

3 March 2022

Apex Building Design Studio

Via email: danny@abds.com.au

Attention: Danny Bracko

105 Carrington Road, Box Hill

Design Review

Dear Danny,

onemilegrid has been engaged to provide traffic engineering input and design advice in relation to the car parking layout for the residential development at 105 Carrington Road, Box Hill.

The proposal contemplates development and construction of eleven two-storey townhouses over a basement level car parking area.

Car parking is proposed to be provided in the form of car stackers, accessed via ramp from Carrington Road.

It is understood that the car parking area has not been constructed in accordance with the endorsed plans, and a modified stacker unit has been installed, as previously assessed by **onemilegrid**. Council has subsequently requested that the following be undertaken

1. *Appoint an independent suitably qualified Traffic Engineering consultant to :*

- *Assess the access into the existing car stackers (based on the above survey plans) via the provision of swept path diagrams of the B85 design vehicle into the proposed car stacker space. The plans are to show the details and dimensions of the car stacker installed i.e column locations and railings etc*
- *Advise whether all parking spaces within the car stacker are suitable for use by the B85 and B99 design vehicle and if this is in accordance with AS 2890.1 or the planning scheme.*
- *Advise whether/how the B85 and B99 design vehicle can satisfactorily access the existing stacker pits*
- *Advise whether the existing car stacker spaces can be accessed in a forward and/or reverse direction and be able to access the pit without hitting the pit wall when being lowered into the pit*
- *Advise whether the proposal meets the requirements of AS 28901 particularly after taking into account the above and make recommendation on how the proposed parking layout can be improved.*

onemilegrid has prepared swept path diagrams based on a feature survey of the basement car park (overlaid onto the architectural plans for clarity) and the specifications for the stacker units installed, and provides the following in response.

Assess the access into the existing car stackers (based on the above survey plans) via the provision of swept path diagrams of the B85 design vehicle into the proposed car stacker space. The plans are to show the details and dimensions of the car stacker installed i.e column locations and railings etc

The attached swept path diagrams (SPA4001, SPA401 and SPA402) have been prepared to demonstrate the accessibility of the stacker units for a B85 design vehicle, based on the survey plans and the detailed dimensional specifications of the stacker units, which confirms the surveyed information.

Advise whether all parking spaces within the car stacker are suitable for use by the B85 and B99 design vehicle and if this is in accordance with AS 2890.1 or the planning scheme

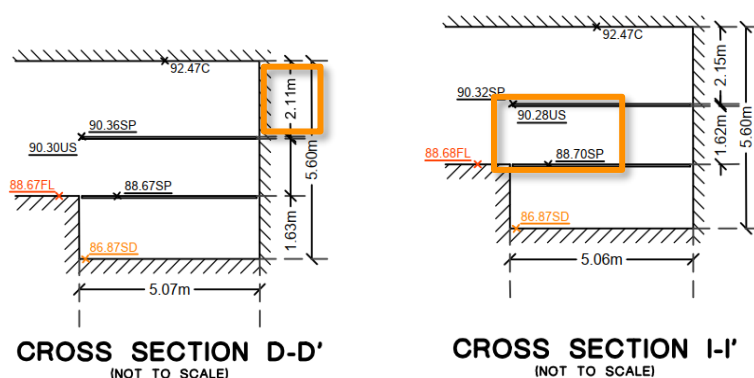
The Australian/New Zealand Standard for Parking facilities, Part 1: Off-street car parking (AS/NZS 2890.1:2004) specifies that "design dimensions based on the B85 vehicle shall be limited to parking spaces and parking aisles", which suggests that the B85 is the appropriate design vehicle for parking spaces. Regardless, swept paths have been prepared for both the B85 and B99 vehicles, as attached.

It is demonstrated that even for the B99 vehicles, at most a single corrective movement is required on entry or exit from the stacker spaces. It is noted that the full 300mm clearance envelopes cannot be maintained through the full movement into or out of the stacker unit, though this is typical for a stacker system, where structural elements of the stacker unit restrict the available clearance. Further, it should be noted that a typical basement car park designed to the Australian Standard minimum requirements (with a 2.4m wide parking bay and columns located adjacent) will not allow for the retention of the full clearance envelopes on both sides of a vehicle swept path, even for a B85 vehicle. Furthermore, in relation to the B99 vehicle, it is noted that these will be required to be positioned on the upper platform space (refer to the commentary below), which are not impacted by the stacker columns below.

