PEKOL TRAFFIC & TRANSPORT

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17 December 2014

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 letter has been prepared in response to items 21, 22 and 23 of the Economic Development Queensland (EDQ) Decision Notice (DN) DEV2012/397. The proposed development comprises a 156 unit residential development at 23-39 Abbotsford Road and 28 Cintra Road, Bowen Hills.

EXISTING CONDITIONS

The site is currently occupied by seven residential dwellings, six fronting onto Abbotsford Road with the other onto Cintra Road. It is located at 23-39 Abbotsford Road and 28 Cintra Road, Bowen Hills 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, Lot 17 on RP47816 and Lot 4 on RP40430.

Abbotsford Road runs along the western boundary of the site with Cintra Road running along the eastern boundary. 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 and one from Cintra Road.

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. On-street parking is available on Cintra Road in the vicinity of the site.

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

ITEM 5

A swept path assessment of a B99 car entering and exiting the nominated parking space was conducted in response to Item 5 of EDQ's FIL. Figures 1 and 2 demonstrate that a B99 car can enter and exit the parking space with sufficient clearances on both sides.

Figure 1: B99 INGRESS MANOEUVRE

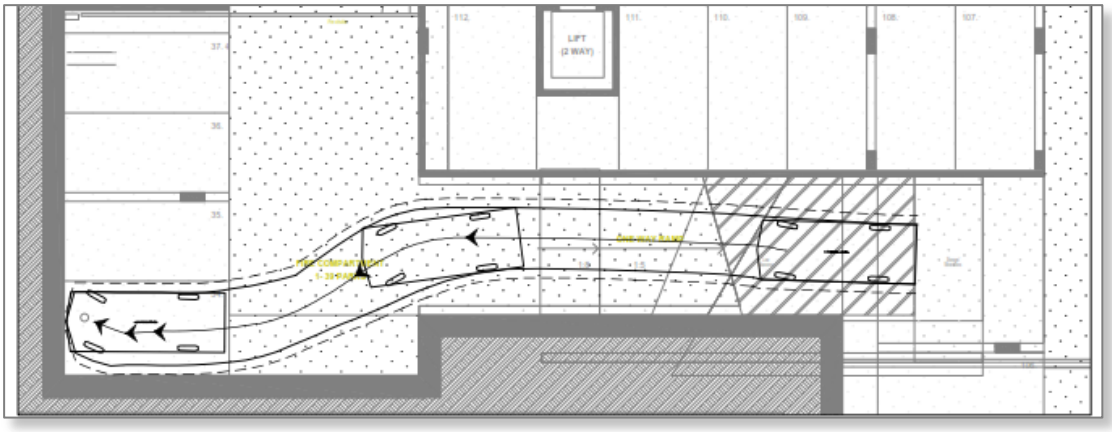
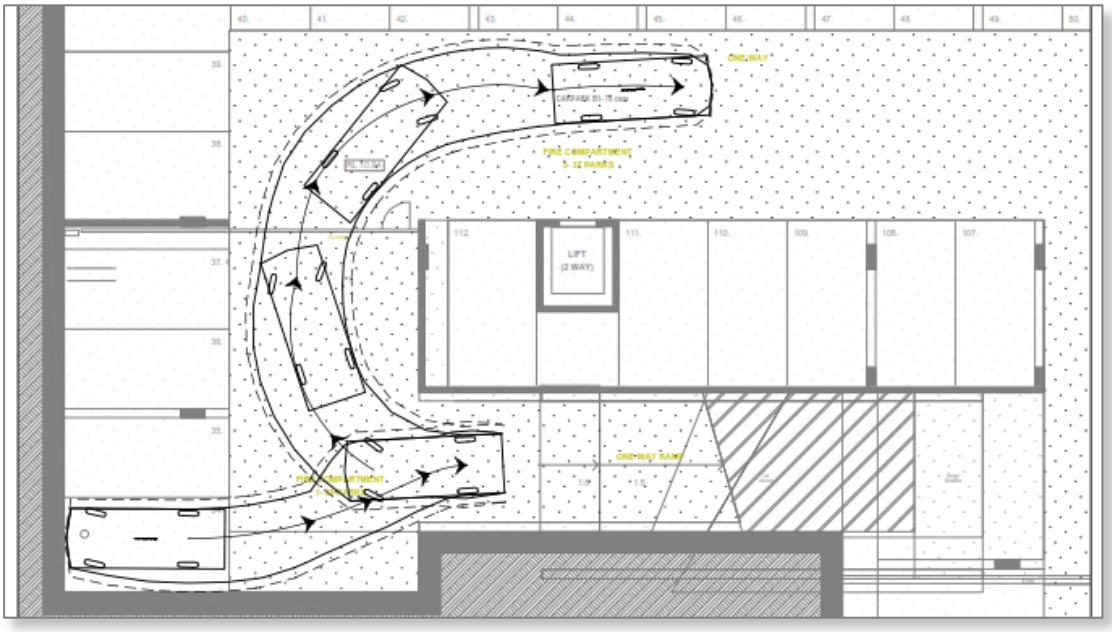


Figure 2: B99 EGRESS MANOEUVRE



ITEM 6

All columns have been located within the design envelope around a parked vehicle, as outlined in the Australian Standards, Part 1: Off-Street Car Parking (AS2890.1).

