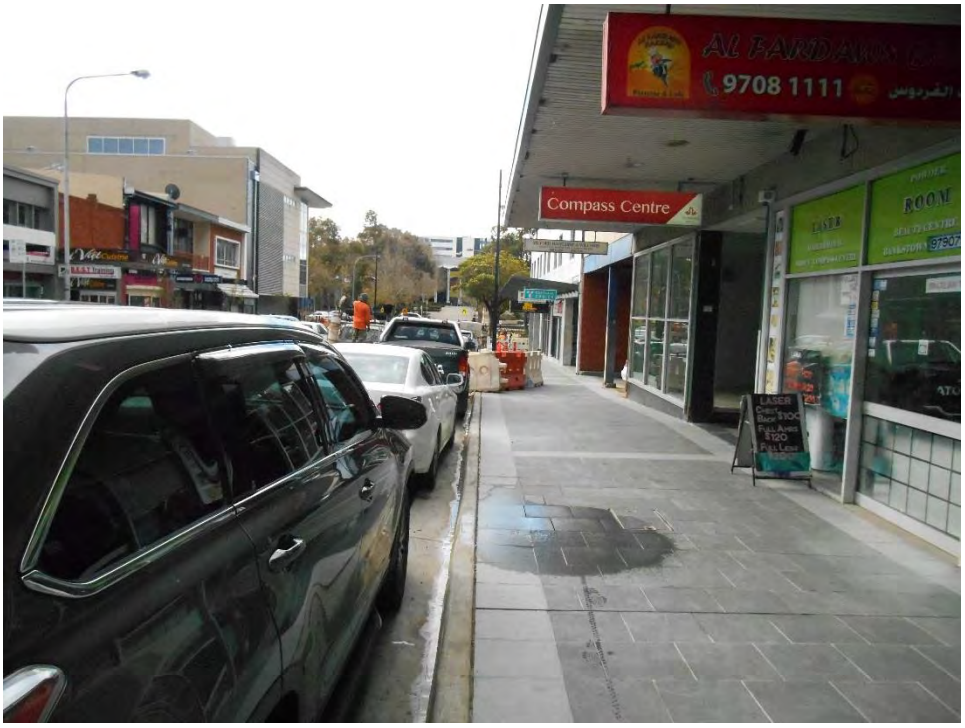
View looking east at intersection of North Terrace and The Appian Way.

View looking south at the intersection of The Mall and The Appian Way.

View looking west at North Terrace, west of The Appian Way.

View looking west at The Mall, west of The Appian Way.

View looking south on Fetherstone Road at the intersection of North Terrace.



View looking north on Fetherstone Road.

Appendix B

SIDRA Analysis

MOVEMENT SUMMARY

Site: Chapel Road / The Mall_Existing PM Peak

Chapel Road / The Mall
Period: PM Peak
Scenario: Existing
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Chapel Road											
2	T1	124	5.0	0.492	5.1	LOS A	4.1	29.9	0.73	0.71	32.7
3	R2	303	5.0	0.492	8.3	LOS A	4.1	29.9	0.73	0.71	33.8
Approach		427	5.0	0.492	7.3	LOS A	4.1	29.9	0.73	0.71	33.5
East: The Mall											
4	L2	319	5.0	0.754	12.2	LOS A	10.6	77.6	0.99	1.07	28.5
6	R2	267	5.0	0.754	15.1	LOS B	10.6	77.6	0.99	1.07	28.7
Approach		586	5.0	0.754	13.5	LOS A	10.6	77.6	0.99	1.07	28.6
North: Chapel Road											
7	L2	335	5.0	0.773	10.0	LOS A	11.1	81.0	0.94	0.97	30.3
8	T1	364	5.0	0.773	9.6	LOS A	11.1	81.0	0.94	0.97	30.5
Approach		699	5.0	0.773	9.8	LOS A	11.1	81.0	0.94	0.97	30.4
All Vehicles		1713	5.0	0.773	10.5	LOS A	11.1	81.0	0.90	0.94	30.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Chapel Road / The Mall_Existing AM Peak

Chapel Road / The Mall
Period: AM Peak
Scenario: Existing
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Chapel Road											
2	T1	175	5.0	0.720	10.0	LOS A	9.4	68.8	0.93	0.98	28.8
3	R2	420	5.0	0.720	13.2	LOS A	9.4	68.8	0.93	0.98	30.3
Approach		595	5.0	0.720	12.3	LOS A	9.4	68.8	0.93	0.98	29.9
East: The Mall											
4	L2	202	5.0	0.590	6.0	LOS A	5.8	42.1	0.78	0.74	32.5
6	R2	333	5.0	0.590	8.8	LOS A	5.8	42.1	0.78	0.74	33.2
Approach		535	5.0	0.590	7.7	LOS A	5.8	42.1	0.78	0.74	32.9
North: Chapel Road											
7	L2	264	5.0	0.694	10.5	LOS A	7.9	57.7	0.92	1.03	30.0
8	T1	254	5.0	0.694	10.1	LOS A	7.9	57.7	0.92	1.03	30.1
Approach		518	5.0	0.694	10.3	LOS A	7.9	57.7	0.92	1.03	30.0
All Vehicles		1647	5.0	0.720	10.2	LOS A	9.4	68.8	0.88	0.92	30.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Chapel Road / The Mall Existing + Development PM Peak

Chapel Road / The Mall
Period: PM Peak
Scenario: Existing + Development
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Chapel Road											
2	T1	124	5.0	0.529	5.4	LOS A	4.6	33.5	0.77	0.74	32.4
3	R2	328	5.0	0.529	8.6	LOS A	4.6	33.5	0.77	0.74	33.5
Approach		453	5.0	0.529	7.7	LOS A	4.6	33.5	0.77	0.74	33.2
East: The Mall											
4	L2	332	5.0	0.789	13.6	LOS A	12.2	89.4	1.00	1.12	27.6
6	R2	280	5.0	0.789	16.5	LOS B	12.2	89.4	1.00	1.12	27.8
Approach		612	5.0	0.789	14.9	LOS B	12.2	89.4	1.00	1.12	27.7
North: Chapel Road											
7	L2	364	5.0	0.832	13.0	LOS A	14.3	104.0	1.00	1.13	28.2
8	T1	364	5.0	0.832	12.7	LOS A	14.3	104.0	1.00	1.13	28.1
Approach		728	5.0	0.832	12.9	LOS A	14.3	104.0	1.00	1.13	28.2
All Vehicles		1793	5.0	0.832	12.3	LOS A	14.3	104.0	0.94	1.03	29.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Chapel Road / The Mall Existing + Development AM Peak

Chapel Road / The Mall
Period: AM Peak
Scenario: Existing + Development
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Chapel Road											
2	T1	175	5.0	0.774	12.5	LOS A	11.6	84.5	1.00	1.09	27.1
3	R2	444	5.0	0.774	15.6	LOS B	11.6	84.5	1.00	1.09	28.7
Approach		619	5.0	0.774	14.7	LOS B	11.6	84.5	1.00	1.09	28.3
East: The Mall											
4	L2	218	5.0	0.632	6.5	LOS A	6.9	50.0	0.82	0.77	32.1
6	R2	356	5.0	0.632	9.4	LOS A	6.9	50.0	0.82	0.77	32.7
Approach		574	5.0	0.632	8.3	LOS A	6.9	50.0	0.82	0.77	32.4
North: Chapel Road											
7	L2	281	5.0	0.744	12.4	LOS A	9.4	68.7	0.98	1.14	28.6
8	T1	254	5.0	0.744	12.1	LOS A	9.4	68.7	0.98	1.14	28.5
Approach		535	5.0	0.744	12.3	LOS A	9.4	68.7	0.98	1.14	28.6
All Vehicles		1727	5.0	0.774	11.8	LOS A	11.6	84.5	0.93	1.00	29.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: North Terrace / The Appian Way_Existing PM Peak

North Terrace / The Appian Way
Period: PM Peak
Scenario: Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Terrace											
5	T1	541	5.0	0.495	0.7	LOS A	3.9	28.1	0.30	0.13	38.3
Approach		541	5.0	0.495	0.7	NA	3.9	28.1	0.30	0.13	38.3
North: The Appian Way											
7	L2	682	5.0	0.446	3.7	LOS A	2.8	20.6	0.20	0.44	34.9
9	R2	237	5.0	0.321	7.7	LOS A	1.3	9.2	0.57	0.86	27.6
Approach		919	5.0	0.446	4.7	LOS A	2.8	20.6	0.30	0.55	33.2
All Vehicles		1460	5.0	0.495	3.2	NA	3.9	28.1	0.30	0.39	35.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: 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 movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: North Terrace / The Appian Way_Existing AM Peak

North Terrace / The Appian Way
Period: AM Peak
Scenario: Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Terrace											
5	T1	559	5.0	0.511	0.7	LOS A	4.1	29.8	0.30	0.13	38.3
Approach		559	5.0	0.511	0.7	NA	4.1	29.8	0.30	0.13	38.3
North: The Appian Way											
7	L2	546	5.0	0.357	3.7	LOS A	2.0	14.7	0.18	0.44	35.0
9	R2	151	5.0	0.209	7.2	LOS A	0.7	5.0	0.55	0.79	28.1
Approach		697	5.0	0.357	4.4	LOS A	2.0	14.7	0.26	0.52	33.7
All Vehicles		1256	5.0	0.511	2.8	NA	4.1	29.8	0.28	0.35	35.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: 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 movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: North Terrace / The Appian Way Existing + Developmentg AM Peak

North Terrace / The Appian Way
Period: AM Peak
Scenario: Existing + Development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Terrace											
5	T1	585	5.0	0.535	0.7	LOS A	4.5	32.5	0.32	0.14	38.2
Approach		585	5.0	0.535	0.7	NA	4.5	32.5	0.32	0.14	38.2
North: The Appian Way											
7	L2	614	5.0	0.402	3.7	LOS A	2.4	17.5	0.19	0.44	35.0
9	R2	171	5.0	0.246	7.7	LOS A	0.8	6.2	0.58	0.83	27.7
Approach		784	5.0	0.402	4.6	LOS A	2.4	17.5	0.27	0.52	33.5
All Vehicles		1369	5.0	0.535	2.9	NA	4.5	32.5	0.29	0.36	35.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: 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 movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: North Terrace / The Appian Way Existing + Development PM Peak

