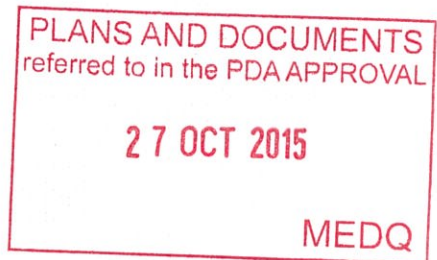


22 October 2015

Starhill Property Group
c/- HAL Architects Pty Ltd
46 Berwick Street
Fortitude Valley QLD 4006



Attn: Adam Lockhart

Dear Adam,

**RE: 23-39 ABBOTSFORD ROAD, BOWEN HILLS
TRAFFIC ENGINEERING ASSESSMENT**

This report has been prepared by Pekol Traffic and Transport, as requested by HAL Architects, to assess the traffic engineering aspects of a proposed 156 unit residential development at 23-39 Abbotsford Road, Bowen Hills. The site is located within the Bowen Hills Urban Development Area and will be assessed by Economic Development Queensland (EDQ).

EXISTING CONDITIONS

The site is currently occupied by six residential dwellings fronting onto Abbotsford Road, as indicated in Figure 1. The site is made up of Lots 1 and 2 on RP10092, Lot 1 on RP10091, Lots 2, 3 and 6 on RP10087 and Lot 17 on RP47816.

Abbotsford Road runs along the western boundary of the site and it is bounded to the north and south by residential properties. The surrounding area is primarily residential. There are currently seven driveway crossovers from Abbotsford Road to the existing residential properties.

The existing residential properties provide associated off-street parking. Parking on the Abbotsford Road frontage is prohibited on weekday from 7:00am to 6:00pm.

Refuse collection currently takes place from the street fronting the site via residential wheelie bins.

Figure 1: EXISTING SITE ARRANGEMENTS



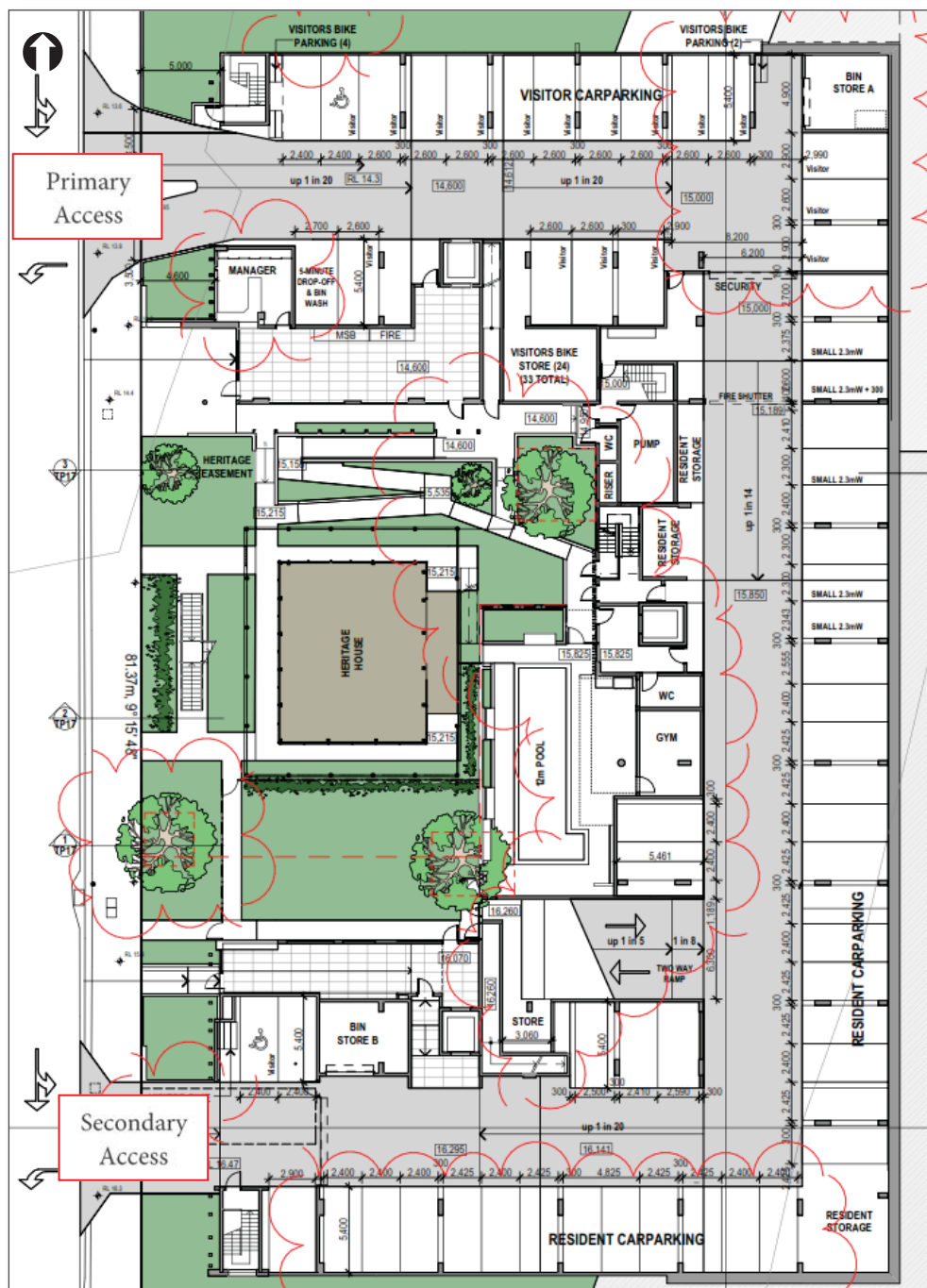
There are currently pedestrian footpaths along both sides of Abbotsford Road connecting the site to surrounding areas. No on-road cycle facilities are indicated on Abbotsford Road.

Bowen Hills Railway Station is situated directly opposite the site on Abbotsford Road with a pedestrian access as indicated in Figure 1. Bus stops are located on both sides of Abbotsford Road in the vicinity of the site. These bus stops are serviced by Translink routes 301, 310, 320 which provide services between Brisbane City and Chermside, Toombul and Redcliffe. Accordingly, the site is very well served by a range of public transport services.

PROPOSED DEVELOPMENT

The proposed development includes two residential buildings totally 156 units and associated parking. It is understood the existing heritage house located on the site is to be retained and converted into commercial space of 308m² Gross Floor Area (GFA). The ground level layout of the development proposal is shown in Figure 2 with dimensioned plans attached.

Figure 2: SITE LAYOUT – GROUND LEVEL



The proposed crossover widths and types are consistent with the standard driveway selection for cars and service vehicles outlined in BCC TAPS Policy.

Queuing at the Site Access

Australian Standard AS2890.1:2004 Parking Facilities Part 1: "Off-Street Car Parking" (AS2890.1) recommends queuing be provided in order to allow a free influx of traffic which will not adversely affect traffic or pedestrian flows on the frontage road (ie Abbotsford Road). The 95th percentile queue at the development access is considered to be an adequate measure of an acceptable queue at the site access.

The 95th percentile queue at the site access has been calculated using queuing theory outlined in the PTT Queuing Practice Note (attached). The results of the analysis indicate a 95th percentile queue at the access of 0.91 vehicles. Based on an average vehicle length of 6.0m, this equates to a 95th percentile queue length of 5.5m. The proposal includes approximately 11.5m of clear queuing at the primary access and 6.1m at the secondary access. Therefore, the proposed on-site queuing provision at both accesses will be sufficient to cater for the proposed development and meet the requirements of AS2890.1.

SECURITY GATES

The proposed location of the security gates are shown in Figures 5 and 6.

Figure 5: PRIMARY ACCESS SECURITY GATE LOCATION

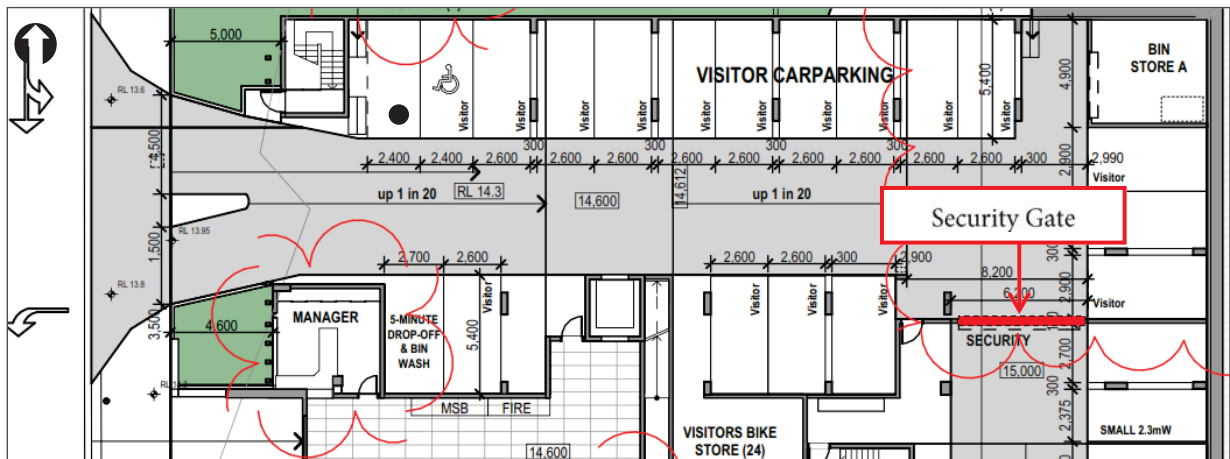
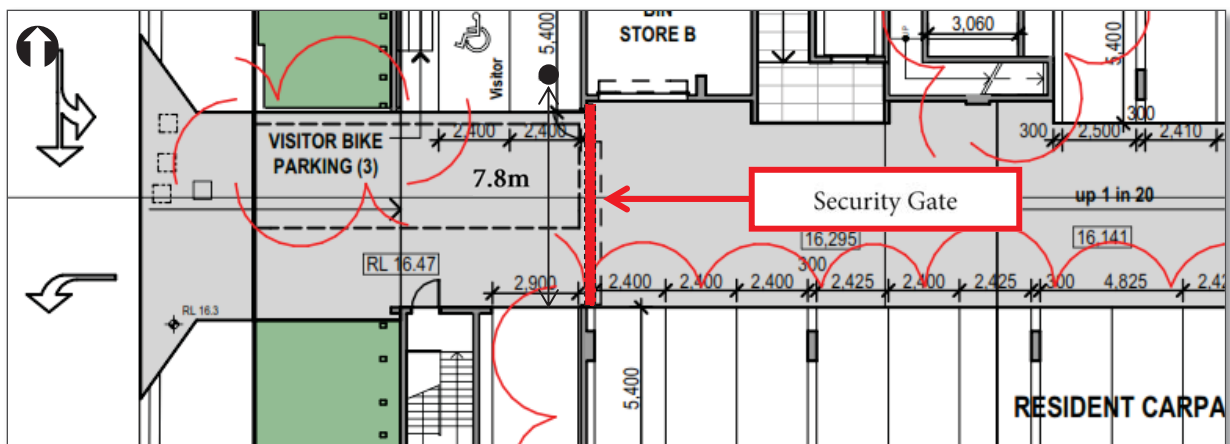


Figure 6: SECONDARY ACCESS SECURITY GATE LOCATION



Queuing at the Security Gate

At the primary access point, the proposed development provides approximately 43m of queue space between the property boundary and the security gate and 36m of queue space between the property boundary the card reader. In both cases, the queue space exceeds the 95th queue length calculated above and also the minimum queue lengths outlined in AS2890.1.

At the secondary access point, approximately 11m of queue space is available between the property boundary and the card reader mounted at the security gate. In both cases, the queue space exceeds the 95th queue length calculated above and also the minimum queue lengths outlined in AS2890.1.