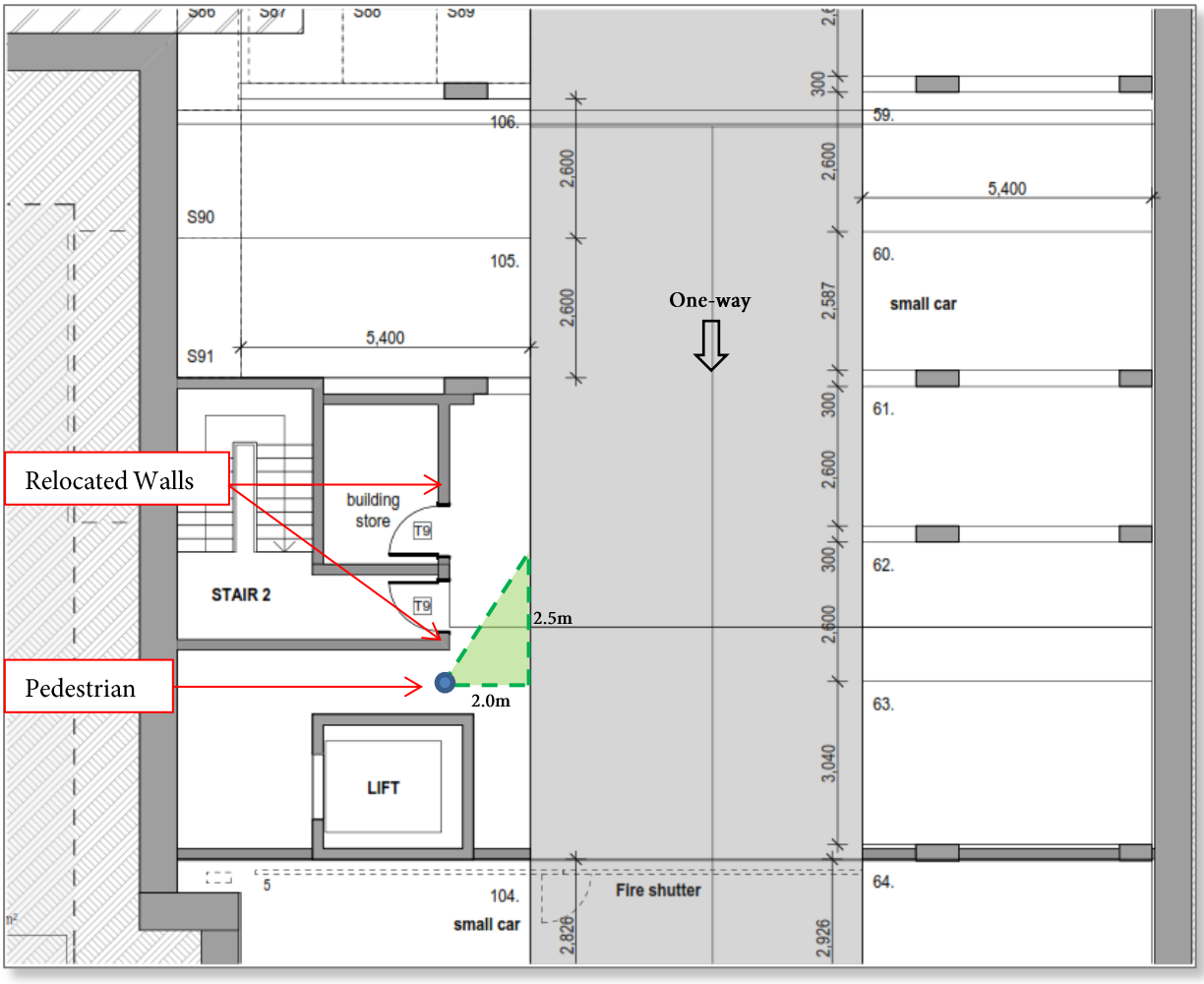
ITEM 7

These symbols were a drawing error and have now been deleted.

ITEM 8

In addressing Item 8 of the FIL, the wall of the building store room has been pulled back from the one-way parking aisle to improve the available pedestrian sight distance. As Figure 3 shows, the pedestrian sight distance is now in line with AS2890.1 Figure 3.3 – Minimum sight lines for pedestrian safety.

Figure 3: MODIFICATIONS TO INCREASE SIGHT DISTANCE



ITEM 9

SECURITY GATES

The proposed location of security gates are shown in Figures 4 and 5. As this is a one-way car park system visitors to the site will need to pass through the security Gates 2 and 3 to exit the site. It is understood that visitors will use intercom to contact building management who will then open Gate 2 to allow the vehicle to exit, Gate 3 is an automatic gate which opens once a vehicle passes over a sensor imbedded in the pavement.