North Terrace / The Appian Way
Period: PM Peak
Scenario: Existing + Development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Terrace											
5	T1	595	5.0	0.544	0.7	LOS A	4.6	33.5	0.32	0.14	38.2
Approach		595	5.0	0.544	0.7	NA	4.6	33.5	0.32	0.14	38.2
North: The Appian Way											
7	L2	823	5.0	0.539	3.8	LOS A	3.9	28.7	0.23	0.44	34.8
9	R2	303	5.0	0.443	9.1	LOS A	2.0	14.6	0.65	0.96	26.4
Approach		1126	5.0	0.539	5.2	LOS A	3.9	28.7	0.34	0.58	32.7
All Vehicles		1721	5.0	0.544	3.6	NA	4.6	33.5	0.34	0.43	34.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: 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 movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: North Terrace / Fetherstone Street_ Existing PM Peak

North Terrace / Fetherstone Street
Period: PM Peak
Scenario: Existing
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Terrace											
5	T1	61	100.0	0.079	2.8	LOS A	0.5	5.9	0.39	0.30	37.1
6	R2	665	5.0	0.530	15.6	LOS B	5.4	39.6	0.85	0.80	32.6
Approach		726	13.0	0.530	14.6	LOS B	5.4	39.6	0.81	0.76	32.8
West: Bankstown City Plaza											
10	L2	99	5.0	0.368	21.4	LOS B	1.9	13.8	0.94	0.75	29.0
Approach		99	5.0	0.368	21.4	LOS B	1.9	13.8	0.94	0.75	29.0
All Vehicles		825	12.0	0.530	15.4	LOS B	5.4	39.6	0.82	0.76	32.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
All Pedestrians		158	14.5	LOS B			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: North Terrace / Fetherstone Street_ Existing AM Peak

North Terrace / Fetherstone Street
Period: AM Peak
Scenario: Existing
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Terrace											
5	T1	59	100.0	0.077	2.8	LOS A	0.4	5.6	0.39	0.30	37.1
6	R2	642	5.0	0.512	15.5	LOS B	5.2	37.9	0.84	0.80	32.7
Approach		701	13.0	0.512	14.5	LOS A	5.2	37.9	0.80	0.75	32.9
West: Bankstown City Plaza											
10	L2	104	5.0	0.387	21.4	LOS B	2.0	14.6	0.94	0.76	29.0
Approach		104	5.0	0.387	21.4	LOS B	2.0	14.6	0.94	0.76	29.0
All Vehicles		805	12.0	0.512	15.4	LOS B	5.2	37.9	0.82	0.75	32.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
All Pedestrians		158	14.5	LOS B			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: North Terrace / Fetherstone Street Existing + Development PM Peak

North Terrace / Fetherstone Street
Period: PM Peak
Scenario: Existing + Development
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Terrace											
5	T1	61	100.0	0.079	2.8	LOS A	0.5	5.9	0.39	0.30	37.1
6	R2	785	5.0	0.626	16.4	LOS B	6.8	49.7	0.88	0.83	32.3
Approach		846	11.9	0.626	15.5	LOS B	6.8	49.7	0.85	0.79	32.5
West: Bankstown City Plaza											
10	L2	107	5.0	0.399	21.5	LOS B	2.1	15.1	0.94	0.76	29.0
Approach		107	5.0	0.399	21.5	LOS B	2.1	15.1	0.94	0.76	29.0
All Vehicles		954	11.1	0.626	16.1	LOS B	6.8	49.7	0.86	0.79	32.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
All Pedestrians		158	14.5	LOS B			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: North Terrace / Fetherstone Street Existing + Development AM Peak

North Terrace / Fetherstone Street
Period: AM Peak
Scenario: Existing + Development
Signals - Fixed Time Isolated Cycle Time = 40 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: North Terrace											
5	T1	59	100.0	0.077	2.8	LOS A	0.4	5.6	0.39	0.30	37.1
6	R2	688	5.0	0.548	15.7	LOS B	5.7	41.4	0.85	0.80	32.6
Approach		747	12.5	0.548	14.7	LOS B	5.7	41.4	0.82	0.76	32.8
West: Bankstown City Plaza											
10	L2	104	5.0	0.387	21.4	LOS B	2.0	14.6	0.94	0.76	29.0
Approach		104	5.0	0.387	21.4	LOS B	2.0	14.6	0.94	0.76	29.0
All Vehicles		852	11.6	0.548	15.5	LOS B	5.7	41.4	0.83	0.76	32.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	14.5	LOS B	0.1	0.1	0.85	0.85
All Pedestrians		158	14.5	LOS B			0.85	0.85

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix C

Reduced Plans

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Assessor Signature ______ Date 14 October 2016

1:250@A1 or 1:500@A3 0m 2.5 5 7.5 10 20m

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Tsang & Lee Architects Pty Ltd t/a h3 Architects
ACN 001 923 404

DATE	REVISION	DESCRIPTION
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2016.10.18	A	For Amended DA Submission

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DRAWING NO.	REVISION
16003 / DA1.01	A
STATUS	**SCALE**
DA	1 : 250 @ A1
DRAWN BY	**CHECKED BY**
Author	Checker

PROJECT TITLE
CAPITAL BANKSTOWN
83-99 NORTH TERRACE & 62 THE MALL, BANKSTOWN

DRAWING TITLE
BASEMENT 02

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REVISION A
STATUS DA
SCALE 1 : 250 @ A1
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PROJECT TITLE
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83-99 NORTH TERRACE & 62 THE MALL, BANKSTOWN

DRAWING TITLE
BASEMENT 01

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STATUS: DA	SCALE: 1 : 250 @ A1
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PROJECT TITLE
CAPITAL BANKSTOWN
83-99 NORTH TERRACE & 62 THE MALL, BANKSTOWN

DRAWING TITLE
GROUND FLOOR PLAN

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COUNCIL CARSPACES | COMMERCIAL CARSPACES | ACCESSIBLE CARSPACES

86 Council carspaces (inclusive of 2 accessible carspaces)
23 Commercial carspaces

TOTAL 109 CARSPACES

1:250@A1 or 1:500@A3 — 0m 2.5 5 7.5 10 20m

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DRAWING NO.	16003 / DA1.04
REVISION	A
STATUS	DA
SCALE	1 : 250 @ A1
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PROJECT TITLE	CAPITAL BANKSTOWN 83-99 NORTH TERRACE & 62 THE MALL, BANKSTOWN
DRAWING TITLE	LEVEL 1 FLOOR PLAN

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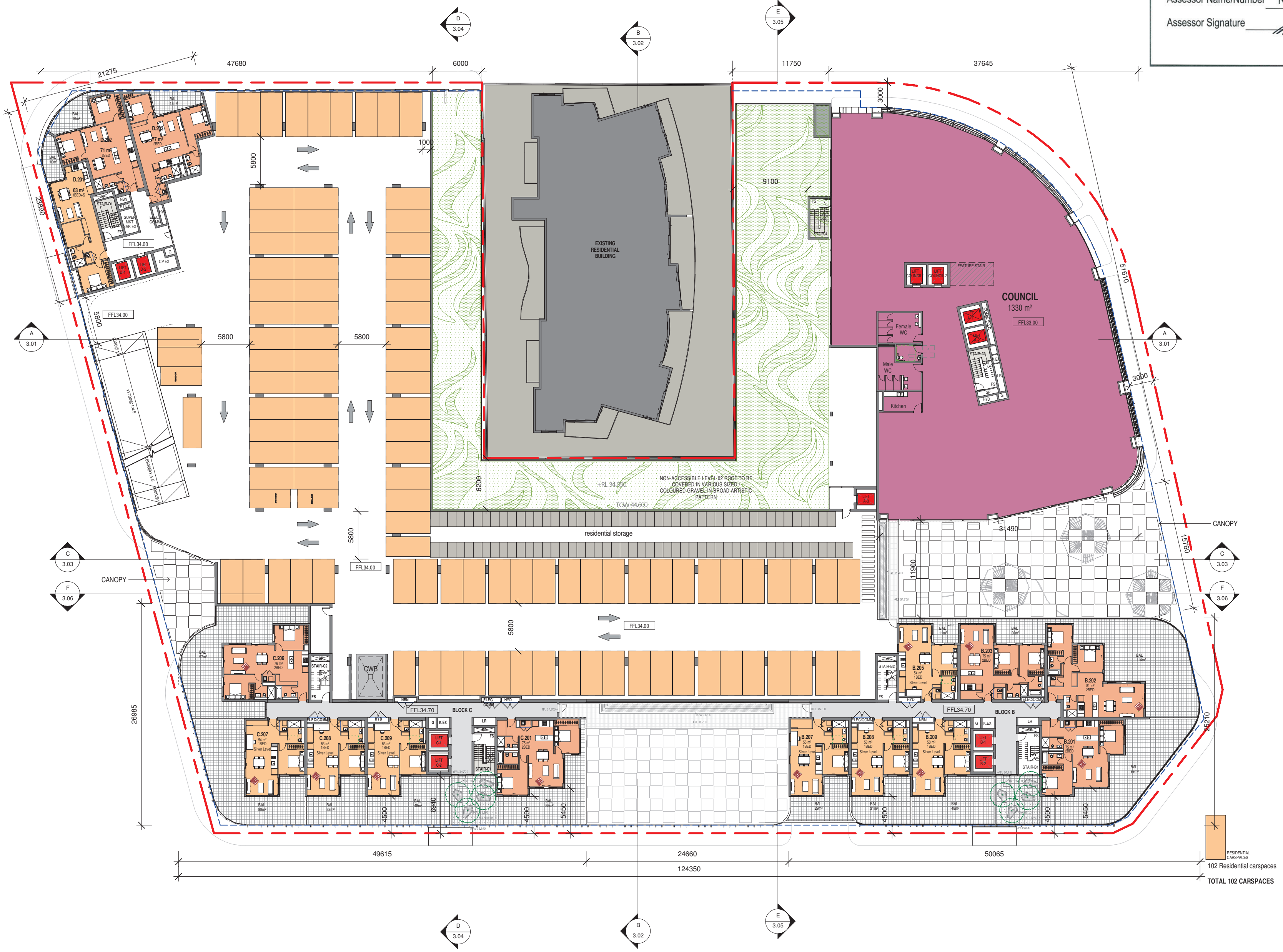