Therefore, the provision of on-site queuing at both security gates is in line with the requirements of AS2890.1.

PARKING

Requirement

The car parking requirement for the site has been determined based on the rates within the Bowen Hills Urban Development Area Development Scheme for residential and commercial uses. A car parking provision of 160 spaces is required based on EDQ recommendations, as shown in Table 1.

Table 1: PARKING REQUIREMENTS

LAND USE	SCALE		PARKING RATE	SOURCE	REQUIREMENT
Residential	156	units	1 spaces per unit	EDQ	156
Commercial (heritage building)	308	m ²	1 space per 100 m ²	EDQ	4
Total					160

Provision

A parking provision of 172 spaces is proposed including:

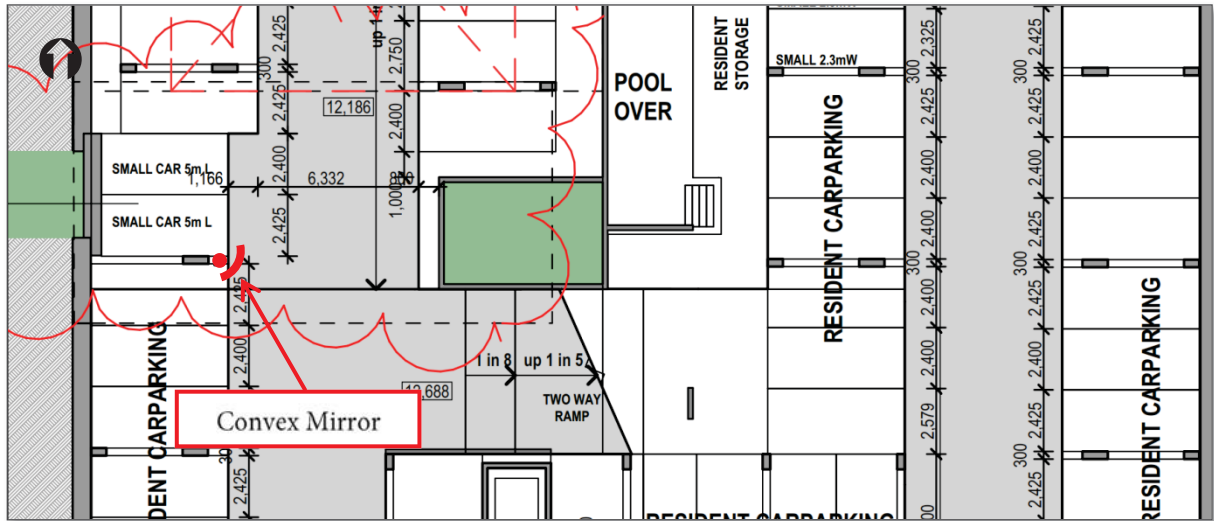
- 113 spaces at basement level 1, including:
 - 25 small car spaces
 - 5 tandem car spaces
- 59 spaces at ground level, including:
 - 19 visitor spaces
 - 2 Person with Disability (PWD) spaces
 - 6 small car spaces
 - 1 short term drop off space

It is understood that the tandem parking spaces are to be allocated to the same residential tenancy.

It is recommended the visitor parking area be signed appropriately for its intended use.

The proposed parking provision is 12 spaces above the requirement outlined in Table 1. This is due to the fact that the three-bedroom units are to be sold with two car parking spaces each. Therefore, the nine three bedroom units will account for nine of the twelve spaces above the requirement calculated in Table 1. The remaining three spaces have been provided for additional visitor parking.

Figure 8: CONVEX MIRROR LOCATION – BASEMENT LEVEL



COMMERCIAL VEHICLE SERVICING

According EDQ the proposed development is required to cater for:

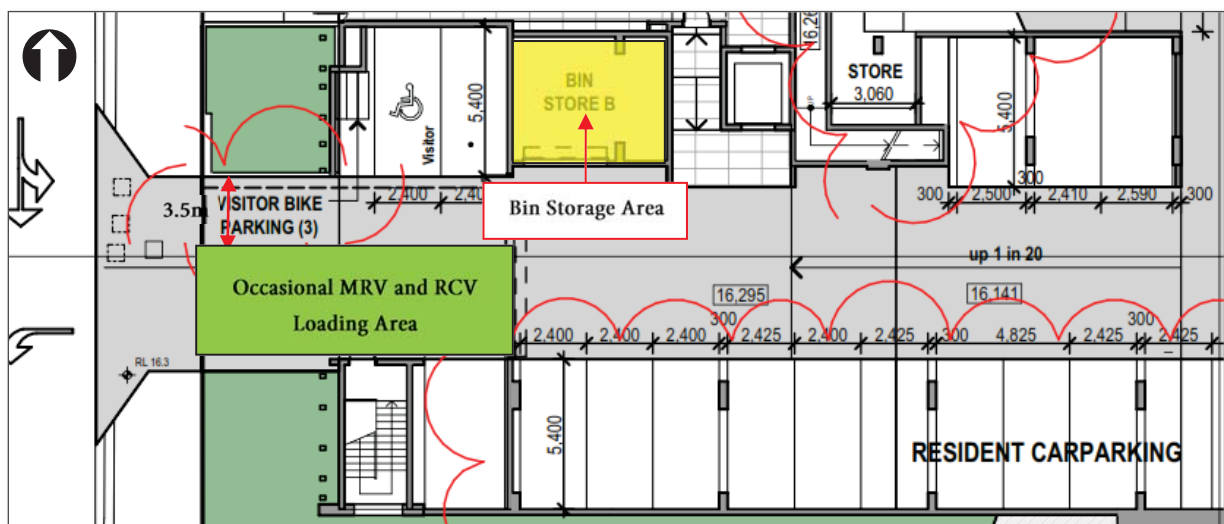
- a Medium Rigid Vehicle (MRV)
- a Refuse Collection Vehicle (RCV)

Servicing will be restricted to times outside of the morning and evening peak hours, reducing the potential for conflicts with other vehicles.

The proposed arrangement for the occasional access of an MRV and RCV is for the vehicle to reverse in from Abbotsford Road into the secondary access and park in the occasional loading area indicated in Figure 9. For refuse collection the bins will be wheeled from the bin storage area.

The proposed servicing area is clear of vertical obstructions.

Figure 9: **LOADING AREA**



This arrangement is considered acceptable given that the service vehicles:

- will access/egress the site utilising one reverse manoeuvre from Abbotsford Road
- can stand wholly contained within the site
- will not block exiting vehicles, as there is sufficient width (ie 3.5m) available for vehicle to manoeuvre around

Brisbane City Council–Waste & Resource Recovery Services have approved these arrangements, as shown on the attached signed and approved plans.

ACTIVE TRANSPORT

Bicycle Parking

Bicycle parking is to be provided in accordance with the rates published in the Bowen Hills Urban Development Area Development Scheme, for residential uses. The minimum requirement is shown in Table 2.

Table 2: BICYCLE PARKING REQUIREMENTS

LAND USE	SCALE		PARKING RATE	SOURCE	REQUIREMENT
Residential	156	units	1 space per dwelling	EDQ	156
Visitor	12,294	m ²	1 space per 400 m ²	EDQ	31
Total					187

The proposed development provides 33 visitor bicycle spaces on the ground floor level. This provision is in accordance with the requirements of the Bowen Hills Urban Development Area Development Scheme.

Furthermore, the proposed development provides adequate provision for residents to securely store bicycles in designated bicycle storage areas on-site.

Public Transport

This development site is well served by public transport and is not expected to have an adverse impact upon the existing public transport network.

RECOMMENDED SIGNAGE AND LINE MARKING

The internal paved areas are to be signed and delineated in accordance with the Manual of Uniform Traffic Control Devices and Austroads.

Signage is proposed at the access points detailing the permitted movements. Directional arrows marked on the pavement of the car park are recommended to clearly demonstrate the directionality of the parking aisles.

Consistent with AS2890.1 Section 4.3.4, a height clearance bar is recommended at the site access. Visitor and PWD car parks are to be clearly marked. Figures 10 and 11 indicate the recommended signage and line marking.

Figure 10: BASEMENT SIGNAGE AND LINE MARKING



CONCLUSIONS

Based on the above, the proposed development is in accordance with the AS2890.1 and the Bowen Hills Urban Development Area Development Scheme.

Please do not hesitate to contact us if you have any questions regarding this matter.

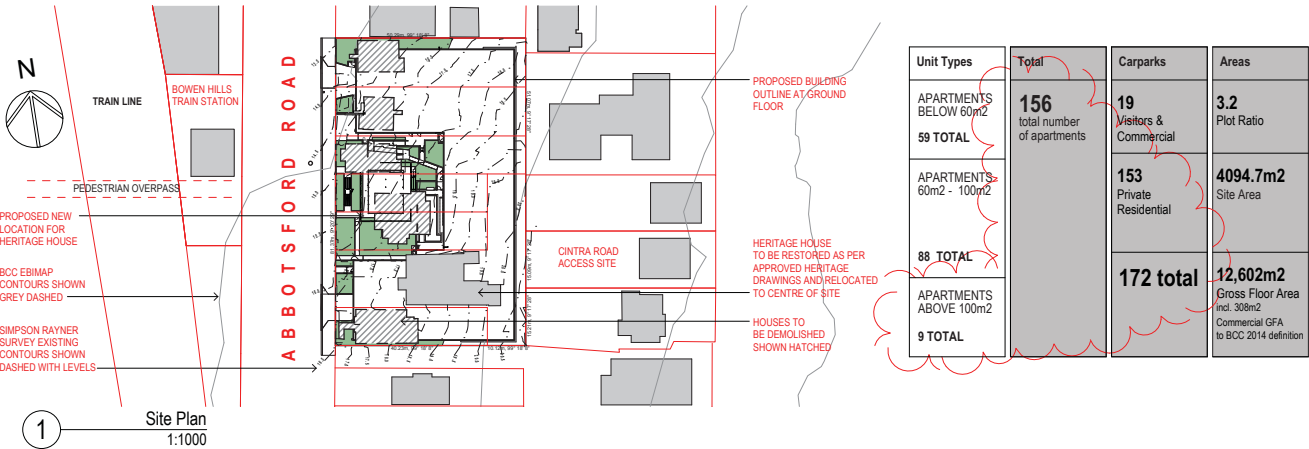
Yours sincerely,

A handwritten signature in black ink, appearing to read 'A. Pekol', enclosed within a hand-drawn oval.

