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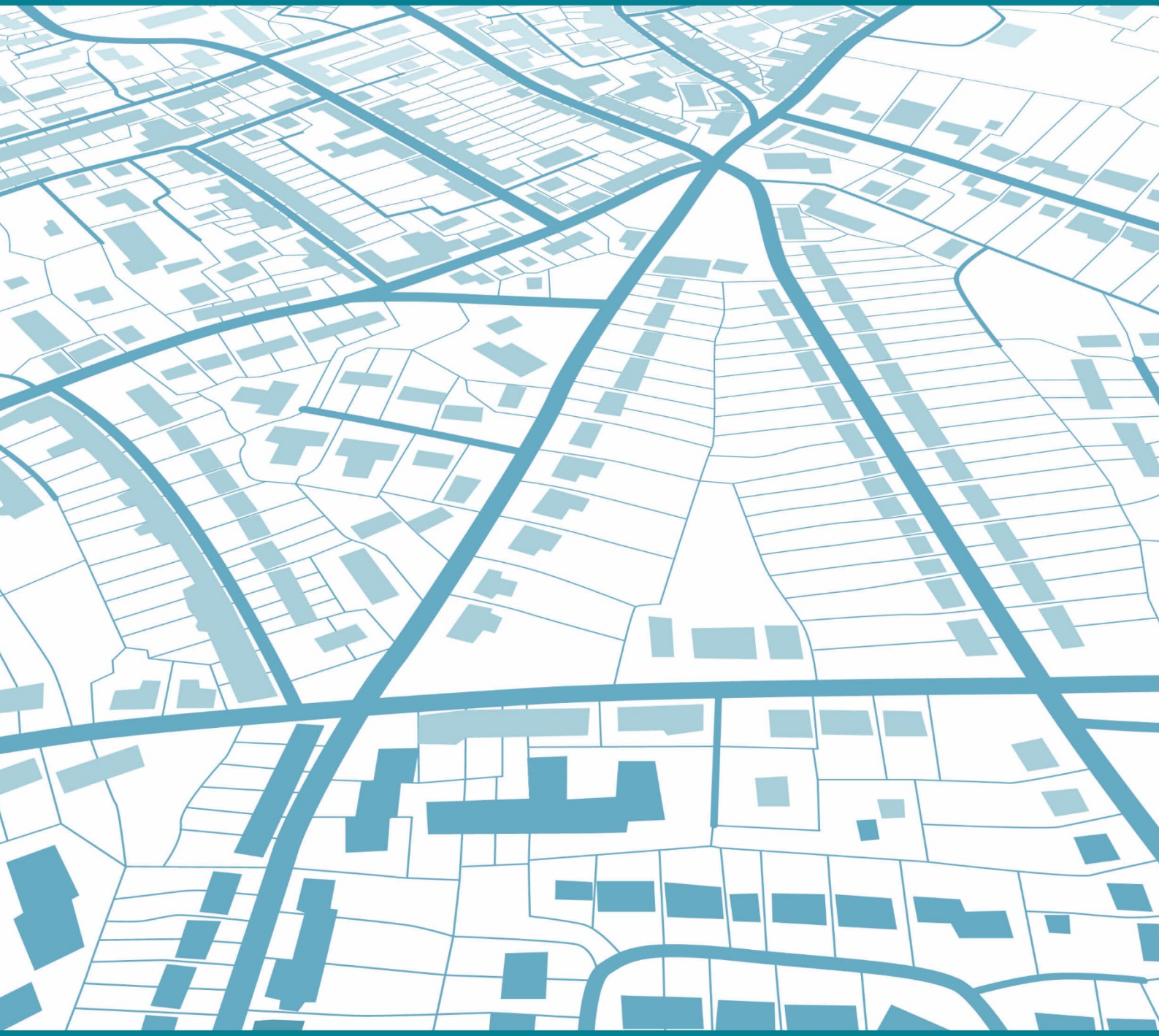

Proposed Mixed Use Development
524–542 Pacific Highway, St Leonards
Traffic and Parking Assessment

Ref: 22086
Date: September 2023
Issue: I

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1.0 Introduction

This Traffic and Parking Assessment Report is submitted to the Department of Planning and Environment (DPE) in support of a concurrent State-led Rezoning and State Significant Development Application (SSDA) for a new mixed-use development, comprising build-to-rent housing, short-term accommodation and retail land uses at the Telstra Exchange Site at 524-542 Pacific Highway, St Leonards (the site).