1:250@A1 or 1:500@A3 — 0m 2.5 5 7.5 10 20m

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DRAWING NO.	REVISION	PROJECT TITLE
16003 / DA1.05	A	CAPITAL BANKSTOWN 83-99 NORTH TERRACE & 62 THE MALL, BANKSTOWN
STATUS: DA	SCALE: 1 : 250 @ A1	DRAWING TITLE: LEVEL 2 FLOOR PLAN
DRAWN BY: Author	CHECKED BY: Checker	

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Assessor Signature ______ Date 14 October 2016

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83-99 NORTH TERRACE & 62 THE MALL, BANKSTOWN

DRAWING TITLE
LEVEL 3 FLOOR PLAN

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Appendix D

Parking Analysis

Parking - Peak Period Analysis

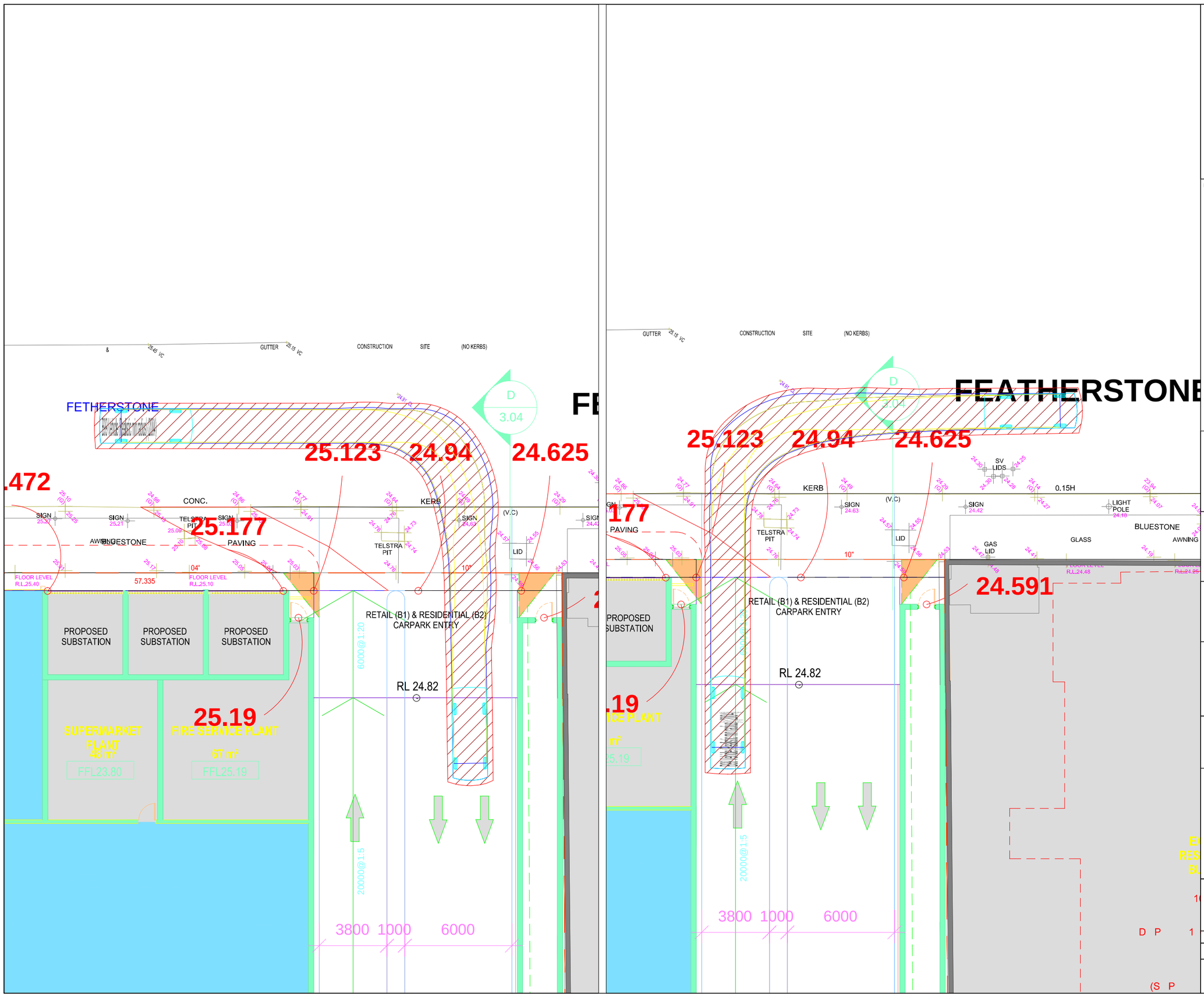
Use		No./ Area	Rate	Council DCP Raw Requirement	Locality Factor to Account for Proximity to Public Transport / Other Premises	Reduced Base Requirement	Rounded (to nearest) Base Requirement	Demand - % of Peak Demand			Demand - Spaces			NOTES
								Weekday Midday	Weekday Evening	Weekend	**Weekday Midday**	Weekday Evening	Weekend	
Residential														
	1 Bed	145	1 / unit	145.00	100%	145.00								Parking rates based on the RMS *Guide to Traffic Generating Developments* , as permitted under SEPP 65.
	2 Bed	285	1 / unit	285.00	100%	285.00	471.00	100%	100%	100%	471	471	471	
	3 Bed +	41	1 / unit	41.00	100%	41.00								Regional centre rate adopted as per Department of Planning & Environment guidelines.
	Visitor	471	0.2 / unit	94.20	90%	84.78	85.00	25%	100%	100%	22	85	85	Peak demand typically occurs in the evening and on weekends.
Retail		5020	1 space / 40 sqm	125.50	90%	112.95	113.00	100%	100%	100%	113	113	113	Peak demand during the day (after 9am) and into the early evening (depending on late night trade etc)
Commercial (Council)		4426	86 Spaces	86.00	100%	86.00	86.00	100%	0%	0%	86	0	0	Peak demand during weekdays, say 8.00am -6.00pm
Comercial (other)		2034	1 space / 40 sqm	50.85	90%	45.77	46.00	100%	0%	0%	46	0	0	Peak demand during weekdays, say 8.00am -6.00pm
				827.55			**801**				**738**	669	669	

Bankstown SA3 JTW Mode Share (Place of Work)	82%	Car Driver
Bankstown CBD (TZ 2305) JTW Mode Share (Place of Work)	74%	Car Driver
Locality Factor	**90%**	

Council	86	0	0
Residential	471	471	471
Visitors	181	198	198

Appendix E

Swept Path Analysis



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Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (*AS/NZS 2890.1-2004 Parking facilities - Off-street car parking*, and/or *AS 2890.2-2002 Parking facilities - Off-street commercial vehicle facilities*). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect
H3 Architects

client
FS Property Group

scale
1:200 @ A3

project
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drawing prepared by
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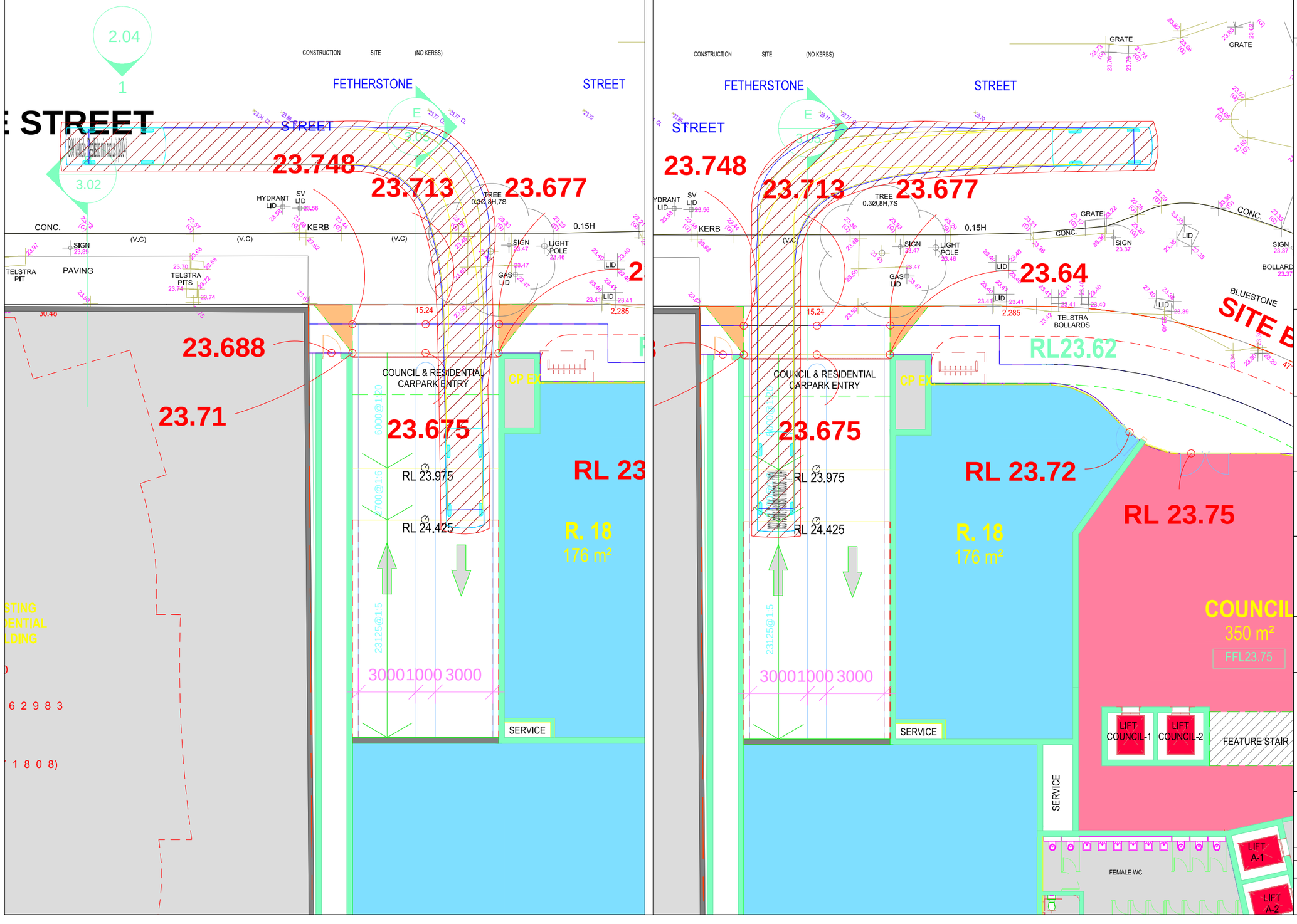
drawing title
Swept Path Analysis
Featherstone Street Access (Basement)
B99 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

project no.	drawing phase.	drawing no.	rev
15.221	DA	TX.01	-



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no.	revision note	by.	date

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- Vehicle Body Envelope
- Clearance Envelope (300mm)