Adam Pekol
Director (RPEQ 5286)

TOPAZ APARTMENTS

23 - 39 ABBOTSFORD ROAD, BOWEN HILLS



1 Site Plan 1:1000



2 Artist's Impression

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Project: TOPAZ RESIDENCES

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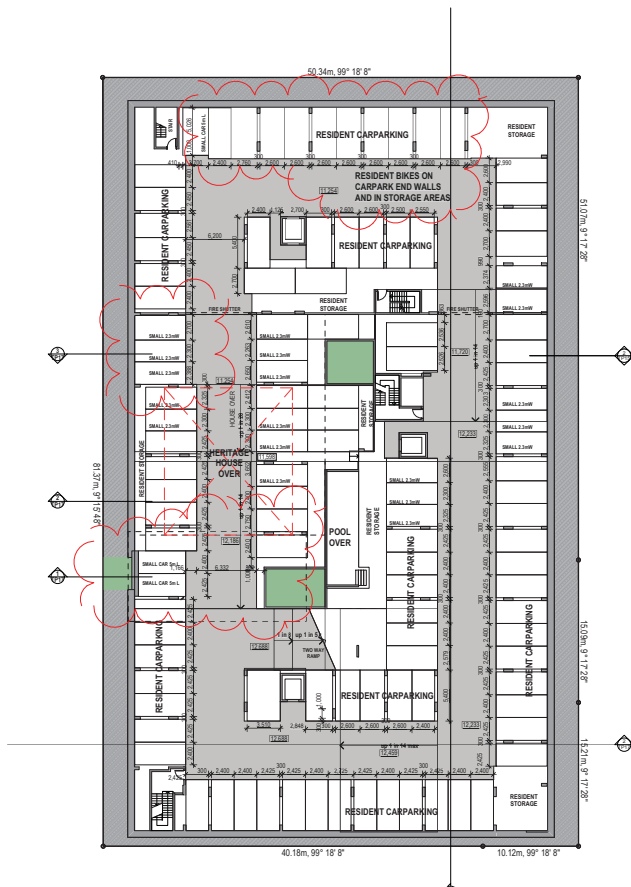
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1 Basement -1 Plan
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BASEMENT CARPARKING

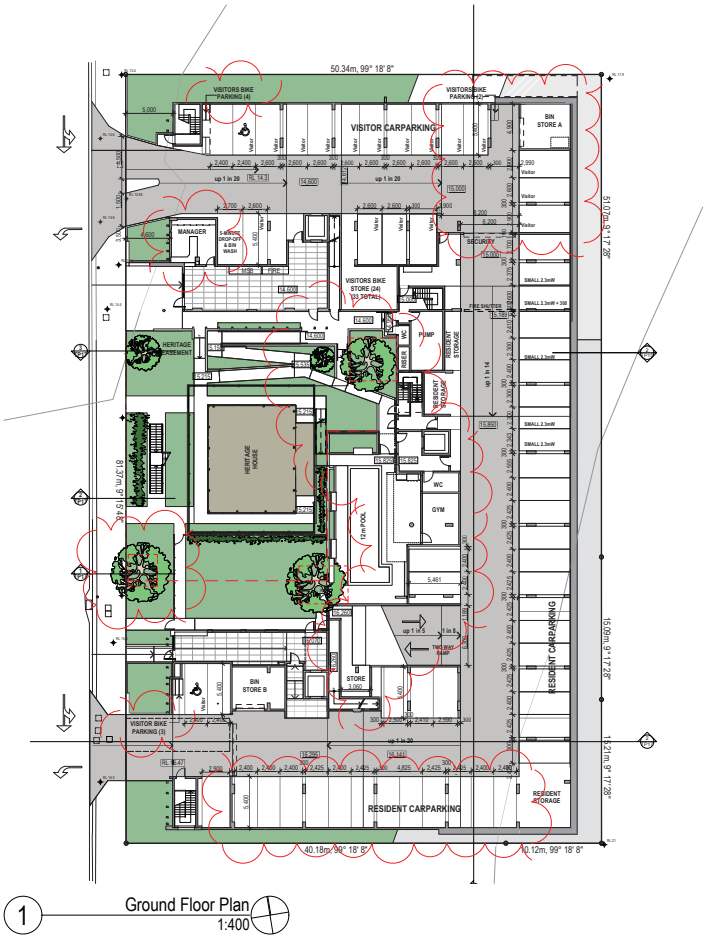
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PLANTING SHOWN INDICATIVELY.
REFER LANDSCAPE PLAN
FOR SPECIES AND PLACEMENTS

LEVELS SHOWN ARE TAKEN FROM
SIMPSON RAYNER SURVEY 06/03/13

RL= LEVEL TO AUSTRALIAN HEIGHT DATUM



HERITAGE HOUSE PUBLIC EASEMENT

= FREE AREA BELOW
FOR DEEP PLANTING ROOT BALL

KEY:

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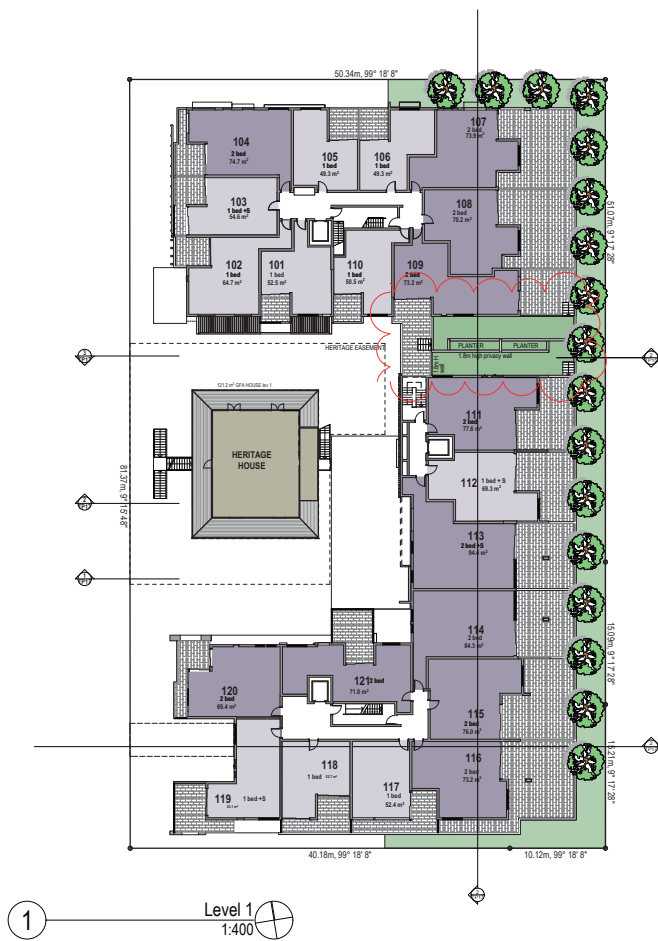
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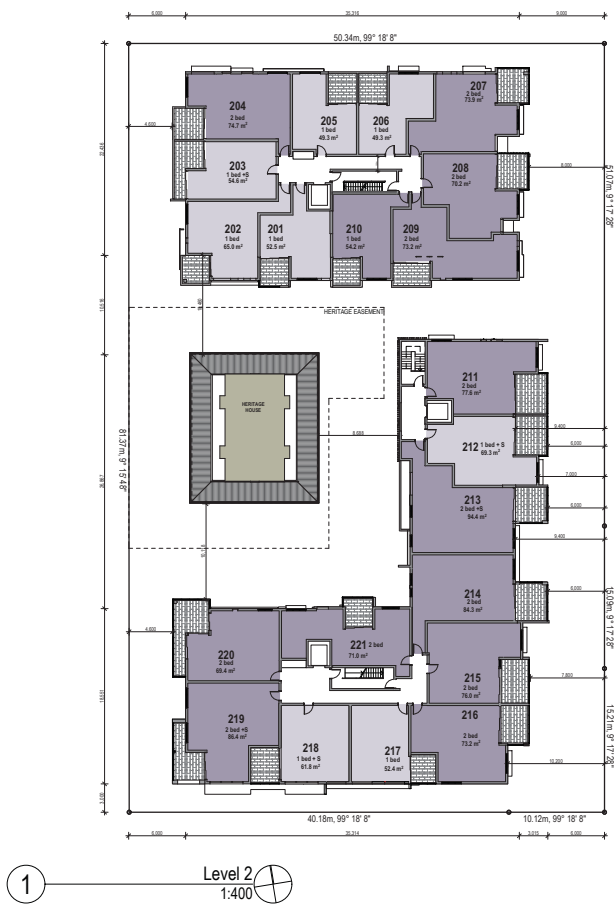
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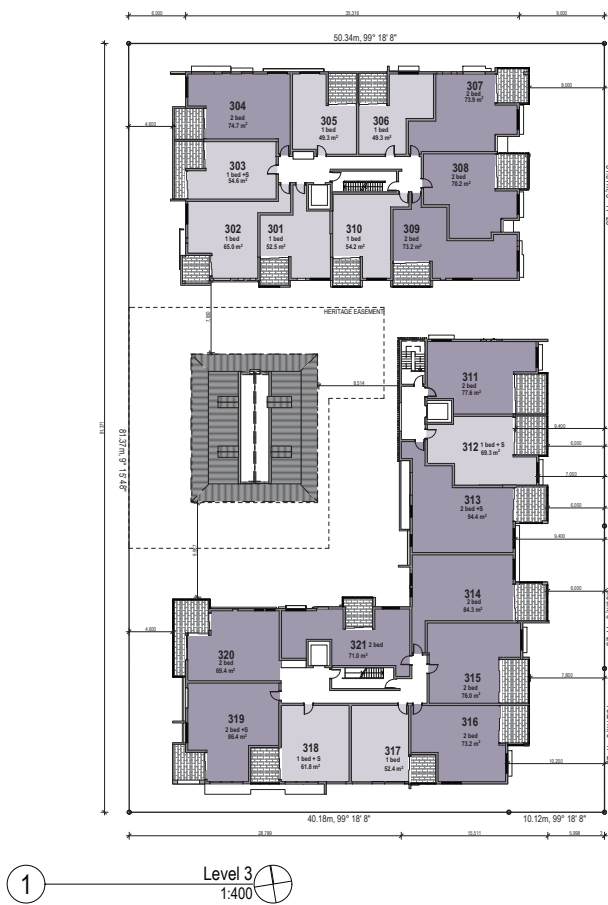
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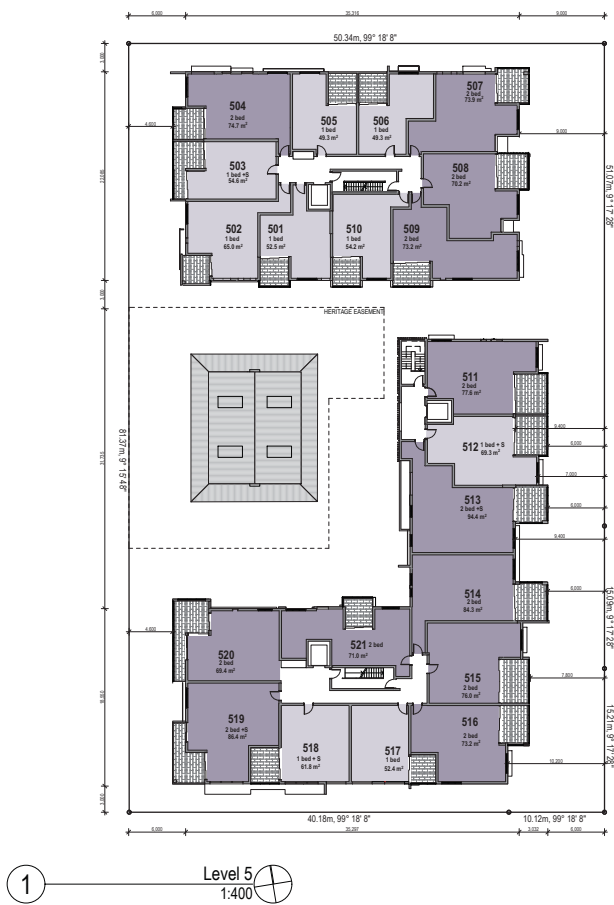
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810114 B	EQD ISSUE	EA
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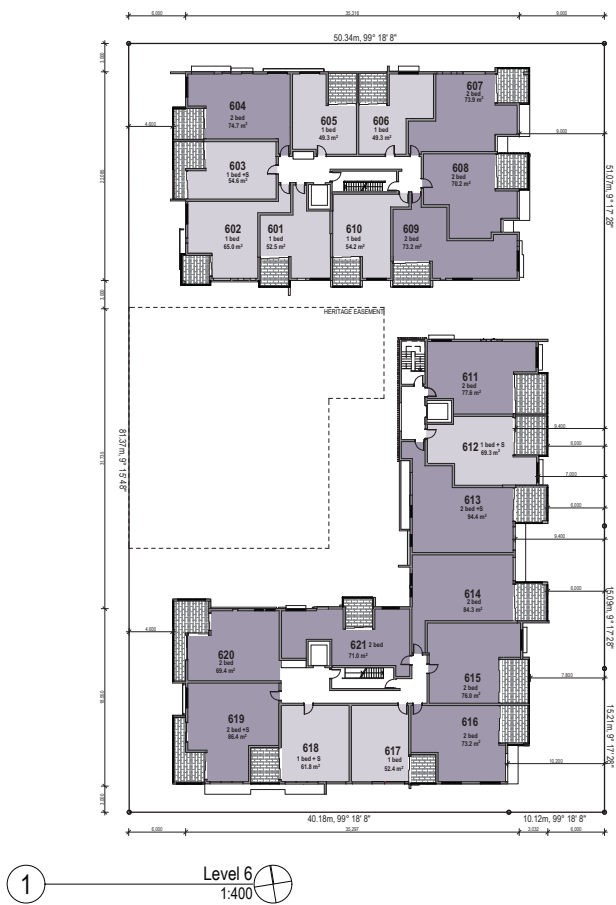
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TOWN PLANNING