Figure 4: SERCURITY GATE LOCATION - ENTRY

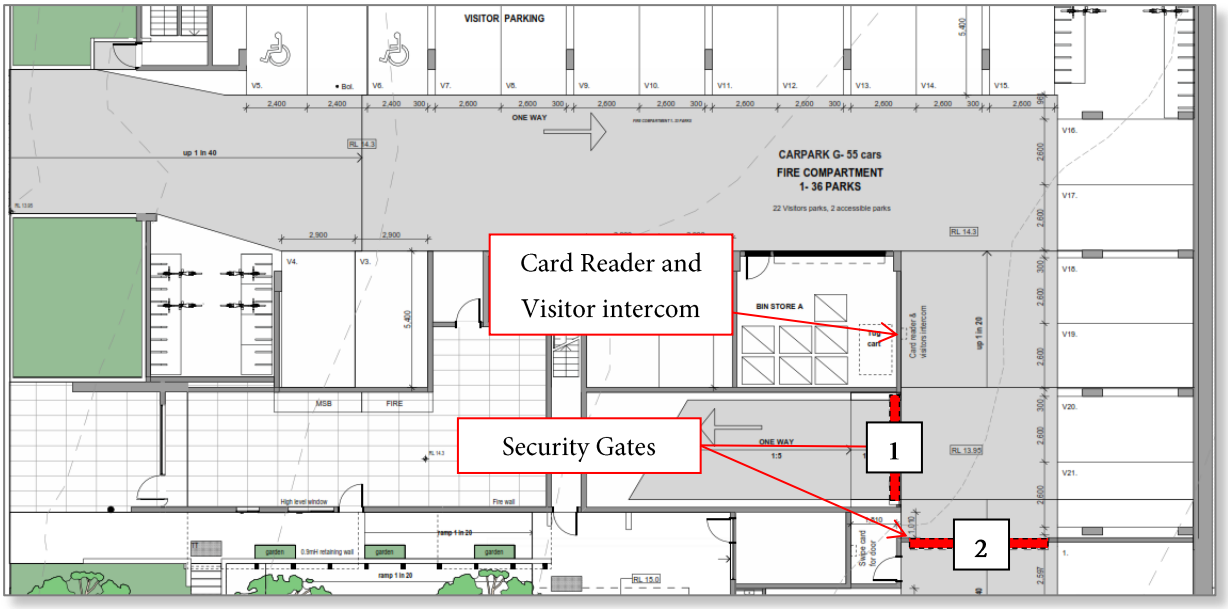
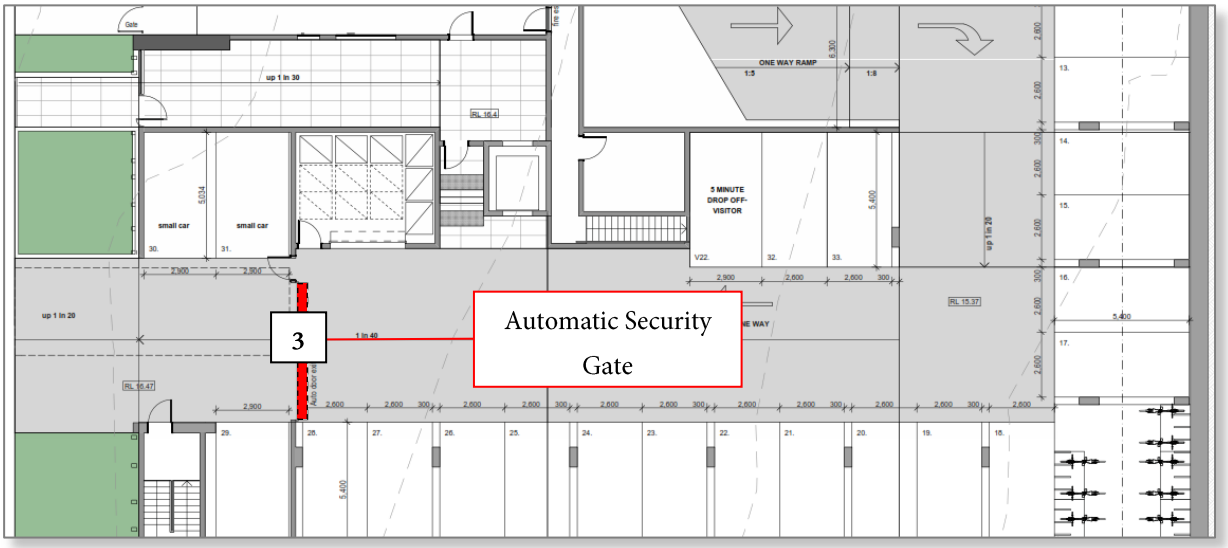


Figure 5: SERCURITY GATE LOCATION - EXIT



QUEUING

Queuing at the Site Access

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 9.0m of clear queuing space between the first vehicular conflict point and property boundary. Therefore, the proposed on-site queuing provision of 9.0m at the site access will be sufficient to cater for the proposed development and meet the requirements of AS2890.1.

Queuing at the Security Gate

The proposed development provides approximately 45m of queue space between the property boundary and the entrance security gate, which 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 the site access and to the security gate is in line with the requirements of AS2890.1.

ITEM 10

The car parking requirement for the site has been determined based on the rates within the BHDS for residential and commercial uses. A car parking provision of 159 spaces is required based on EDQ recommendations, as shown in Table 2.

Table 2: PARKING REQUIREMENTS

LAND USE	SCALE		PARKING RATE	SOURCE	REQUIREMENT
Residential	156	units	Average of 1 spaces per unit (including visitor)	EDQ	156
Commercial (heritage building)	302	m^2	Maximum of 1 space per 100 m^2	EDQ	3
Total					**159**

A parking provision of 170 car parking spaces is proposed including:

