

Traffic Engineering Report

Proposed Commercial Development – Building 3

153 Campbell Street, Bowen Hills

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 1 / 6 / 12

Prepared for:

Centuria Property Funds Limited

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1. Introduction

1.1 Background

TTM Consulting Pty Ltd (TTM) has been engaged by Centuria Property Funds Limited to prepare a traffic engineering report investigating the proposed commercial development at 153 Campbell Street in Bowen Hills. As the development falls within the Bowen Hills Urban Development Area (UDA), the Development Application will be lodged with the Urban Land Development Authority (ULDA).

1.2 Scope

This report investigates the transport aspects associated with the proposed development. The scope of the transport aspects investigated includes:

- ▶ Parking supply
- ▶ Car park layout
- ▶ Site Access location and effect of new development on existing access point onto Campbell Street
- ▶ Integration with existing developments servicing provisions and internal circulating roads
- ▶ Internal road layout to provide efficient and safe internal manoeuvring for service vehicles
- ▶ Suitability of access and internal facilities to provide for pedestrian and cyclist operation
- ▶ Access to suitable level of public transport

To evaluate the proposed transport arrangements, the development plans have been assessed against the following guidelines and planning documents:

- ▶ Bowen Hills UDA Development Scheme
- ▶ Australian Standard 2890 (Parking Facilities)
- ▶ Department of Transport and Main Roads Road Planning and Design Manual
- ▶ RTA (NSW) Guide to Traffic Generating Developments
- ▶ Austroads Guide to Traffic Management

1.3 Site Location

The proposed development is located on the property of the existing "Citilink Business Centre", situated on the corner of Campbell Street and Bowen Bridge Road in Bowen Hills. The new development itself will utilise space on the north-east corner of the site, in an area currently dedicated to a swimming pool and tennis court. Figure 1.1 below outlines the existing Citilink Business Centre and area of the site dedicated for the new development.

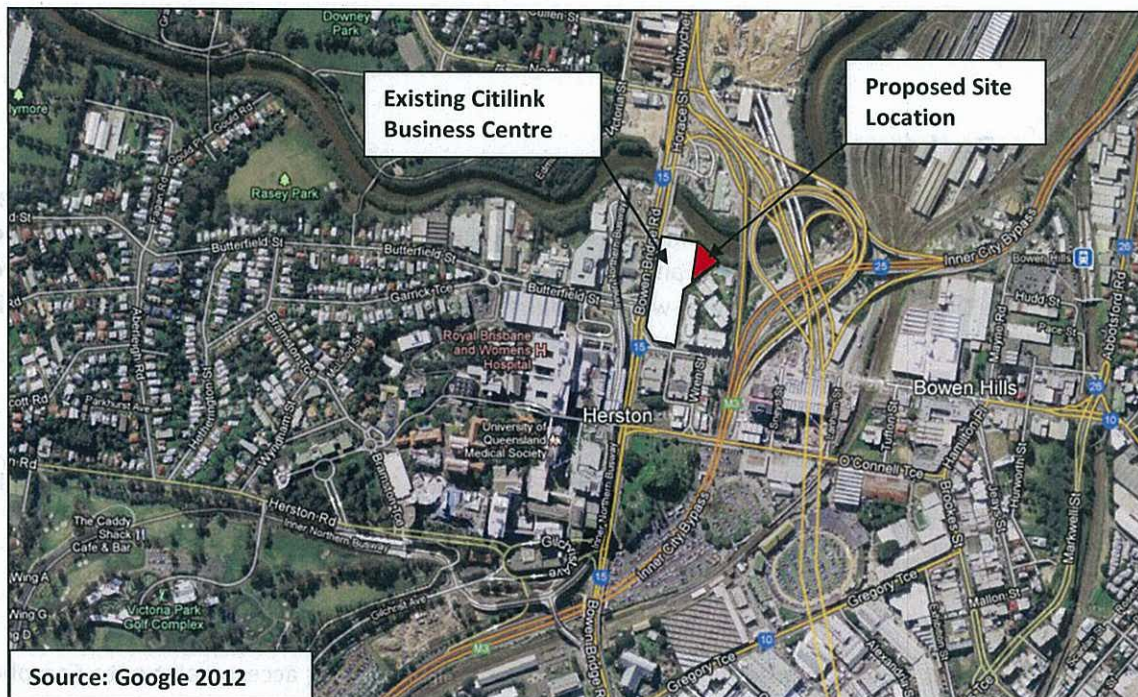


Figure 1.1: Site Location

1.4 Current Site Use

The current Citilink Business Centre consists of two multiple level office buildings. Both buildings primary access points are from the Bowen Bridge Road frontage.

Building 1 is situated on the southern end of the site and consists of four levels of office space (and also a small cafe on Ground Floor) totalling 12,700m² GFA. The building is serviced by three ground floor foyer/lift areas accessible from the pedestrian footpath along Brown Bridge Road.

Building 2 is situated on the northern end of the site and consists of two levels of office space totalling 3,600m² GFA. The building serviced by a single Ground Floor foyer/atrium in the centre of the building and is accessible from the pedestrian footpath along Bowen Bridge Road (through the carpark area).

The site has an office/tenant carpark area covering the entire Ground Level of the site and a mezzanine level (Level 1) for building servicing. The site has 289 parking spaces, including 7 'visitor' spaces. The site has one access point, onto Campbell Street, which provides access to both the ground and mezzanine levels for all vehicles.

2. The Proposed Development

2.1 Development Profile

This proposed development comprises a single, seven storey office building with a total space of 9 498m² GFA.

2.2 Access

The new office building will be incorporated into the existing site infrastructure and so the following access arrangements will apply:

- ▶ Access to the new building basement parking area for office/tenant parking is gained via a new circulating road extending off from one of the existing aisles on the Ground Level covered parking area. There is currently only one entry point into the Ground Level parking area, which is from a road leading off the main access point on Campbell Street (just before the ramp up to Level 1).
- ▶ Access to the Level 1 servicing area, and existing visitor parking for business centre, will be via the existing ramp just after entry to the site via the Campbell Street access point.

The access arrangements are shown in Figure 2.1 below.

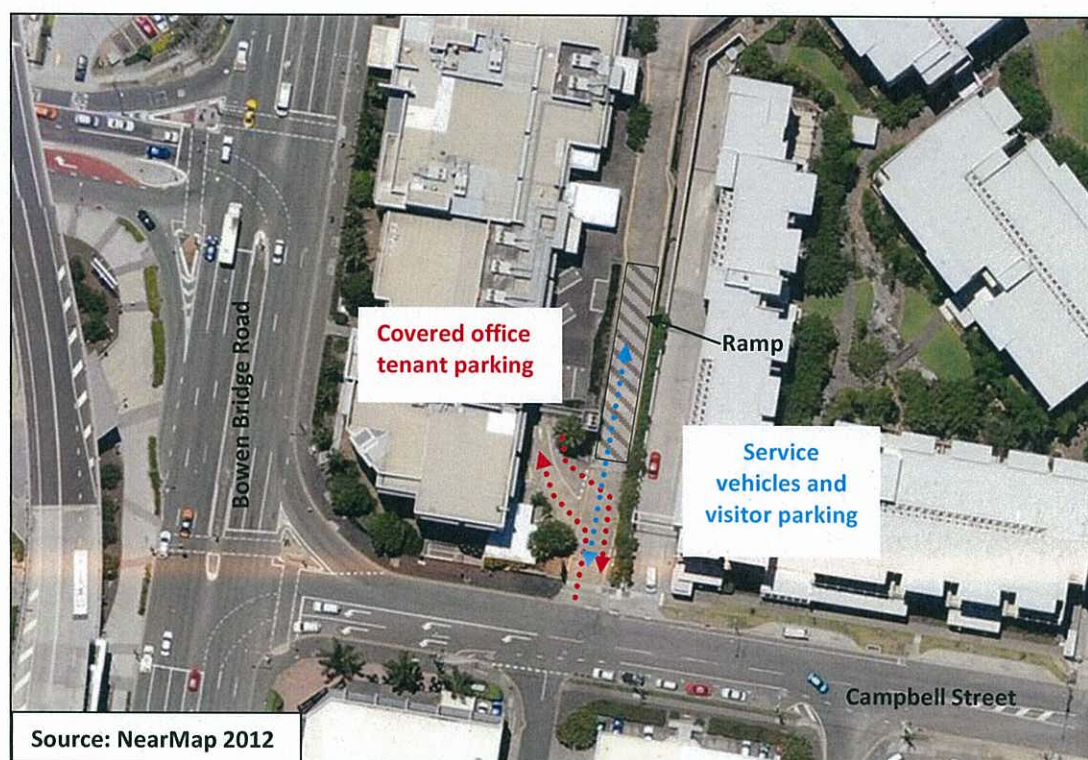
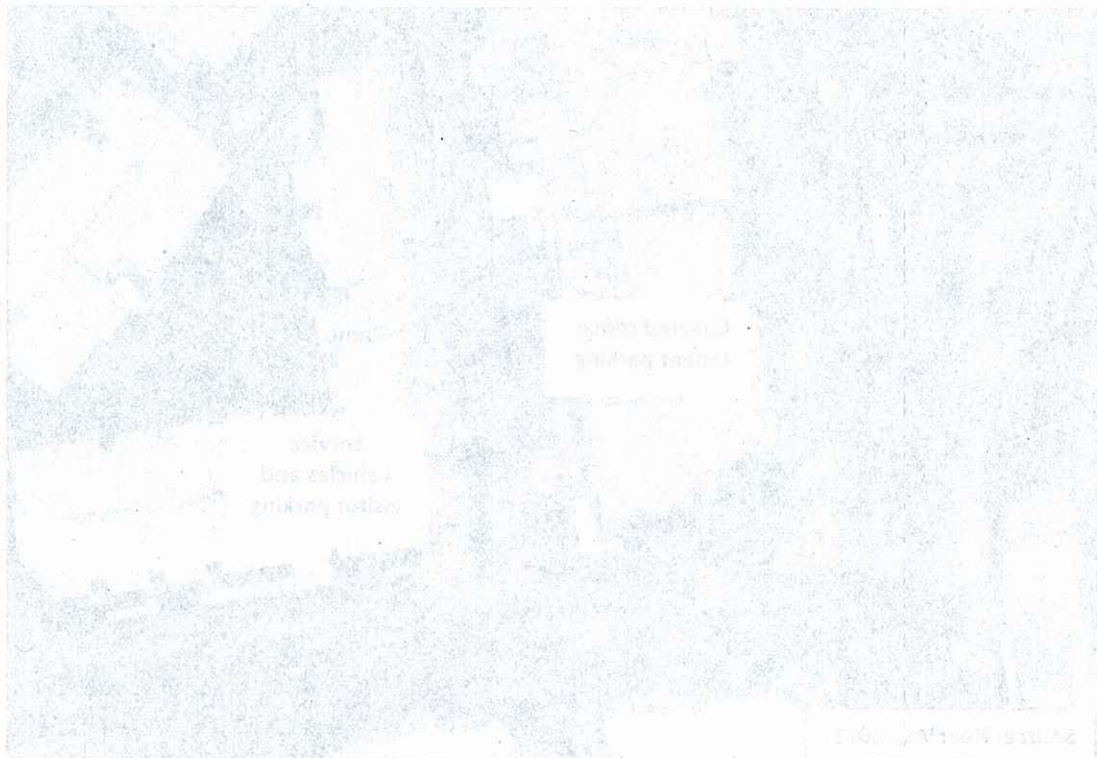


Figure 2.1: Site Access Arrangements

2.3 Parking

The proposal includes an additional 137 parking spaces as part of the three basement levels under the footprint of the new building. This includes 10 'small car' spaces, six motorcycle spaces and two Person With Disability (PWD) spaces. There is also provision for 52 bicycle parking racks spread over the basement levels of the new building.

To enable construction of the new building, it is anticipated that 39 parking spaces (16 on Level 1 and 23 on the Ground Floor) will be lost from the existing parking areas. In addition, 18 of the existing parking spaces on the Ground Floor next to the new building will have to be converted to tandem bays given new building walls.



3. Existing Transport Infrastructure

3.1 The Road Network

All of the roads in the immediate vicinity of the development are administered by Brisbane City Council (BCC). The hierarchy and characteristics of roads are shown below in Table 3.1.