The swept paths are therefore considered to represent suitable accessibility of the stacker units for both B99 and B85 vehicles.

In relation to vehicle heights, it is shown in Cross Section D-D that the minimum height clearance in the upper stackers (platform to ceiling) is 2.11m. Similarly, the levels in Cross Section I-I show the minimum height clearance in the lower stackers (platform to underside of platform) is 1.58m (noting the dimension shown is platform to platform).

Figure 1 Cross-Sections



Design Standard 4: Mechanical parking of Clause 52.06-9 of the Planning Scheme requires that 25% of mechanical car parking can accommodate a vehicle height of at least 1.8 metres. Based on the above cross-sections, the upper platform in each stacker system (i.e. 50%) can accommodate vehicles of in excess of 1.8 metres (up to 2.1m), in excess of the requirements of the Planning Scheme.

The lower spaces can accommodate vehicles in excess of 1.5 metres. According to the Australian/New Zealand Standard for Parking facilities, Part 1: Off-street car parking (AS/NZS 2890.1:2004), "The height of all passenger cars and station wagons is below 1.5 metres.", therefore the height clearance in the lower stacker spaces is considered to be appropriate.

The height clearances available are also proportional to the vehicle lengths which the upper and lower platforms can accommodate, with the upper platform being able to accommodate longer and higher vehicles, which is appropriate.

Advise whether/how the B85 and B99 design vehicle can satisfactorily access the existing stacker pits

It is understood that the stacker pits have been constructed with a length of 5.1 metres, which is slightly shorter than the 5.4m pits originally proposed. As a result of the reduced length, whilst the stacker unit itself is not altered, the vehicle length which can be accommodated within the pit (i.e., the lower stacker spaces only) is slightly reduced, due to the reduced ability to overhang the stacker platform. The available length in the upper stacker space is not impacted by the pit length.

Allowing for some clearance to the external pit walls, it is acknowledged that the B99 vehicle (at 5.2m long) cannot be accommodated within the lower stacker platforms.

In the same way that the height clearance on some stacker spaces can be reduced below 1.8 metres, it is considered appropriate that the available length may also be reduced on some stacker spaces, particularly noting that the length restriction will apply to the same car spaces to which the height restriction will apply (i.e., the lower stacker spaces). In this way, the lower stacker spaces are expected to accommodate smaller vehicles (both height and length), whilst the upper spaces will accommodate larger vehicles.

Importantly, it is noted that the apartments will be allocated one upper and one lower parking space in a stacker unit. Consequently, each apartment will typically have access to one space which can accommodate longer (B99 and above) and higher (greater than 1.8m) vehicles, and access to one smaller space which can accommodate smaller vehicles. This is considered to be a suitable arrangement, given that the probability of a resident owning two B99 vehicles is very small (less than 0.01%), particularly in a medium density development such as that proposed. Further, it can be expected that a number of apartments will not require parking for more than one vehicle, therefore, the restrictions on the lower stacker spaces are irrelevant.

Advise whether the existing car stacker spaces can be accessed in a forward and/or reverse direction and be able to access the pit without hitting the pit wall when being lowered into the pit

The attached swept paths use a combination of reverse and forward entry, depending on the location of the stacker space in relation to the basement access point.

As above, B99 vehicles cannot be accommodated within the lower level of the pit, though can be accommodated in the upper levels, which are not impacted by the pit dimensions.

Advise whether the proposal meets the requirements of AS 28901 particularly after taking into account the above and make recommendation on how the proposed parking layout can be improved

As above, it is concluded that the constructed basement car park and stacker systems will provide suitable accessibility for the majority of users, generally in accordance with the requirements of Australian/New Zealand Standard for Parking facilities, Part 1: Off-street car parking (AS/NZS 2890.1:2004) or the Planning Scheme.