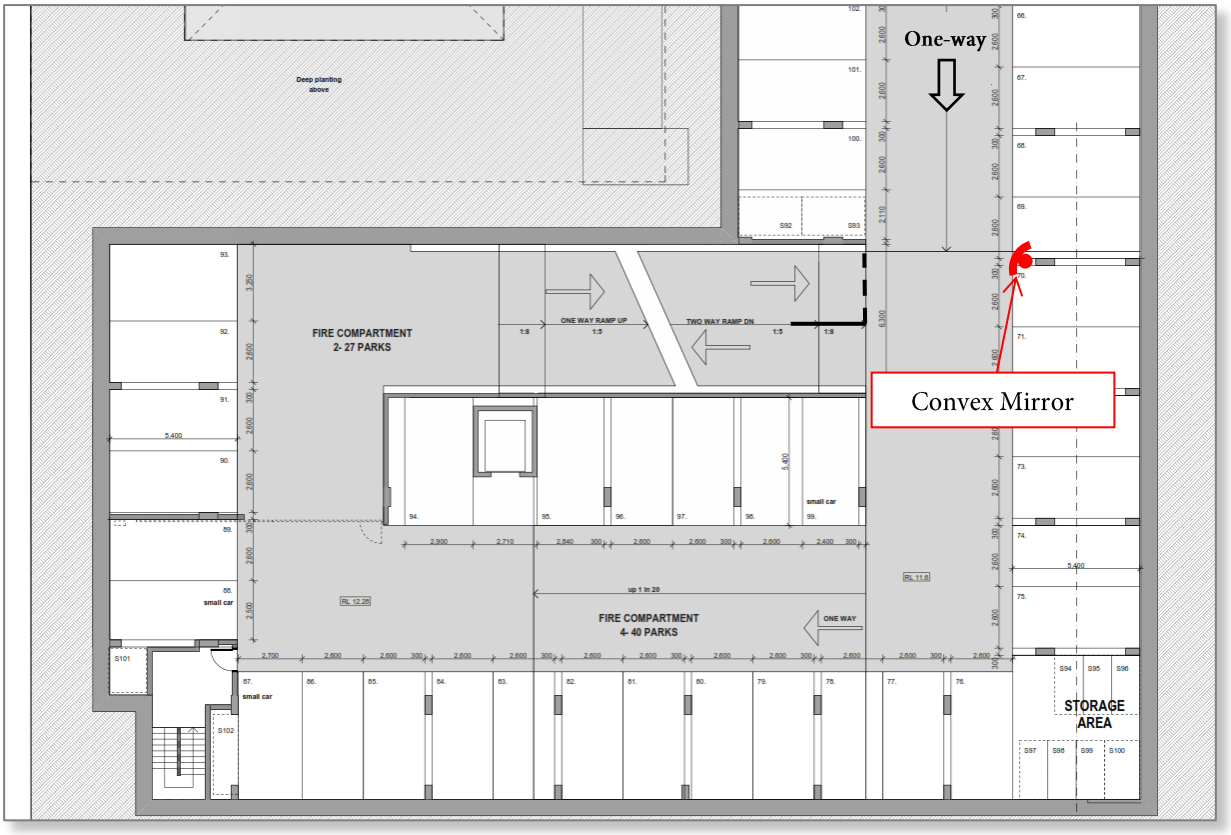
- 148 resident car parking spaces
- 22 visitor car parking spaces (including two Persons With Disability parking spaces)

The proposed parking provision is 11 spaces above the requirement outlined in Table 2. The proposed parking provision is above the calculated requirement because 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 11 spaces above the requirement calculated in Table 2. The remaining two spaces have been provided for additional visitor parking.

ITEM 11

A convex mirror is proposed to be installed, as indicated on Figure 6. This mirror is expected to provide adequate site distance for vehicles exiting the ramp from basement 2 to basement 1, thus addressing item 11 of the FIL.

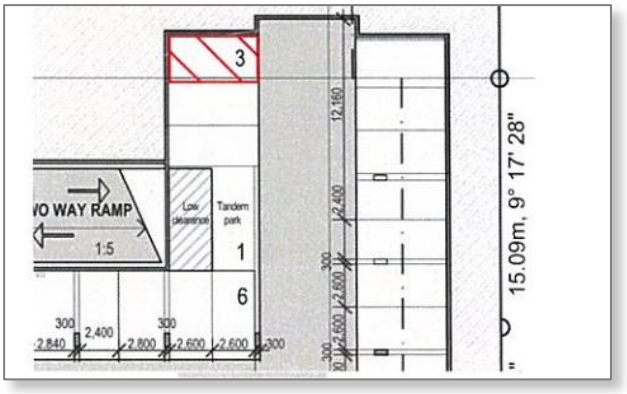
Figure 6: CONVEX MIRROR LOCATION



ITEM 12

Item 12 of the EDQ FIL requires a turnaround bay to be installed, as shown in Figure 7. This requirement is considered to be unnecessary as all the car parking spaces are allocated to particular units. Therefore, any vehicle that enters this parking aisle would have an allocated parking space and the need for a turnaround bay is not warranted.