The proposed development will specifically comprise the following:

- Site preparation and excavation.
- Retention and integration of the existing Telstra Exchange Building
- Construction of a new 42-storey mixed-use development, comprising:
  - 21,472m^2 of build-to-rent housing across 31 storeys, including 272 dwellings;
  - 3,840m^2 of non-residential space within an 8 storey podium used for the purposes of short stay accommodation, including;
    - 721 m^2 of Key Worker Housing across 1 level, within the podium, delivering a total 10 dwellings to be managed as part of the build to rent development
    - 84 short term accommodation units across 5 levels
    - 159m^2 of retail area on level 1
    - community amenity facilities throughout the building.
- Residential lobby accessed via Christie Street and separate mixed-use lobby accessed via Pacific Highway;
- Podium car parking and loading area with vehicular access via Christie Street, comprising a 48 space car stacker;
- Associated landscaping and public domain works; and
- Augmentation of, and connection to, existing utilities services as required.

This report addresses the relevant Secretary's Environmental Assessment Requirements (SEARs) and Study Requirements, and it is noted that to facilitate the

abovementioned development, amendments to the Lane Cove Local Environmental Plan 2013 are proposed via a concurrent State Led Rezoning to rezone the site from B3 Commercial Core to B4 Mixed Use and to increase the maximum building height of 72m to 155m. The FSR of the site will remain as per existing at 17.1:1.

The DPIE generic SEARS in relation to the proposed development include the following in relation to Traffic, Access and Parking together with the summarised responses.

SEARS	Summary Response	TIA Section
Traffic, Transport and Accessibility		
• Provide a transport and accessibility impact assessment, which includes:		
o an analysis of the existing transport network, including the road hierarchy and any pedestrian, bicycle or public transport infrastructure, current daily and peak hour vehicle movements, and existing performance levels of nearby intersections.	Detailed description provided in relation to all elements of the transport network.	Section 3
o details of the proposed development, including pedestrian and vehicular access arrangements (including swept path analysis of the largest vehicle and height clearances), parking arrangements and rates (including bicycle and end-of-trip facilities), drop-off/pick-up-zone(s) and bus bays (if applicable), and provisions for servicing and loading/unloading.	Detailed description provided particularly in relation to the proposed parking arrangements.	Section 1, 6 & 7
o analysis of the impacts of the proposed development (including justification for the methodology used), including predicted modal split, a forecast of additional daily and peak hour multimodal network flows as a result of the development (using industry standard modelling), identification of potential traffic impacts on road capacity, intersection performance and road safety (including pedestrian and cyclist conflict) and any cumulative impact from surrounding approved developments.	Detailed analysis of vehicle and pedestrian generation provided.	Section 5
o measures to mitigate any traffic impacts, including details of any new or upgraded infrastructure to achieve acceptable performance and safety, and the timing, viability and mechanisms of delivery (including proposed arrangements with local councils or government agencies) of any infrastructure improvements in accordance with the relevant standards.	None required due to extremely low traffic generation and the measures proposed in the DPIE St Leonards and Crows Nest Plan.	-

o proposals to promote sustainable travel choices for employees, residents, guests and visitors, such as connections into existing walking and cycling networks, minimising car parking provision, encouraging car share and public transport, providing adequate bicycle parking and high quality end-of-trip facilities, and implementing a Green Travel Plan.	Green Travel Plan provided.	Separate document
• Provide a Construction Traffic Management Plan detailing construction vehicle movements, routes, access and parking arrangements, coordination with other construction occurring in the area, and how impacts on existing traffic, pedestrian and bicycle networks would be managed and mitigated.	Indicative CTMP provided and it is assumed that Consent Conditions will require a detailed CTMP for CC when a builder will be able to provide more definitive details.	Section 9