As is common for stacker units, and acceptable based on Planning Scheme requirements for mechanical parking, typical dimensional restrictions will prevent their use by all vehicles, though purchasers will be made aware of any limitations.

Given that the parking layout has been constructed, and given that swept paths demonstrate suitable accessibility, it is considered that no modifications to the parking layout are required.

Please do not hesitate to contact the undersigned, should you wish to discuss the above.

Yours sincerely

A handwritten signature in black ink, appearing to read "Ross Hill", written in a cursive style.

Ross Hill

Director - Senior Engineer

onemilegrid

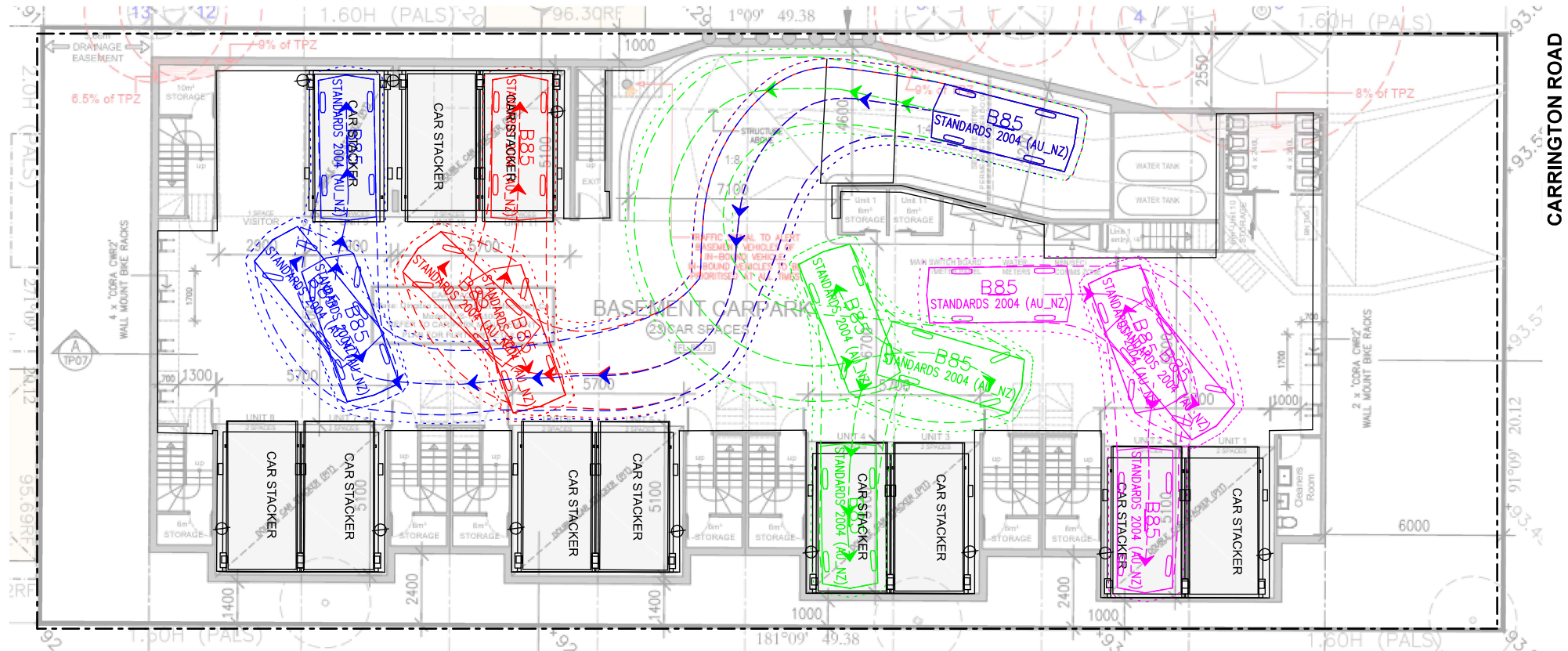
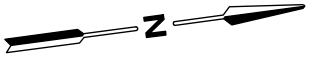
m: 0410 526 917