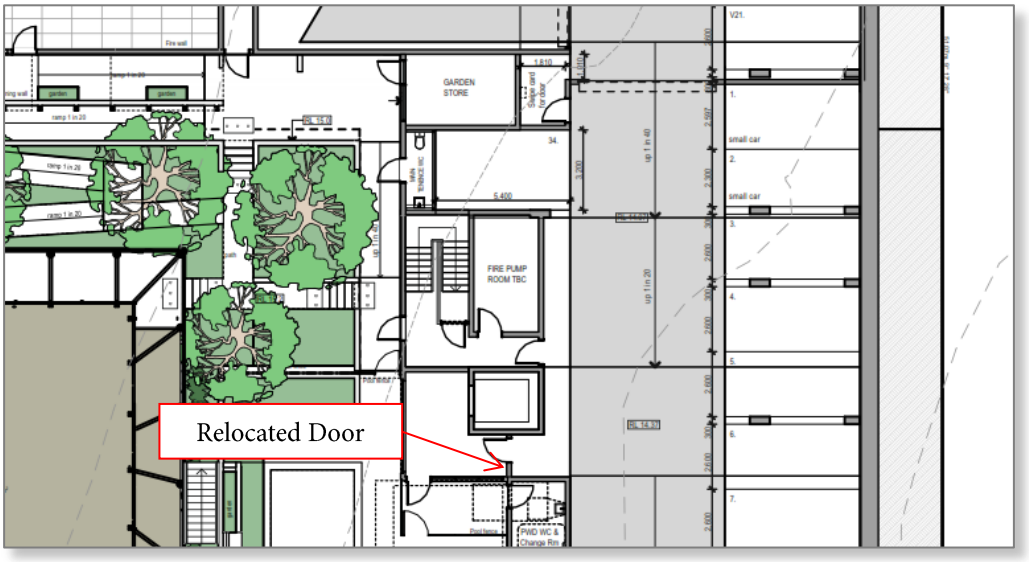
Figure 7: TURN BAY REQUIREMENT



ITEM 13

In accordance with item 13 of the FIL, the door has been re-located towards the lift to increase the available pedestrian walking area, as shown in Figure 8.

Figure 8: RELOCATED DOOR

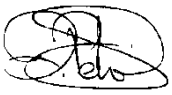


CONCLUSIONS

Based on the above, the revised development plans for the site at 23-39 Abbotsford Road, Bowen Hills are in line with items 4 to 13 of EDQ's further issues letter.

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

Yours sincerely,



Adam Pekol

Director (RPEQ 5286)

PRACTICE NOTE

QUEUING CHARACTERISTICS AT SITE ACCESSES

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.

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PRACTICE NOTE

QUEUING CHARACTERISTICS AT SITE ACCESSES

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 α=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 α=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:

$$\frac{vehicle}{hour} = 3{,}600\left(\frac{seconds}{vehicle}\right)^{-1}$$

$$s = \frac{3{,}600}{14.7} = 244.9 \text{ vehicles per hour}$$

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.