Table 3.1: Local Road Hierarchy

Road	Speed Limit	Road Cross Section	Classification	Road Authority
► Bowen Bridge Road	60kph	Six lanes, two way, undivided	Arterial	BCC
► Campbell Street	50kph	Two lanes , two way, undivided	District Access	BCC
► Wren Street	50kph	One lane, one way (southbound only)	District Access	BCC
► Walden Lane	50kph	Two lanes, two way, unmarked	Local Access	BCC

The intersection of Bowen Bridge Road and Campbell Street is a signalised 'T' intersection. The Walden Lane and Wren Street intersections with Campbell Street are both priority controlled intersections.

3.2 Road Planning

The Bowen Hills UDA has been the subject of extensive road planning due to the significant redevelopment occurring. As this planning has taken into consideration the total development in the precinct, it is not considered necessary for an impact assessment to be included in this report.

3.3 Public Transport and Pedestrian Facilities

The development is situated between two key transport routes for the northern side of Brisbane City – the Royal Brisbane & Women's Hospital (RBWH) Station of the Inner Northern Busway and the Bowen Hills Railway Station. The RBWH Station is located approximately 150m walk to the south west of the site (above Bowen Bridge Road) and the Bowen Hills Railway Station is located approximately 1km to the north-east of the site.

The public transport routes servicing these two key stations are summarised below.

Bus Services

Brisbane Transport (Translink) currently operates up to 18 bus services that travel through the RBWH station. These services include the High frequency (BUZ) Route 333, servicing Chermside, Kedron, Windsor and Brisbane City, along with numerous other routes such as 66 (also high frequency, but not a BUZ), 330, 340, 370, 375, 379, and 393 servicing suburbs including Woolloongabba, Brisbane City, Fortitude Valley, Newstead, Bardon, Ashgrove, Stafford, Taigum and Boondall.

A number of these routes also connect to other key interchanges including the Woolloongabba Bus Terminal, Southbank Cultural Centre Platforms, Queen Street/King George Square/Roma St Stations, Chermside Bus Interchange and Stafford City Shopping Centre Bus Terminal for transfer to other public transport services. In effect, the serviceable area of public transport routes within one connection of the RBWH Station covers a significant proportion of the Brisbane Metropolitan area.

On weekdays the station receives an average of 550 inbound buses (heading towards the city) between 5:15am and 11:15pm, and 450 outbound buses between 5:45am and 11:50pm. All of the 18 routes run on weekdays. Routes 333 and 66 operate with a peak hour frequency of 5-10 minutes and off-peak frequency of 10-15 minutes. Each of the other routes servicing the station generally have peak hour frequencies between 15 and 30 minutes, and off-peak frequencies between 20 minutes and 1 hour.

On the weekends the station receives an average of 250 inbound/250 outbound bus movements between 5:20am and Midnight on Saturdays, and 230 inbound/190 outbound bus movements between 6:20am and 11:40pm on Sundays. Only 10 and 8 (out of a total of 18) bus routes run on Saturdays and Sundays, respectively. Route 333 runs every 15 minutes on the weekends, while Route 66 does not operate. Routes 330, 340, 370 and 375 operate every 30 minutes, and the remaining services operate every 1-2 hours.

Train Services

Bowen Hills Railway Station is a major connecting station for all routes into/out of Brisbane City from the northern train lines. As such, the station is serviced by up to 5 Train services from the north and 4 services from the south. Access to all Brisbane train lines can be achieved direct, or through at most one connection, from the Bowen Hills station. The station is serviced by approximately 520 train movements (inbound/outbound platforms combined) between 4:20am and Midnight on weekdays. The average frequency of train arrivals/departures is approximately 2-3 minutes in the peak periods, and 10 minutes in the off-peak. During the weekends, the station is serviced by approximately 350 train movements between 3:45am and Midnight. The average frequency of train arrivals/departures is approximately 5-10 minutes.

Figure 3.1 shows the location of the RBWH Station and Bowen Hills Railway Station in relation to the proposed development, and respective access routes.

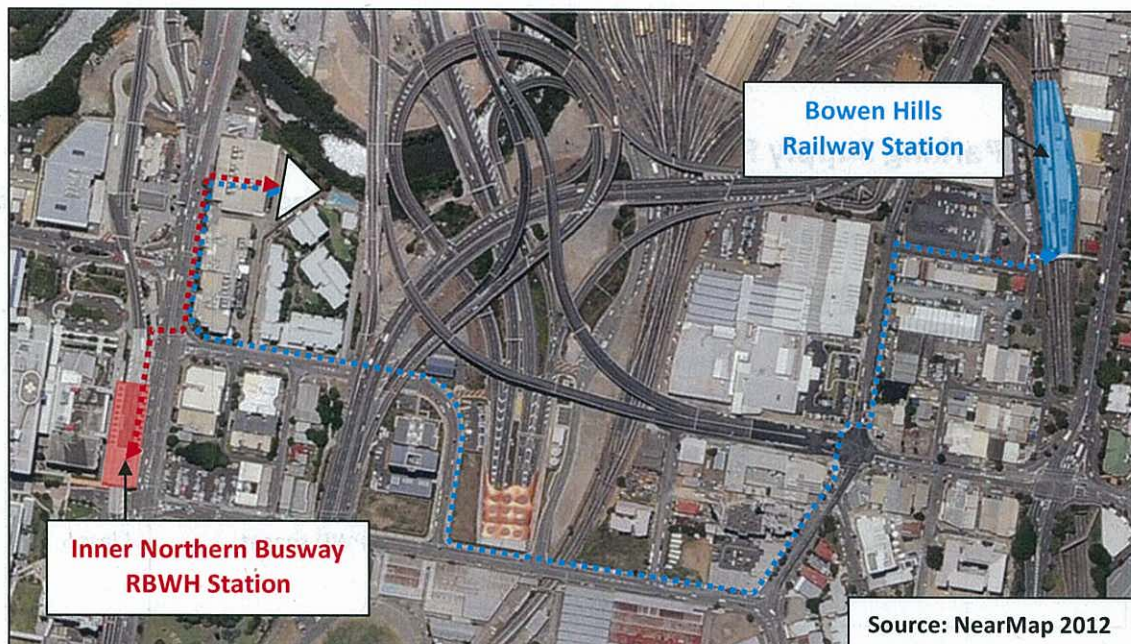


Figure 3.1: Public Transport Services in Bowen Hills

Pedestrian and Cyclists

The surrounding roads incorporate pedestrian footpaths and on-street bicycle lanes. There are pedestrian crossings at the Bowen Bridge Road signalised intersections with Campbell Street, Butterfield Street, and O'Connell Terrace.

The RBWH Station "Cycle Centre" is located on the western side of Bowen Bridge Road, under the elevated busway, directly opposite the site. This facility provides end-of-trip facilities for cyclists including showers, change rooms, lockers and 750 secure bicycle parking spaces. These facilities are available to members of the public (via a paid membership scheme) with preference given to hospital and local business staff. There is also a dedicated bicycle/walking path on the northern side of Breakfast Creek, called the Bowen Hills Heritage Trail, which extends west to the suburb of Newmarket and links to major parks, recreation and residential areas. A bridge link from the current end point (at the end of Edgar Street) through to Campbell Street is currently under construction and is due to open with the completion of the Airport Link project in July 2012.

4. Car Parking Arrangements

4.1 Parking Supply Requirement

ULDA parking requirements specific to the Bowen Hills UDA (Precinct 3) for this type of development are identified in Table 4.1.

Table 4.1: Parking Supply Requirement

Land Use	ULDA Requirement	Quantity/ Area	Requirement	Provided	Space Type
Commercial	1 space/100m ² GFA (maximum)	9,498m ² GFA	95 spaces	137 spaces	Class 1A
• PWD	1 space/ 100 standard spaces	137 spaces	2 PWD spaces	2 PWD spaces	Class 5

4.2 Suitability of Parking Supply

The ULDA requirements indicate that a maximum of 95 additional parking spaces is needed. The development provides 137 new parking spaces, minus the 39 spaces removed due to demolition of parts of the existing parking structures. This results in a net gain of 98 parking spaces, which slightly exceeds the maximum supply specified by the ULDA. Given that 18 existing parking spaces will have to be converted to tandem spaces, these spaces in effect will become less accessible and should not be included as a 'standard' bay in terms of total parking supply. As such the parking supply of the new building will, in effect, be below the maximum supply specified and is considered acceptable. The total supply of the Citilink Business Centre once complete will be 387 spaces.

4.3 Car Park Layout

Table 4.2 identifies the characteristics of the proposed parking area with respect to the requirements of the Australian Standard for Parking Facilities (AS2890). The last column identifies the compliance of each design aspect. Vehicle manoeuvring paths were also developed to show there is sufficient space on the ramp/parking aisle for cars to safely navigate and pass on the basement levels. These manoeuvring paths are included in Appendix B.

Table 4.2: Parking Layout Characteristics

Design Aspect	AS2890 Requirements	Proposed Provision	Compliance
Parking space length			
▶ Standard bays (Class 1A)	5.4m (min)	5.4m	Australian Standards Compliant
▶ Small Car bays	5.0m (min)	5.0m	
▶ PWD bays (Class 5)	5.4m (min)	5.4m	

► Motorcycle bays	2.5m (min)	2.5m	
Parking space width:			
► Standard bays	2.4m (min)	2.4m	Australian Standards Compliant
► Small Car bays	2.3m (min)	2.4m	
► PWD bays	2.4m (min) + 2.4m 'shared' space next to bay	2.4m (min) + 2.4m 'shared' space next to bay	
► Motorcycle bays	1.2m	1.5m	
Aisle Width:			
► Parking aisle	6.2m (min)	6.2m	Australian Standards Compliant
► Circulating Road/Ramp	5.5m (min)	6.2m	
Parking envelope clearance - Column intrusion	0.25m into bay within 0.3m & 0.2m into bay within 1.2m of front of bay	None	Australian Standards Compliant
Parking envelope clearance - Column adjacent to bay	Located between 0.75m and 1.75m of aisle	Located between 0.8m and 1.6m of aisle	Australian Standards Compliant
Parking envelope clearance – space adjacent to wall	Space 0.3m clear of wall	Space 0.3m clear of wall	Australian Standards Compliant
Maximum Gradient:			
► PWD parking	1:40 (2.5%)	Ground and Basement levels are flat Max 1:5 (20.0%)	Australian Standards Compliant
► Parking bay	1:20 (5.0%)		
► Parking aisle	1:16 (6.25%)		
► Ramp	1:5 (20.0%)		
Maximum Ramp Transitions	12.5% summit 15.0% sag	12.5% summit 15.0% sag	Australian Standards Compliant
Height Clearance			
► General Min.	2.2m (2.3m PWD)	Min 2.7m (parking levels)	Australian Standards Compliant
► Over PWD bay	2.5m		
► Absolute Min.	NA	Min 2.3m (basement ramps)	
Parking Aisle Extension	1m beyond last bay	1m beyond last bay	Australian Standards Compliant

5. Estimated Future Transport Demands

5.1 Estimated Development Traffic Generation

As outlined in Section 4, the car parking rates specified by the ULDA for this development have been deliberately set at lower rate in an attempt to reduce private vehicle travel to/from the Bowen Hills UDA and encourage alternative transportation methods. As a result, the traffic generation of this development is expected to be considerably less than that of a similar sized commercial development outside of the UDA where more car parking is provided. Therefore, the standard traffic generation rates commonly used in the RTA *Guide to Traffic Generating Developments* are not appropriate to this particular development.

A standard commercial development is expected to supply 1 parking space per 30m² GFA (BCC TAPS policy) – or 3.3 spaces per 100m² GFA - and generate 2 peak hour trips per 100m² GFA (RTA Guide). Therefore, the ratio of peak hour trips to parking spaces provided for a commercial development is roughly 0.6 peak hour trips/parking space. Applying this ratio to the development, which has an increased parking supply of 98 spaces, means that the peak hour traffic generated by the development is expected to be approximately 60 vph. It is expected that 80% of this traffic will be travelling into the site and 20% leaving the site in the AM peak, and vice versa in the PM peak. This assumption is consistent with the in/out splits of traffic currently using the access.

5.2 Estimated Development Traffic Distribution

The traffic distribution associated with this development was assumed based on existing movement splits in/out of the development. Two hour AM and PM peak hour counts were undertaken at the existing Citilink Business Centre Access on Wednesday 22nd February 2012. The AM peak hour for this access was found to be between 7:45-8:45am and the PM peak hour was between 4:45-5:45pm. A summary of the peak hour intersection counts is shown in Figure 5.1 below.