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230215 D	TRAFFIC ISSUE	EA
280115 C	EQD ISSUE	EA
810114 B	EQD ISSUE	EA
311014 A	EQD ISSUE	EA

Drawn by: J. Lynch Checked by: J. Lynch

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Devine Constructions

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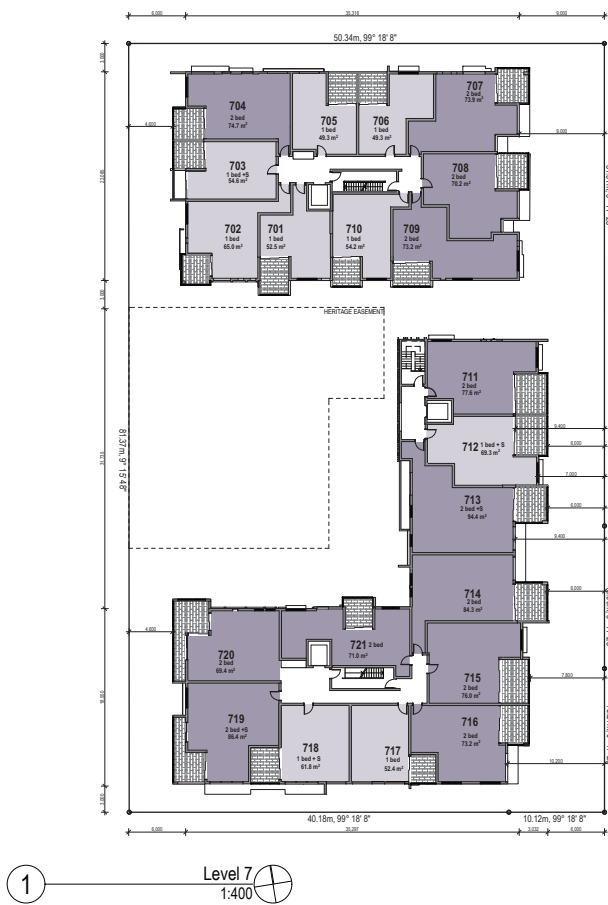
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Drawing Title

LEVEL 6 PLAN

Scale @ A3	Drawn: SH	Checked: EA
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H3179ABB	TP08	P

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1 Level 7
1:400

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28/01/15	C	EQD ISSUE	EA
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31/10/14	A	EQD ISSUE	EA

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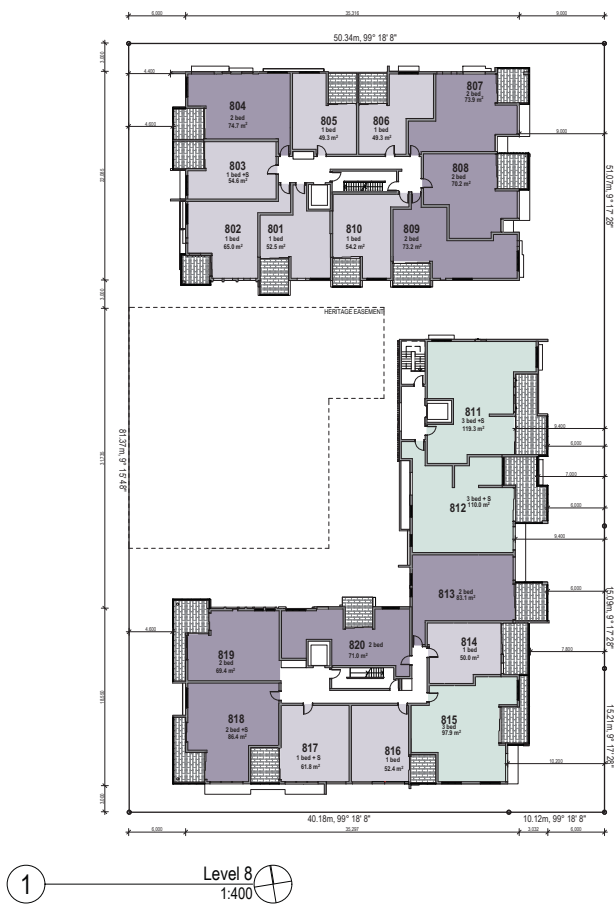
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Drawing Title

LEVEL 7 PLAN

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H3179ABB	TP09	P

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311014 A	EQD ISSUE	EA
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Drawing Title
LEVEL 8 PLAN

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H3179ABB	TP10	P

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28/01/15	C EDQ ISSUE	EA	
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31/10/14	A EDQ ISSUE	EA	
Date	No.	Details	Checked



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TORAZ RESIDENCES

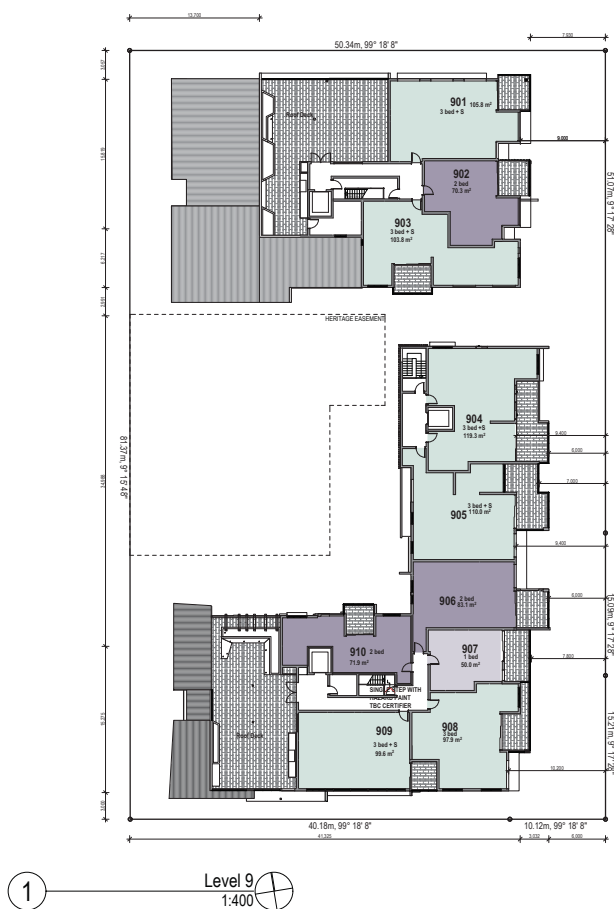
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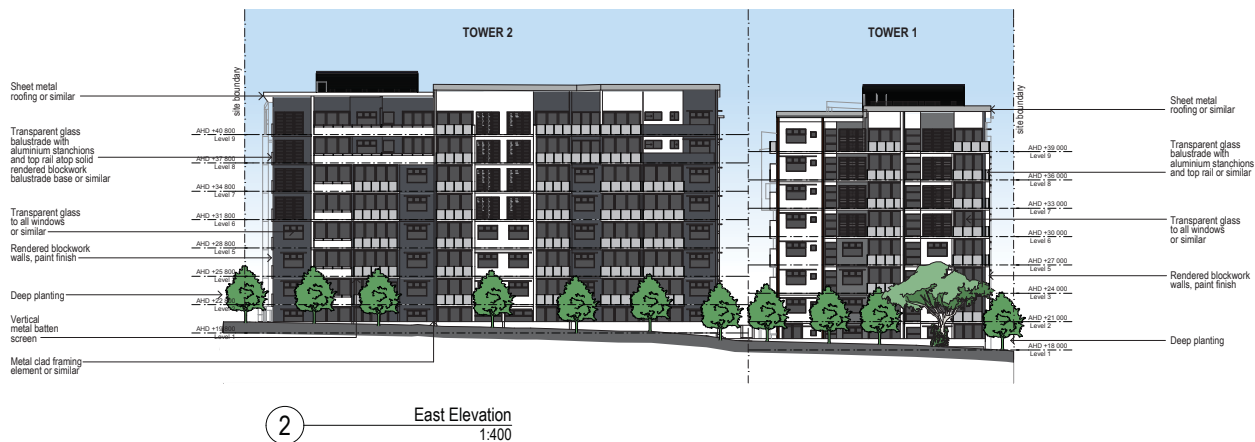
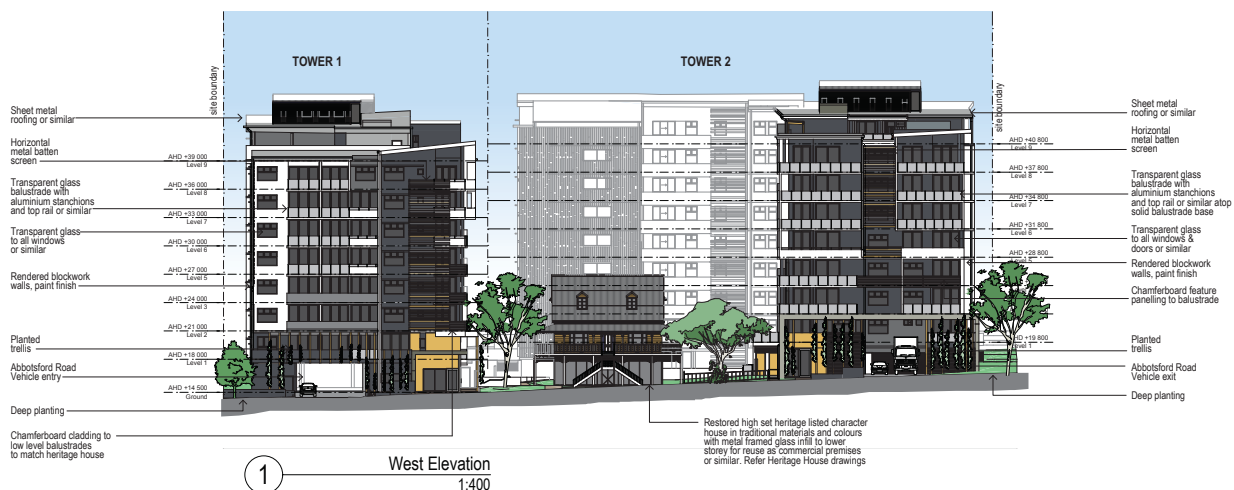
Bowen Hills, QLD 4006

Drawing Title
LEVEL 9 PLAN

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230215 D	TRAFFIC ISSUE	EA
280115 C	EQD ISSUE	EA
610114 B	EQD ISSUE	EA
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Client: Devine Constructions

Project: **TOPAZ RESIDENCES**

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Drawing Title: **EAST & WEST ELEVATION**

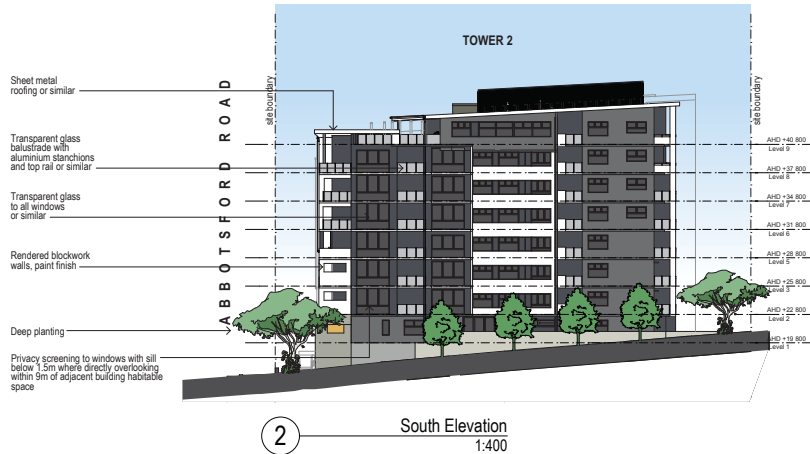
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Drawing Number: P