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client
FS Property Group

scale
1:200 @ A3
0m 2 4 6 8

project
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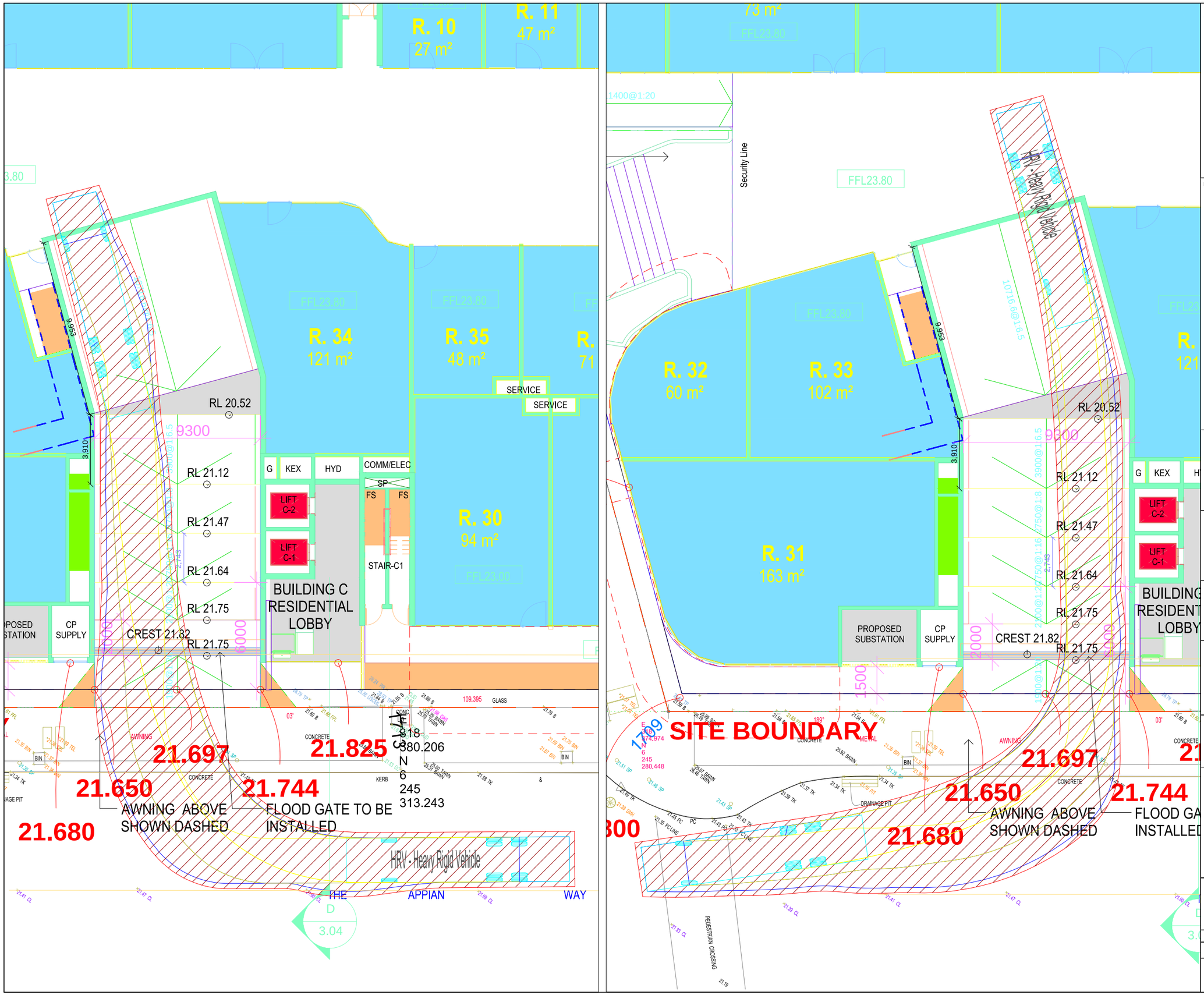
drawing title
Swept Path Analysis
Featherstone Street Access (Upper Levels)
B99 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

project no.	drawing phase.	drawing no.	rev
15.221	DA	TX.02	-



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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect
H3 Architects

client
FS Property Group

scale
1:200 @ A3
0m 2 4 6 8

project
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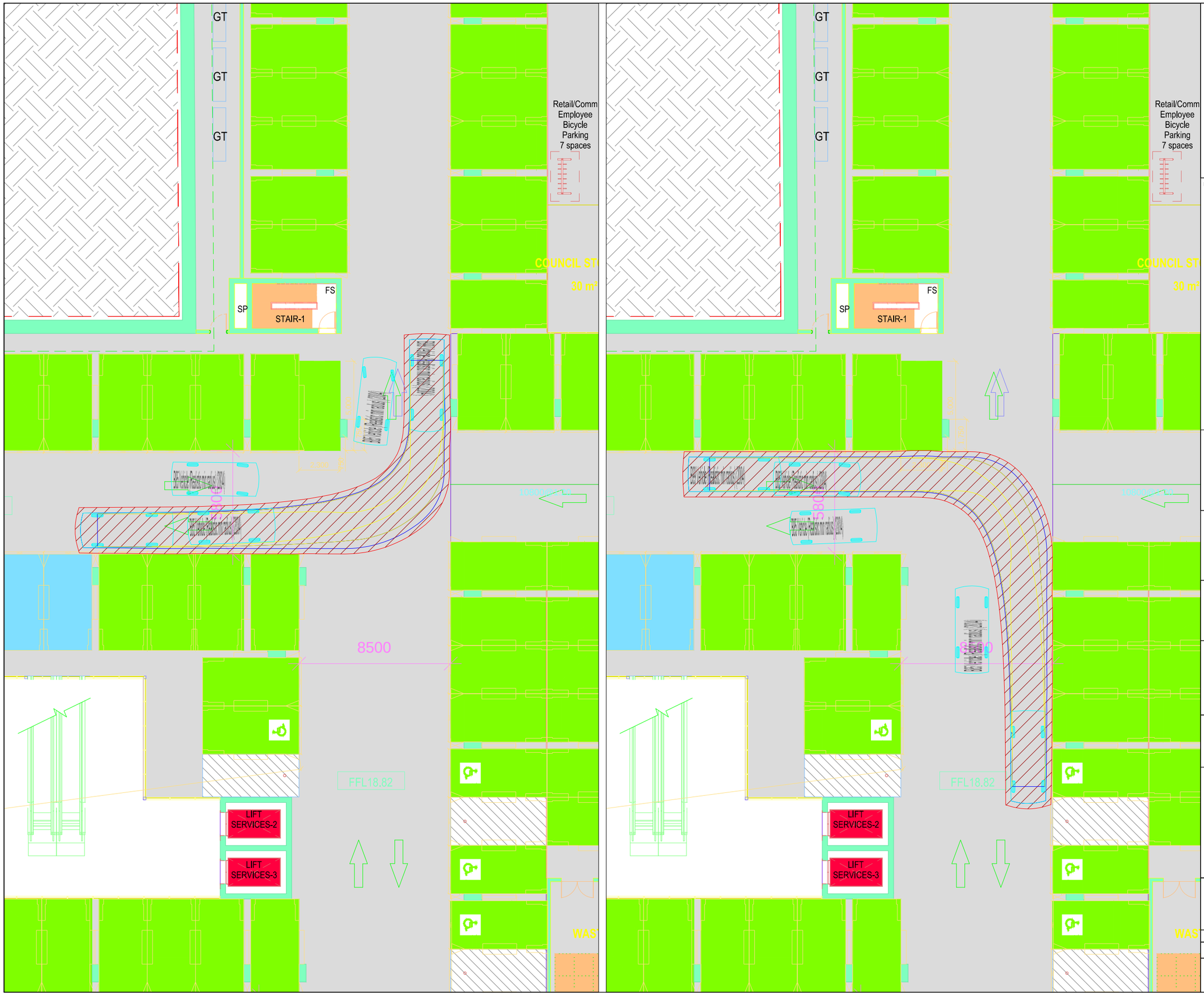
drawing title
Swept Path Analysis
The Appian Way Access
12.5m Heavy Rigid Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

project no.	drawing phase.	drawing no.	rev
15.221	DA	TX.03	-



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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect

H3 Architects

client

FS Property Group

scale

1:200 @ A3

0m 2 4 6 8

project

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drawing prepared by

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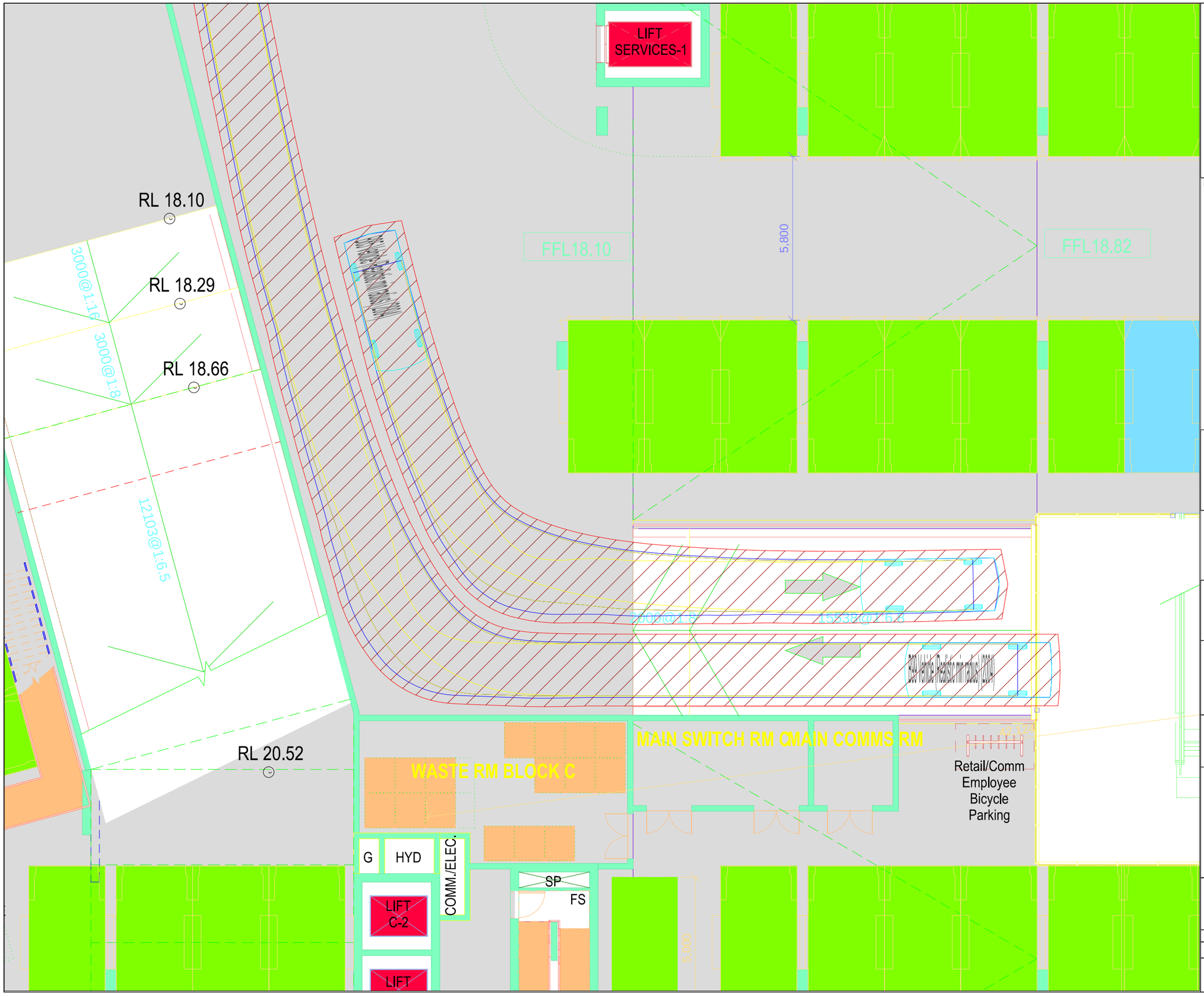
traffic & transport planners

drawing title

Swept Path Analysis
Basement 1 - Circulation
B85 & B99 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

project no.	drawing phase.	drawing no.	rev
15.221	DA	TX.04	-



Notes

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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect
H3 Architects

client
FS Property Group

scale
1:200 @ A3
0m 2 4 6 8

project
BANKSTOWN COMPASS CENTRE

drawing prepared by

TRAFFIX
traffic and transport planners
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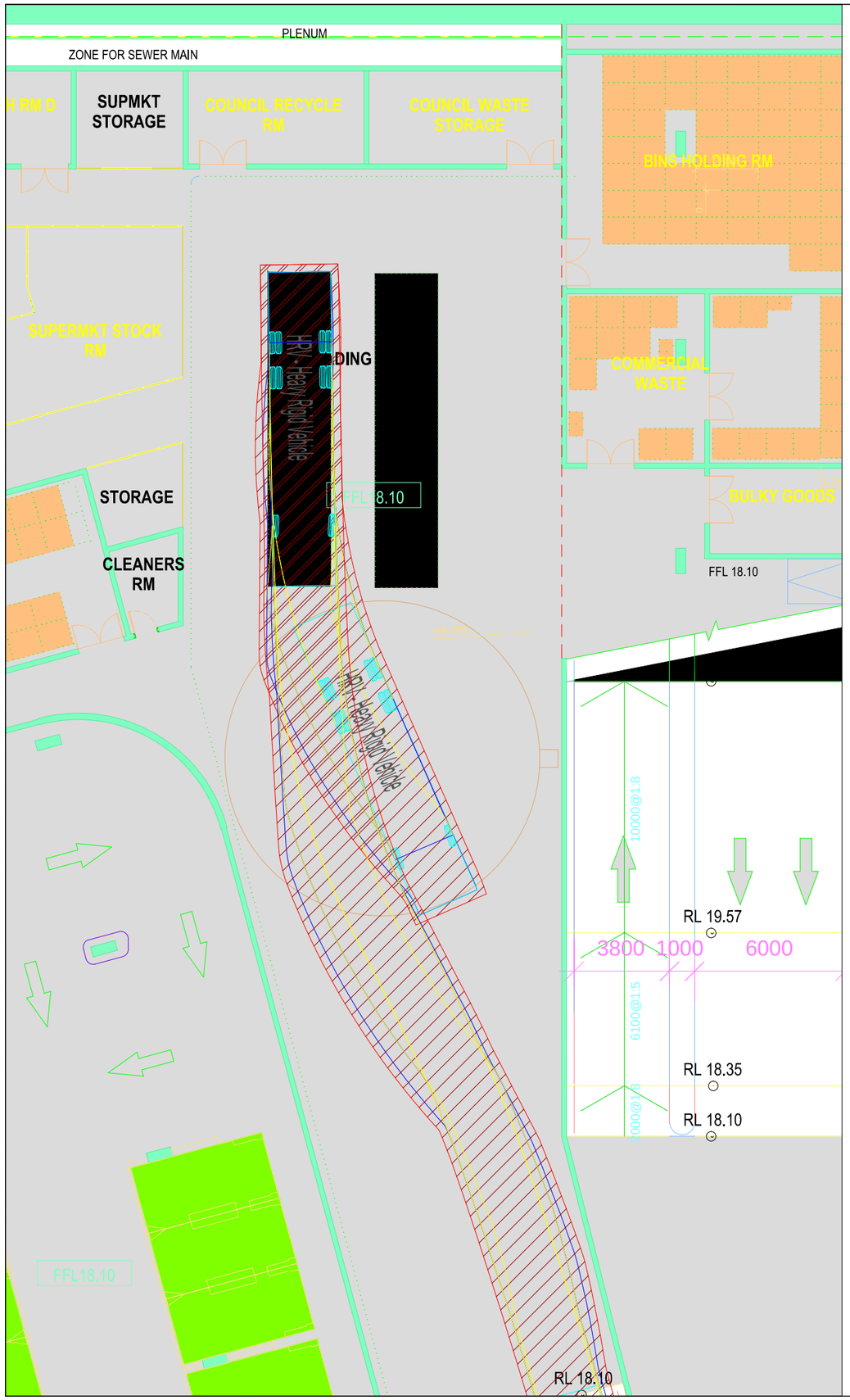
f: +61 2 9380 4481
e: info@traffix.com.au

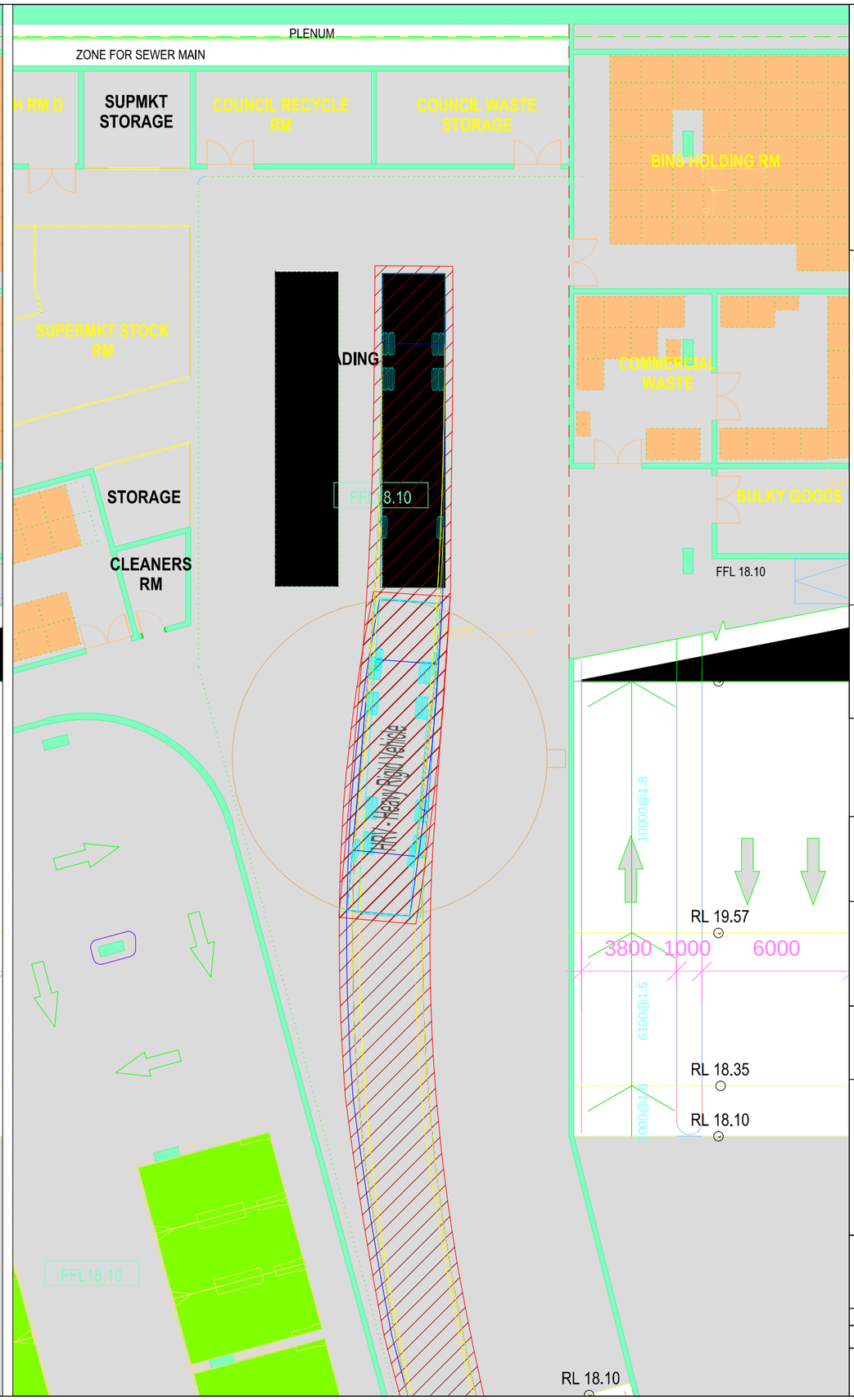
traffix
traffic & transport planners

drawing title
Swept Path Analysis
Basement 1 - Basement 2 Ramp
B85 & B99 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