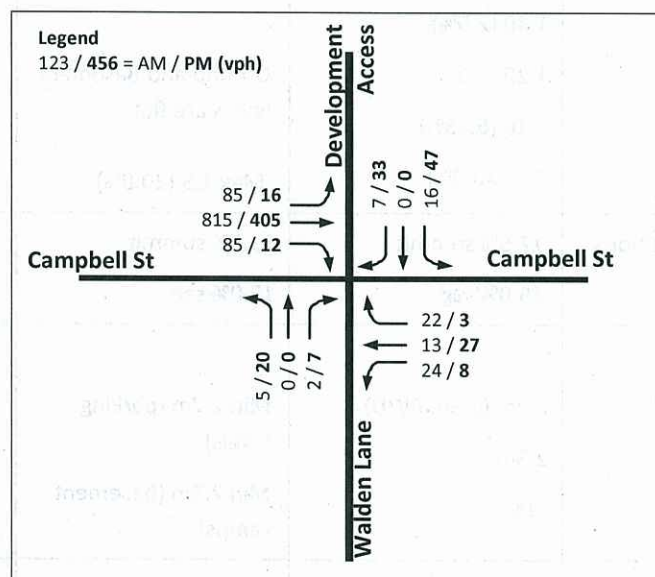


Figure 5.1: 2012 AM/PM Peak Hour Access Count (Existing)

Applying the same movement splits to the traffic generated by the development (shown in Section 5.1) results in the new intersection volumes given in Figure 5.2.

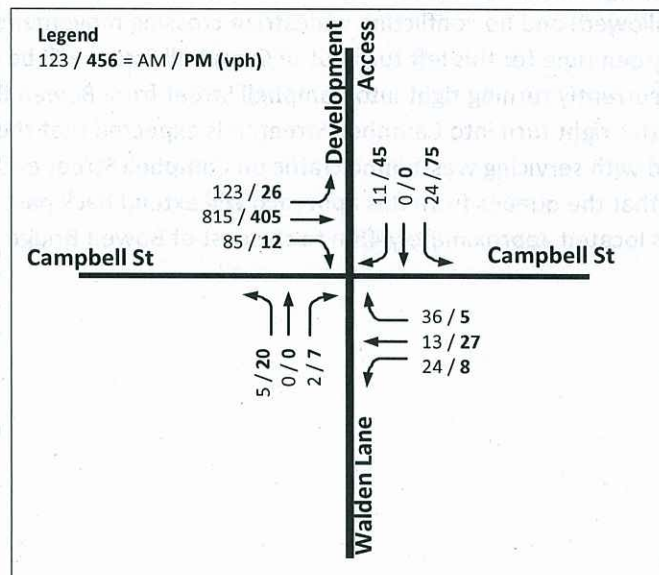


Figure 5.2: 2012 AM/PM Peak Hour Access Volumes (Existing + Development Traffic)

5.3 Development Access Operation

Assessing the existing traffic volumes, it is apparent that Campbell Street caters predominately for eastbound through traffic, with 815vph travelling eastbound past the access in the AM Peak and 504vph in the PM peak. Comparing this to westbound traffic, it can be seen there is significantly less traffic during both peak hours. This is an important factor, as the period when there is greatest chance of negative effects from the new development, during the PM peak when 80% of the traffic is leaving the site, coincides with the lowest peak through volumes on Campbell Street. Therefore, the serviceability of the outbound movements from the development onto Campbell Street should be acceptable.

Similarly, in the AM peak the majority of development generated traffic is going to be directed into the site from the western side of Campbell Street. Given 80% of the arriving traffic comes from the western approach (from Bowen Bridge Road), and has priority when turning into the development, then the access should also operate relatively efficiently.

To verify these assumptions, the development access was analysed using SIDRA 5.0 to determine the operational characteristics during peak hours and the effects of the new traffic generated by the development. The analysis showed that during the both the AM and PM peak hours, the access will continue to operate well below capacity, with a maximum Degree of Saturation (DOS) for the access approach of 0.28 in the AM peak and 0.23 in the PM peak. There are no noticeable effects on Campbell Street or Walden Lane. All associated queue lengths, average delays and overall Level of Service (LOS) are within acceptable limits. A summary of the SIRDRA output data is included in Appendix D.

One other concern, given the close proximity of the access point to the Bowen Bridge Road, is the queuing on Campbell Street from the signalised intersection obstructing movement of vehicles out of the development access. Referring to the peak hour volumes, however, it can be seen that

the number of vehicles that will be travelling westbound towards the signalised intersection is relatively low (38 and 51 vph in the AM peak and PM peak hours, respectively). The Campbell Street approach of the signalised intersection has dual left turn lanes (with no right turn onto Bowen Bridge Road allowed) and no conflicting pedestrian crossing movements. During the peak hours, the length of green time for this left turn out of Campbell Street will be dictated by the volume of traffic concurrently turning right into Campbell Street from Bowen Bridge Road. Given the high demand for this right turn into Campbell Street, it is expected that there will be significant green time associated with servicing westbound traffic on Campbell Street each cycle. Therefore it is extremely unlikely that the queues from this approach will extend back past the development access point (which is located approximately 45m to the east of Bowen Bridge Road).

6. Site Access Arrangements

It is proposed that this new building of the Citilink Business Centre will use the existing access point onto Campbell Street. From here, it is proposed that office vehicles will turn off to the left and travel into the Ground Floor carpark (office parking restricted to those with access cards for boom gates) and visitors/service vehicles will travel straight up the existing ramp to Level 1. The section of Campbell Street where the existing access is located has a posted speed limit of 50km/h and the internal roads on the site have a speed limit of 5km/h. The design vehicle for the access and development is a Refuse Collection Vehicle (RCV). The service vehicle provisions are outlined further in Section 7.

Table 6.1 identifies the characteristics of the existing access and its location on Campbell Street with respect to the Australian Standards requirements. The last column identifies the compliance of each design aspect. When compliance is not achieved, further information is provided after the table.

Table 6.1: Citilink Business Centre Access Characteristics

Design Aspect	AS2890 Requirement	Proposed Provision	Compliance
Crossover type/width for: ▶ Cars ▶ Design service vehicle	Category 2 Access 6.0-9.0m combined access width Category 2 Access 9m (min) at crossover point. 6.5m (min) driveway width	Category 2 Access 10.0m crossover 6.9m wide driveway through to internal intersection where vehicles split to either Ground Floor or Level 1	Australian Standards Compliant
Minimum distance to adjacent feature: ▶ Minor intersection ▶ Major intersection ▶ Adjacent driveway ▶ Median break ▶ Clear of queuing at signals	6m from any intersection or median break Yes	Walden Lane – Across from Access point Bowen Bridge Road – 45m to west Residential development access on east side of access Yes	Alternative Solution
Sight distance	Ideally 70m, minimum of 45m	50m to RHS of access (up to Bowen Bridge Road intersection) and +100m LHS Exit	Australian Standards Compliant

7. Service Vehicle Arrangements

7.1 Current Service Vehicle Provisions

The site is currently serviced by multiple vehicles and various purposes. The current service vehicle arrangements are as follows:

1. Daily deliveries to Siemens Telecommunications office space via Level 1 loading dock at north east-corner of Building 2. Vehicles are required to reverse up the parking aisle on east side of Building 2. Vehicles servicing this area are equivalent to BCC SRV/MRV size.
2. Daily morning food deliveries to café on Campbell Street frontage of Building 1. Vehicles are required to park and unload in the tiled area on Level 1. Vehicles are equivalent to BCC VAN/SRV size.
3. Mini-bus operating every 20minutes between 6am and 6pm on weekdays, ferrying Queensland Health workers & internal deliveries between various offices in Brisbane. The mini-bus enters the Ground Floor, circulates the car park and drops-off/picks-up passengers. The mini-bus is equivalent to a BCC MRV.
4. Monthly fuel tanker deliveries to two diesel generator rooms located on Level 1. Vehicles are equivalent to BCC SRV size.
5. Approximately three refuse trucks per week, collecting rubbish from Siemens loading dock and at other bin storage location on Level 1. Vehicles are equivalent to BCC RCV size.
6. Other various courier/deliveries to office components of site, to different locations on Level 1 (generally where there is free space to stand or in visitor parking area)

Figure 7.1 on the following page outlines the locations of existing service areas on Level 1.

The primary manoeuvring point for all service vehicles on site is in the green shaded area shown in Figure 7.1 (Level 1 near ramp down to visitor parking). All service vehicles enter the site from Campbell Street in a forward manner, proceed up the ramp to level 1 (except for the mini-bus, which proceeds into the Ground Floor carpark) and drives to their respective service area indicated. The vehicles may need to reverse into or out of the respective areas and as such use the existing manoeuvring point to undertake the necessary movements. All existing service vehicles then exit the site back down the ramp in a forward manner.

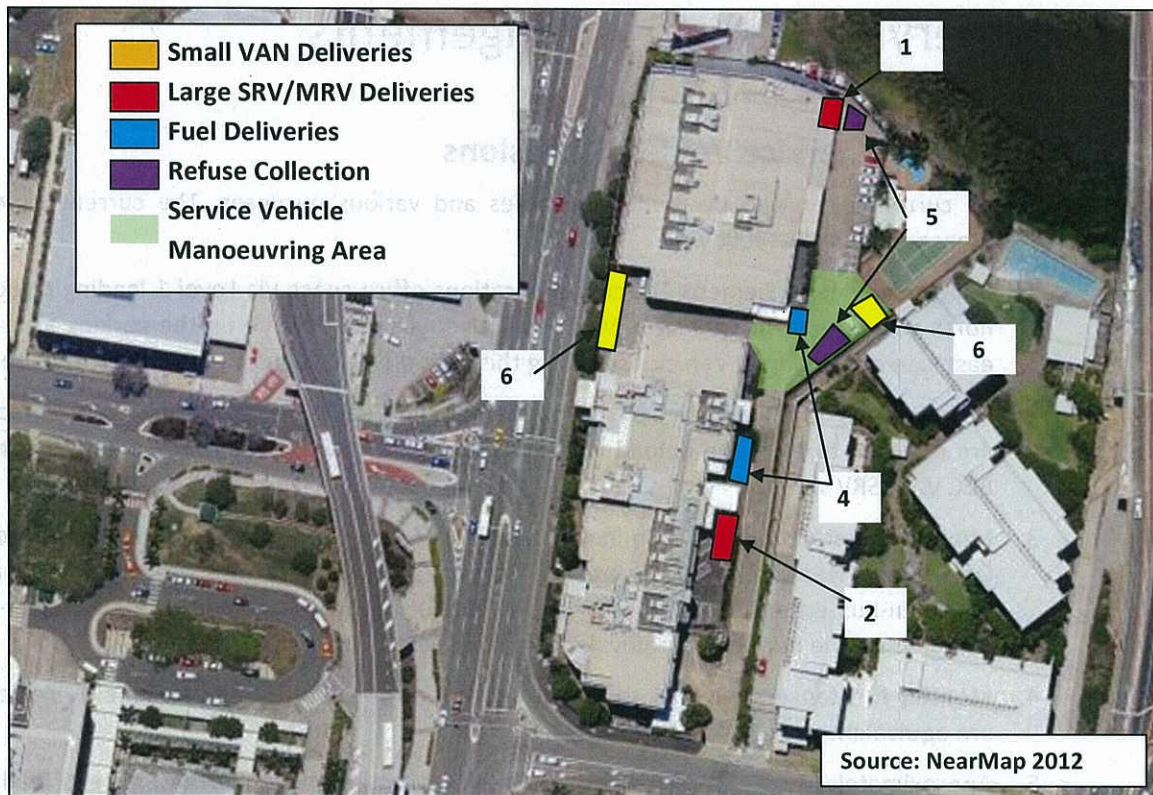


Figure 7.1: Existing Servicing Provisions – Level 1

7.2 Proposed New Provisions

The service vehicle provisions will need to be altered because the new building footprint will encroach on the existing vehicle manoeuvring point and bin pick up location. The new development incorporates a dedicated service area on Level 1 just to the east of the existing Building 2 (underneath the new building footprint). This will become the primary service area and manoeuvring point for the whole site. The area includes a MRV service bay, two SRV service bays and three VAN bays. This service area provides approximately 6.0m height clearance (to the slab of Floor 2) and is thus suitable for access and manoeuvring of all service vehicles expected on site.

There is, however, insufficient height clearance to allow a front loading RCV to collect rubbish – so this will continue at the location shown next to the Siemens loading bay, and also just to the south of the new building (outside of the outline of the building). Refuse collection vehicles will have to use the new service bay area to manoeuvre into the right direction to allow front collection of rubbish bins and to exit the site in a forward manner.