Issue: P

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6/12/14	B	EQD ISSUE	EA
31/10/14	A	EQD ISSUE	EA

Date: 20/10/15

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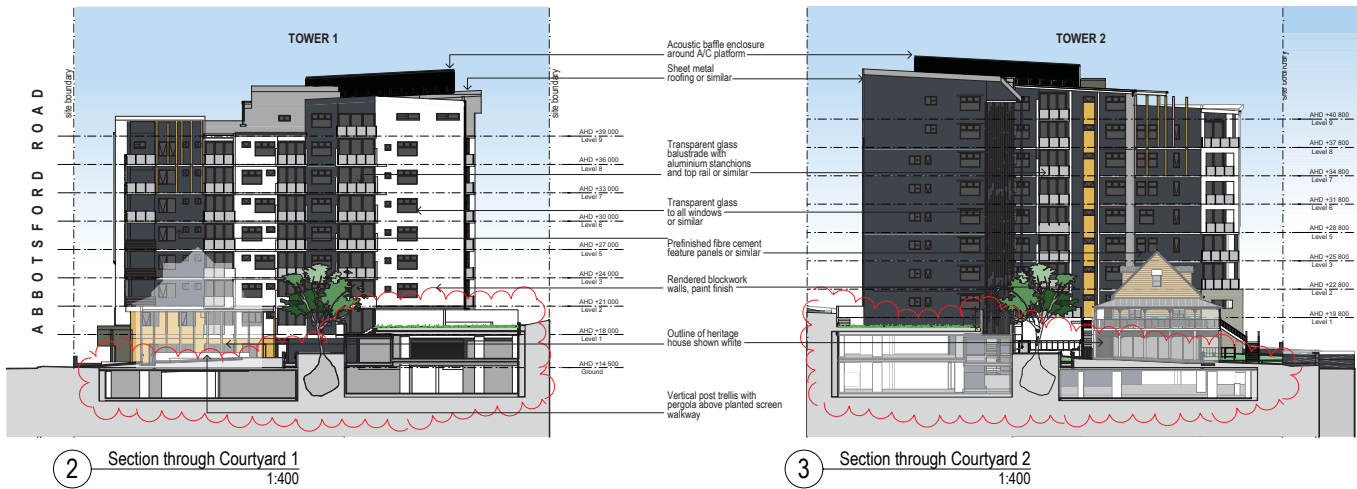
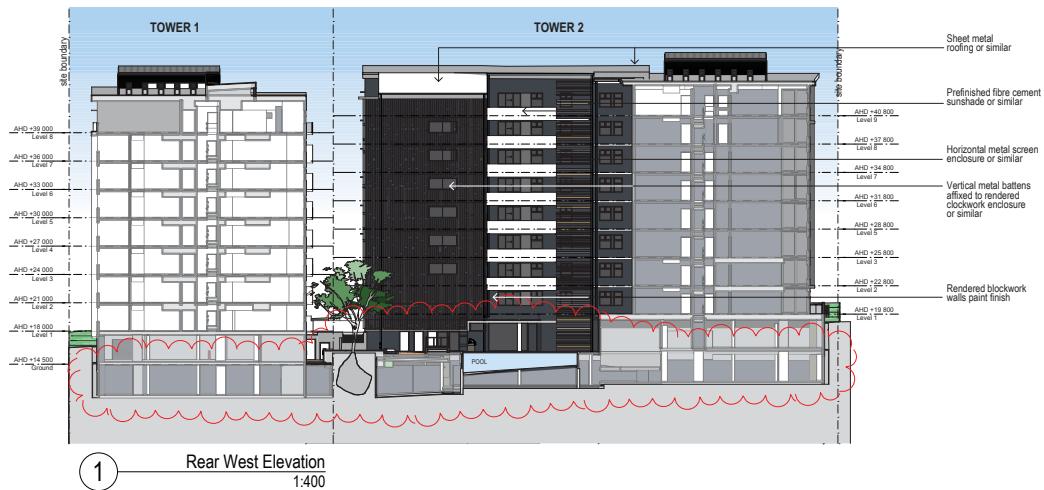
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Drawing Title
NORTH & SOUTH ELEVATION

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8/12/14	B	EQD ISSUE	EA
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Drawing Title
COURTYARD ELEVATIONS

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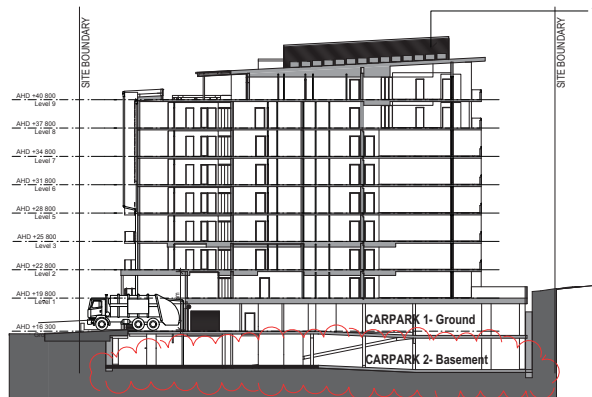
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1

Section A
1:400

ACOUSTIC Baffle SCREEN
AS REQUIRED TO MITIGATE
NUISANCE NOISE TO
NEIGHBOURING PROPERTIES



2

Section B
1:400

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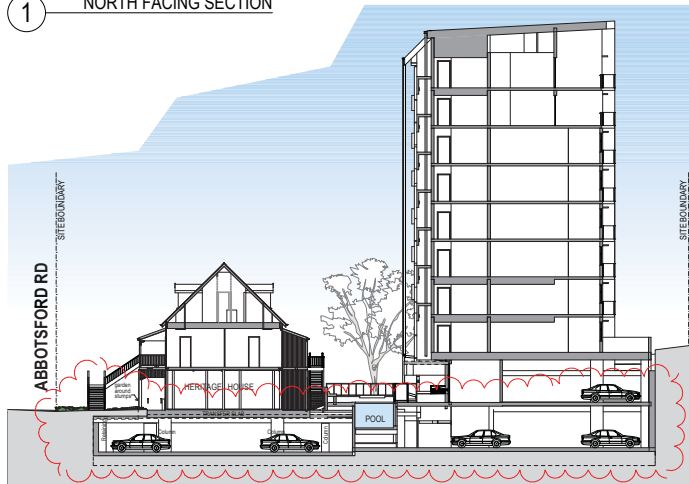
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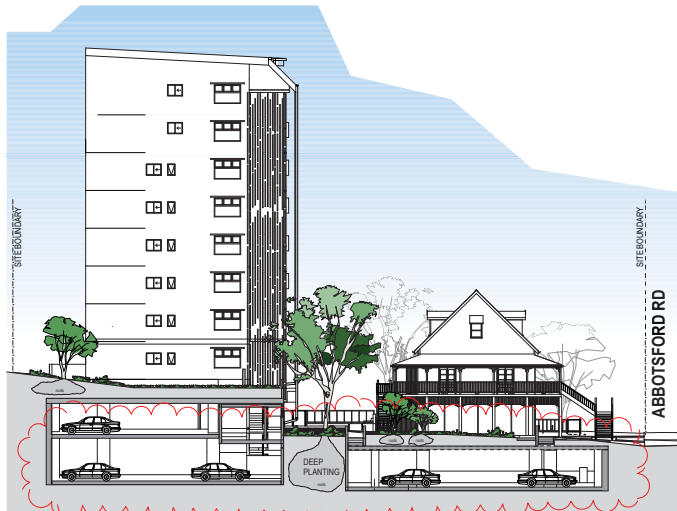
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1 NORTH FACING SECTION



2 SECTION THROUGH HOUSE



3 EAST FACING SECTION

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230215 D	TRAFFIC ISSUE	EA
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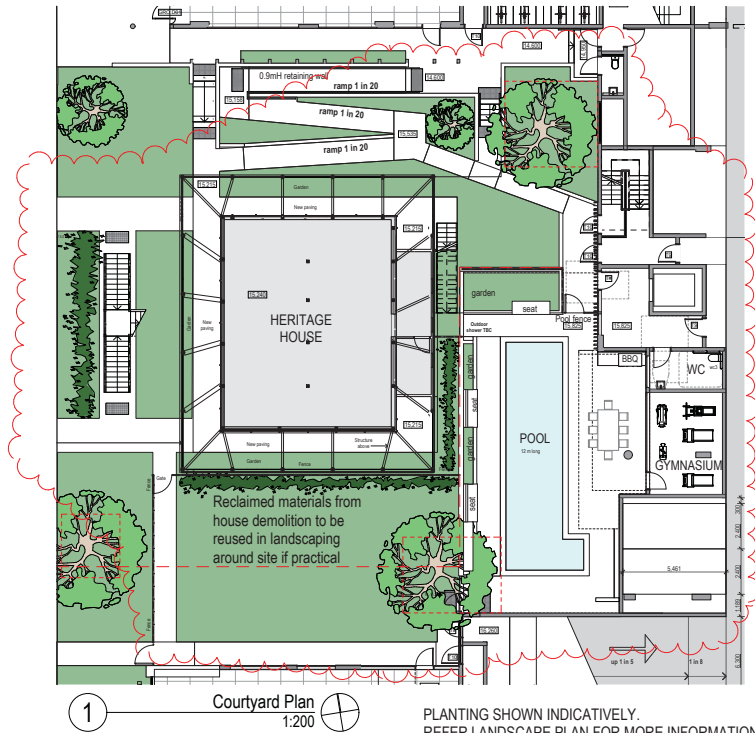
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SECTIONS THROUGH CARPARK
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Project Number: H3179ABB
Drawing Number: TP17
Issue: P