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PRACTICE NOTE

QUEUING CHARACTERISTICS AT SITE ACCESSES

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, Caufield East

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

DISCLAIMER

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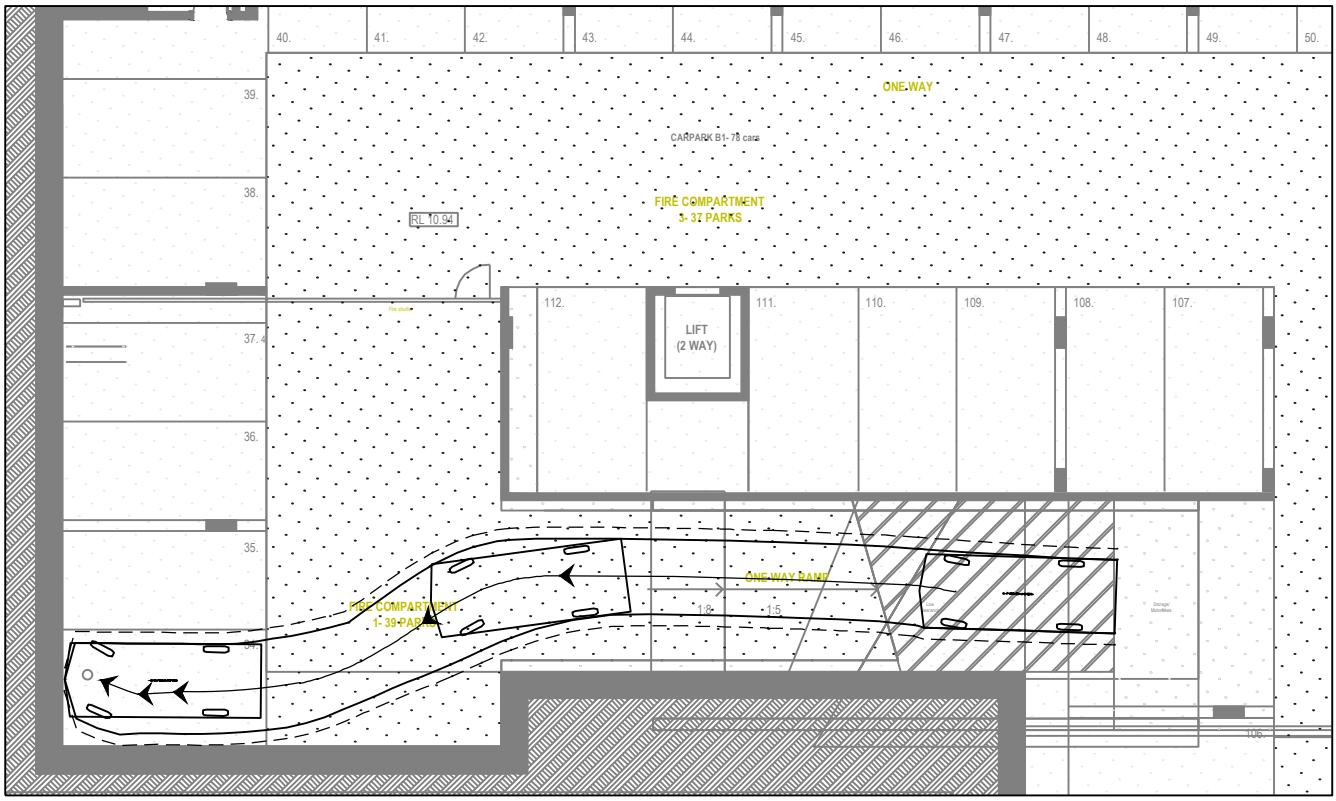
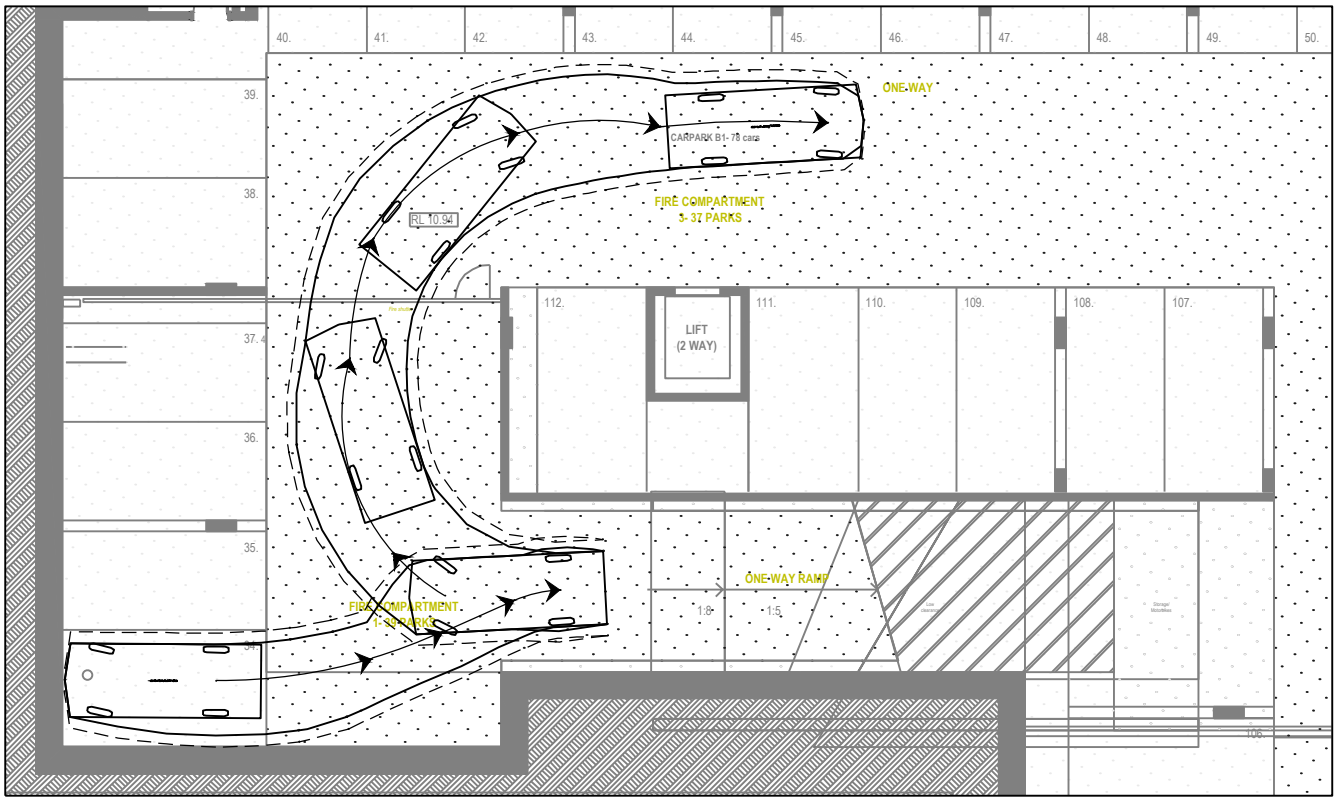