The columns along the perimeter of the new building, where the service area is location, have been arranged in such a manner as to allow reversing and turn around movements up to RCV sized vehicles.

Figure 7.2 below shows the revised service vehicle provisions for the whole Citilink Business Precinct.

The swept path analysis of the regular on-site MRV/RCV turn around at the service area and parking of MRV/SRV vehicles in the service bays is included in Appendix B.

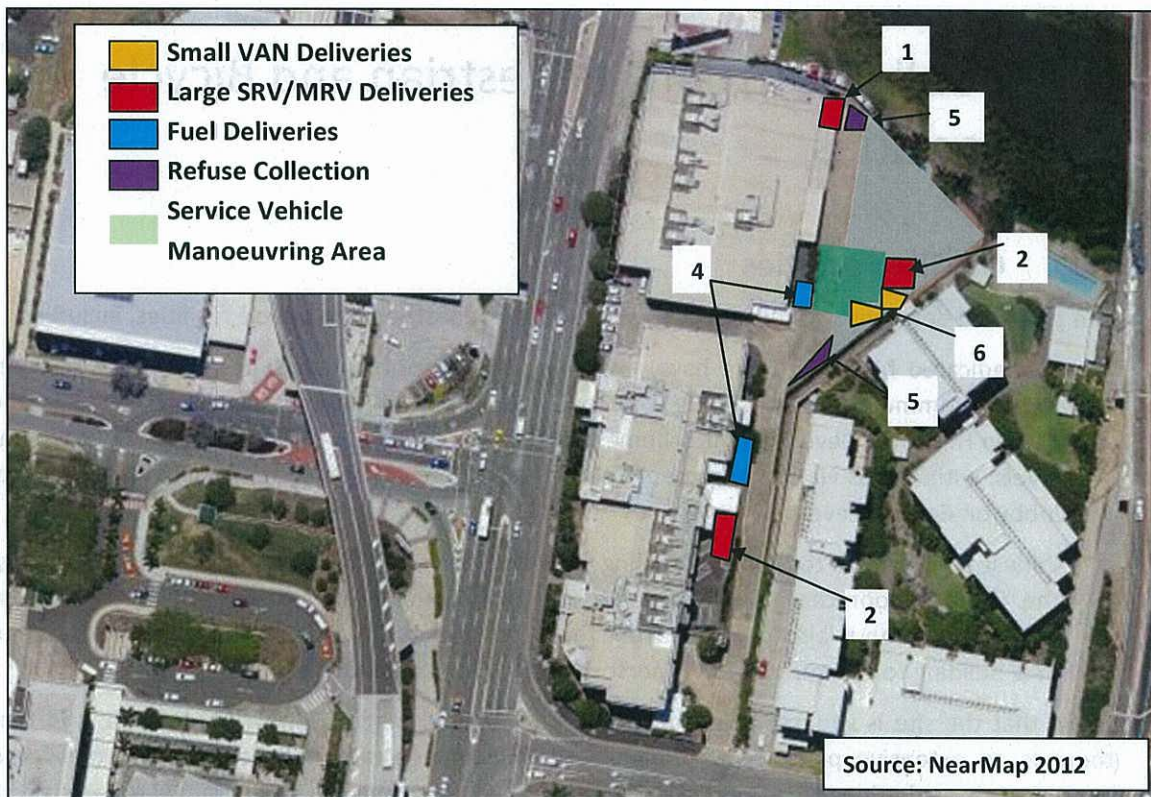


Figure 7.2: Revised Servicing Provisions – Level 1

The Queensland Health Mini-Bus service will continue to drive into the Ground Floor carpark area. Instead of circulating around the parking aisles in a 'loop', however, the bus will need to drive to north end of the site and perform a three-point manoeuvre in order to leave the site in a forward manner. The swept path analysis of this turning movement, assuming a MRV sized vehicle, is included in Appendix B.

8. Public Transport, Pedestrian and Bicycle Facilities

8.1 On-Site Facilities

The proposed development incorporates a number of pedestrian and bicycle facilities, including:

- ▶ 52 dedicated bicycle storage bays, exceeding the recommended supply of 1 space/200m² NLA of commercial spaces (plus 1 space/1000m² NLA for visitor spaces) specified in the Bowen Hills UDA Development Scheme. The spaces are spread out over the three basement levels, with access via the basement vehicle ramps, or by elevator from main building entry lobby on Ground Level.
- ▶ Pedestrian footpath to the new building from Bowen Bridge Road, running east to west along the Ground Floor carpark (underneath Building 2) and then into the lobby of the new building. A ramp is also provided from the Ground Floor level up to the entry lobby in the new building to accommodate for persons with disabilities and cyclists.

Given that the site is situated in the middle a key public transport infrastructure hub, and that there is an extensive pedestrian/cycling network already established, it was not considered necessary that additional facilities be provided as a result of this development. TTM feels there are sufficient provisions already in place to ensure the ULDA's goal for sustainable and efficient transportation solutions for the Bowen Hills UDA is met.

9. Summary and Conclusion

9.1 Car Parking Arrangements

The development proposal provides a net increase of 98 parking spaces. The overall parking supply of 387 spaces for the building exceeds the minimum number required by the ULDA. The car park layout complies with all the requirements of the Australian Standards. Therefore, the car parking arrangements are considered adequate for the proposed development.

9.2 Impact on the Surrounding Road Network

The ULDA currently have plans for significant upgrade to the road network in the Bowen Hills UDA. The traffic generated by this development has been accommodated in the design of the road upgrades and, as such, there will be no adverse impacts on the surrounding road network.

9.3 Development Access

It is proposed that this development will utilise the existing site access onto Campbell Street. The existing access generally complies with the Australian Standards requirements, however, it is recognised that the location of the access point is not ideal. As there was no other viable alternative locations, and because it was demonstrated that the new development would not negatively affect the operation of the access or Campbell Street, it was deemed satisfactory for this development.

9.4 Service Vehicle Arrangements

All service vehicles will continue to enter and exit the site through the Campbell Street access. The on-site service area and provision for vehicle manoeuvring has been altered due to the footprint of the new building. There is still, however, adequate space on site to address the needs of all service vehicles and their respective movements under this new servicing arrangements. Therefore, the service vehicle arrangements are considered adequate for the proposed development.

9.5 Public Transport and Bicycle / Pedestrian Facilities

The current public transport, bicycle and pedestrian facilities are considered adequate for the needs of the proposed development, and no additional facilities or services are considered necessary.

9.6 Conclusion

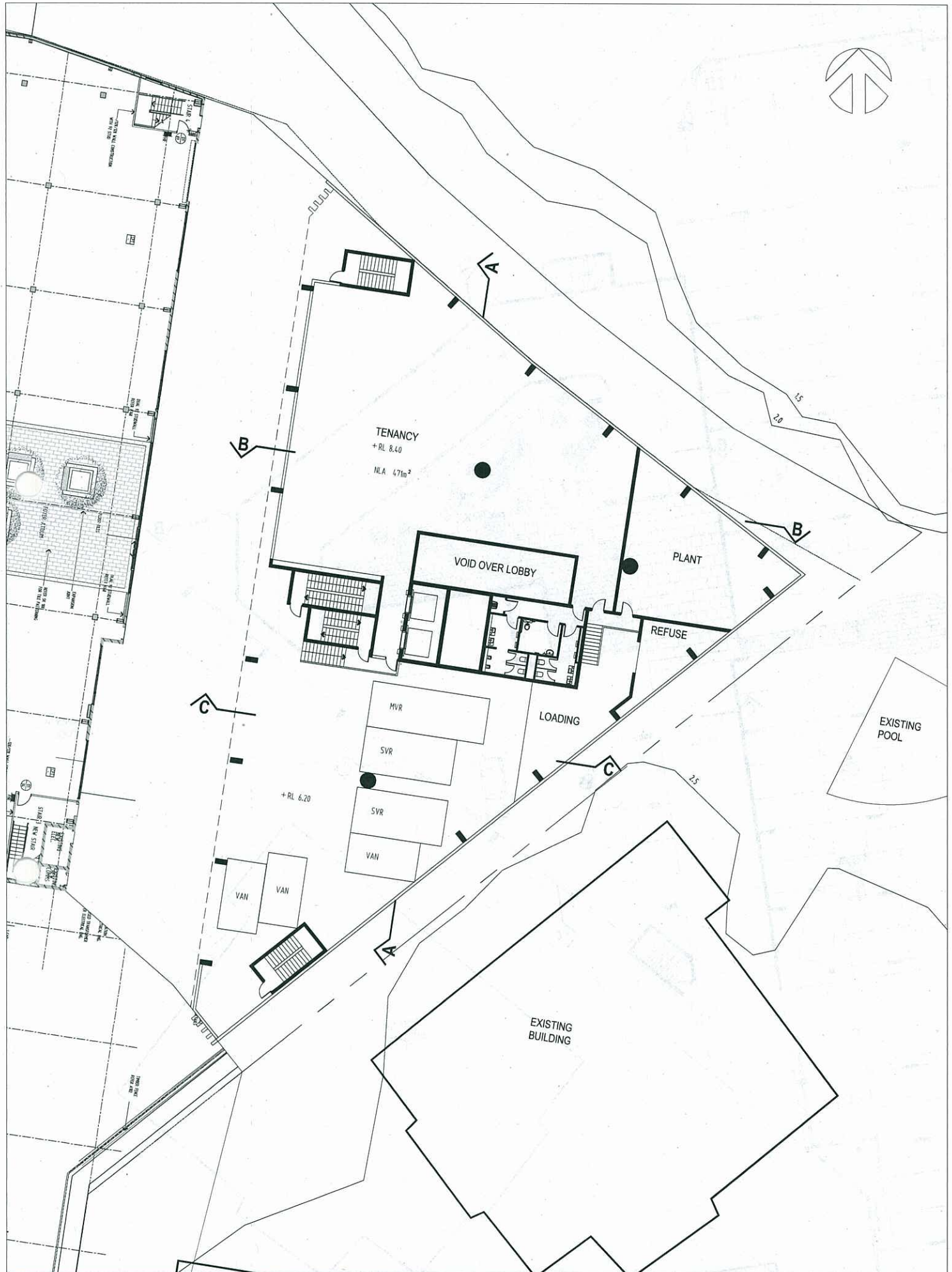
Based on the assessment contained within this report, TTM see no traffic engineering reason why the proposed development should not be granted the relevant approvals