d: (03) 9982 9725

e: ross.hill@onemilegrid.com.au

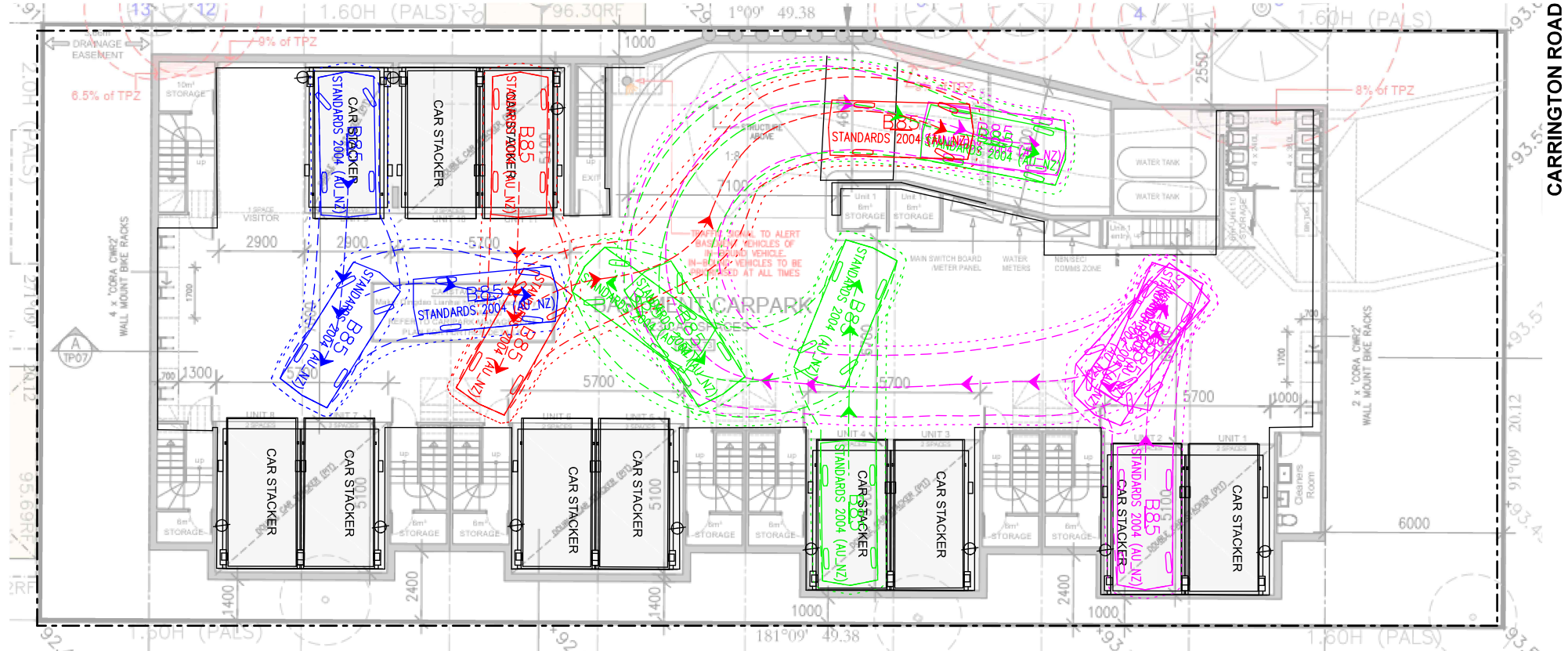
P/R: Ross Hill

att: Swept Path Diagrams



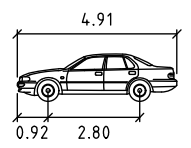
ENTRY MANOEUVRES

----- DESIGN VEHICLE SWEEP PATHS SHOWN DASHED
..... 300mm CLEARANCE ENVELOPE SHOWN DOTTED



EXIT MANOEUVRES

----- DESIGN VEHICLE SWEEP PATHS SHOWN DASHED
..... 300mm CLEARANCE ENVELOPE SHOWN DOTTED



B85	meters
Width	: 1.87
Track	: 1.77
Lock to Lock Time	: 6.0
Steering Angle	: 34.1