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ABBOTSFORD ROAD



1 Courtyard Plan 1:200

PLANTING SHOWN INDICATIVELY.
REFER LANDSCAPE PLAN FOR MORE INFORMATION

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31/12/14	A	EQD ISSUE	EA

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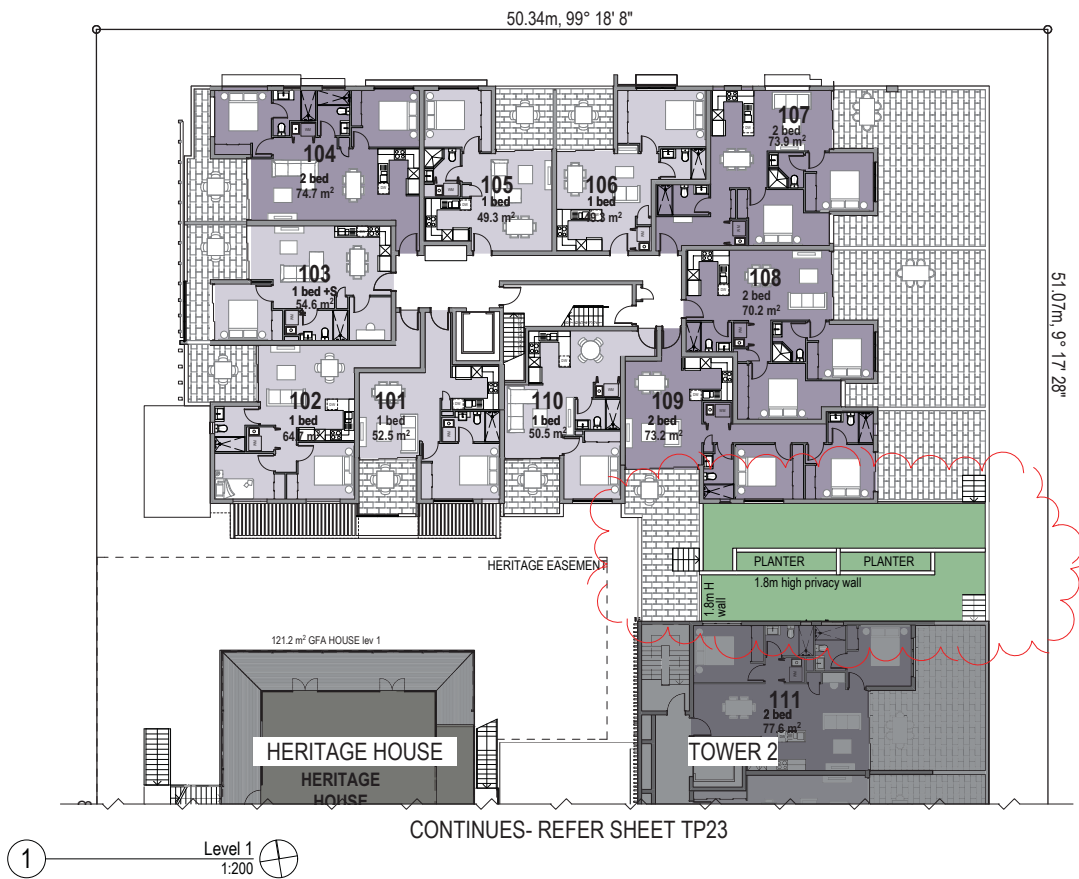
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Drawing Title
COURTYARD DETAIL PLAN

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31/12/14	A	EQD ISSUE	EA

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Drawing Title
**TOWER 1 ROOM LAYOUTS-
LEVEL 1**
Scale @ A3 Drawn: SH Checked: EA
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030615 G	EQD MEETING	EA
250315 F	EQD FURTHER ISSUES	EA
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230215 D	TRAFFIC ISSUE	EA
280115 C	EQD ISSUE	EA
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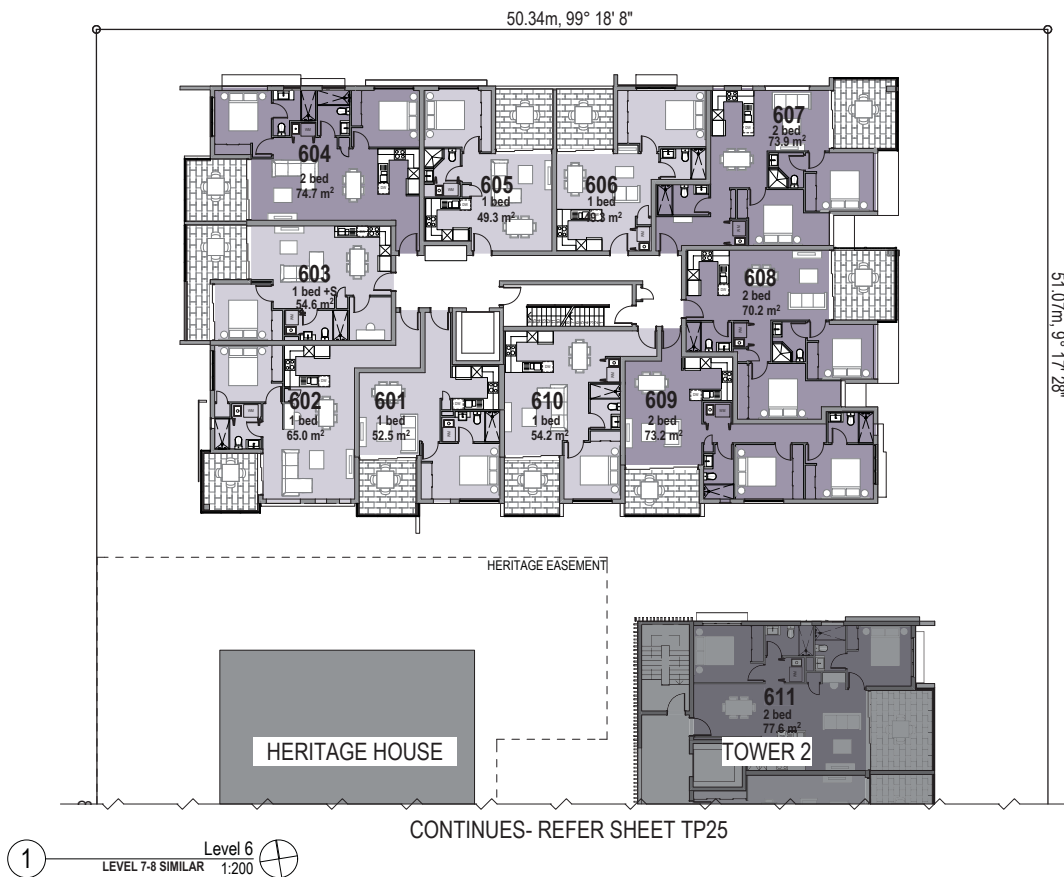
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Drawing Title
**TOWER 1 ROOM LAYOUTS,
LEVEL 2-5 TYPICAL FLOOR**
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Project Number Drawing Number Issue
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280115 C	EQD ISSUE	EA
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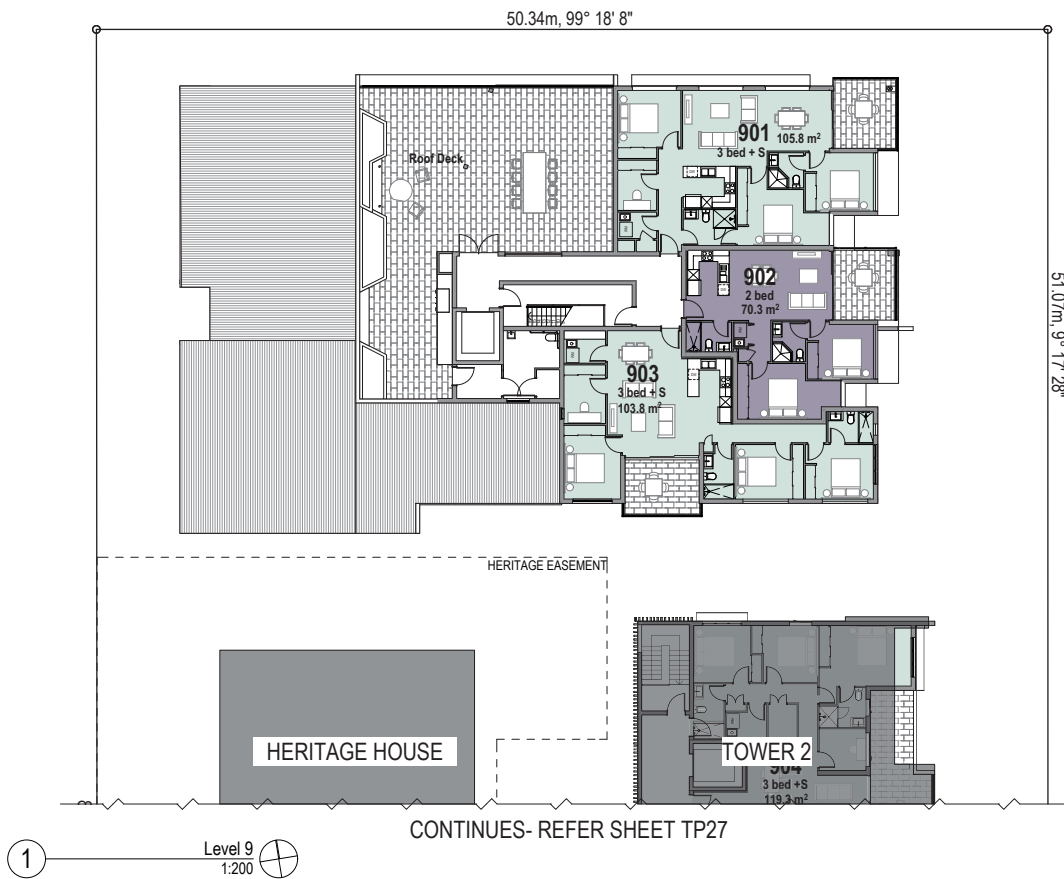
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Drawing Title
**TOWER 1 ROOM LAYOUTS,
LEVEL 6-8 TYPICAL FLOOR**
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1:200 SH EA
Project Number Drawing Number Issue
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04/03/15	E	EQD FURTHER ISSUES	EA
23/02/15	D	TRAFFIC ISSUE	EA
28/01/15	C	EQD ISSUE	EA
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31/12/14	A	EQD ISSUE	EA

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Drawing Title
**TOWER 1 ROOM LAYOUTS-
LEVEL 9**
Scale @ A3 Drawn: SH Checked: EA
1:200
Project Number Drawing Number Issue
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15/09/15	M	EQD ISSUE REVISED	AL
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28/01/15	C	EQD ISSUE	EA
8/12/14	B	EQD ISSUE	EA
31/03/14	A	EQD ISSUE	EA

Drawn by: J. Lynch Checked by: J. Lynch

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Project: **TOPAZ RESIDENCES**

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Drawing Title: **TOWER 2 ROOM LAYOUTS- LEVEL 1**

Scale: B/A3 Drawn: SH Checked: EA

Project Number: H3179ABB Drawing Number: TP23 Issue: P

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Drawing Title
TOWER ROOM LAYOUTS-

LEVEL 2-5 TYPICAL FLOOR

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Project Number Drawing Number Issue

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230215 D	TRAFFIC ISSUE	EA
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Drawing Title
TOWER 2 ROOM LAYOUTS.

LEVEL 6-7 TYPICAL FLOOR

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230215 D	TRAFFIC ISSUE	EA
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Drawing Title