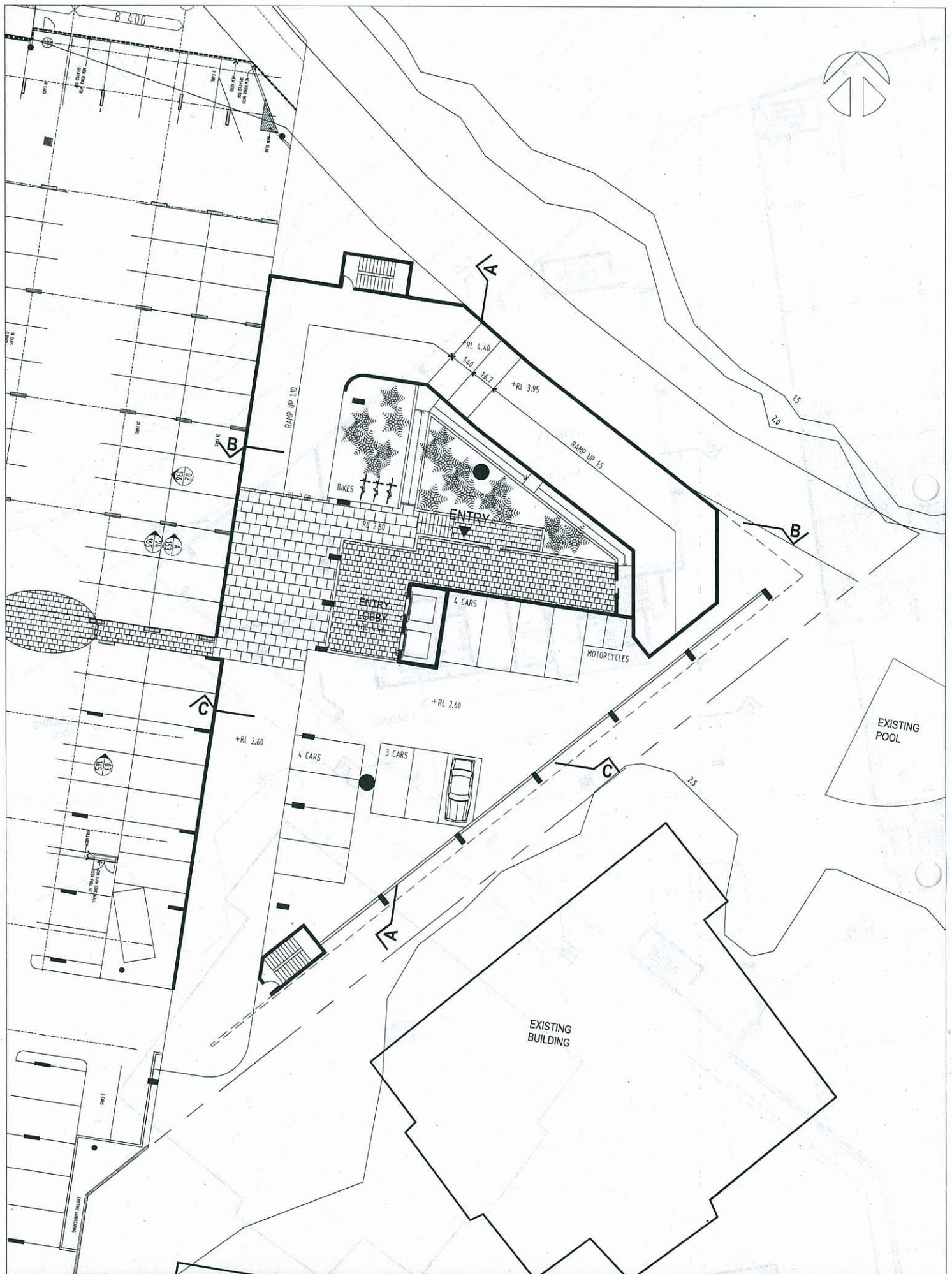
Appendix A

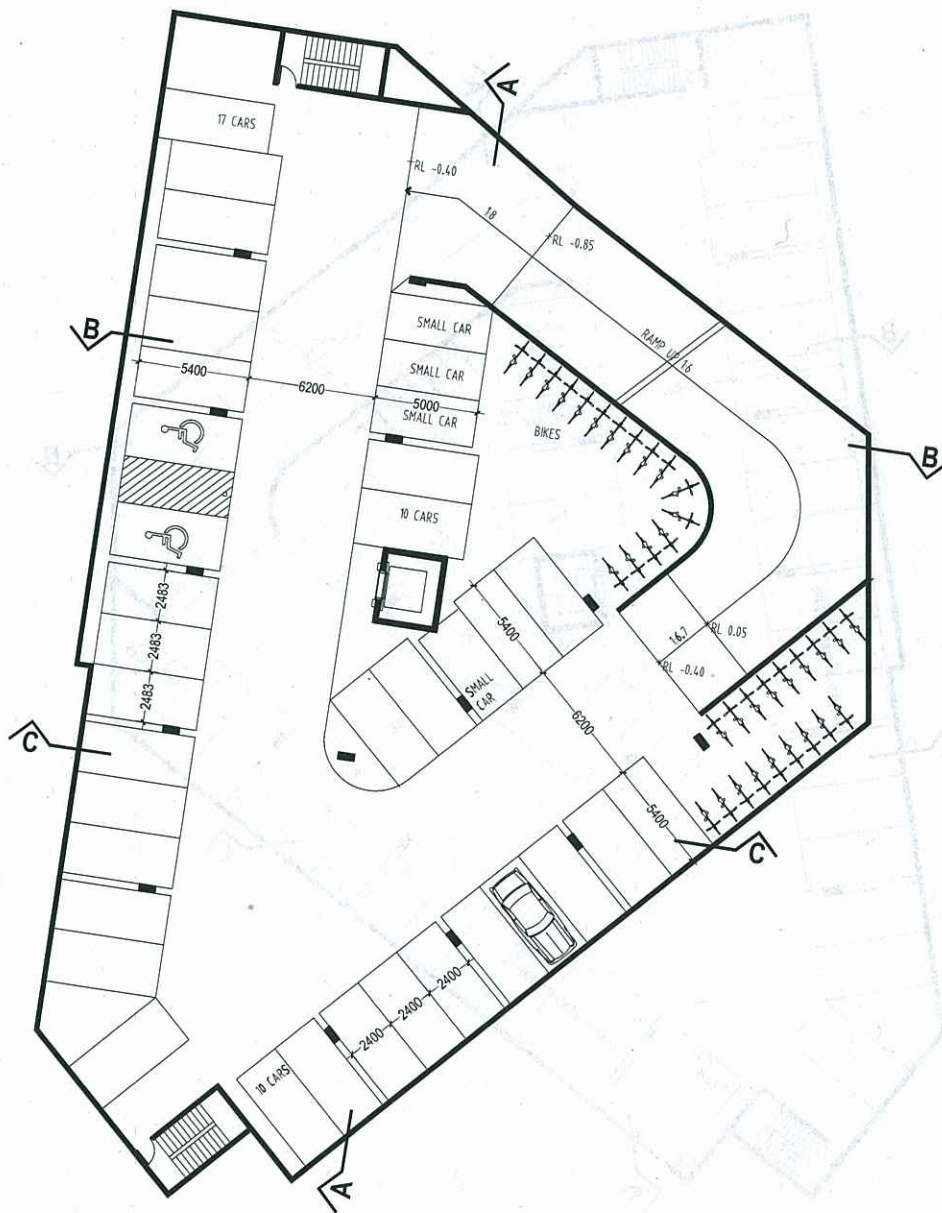
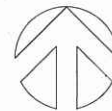
DEVELOPMENT LAYOUT

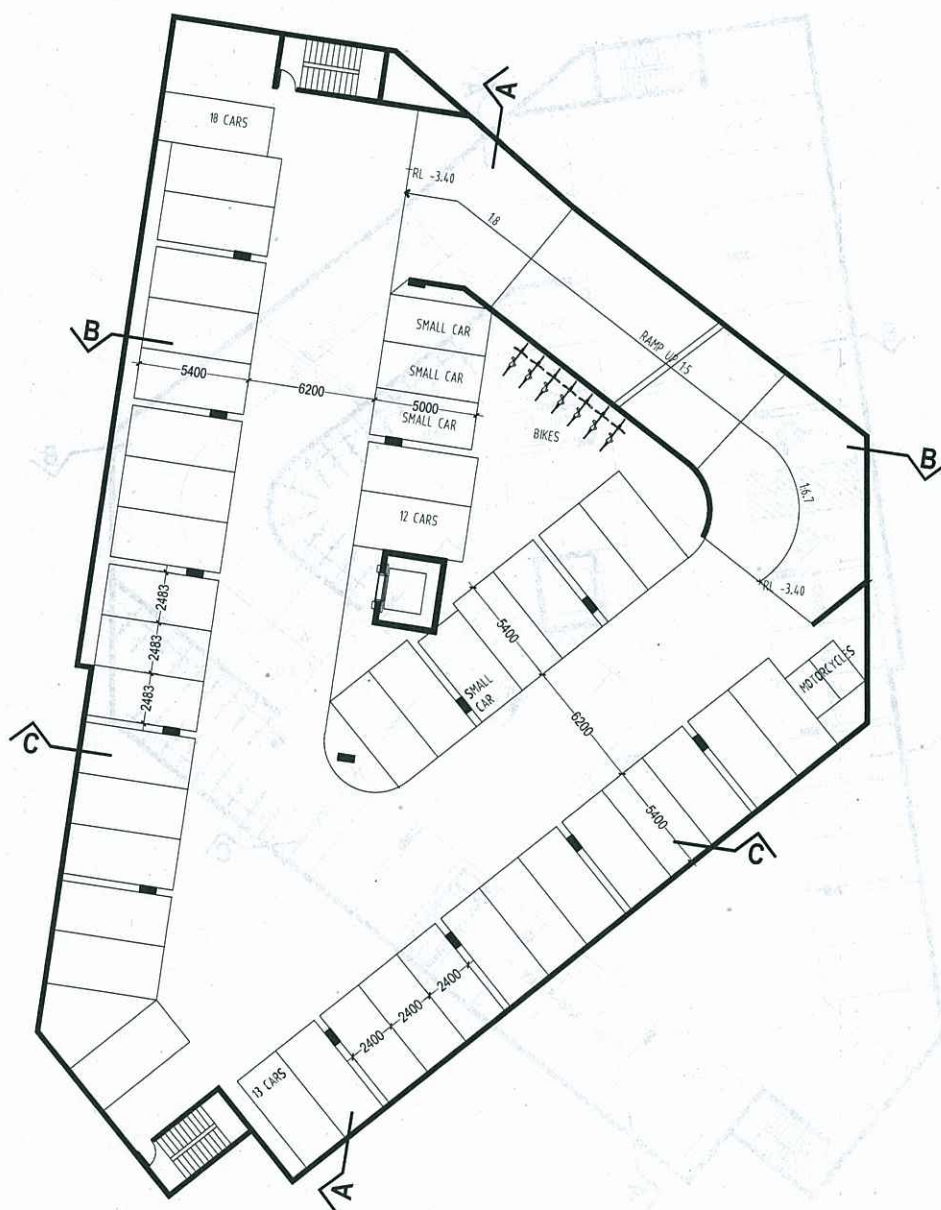
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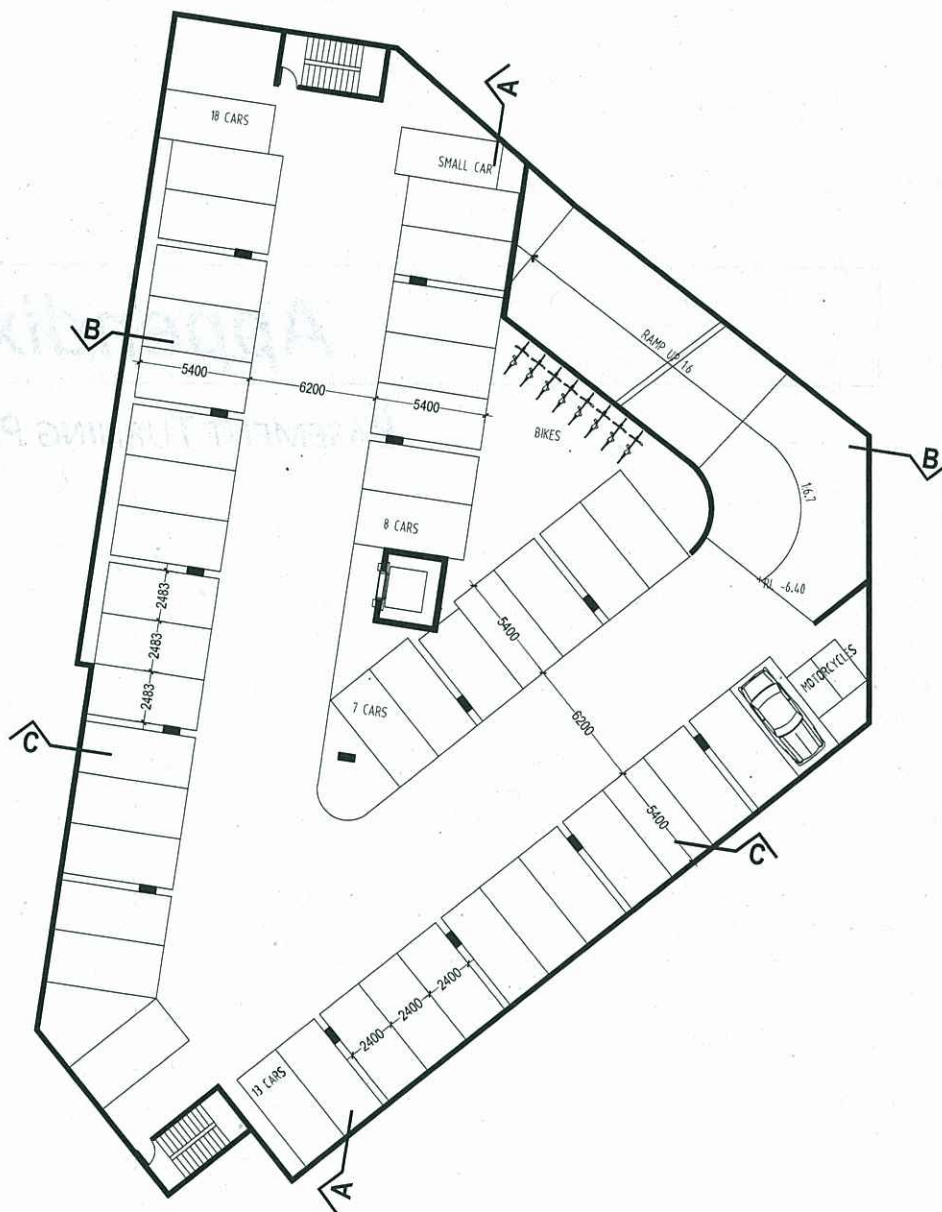
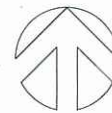
DEVELOPMENT LAYOUT