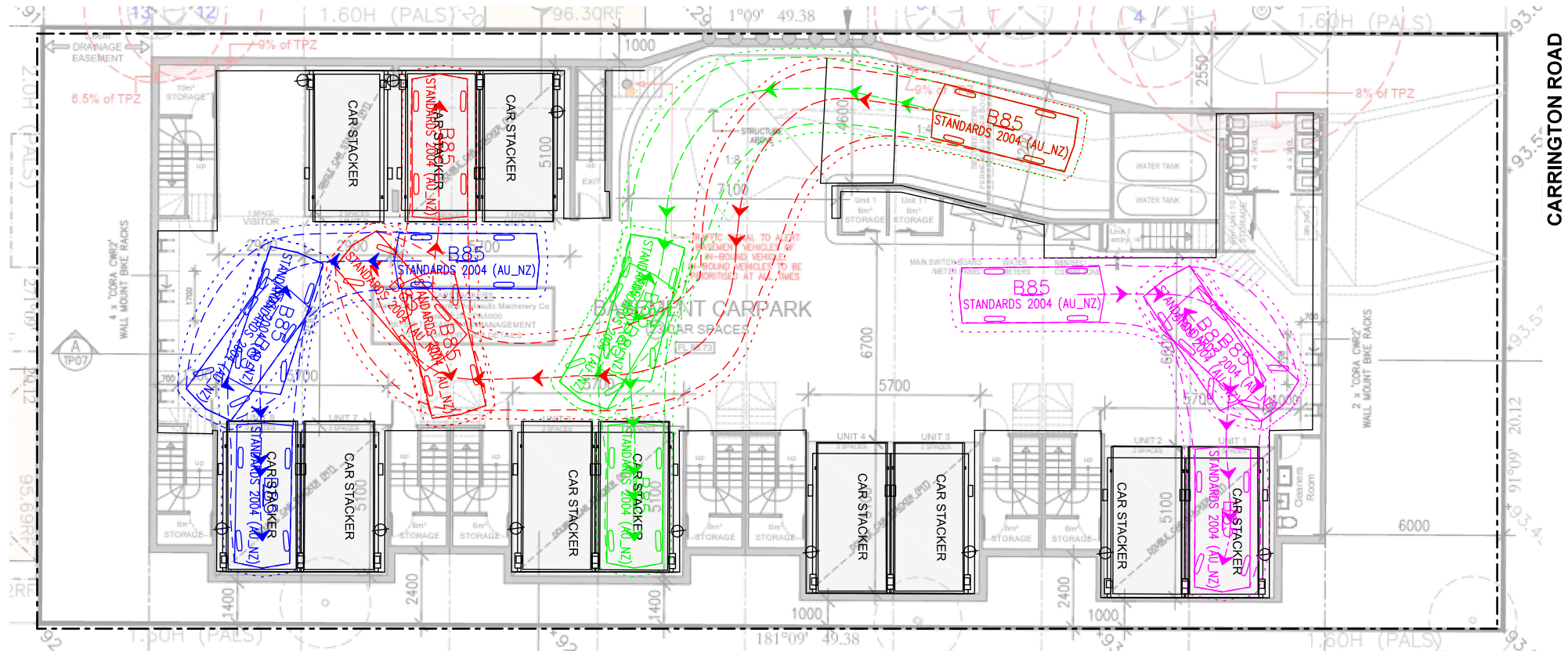
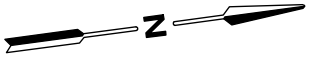
56 Down Street, Collingwood, VIC 3066
Email: info@onemilegrid.com.au Web: www.onemilegrid.com.au
Phone (03) 9939 8250