TOWER 2 ROOM LAYOUTS -

LEVEL 8

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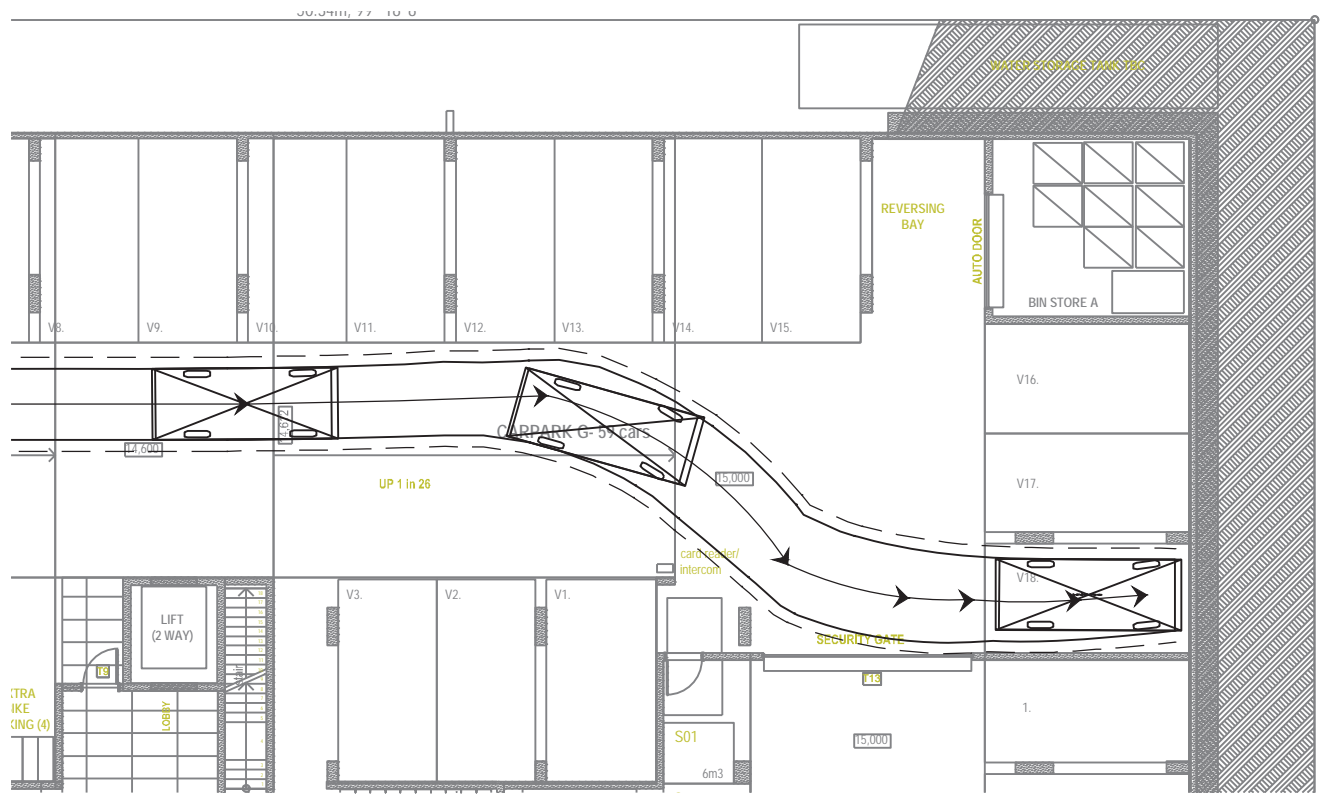
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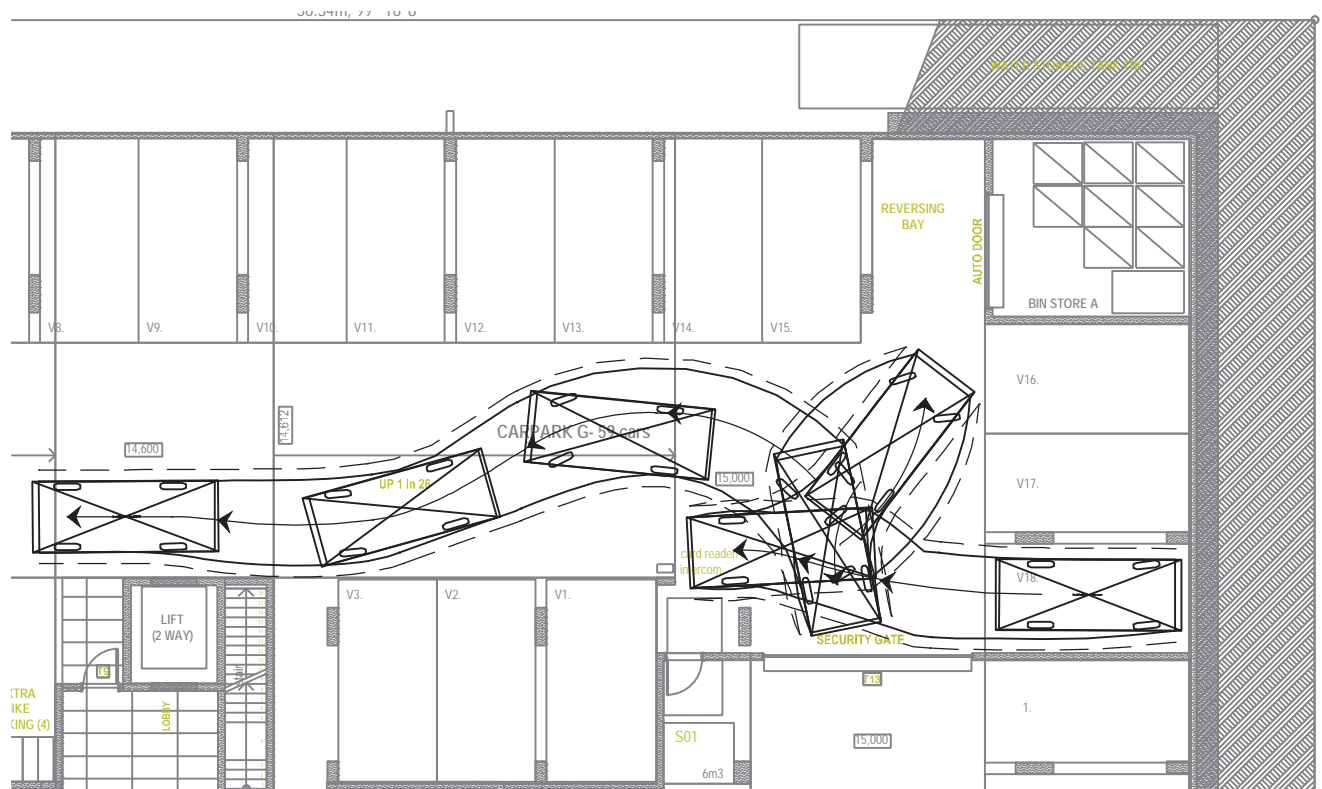
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Drawing Title
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LEVEL 9**
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Project Number Drawing Number Issue
H3179ABB TP27 P

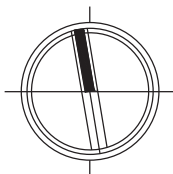
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INGRESS MANOEUVRE



EGRESS MANOEUVRE



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Full Size A4



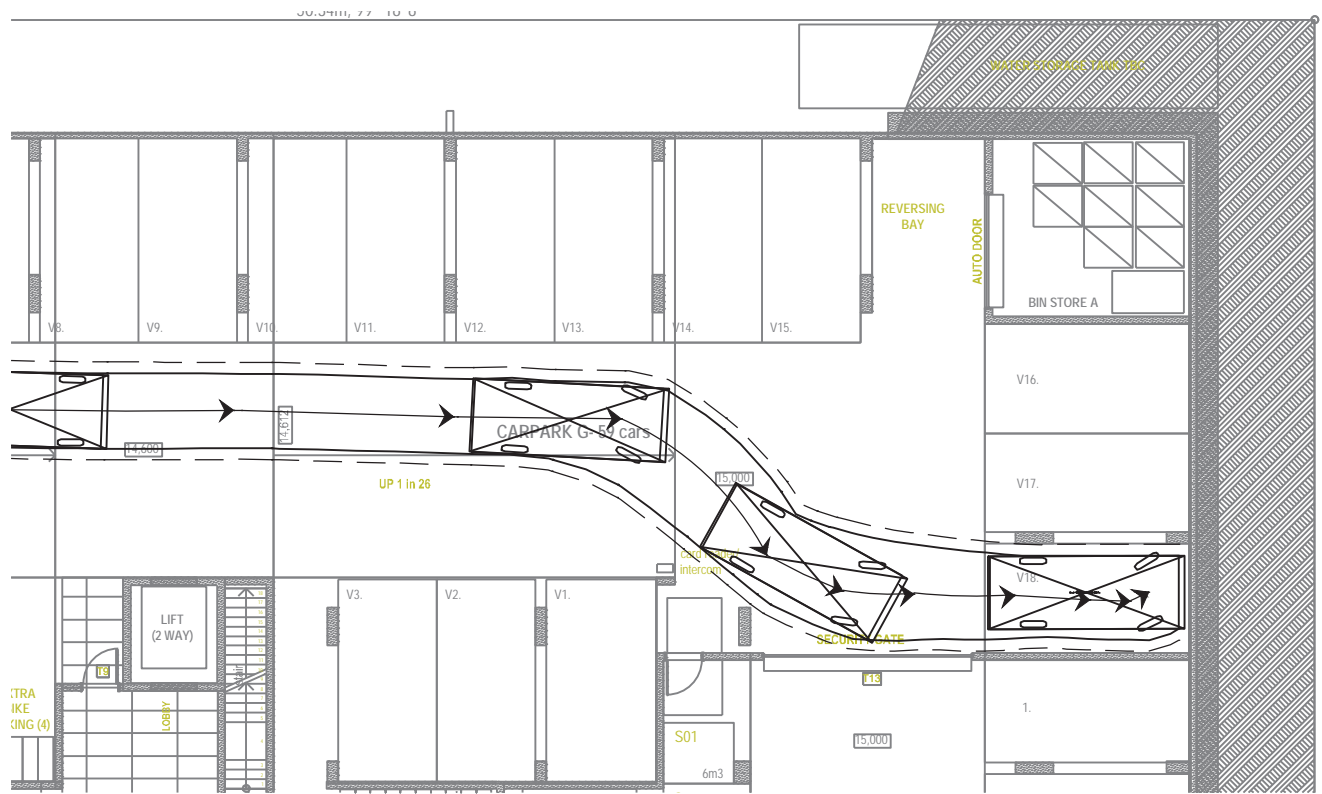
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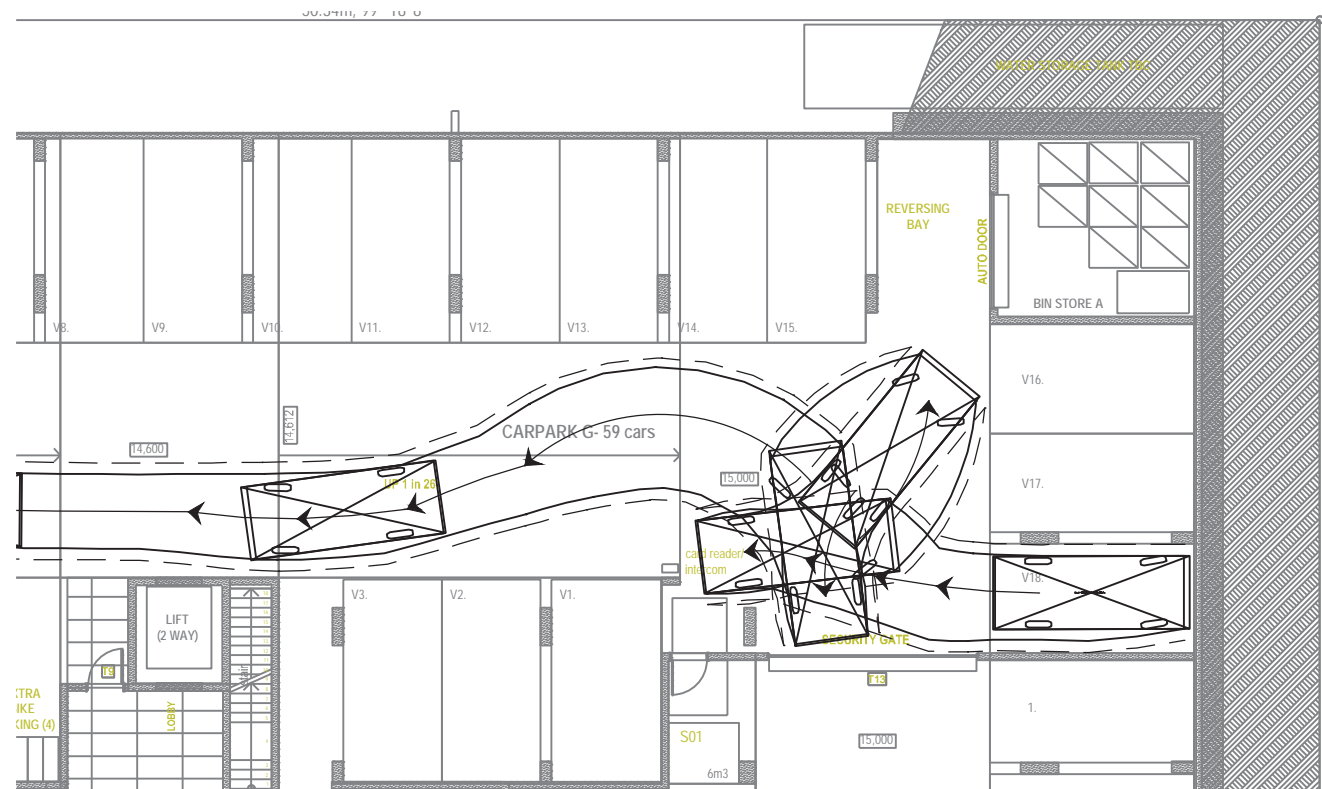
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DATE: 1/10/2015 JOB NO: 5541-048

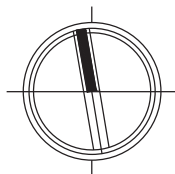
SCALE: 1 : 200 DRAWING: FIGURE 2



INGRESS MANOEUVRE



EGRESS MANOEUVRE



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Full Size A4

PRACTICE NOTE

QUEUING CHARACTERISTICS AT SITE ACCESSSES



BACKGROUND

On-site queuing areas are required at site access locations to ensure that vehicles do not queue across pedestrian paths or back onto the frontage road.