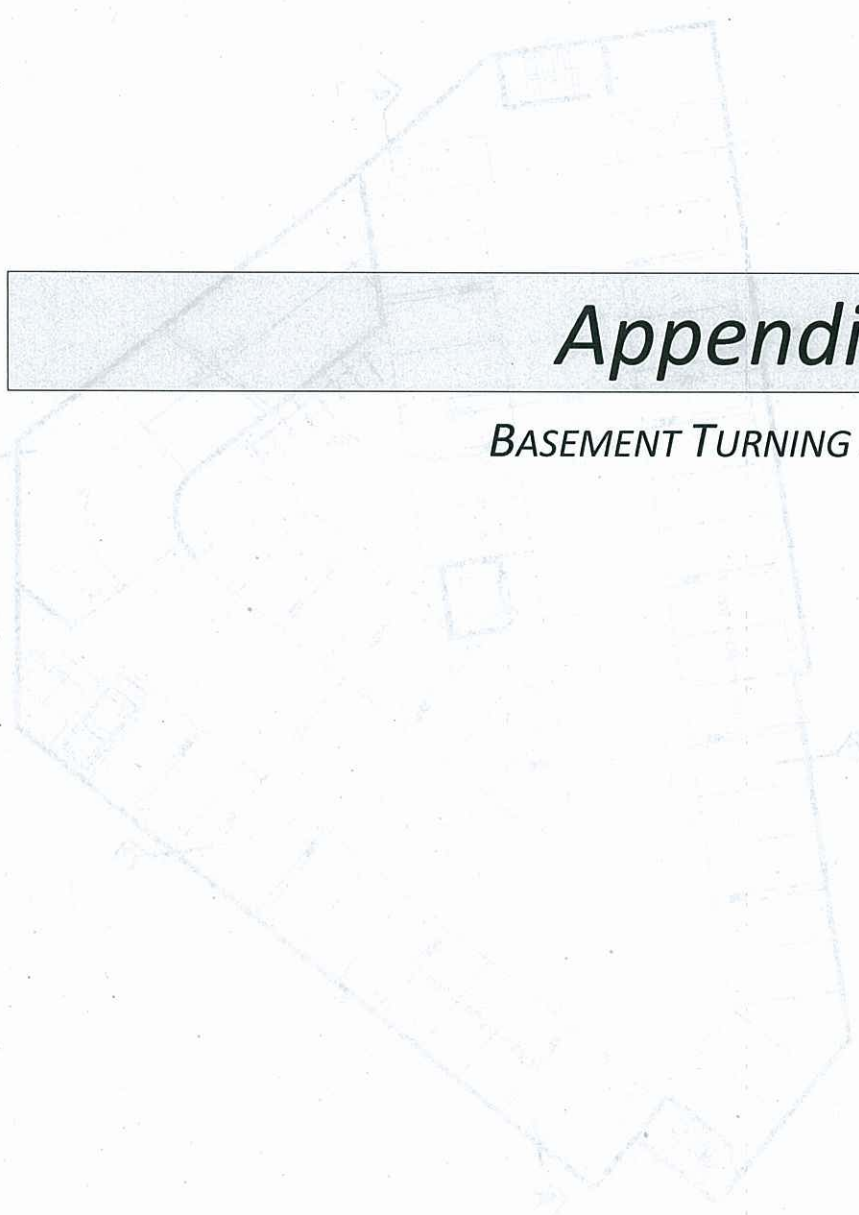












Appendix B

BASEMENT TURNING PATHS

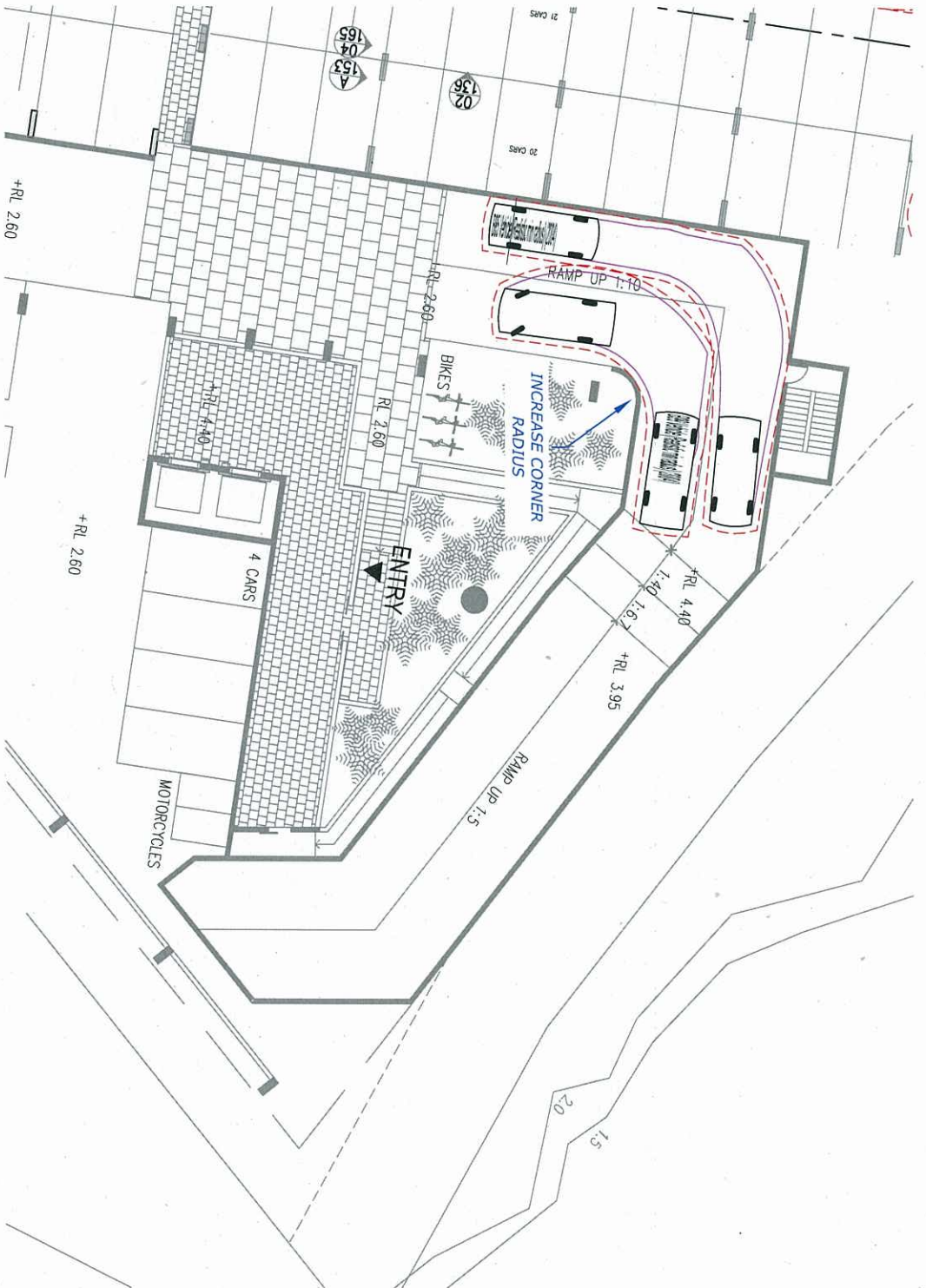


SCALE 1:500
1/2" = 100'