15.221	DA	TX.05	-
project no.	drawing phase.	drawing no.	rev





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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect

H3 Architects

client

FS Property Group

scale

1:200 @ A3

0m 2 4 6 8

project

BANKSTOWN COMPASS CENTRE

drawing prepared by

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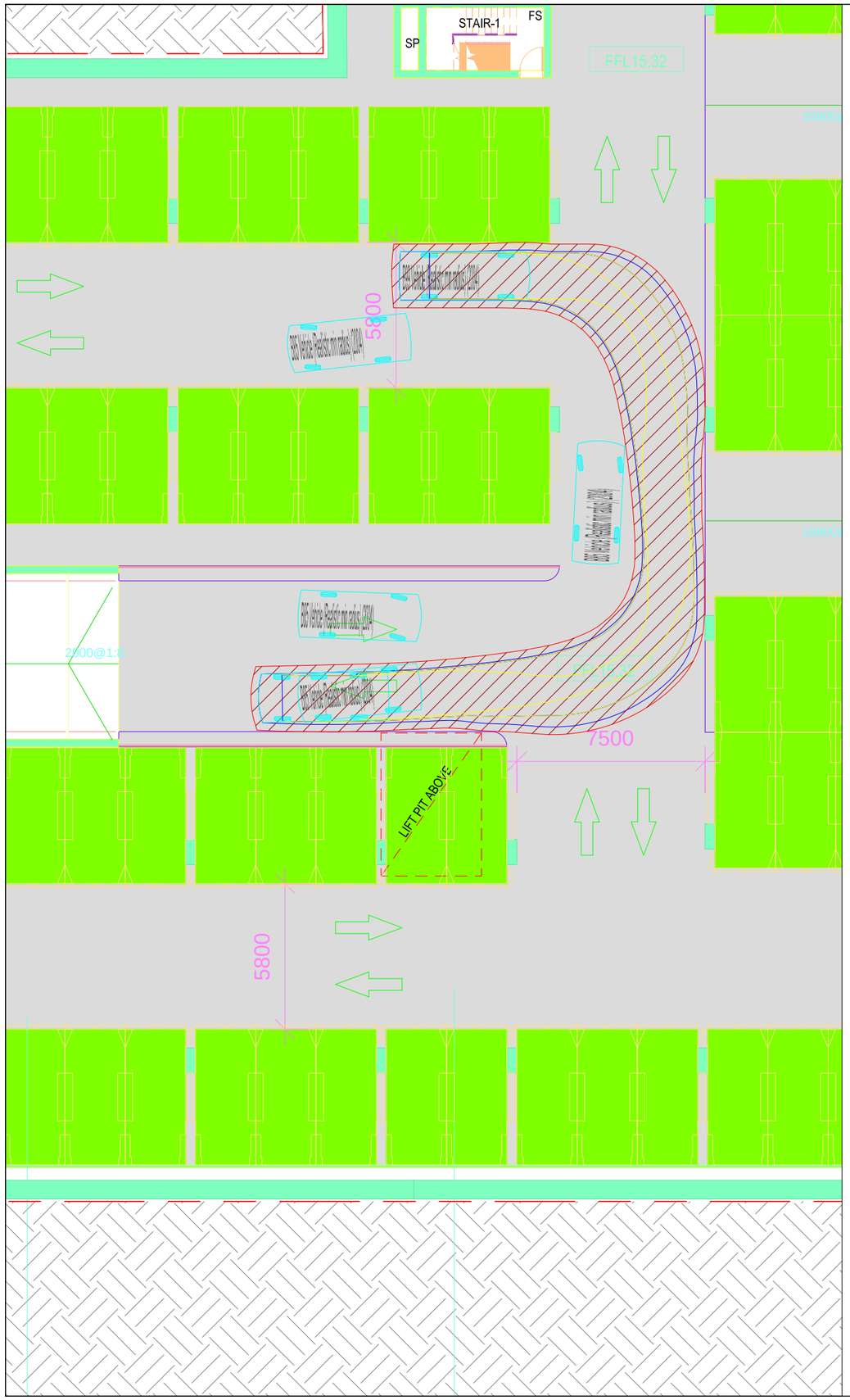
traffix
traffic & transport planners

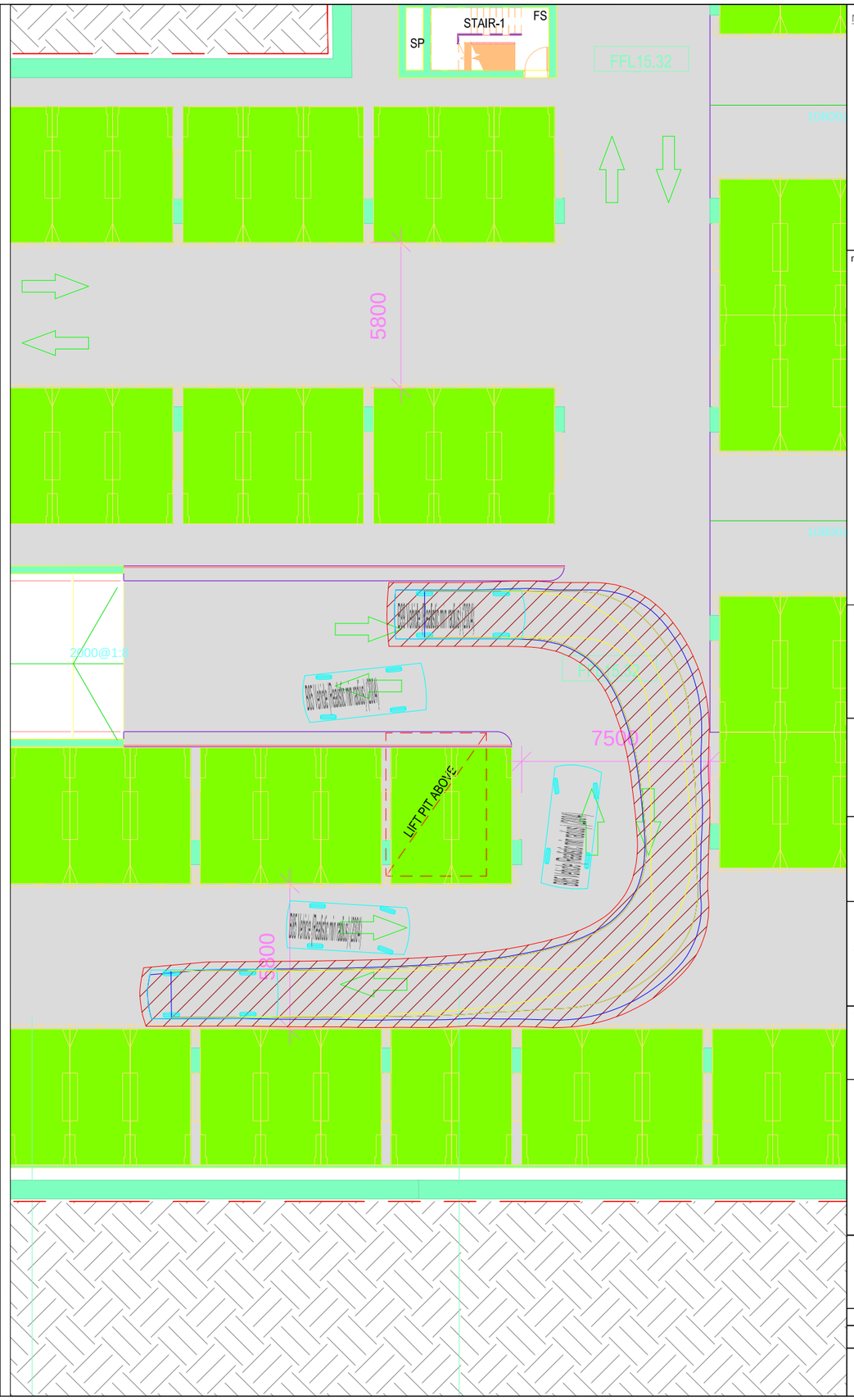
drawing title

Swept Path Analysis
Basement 1 - Service Vehicle Area (Turntable)
12.5m Heavy Rigid Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

project no.	drawing phase.	drawing no.	rev
15.221	DA	TX.06	-





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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect

H3 Architects

client

FS Property Group

scale

1:200 @ A3

0m 2 4 6 8

project

BANKSTOWN COMPASS CENTRE

drawing prepared by

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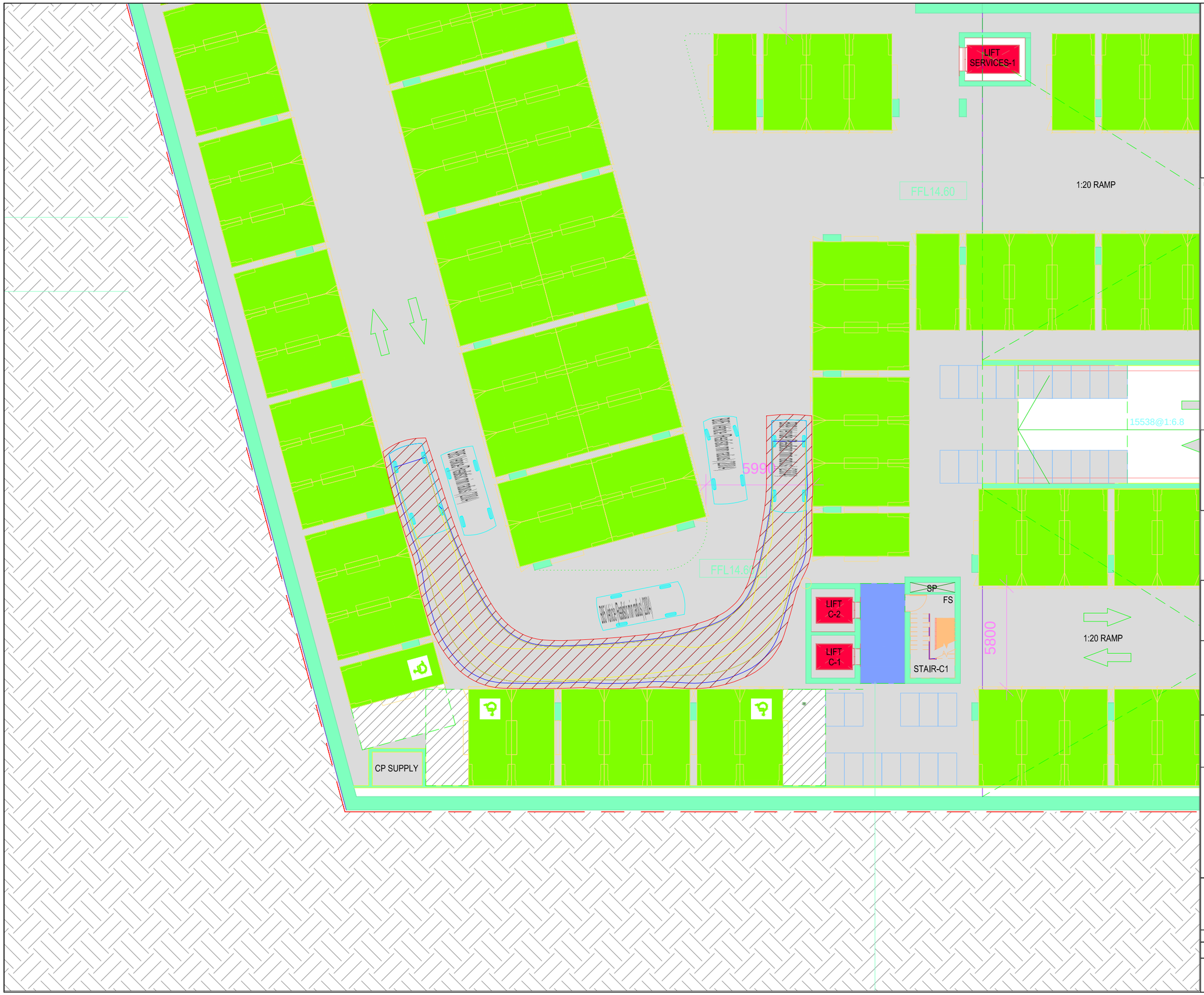
traffix
traffic & transport planners

drawing title

Swept Path Analysis
Basement 2 - Circulation (1/2)
B85 & B99 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

project no.	drawing phase.	drawing no.	rev
15.221	DA	TX.05	-



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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect
H3 Architects

client
FS Property Group

scale
1:200 @ A3
0m 2 4 6 8

project
BANKSTOWN COMPASS CENTRE

drawing prepared by

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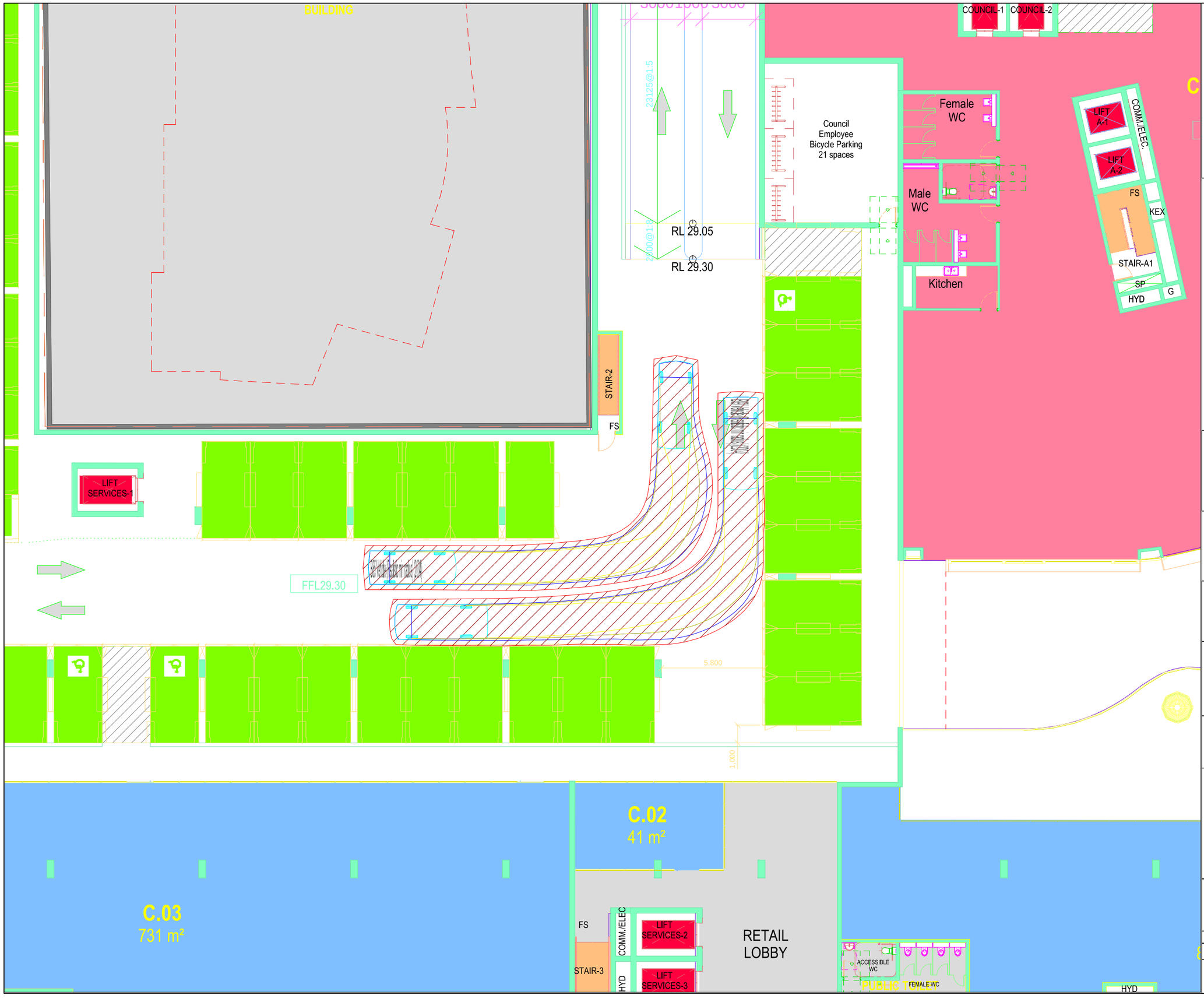
traffix
traffic & transport planners

drawing title
Swept Path Analysis
Basement 2 - Circulation (2/2)
B85 & B99 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

project no.	drawing phase.	drawing no.	rev
15.221	DA	TX.08	-



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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect

H3 Architects

client

FS Property Group

scale

1:200 @ A3

0m 2 4 6 8

project

BANKSTOWN COMPASS CENTRE

drawing prepared by

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traffix
traffic & transport planners

drawing title

Swept Path Analysis
Level 1 - Circulation (1/2)
B85 & B99 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

15.221	DA	TX.09	-
project no.	drawing phase.	drawing no.	rev

VOID

SP

KT EX

STAIR-D1

SUPER MKT

SMK EX

FS

HYD

COMM/ELEC

LIFT OVERRUN

G

CP EX

LIFT D-1

LIFT D-2

5800

5800

5800

5800

5,000

2,300

AWNING

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C

Notes

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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect

H3 Architects

client

FS Property Group

scale

1:200 @ A3

0m 2 4 6 8

project

BANKSTOWN COMPASS CENTRE

drawing prepared by

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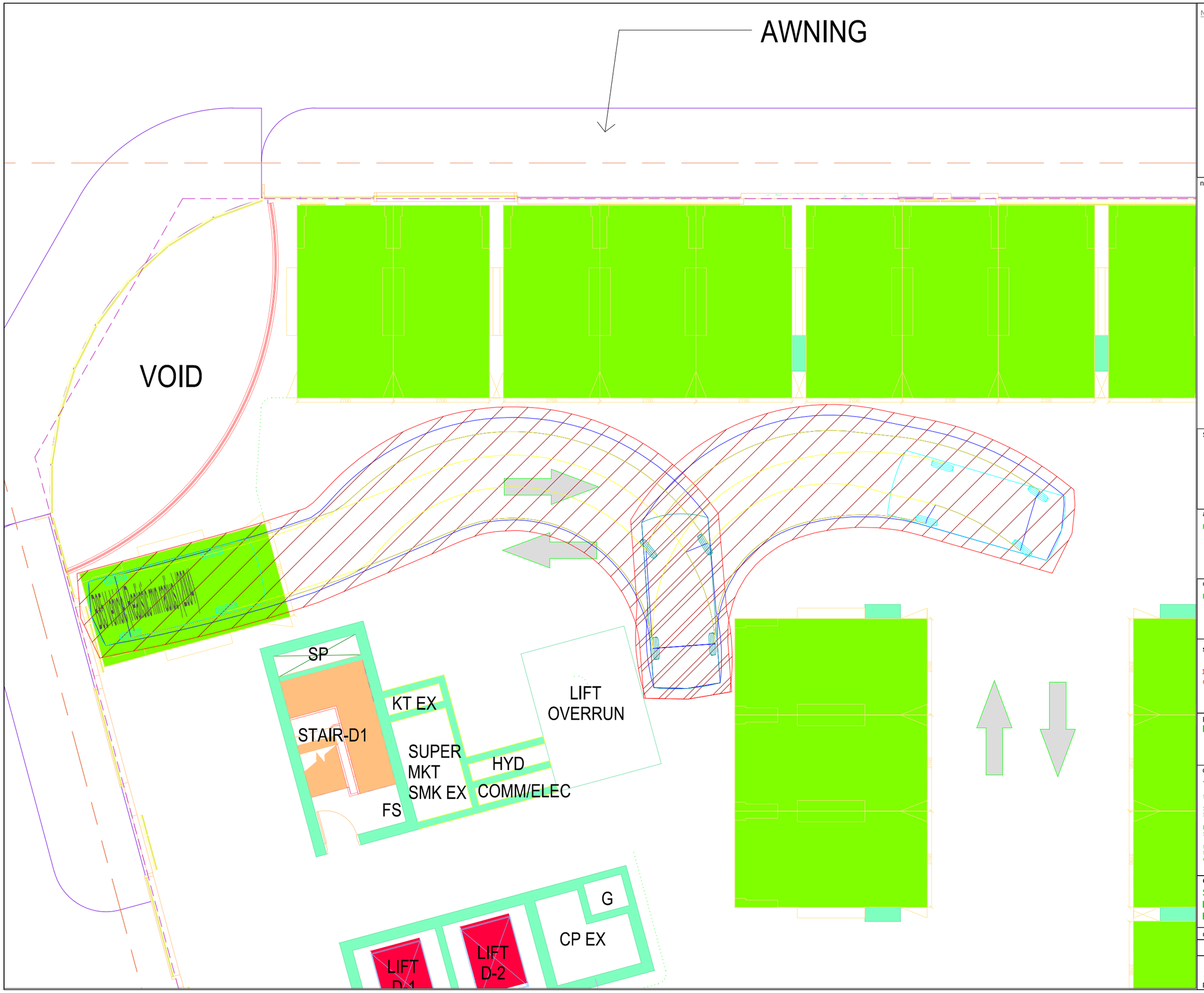
traffix
traffic & transport planners