However, with queuing requirements in planning scheme policies becoming increasingly onerous, the usage of these figures can result in excessive queuing areas which can unnecessarily have an adverse effect construction costs and development yields.

This practice note demonstrates how conventional queuing theory can be used in traffic engineering to determine the anticipated queue length at access locations as a function of local conditions.

QUEUING THEORY

To calculate the amount of queuing space required, we must estimate the probability of a number of vehicles in a queue (n) exceeding a specified number of vehicles (N) at any instant. This is calculated using the following formula:

$$\Pr(n > N) = \rho^{N+1} \leq \alpha$$

Where:

- ρ is the queue utilisation factor
- α is the probability of a queue of N vehicles being exceeded

Rearranging this formula enables the calculation of the design queue length in terms of the number of vehicles as follows:

$$N = \frac{\log(\alpha)}{\log(\rho)} - 1$$

The **minimum** design queue would be calculated as N vehicles, which may include a fraction of a vehicle (eg 1.2 vehicles). This design queue could be applied subject to engineering judgment.

The **desirable** design queue would be the smallest integer which contains the value, N (ie rounded up to the nearest integer).

Application of a standard vehicle length of 6m per vehicle results in a design queue length in metres.

QUEUE UTILISATION FACTOR

The utilisation factor, ρ , is the ratio of the mean arrival rate (r) and the mean service rate (s), ie:

$$\rho = \frac{r}{s}$$

The mean arrival rate (veh/hr) varies for each situation. It is calculated using the peak hour trip generation for the facility. This is expressed in vehicles per hour.

The mean service rate (veh/hr) is determined by observing the operations of similar facilities.

PTT has calculated the mean service rate for a non-controlled (ie no boom gate) parking facility by surveying the average time taken for cars to enter and leave from visitor parks in a residential development.

This survey was undertaken at a recently approved and constructed mixed use commercial/residential development at Nundah on a Wednesday in July 2014 between 4:30-6:00pm. A minimum of 30 observations were made for both “parking” and “unparking” manoeuvres. The results of this analysis are shown in Table 1.

PRACTICE NOTE

QUEUING CHARACTERISTICS AT SITE ACCESSSES



Table 1: MEAN VEHICLE MANOEUVRING TIME
(seconds/vehicle)

MANOEUVRE	MEAN TIME	STD DEV	MIN	MAX
Parking	12.2	13.8	1.1	69.5
Unparking	14.7	7.1	2.1	37.2

The application of the mean “unparking” value from Table 1 assumes that each vehicle which enters the access will be waiting for a car to “unpark” from the space nearest to the access. This is an extremely conservative assumption, which will result in an over-estimate of queue lengths.

The mean service time for car parks with entrance controls such as boom gates, ticket dispensing machines, car stackers and mechanical parking installations can usually be provided by the supplier of the product.

PROBABILITY OF EXCEEDANCE

The queuing formula is used to calculate the queue length given a specified probability (α).

Generally, the 95th percentile queue is considered an adequate measure of an acceptable queue at access driveways. This infers that there is a 5% probability that the queue length will be exceeded (ie $\alpha=0.05$).

Australian Standards, AS2890.1, outlines the requirement to provide a 98th percentile queue for situations where mechanical parking installations such as car stackers are used (ie $\alpha=0.02$).

EXAMPLE

A development with a mean peak hour trip generation of 100 veh/hr and a 80:20 in:out split results in a vehicle arrival rate of 80 veh/hr.

The service rates from Table 1 can be applied to calculate the queue utilisation factor. However common units are required to find a ratio.

Therefore, the service rate, s , is:

$$\frac{\text{vehicle}}{\text{hour}} = 3,600 \left(\frac{\text{seconds}}{\text{vehicle}} \right)^{-1}$$
$$s = \frac{3,600}{14.7} = 244.9 \text{ vehicles per hour}$$

The queue utilisation factor is:

$$\rho = \frac{r}{s} = \frac{80}{244.9} = 0.327$$

The 95th percentile design queue:

$$N = \frac{\log(\alpha)}{\log(\rho)} - 1$$
$$N = \frac{\log(0.05)}{\log(0.327)} - 1$$

$$N = 1.68 \text{ vehicles}$$

Therefore, desirably, the development should be designed to allow for an entrance queue of two vehicles (ie 12m). However, an available queuing distance of 1.68 vehicles (ie 10.1m) would be considered acceptable to cater for the 95th percentile queue, subject to engineering judgment.

PRACTICE NOTE

QUEUING CHARACTERISTICS AT SITE ACCESSSES



CONCLUSION

Conventional traffic engineering queuing theory can be used to determine the anticipated queue length at access locations. This ensures that queuing does not adversely impact on nearby traffic or pedestrian flows whilst ensuring that the queuing area is not excessive.

REFERENCES

Bennett, DW and Rose, G (1988), *Unsignalised Intersection Analysis*, University of Melbourne

Institute of Transport Studies Monash University (2003), *Traffic Engineering and Management*, Volume 2, Caulfield East

Standards Australia (2004), *AS2890.1:2004 Parking facilities Part 1: Off-street car parking*, Sydney

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Contact Name: John Love
Telephone: 3027 4669:
E-mail: john.love@brisbane.qld.gov.au

Dedicated to a better Brisbane

Date 6 August 2015

REF No 3330

Attn: Harj Singh
Pekol Traffic & Transport
Level G 67 St Pauls Terrace
Spring Hill 4000

Phone Ph 3839 6771
Email: h.singh@ptt.com.au

Dear Harj,

Re: Refuse Service
156 Multiple dwelling units + existing Heritage Building REAR LIFT
TRUCK
23 - 39 Abbotsford Road Bowen Hills

- This letter is provided as advice only that Waste & Resource Recovery Services can provide waste and recycling collections based on the plans provided. Development Assessment is the Council agency responsible to assess and approve that the design of waste collection is in accordance with City Plan refuse collection policy.

If you need any further information please contact me on the above phone number.

Yours faithfully

John Love
Waste Development Assessment Officer
Waste and Resource Recovery Services Branch

0808 FEB

REF 3330

THESE PLANS ARE SATISFACTORY TO
WASTE AND RESOURCE RECOVERY SERVICES
SUBJECT TO APPROVAL FROM D.A.
6/8/2015
JOHN LOVE
WASTE AND RESOURCE RECOVERY SERVICES

BIN STORE A-
SITE MANAGER USES
TOWING VEHICLE TO
RELOCATE BINS TO BIN
STORE B FOR COLLECTION

TOWING VEHICLE EG: MOVEXX
'TUG' MODEL T2500 (OR SIMILAR)
REQUIRED. STORED IN BIN STORE
A, SECURED TO WALL

REAR LIFT TRUCK
REVERSE IN
DRIVE OUT
1100 LTR BINS
WASTE AND RECYCLE

BIN STORE B-
BINS FROM BIN STORE A
RELOCATED TO
REFUSE TRUCK THIS ROOM ON
REFUSE COLLECTION DAY

BIN QUANTITY

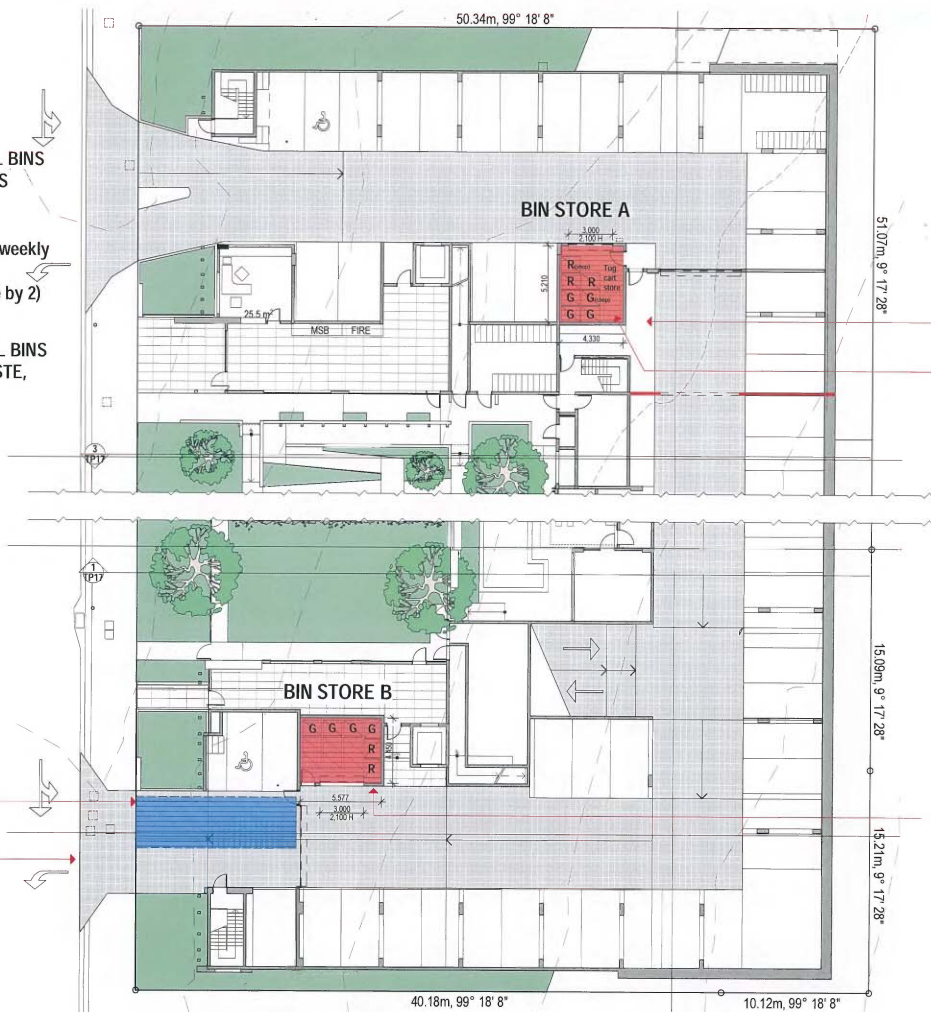
FOR APARTMENTS: 1100L BINS
7 x GENERAL WASTE BINS
4 x RECYCLING BINS

(156 units x 100L /2 (twice weekly
pickup)/ 1100L = bin
number. Recycling= divide by 2)

FOR COMMERCIAL: 1100 L BINS
EXTRA 1 x GENERAL WASTE,
EXTRA 1 RECYCLING
(estimated usage)

REFUSE TRUCK
LOADING AREA

TWO-WAY
TYPE B2
CROSSOVER



TOPAZ APARTMENTS ABBOTSFORD ROAD - REFUSE COLLECTION STRATEGY 04/08/15 NTS

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REF 3330

RECEIVED
FEB 11 1964
U.S. AIR FORCE

RECEIVED
FEB 11 1964
U.S. AIR FORCE
WASHTON

REF. 3330

THREE AND FOUR WHEEL
DRIVE LIFT TRUCKS
REAR LIFT TRUCK
REAR LIFT TRUCK

REAR LIFT TRUCK
REVERSE IN
DRIVE OUT
LIFT TRUCK