Scale 1:200 @ A3

Drawing Title
105 CARRINGTON ROAD, BOX HILL
SITE ACCESS - B85
SWEEP PATH ANALYSIS

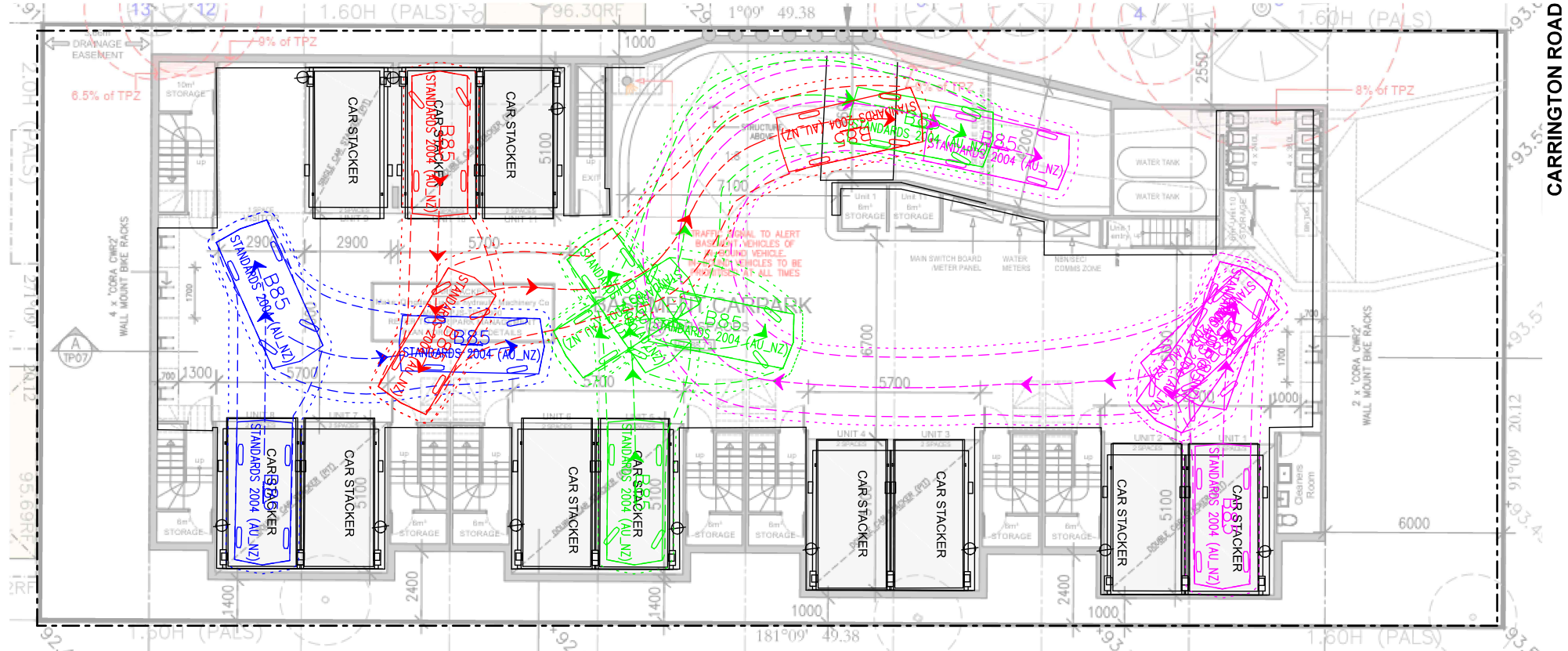
Designed DW	Approved RBH	Metway Ref 47 B10
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Project Number 180708	Drawing Number SPA400	Revision A
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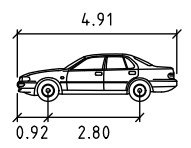
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..... 300mm CLEARANCE ENVELOPE SHOWN DOTTED



EXIT MANOEUVRES

----- DESIGN VEHICLE SWEEP PATHS SHOWN DASHED
..... 300mm CLEARANCE ENVELOPE SHOWN DOTTED



B85	width	1.87	meters
	track	1.77	
	lock to lock time	6.0	
	steering angle	34.1	



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Scale 1:200 @ A3

Drawing Title
105 CARRINGTON ROAD, BOX HILL
SITE ACCESS - B85
SWEEP PATH ANALYSIS

Designed DW	Approved RBH	Metway Ref 47 B10
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Project Number 180708	Drawing Number SPA401	Revision A
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