INGRESS MANOEUVRE



EGRESS MANOEUVRE

4 2 0 4 8 12 16m 1:200

Full Size A4

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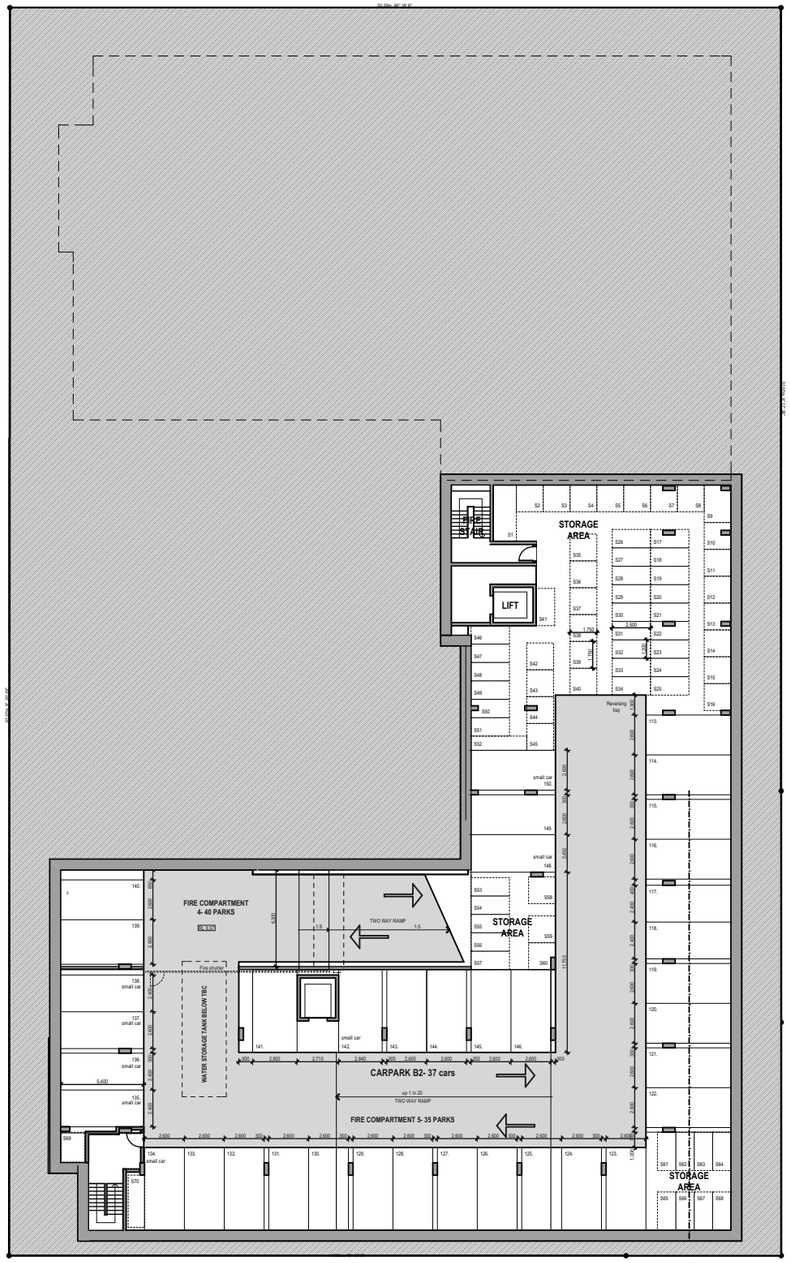
Title:
5.2m (B99) LARGE CAR MANOEUVRING TO ACCESS BASEMENT 1 PARKING BAY AT THE END OF THE RAMP

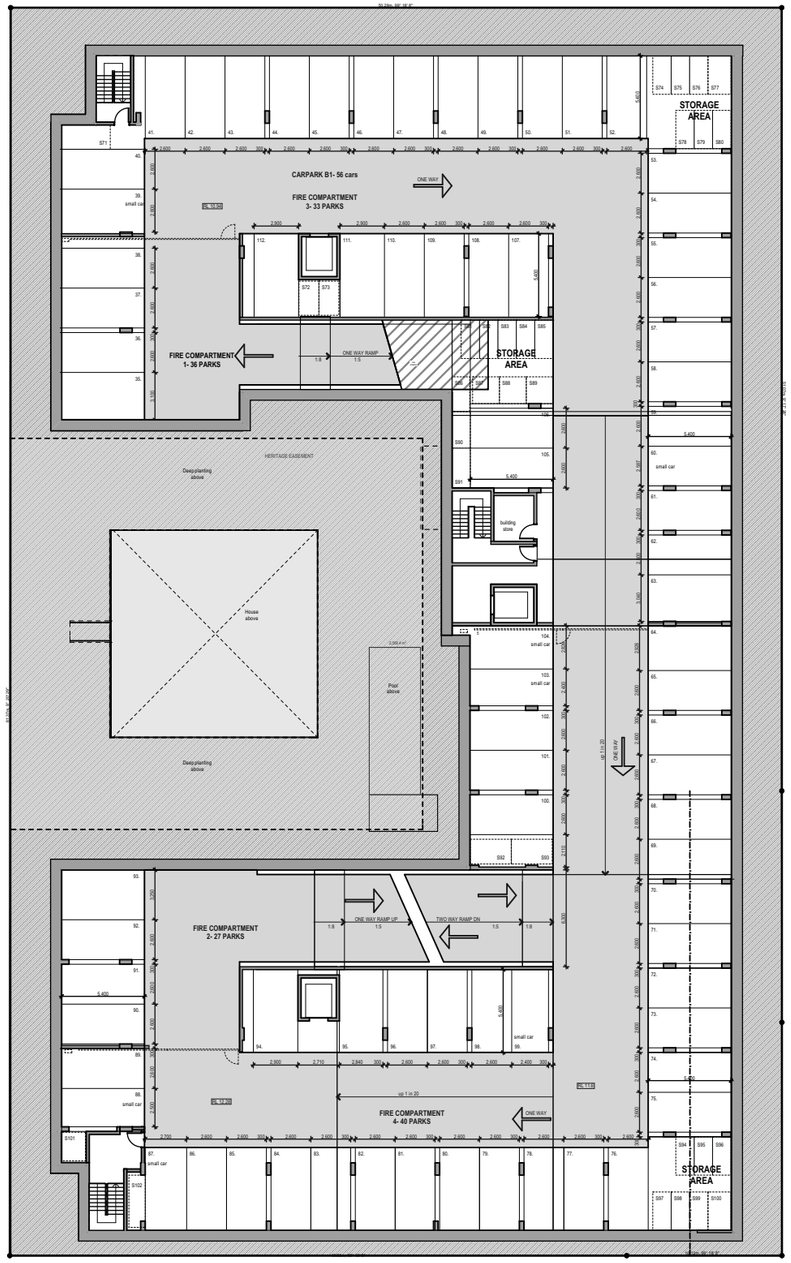
Project: 23-39 ABBOTSFORD ROAD, BOWEN HILLS

DATE: 19/2/2015 | JOB NO: 5541-006

SCALE: 1 : 200 | DRAWING: FIGURE 1



1 Lower Basement Plan
1:400



2 Basement Plan
1:400

TOWN PLANNING

General Notes

Confirm all dimensions on site.
Do not scale off drawings.
All levels are approximate only and are subject to confirmation by licensed surveyor.
All workmanship, materials and construction to comply with the Queensland Building Act 1975 and The Building Code of Australia 2014, Premises Standard and AS1428.1.
Work to be carried out in a neat and appropriate manner.
Where ambiguities or discrepancies exist, Hayes Anderson Lynch Architects Pty. Ltd. shall be contacted for clarification.