GROUND PLAN - 173 CANNON PLAZA
VEHICLE MANEUVERING - RAMP ACCESS

INVESTIGATION OF PLANS





TRAFFIC • PARKING • ACOUSTICS

12BRT0061-SK3

ISSUE B

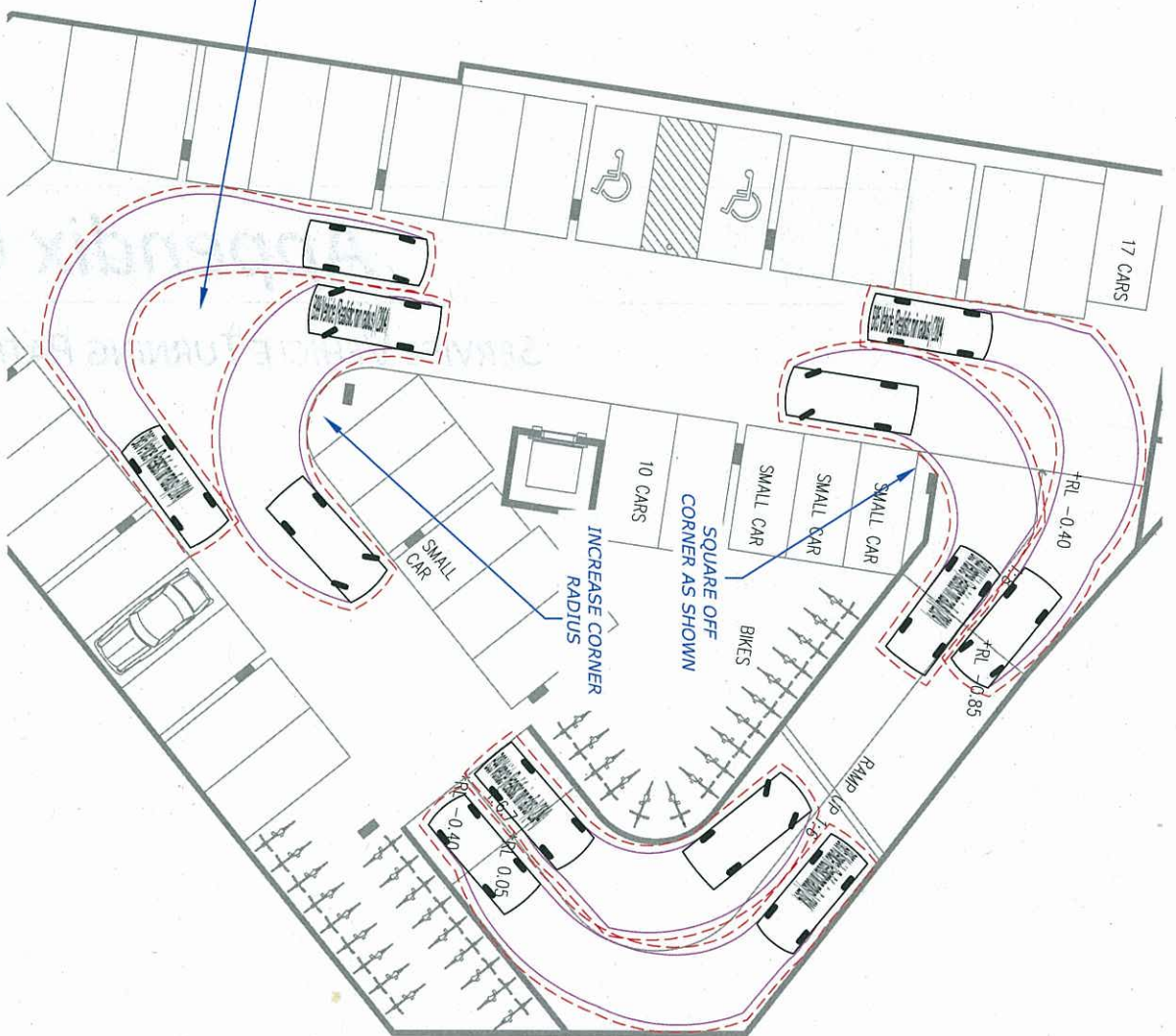
SCALE 1:200

VEHICLE MANEUVERING - RAMP ACCESS

GROUND LEVEL - 153 CAMPBELL STREET

INVESTIGATION PLAN

FOR DISCUSSION PURPOSES ONLY



CENTERLINE TO BE PAINTED
FOR INCREASED DELINEATION
AND SAFER MANEUVERING
THROUGH THIS OPEN SPACE



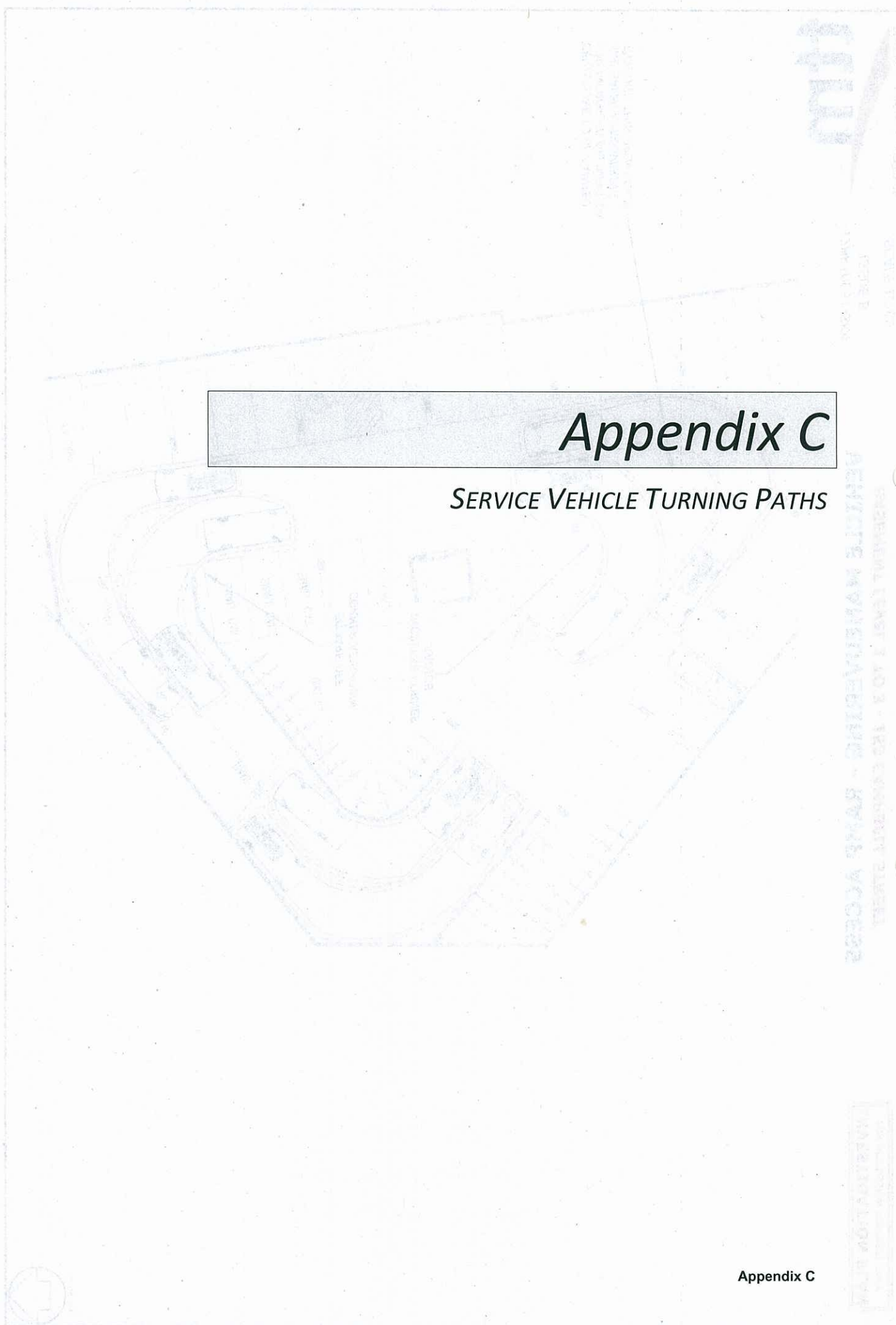
TRAFFIC • PARKING • ACOUSTICS

12BRT0061-SK4
ISSUE B

SCALE 1:200

VEHICLE MANEUVERING - RAMP ACCESS BASEMENT LEVEL 1 TO 3 - 153 CAMPBELL STREET

INVESTIGATION PLAN
FOR DISCUSSION PURPOSES ONLY



Appendix C

SERVICE VEHICLE TURNING PATHS

440

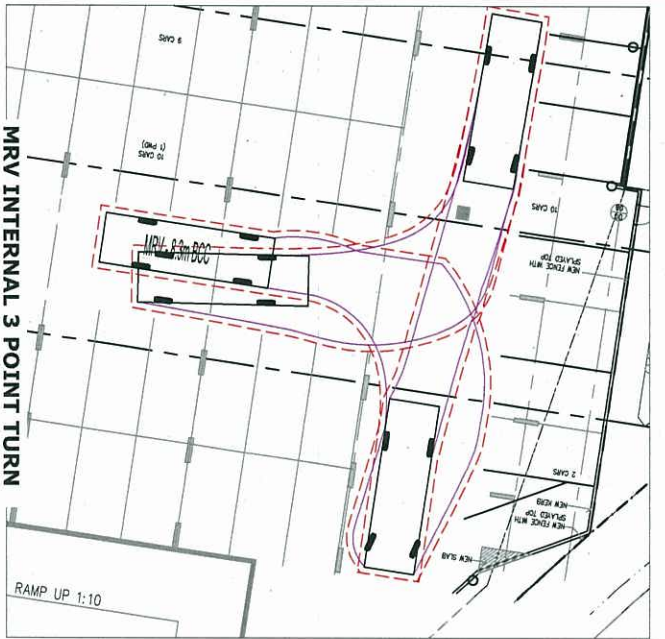
CONFIDENTIAL

CONFIDENTIAL

CONFIDENTIAL

CONFIDENTIAL

CONFIDENTIAL



MRV INTERNAL 3 POINT TURN

INVESTIGATION PLAN
FOR DISCUSSION PURPOSES ONLY

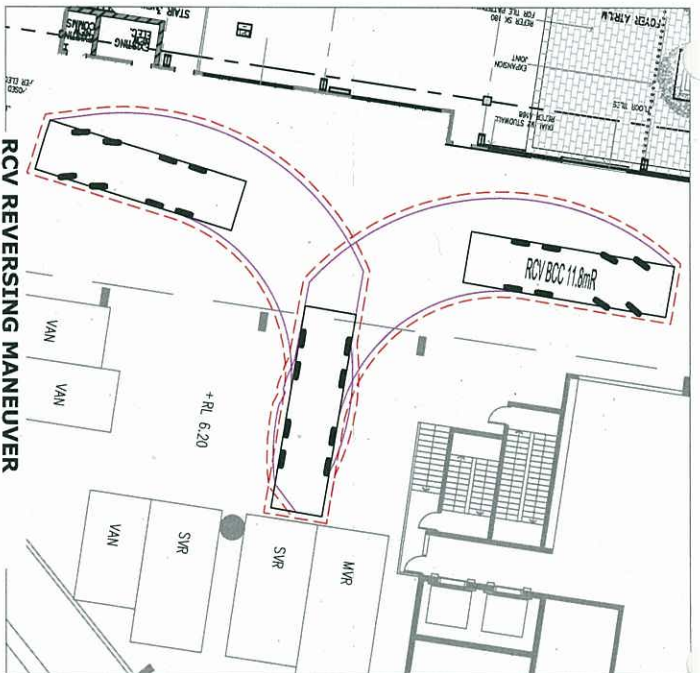
COMMERCIAL VEHICLE MANEUVERING **LEVEL 1 - 153 CAMPBELL STREET**



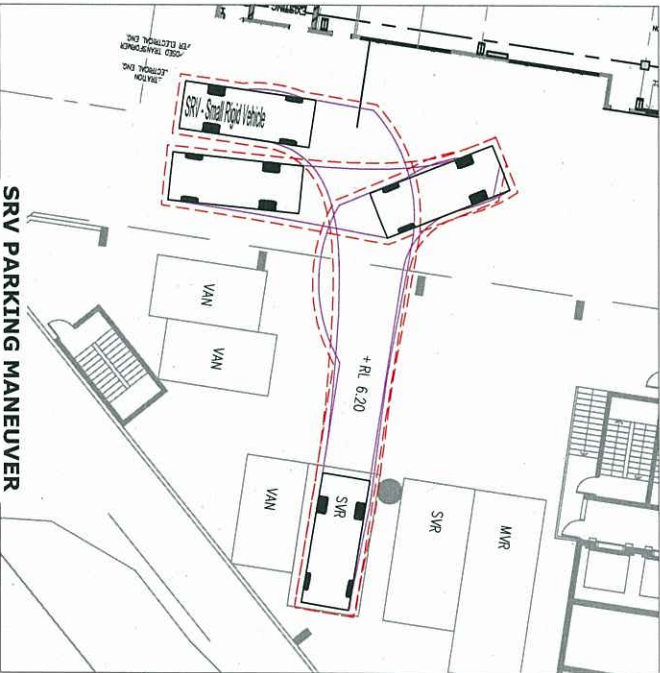
TRAFFIC • PARKING • ACOUSTICS

12BRT0061-SK2
ISSUE B

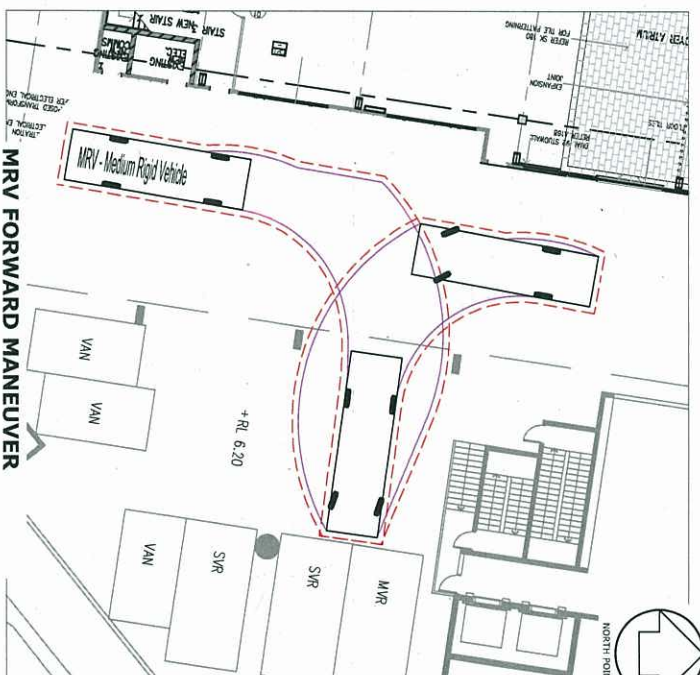
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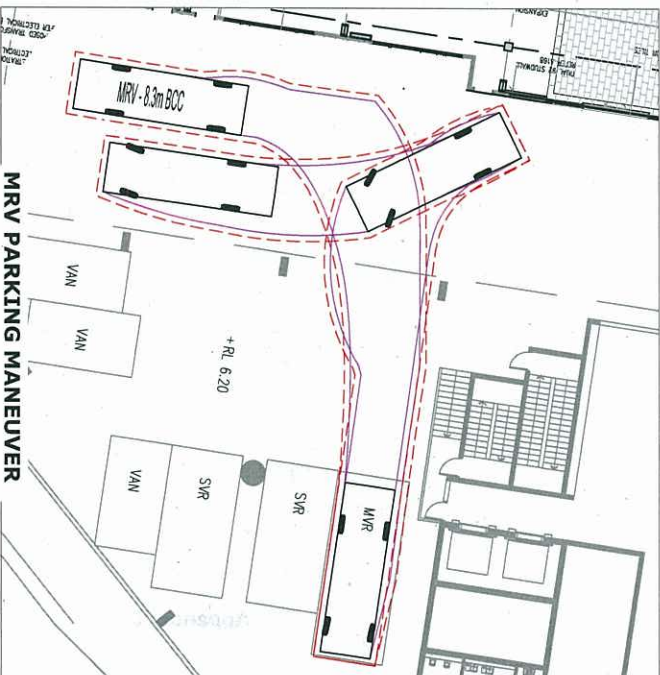
RCV REVERSING MANEUVER