drawing title

Swept Path Analysis
Level 1 - Circulation (2/2)
B85 & B99 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

project no.	drawing phase.	drawing no.	rev
15.221	DA	TX.10	-



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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect
H3 Architects

client
FS Property Group

scale
1:100 @ A3
0m 1 2 3 4

project
BANKSTOWN COMPASS CENTRE

drawing prepared by
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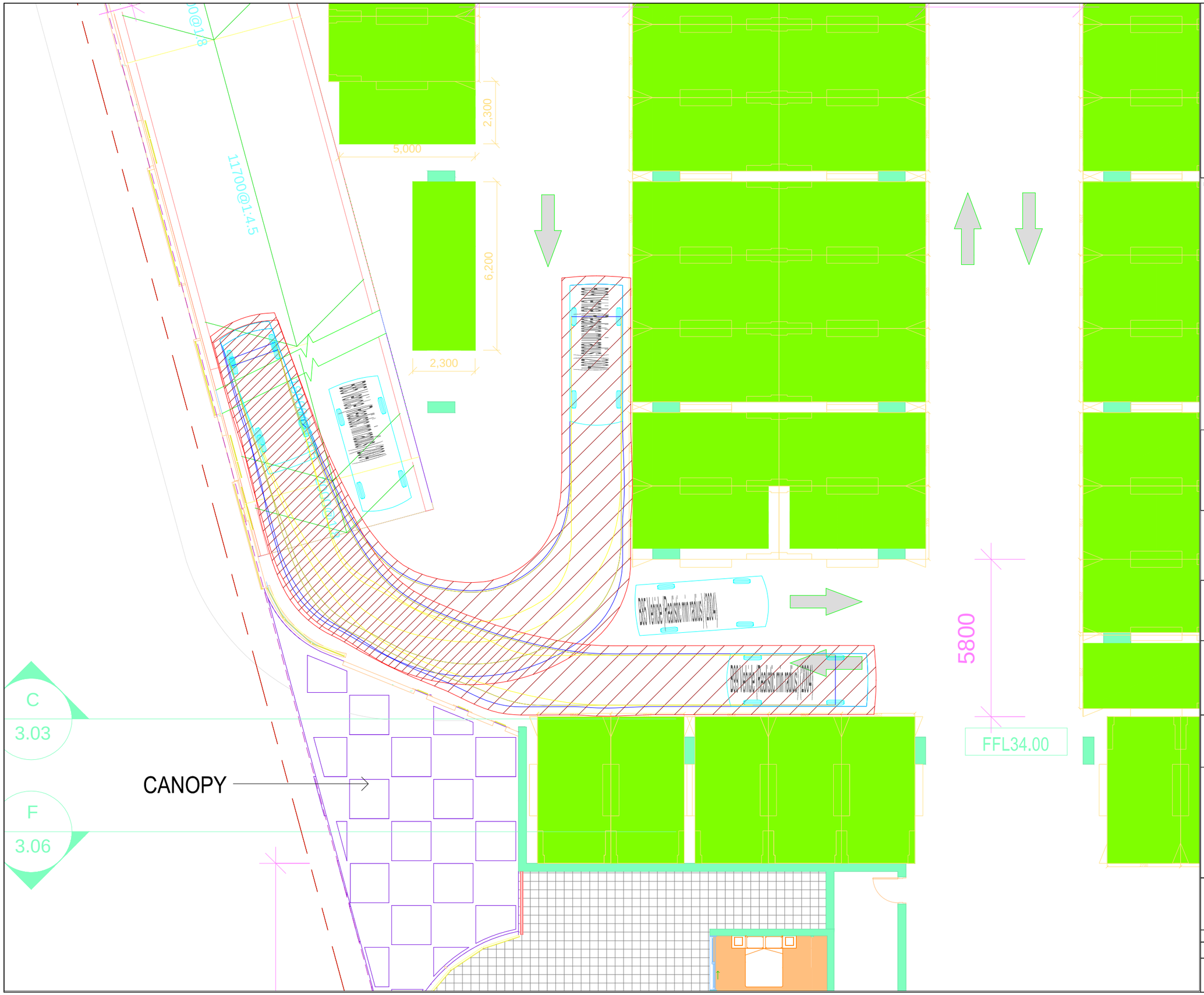
traffix
traffic & transport planners

drawing title
Swept Path Analysis
Level 1 - Manouevring
B85 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

15.221	DA	TX.11	-
project no.	drawing phase.	drawing no.	rev



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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect
H3 Architects

client
FS Property Group

scale
1:200 @ A3
0m 2 4 6 8

project
BANKSTOWN COMPASS CENTRE

drawing prepared by
TRAFFIX
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e: info@traffix.com.au

traffix
traffic & transport planners

drawing title
Swept Path Analysis
Level 2 - Circulation
B85 & B99 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

15.221	DA	TX.12	-
project no.	drawing phase.	drawing no.	rev

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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect
H3 Architects

client
FS Property Group

scale
1:200 @ A3
0m 2 4 6 8

project
BANKSTOWN COMPASS CENTRE

drawing prepared by

TRAFFIX
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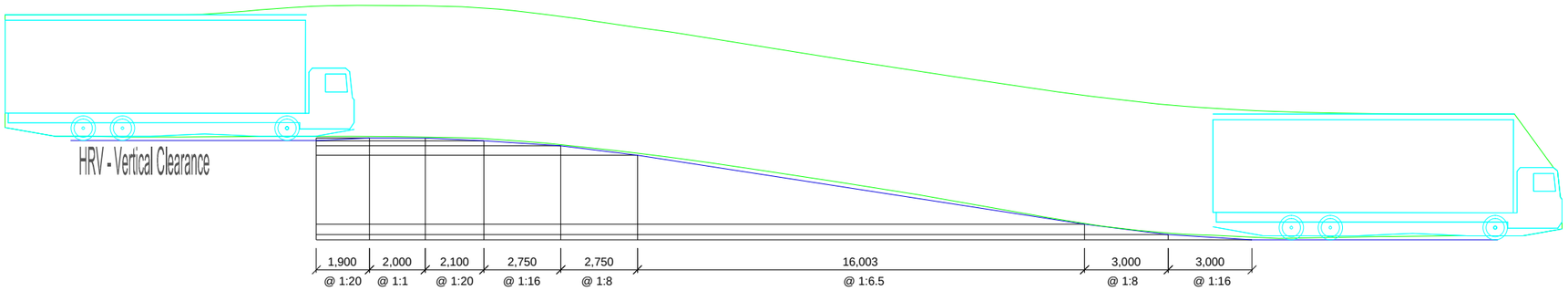
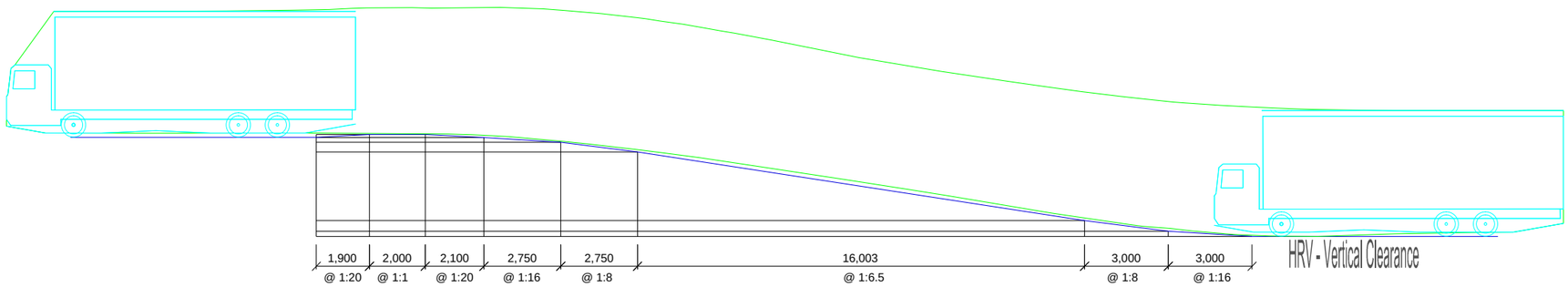
traffix
traffic & transport planners

drawing title
Swept Path Analysis
Level 2 - Circulation
B85 & B99 Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

15.221	DA	TX.12	-
project no.	drawing phase.	drawing no.	rev





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no.	revision note	by.	date

Swept Path Legend:

- Wheel Path
- Vehicle Body Envelope
- Clearance Envelope (300mm)

architect

H3 Architects

client

FS Property Group

scale

1:200 @ A3

0m 2 4 6 8

project

BANKSTOWN COMPASS CENTRE

drawing prepared by

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traffix
traffic & transport planners

drawing title

Vertical Clearance Test (Ground Clearance)
Service Vehicle Entry Ramp
12.5m Heavy Rigid Vehicle

drawn:	checked:	date:
KB	GH	12 Oct 16

project no.	drawing phase.	drawing no.	rev
15.221	DA	TX.12	-