Date	No.	Details	Checked
23/02/15	D	TRAFFIC ISSUE	EA
28/01/15	C	EDQ ISSUE	EA
6/12/14	B	EDQ ISSUE	EA
31/10/14	A	EDQ ISSUE	EA

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Client
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Project
Topaz Apartments
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Bowen Hills, QLD 4006

Drawing Title
BASEMENT CARPARKING

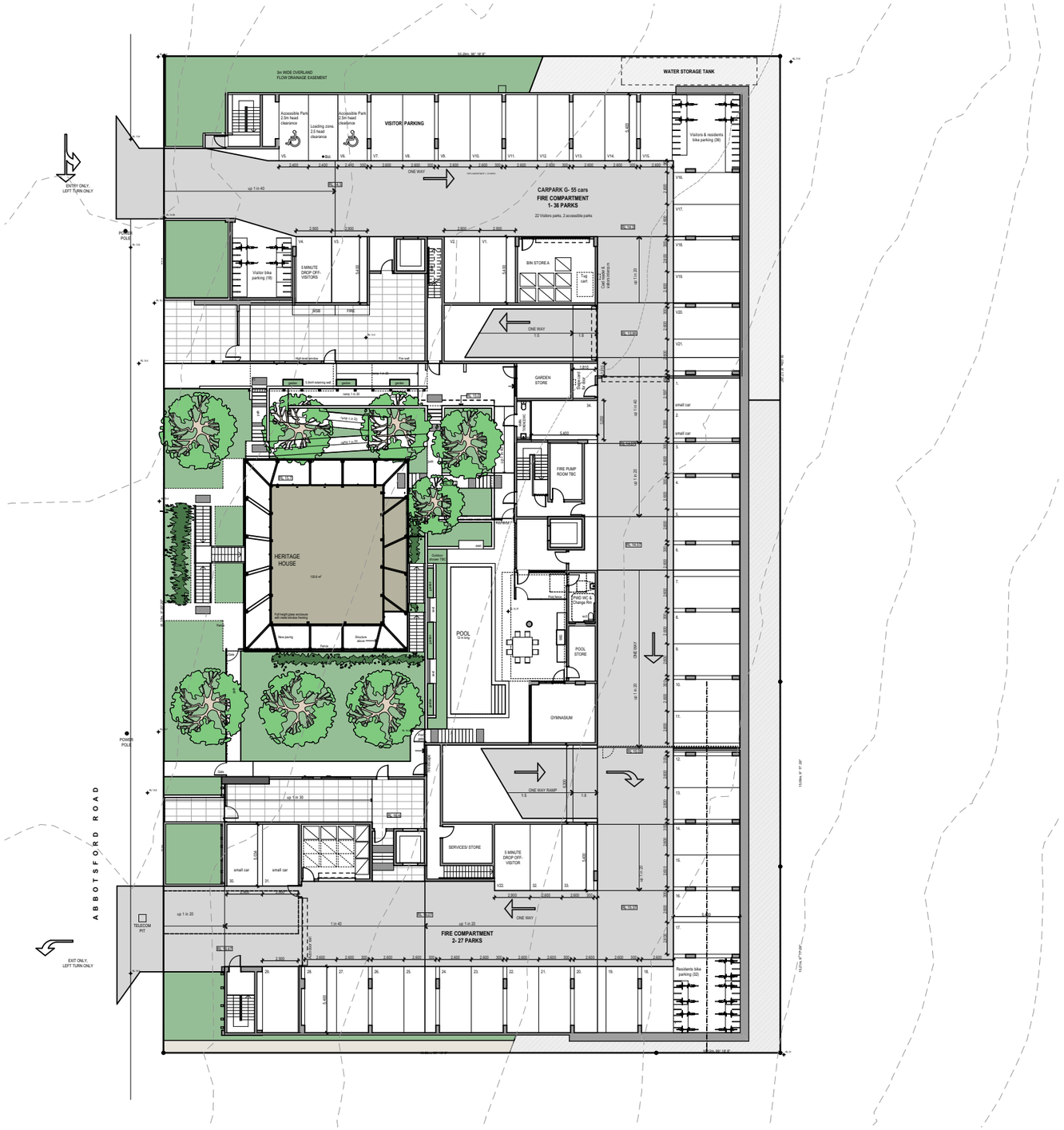
Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP02**	D

Printed:- 23/02/2015

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



1 Ground Floor Plan
1:400

TOWN PLANNING

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Drawing Title
GROUND LEVEL PLAN

Scale @ A3	Drawn:	Checked:
1:400	SH	EA
Project Number	**Drawing Number**	**Issue**
H2943ABB	**TP03**	D

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