SRV PARKING MANEUVER



MRV FORWARD MANEUVER



MRV PARKING MANEUVER



Appendix D

DETAILED SIDRA OUTPUTS

Appendix D

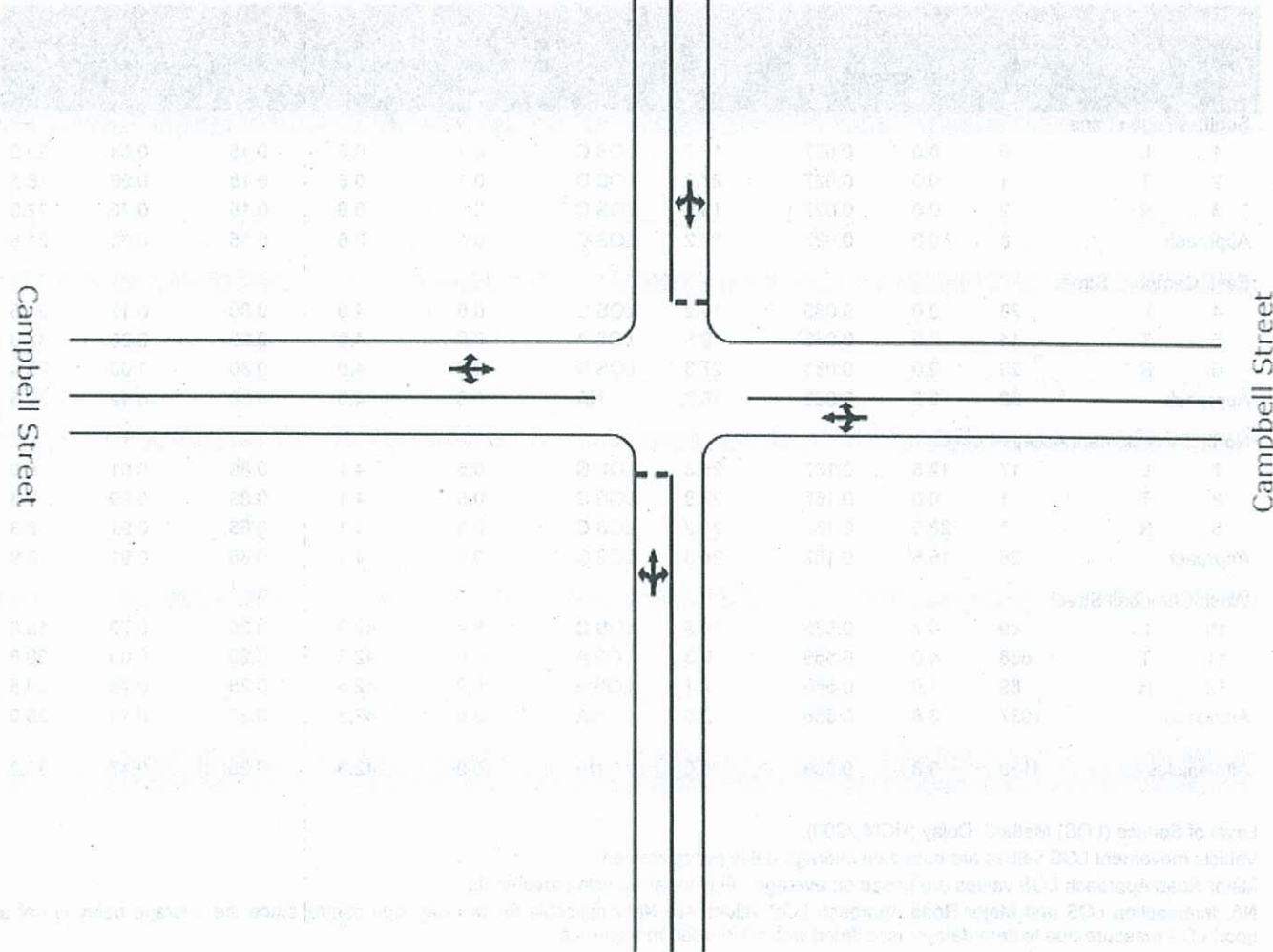
DETAILED SIDE OUTPUTS



Development Access

MOVEMENT SUMMARY

1. Approach from North (Campbell Street) to Intersection with Walden Lane
2. Approach from South (Campbell Street) to Intersection with Walden Lane
3. Approach from East (Walden Lane) to Intersection with Campbell Street
4. Approach from West (Walden Lane) to Intersection with Campbell Street



Walden Lane

MOVEMENT SUMMARY

Site: Campbell St/Development
Access - 2012 AM

Campbell Street / Walden Lane / Development Access
Unsignalised 4-Way Intersection
2012 AM Peak - Existing Traffic Volumes
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow 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: Walden Lane											
1	L	5	0.0	0.027	15.7	LOS C	0.1	0.6	0.15	0.54	22.3
2	T	1	0.0	0.027	27.2	LOS D	0.1	0.6	0.15	0.96	16.5
3	R	2	0.0	0.027	15.9	LOS C	0.1	0.6	0.15	0.70	22.0
Approach		8	0.0	0.027	17.2	LOS C	0.1	0.6	0.15	0.63	21.6
East: Campbell Street											
4	L	25	0.0	0.083	15.9	LOS C	0.6	4.0	0.80	0.12	31.5
5	T	14	0.0	0.083	9.5	LOS A	0.6	4.0	0.80	0.00	32.6
6	R	23	0.0	0.083	27.3	LOS D	0.6	4.0	0.80	1.00	28.4
Approach		62	0.0	0.083	18.7	NA	0.6	4.0	0.80	0.42	30.6
North: Development Access											
7	L	17	12.5	0.167	24.3	LOS C	0.5	4.1	0.86	0.91	8.9
8	T	1	0.0	0.167	23.9	LOS C	0.5	4.1	0.86	0.89	8.8
9	R	7	28.0	0.167	24.2	LOS C	0.5	4.1	0.86	0.91	8.8
Approach		25	16.5	0.167	24.3	LOS C	0.5	4.1	0.86	0.91	8.9
West: Campbell Street											
10	L	89	4.7	0.566	18.5	LOS C	5.9	42.3	0.25	0.79	19.8
11	T	858	4.0	0.566	0.3	LOS A	5.9	42.3	0.25	0.00	38.8
12	R	89	1.0	0.566	7.1	LOS A	5.9	42.3	0.25	0.78	29.5
Approach		1037	3.8	0.566	2.5	NA	5.9	42.3	0.25	0.14	36.0
All Vehicles		1133	3.8	0.566	4.0	NA	5.9	42.3	0.29	0.17	33.2

Level of Service (LOS) Method: Delay (HCM 2000).

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 used.

Processed: Wednesday, 14 March 2012 5:53:53 PM
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INTERSECTION

MOVEMENT SUMMARY

Site: Campbell St/Development
Access - 2012 AM + Development

Campbell Street / Walden Lane / Development Access
Unsignalised 4-Way Intersection
2012 AM Peak - Existing Traffic Volumes + Development Traffic
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Walden Lane											
1	L	5	0.0	0.029	16.4	LOS C	0.1	0.6	0.15	0.54	21.8
2	T	1	0.0	0.029	27.9	LOS D	0.1	0.6	0.15	0.96	16.0
3	R	2	0.0	0.029	16.7	LOS C	0.1	0.6	0.15	0.70	21.5
Approach		8	0.0	0.029	17.9	LOS C	0.1	0.6	0.15	0.63	21.0
East: Campbell Street											
4	L	25	0.0	0.134	17.4	LOS C	0.8	5.6	0.85	0.09	30.2
5	T	14	0.0	0.134	11.0	LOS B	0.8	5.6	0.85	0.00	31.0
6	R	38	0.0	0.134	28.9	LOS D	0.8	5.6	0.85	1.00	27.4
Approach		77	0.0	0.134	21.9	NA	0.8	5.6	0.85	0.52	29.0
North: Development Access											
7	L	25	12.5	0.275	29.9	LOS D	0.9	7.2	0.89	1.03	8.0
8	T	1	0.0	0.275	29.4	LOS D	0.9	7.2	0.89	1.02	7.9
9	R	12	28.0	0.275	29.8	LOS D	0.9	7.2	0.89	1.03	7.9
Approach		38	16.9	0.275	29.9	LOS D	0.9	7.2	0.89	1.03	7.9
West: Campbell Street											
10	L	129	4.7	0.588	18.5	LOS C	6.3	45.8	0.26	0.78	19.8
11	T	858	4.0	0.588	0.4	LOS A	6.3	45.8	0.26	0.00	38.2
12	R	89	1.0	0.588	7.1	LOS A	6.3	45.8	0.26	0.76	29.4
Approach		1077	3.8	0.588	3.1	NA	6.3	45.8	0.26	0.16	34.9
All Vehicles		1200	4.0	0.588	5.3	NA	6.3	45.8	0.32	0.21	31.1

Level of Service (LOS) Method: Delay (HCM 2000).

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 used.

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MOVEMENT SUMMARY

Site: Campbell St/Development
Access - 2012 PM

Campbell Street / Walden Lane / Development Access
Unsignalised 4-Way Intersection
2012 PM Peak - Existing Traffic Volumes
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Walden Lane												
1	L	21	0.0	0.038	8.2	LOS A	0.1	1.0	0.10	0.57	30.3	
2	T	1	0.0	0.038	19.7	LOS C	0.1	1.0	0.10	0.95	23.8	
3	R	7	0.0	0.038	8.4	LOS A	0.1	1.0	0.10	0.68	29.9	
Approach		29	0.0	0.038	8.7	LOS A	0.1	1.0	0.10	0.61	30.0	
East: Campbell Street												
4	L	8	13.0	0.023	8.9	LOS A	0.2	1.2	0.55	0.36	39.3	
5	T	28	0.0	0.023	2.1	LOS A	0.2	1.2	0.55	0.00	40.3	
6	R	3	0.0	0.023	20.0	LOS C	0.2	1.2	0.55	0.86	34.9	
Approach		40	2.7	0.023	4.9	NA	0.2	1.2	0.55	0.14	39.7	
North: Development Access												
7	L	49	4.0	0.155	5.5	LOS A	0.6	4.2	0.55	0.62	14.8	
8	T	1	0.0	0.155	5.1	LOS A	0.6	4.2	0.55	0.59	14.8	
9	R	35	3.0	0.155	5.4	LOS A	0.6	4.2	0.55	0.67	14.7	
Approach		85	3.5	0.155	5.5	LOS A	0.6	4.2	0.55	0.64	14.8	
West: Campbell Street												
10	L	17	19.0	0.244	19.2	LOS C	1.6	11.6	0.15	0.89	20.1	
11	T	426	4.0	0.244	0.2	LOS A	1.6	11.6	0.15	0.00	42.7	
12	R	13	1.0	0.244	6.9	LOS A	1.6	11.6	0.15	0.89	29.8	
Approach		456	4.5	0.244	1.1	NA	1.6	11.6	0.15	0.06	41.2	
All Vehicles		611	4.0	0.244	2.3	NA	1.6	11.6	0.23	0.17	33.8	

Level of Service (LOS) Method: Delay (HCM 2000).

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 used.

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MOVEMENT SUMMARY

Site: Campbell St/Development
Access - 2012 PM + Development

Campbell Street / Walden Lane / Development Access
Unsignalised 4-Way Intersection
2012 PM Peak - Existing Traffic Volumes + Development Traffic
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Walden Lane											
1	L	21	0.0	0.038	8.2	LOS A	0.1	1.0	0.10	0.57	30.3
2	T	1	0.0	0.038	19.7	LOS C	0.1	1.0	0.10	0.95	23.7
3	R	7	0.0	0.038	8.5	LOS A	0.1	1.0	0.10	0.68	29.9
Approach		29	0.0	0.038	8.7	LOS A	0.1	1.0	0.10	0.61	30.0
East: Campbell Street											
4	L	8	13.0	0.026	9.0	LOS A	0.2	1.3	0.54	0.35	39.0
5	T	28	0.0	0.026	2.2	LOS A	0.2	1.3	0.54	0.00	40.2
6	R	5	0.0	0.026	20.1	LOS C	0.2	1.3	0.54	0.86	34.8
Approach		42	2.6	0.026	5.8	NA	0.2	1.3	0.54	0.18	39.3
North: Development Access											
7	L	79	4.0	0.229	5.7	LOS A	0.9	6.4	0.57	0.66	14.7
8	T	1	0.0	0.229	5.2	LOS A	0.9	6.4	0.57	0.63	14.7
9	R	47	3.0	0.229	5.6	LOS A	0.9	6.4	0.57	0.69	14.6
Approach		127	3.6	0.229	5.7	LOS A	0.9	6.4	0.57	0.67	14.7
West: Campbell Street											
10	L	27	19.0	0.250	19.2	LOS C	1.6	12.0	0.15	0.88	20.1
11	T	426	4.0	0.250	0.2	LOS A	1.6	12.0	0.15	0.00	42.6
12	R	13	1.0	0.250	6.9	LOS A	1.6	12.0	0.15	0.88	29.7
Approach		466	4.8	0.250	1.5	NA	1.6	12.0	0.15	0.08	40.5
All Vehicles		665	4.2	0.250	2.9	NA	1.6	12.0	0.26	0.22	31.4

Level of Service (LOS) Method: Delay (HCM 2000).

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 used.

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