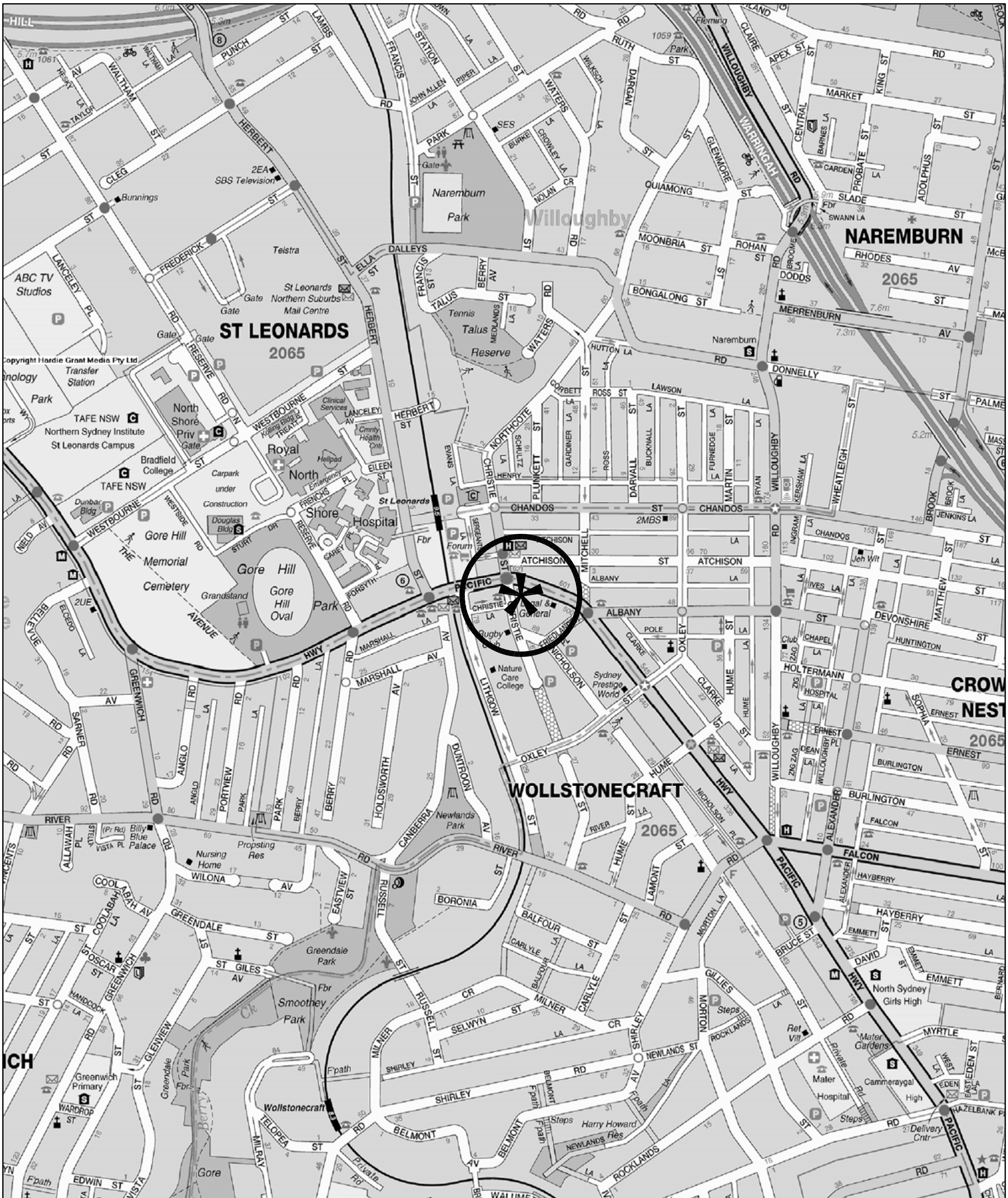
The Study Requirements comprise:

- a Traffic and Transport Assessment and Accessibility Impact Assessment, consistent with the requirements provided for in the SEARs (Attachment A).
- the impact of the proposal on traffic at the intersection of Christie Street and Pacific Highway with regard to vehicular access, vehicle movements, proposed parking spaces and any proposed car stacking mechanism.

The purpose of this report is to:

- describe the site, its context and the proposed development scheme
- describe the road network serving the site and the prevailing traffic conditions on that network
- describe the planning which has been undertaken for development of the precinct
- assess the potential traffic implications of the proposed development
- assess the adequacy and appropriateness of the proposed parking provision
- assess the proposed vehicle access, internal circulation and servicing arrangements
- provide a Green Travel Plan

- provide a Construction Traffic Management Plan
- provide responses to the SEARS requirements and issues raised by DPIE in relation to Traffic, Transport and Accessibility



Legend

Location

Fig 1

2.0 Proposed Development Scheme

2.1 Site, Context and Existing Circumstances

The site (Figure 2) is a merging of lots occupying an irregular shaped area of some 1,673m^2 with frontages to the southern side of Pacific Highway, the eastern side of Christie Street and the northern side of Nicholson Lane.

The site is located in the central part of the St Leonards commercial precinct and the surrounding uses include the Railway Station immediately to the west, the high-rise office and residential buildings located along the Highway and the large North Shore Hospital complex just to the north-west. The site is adjoined by a new multi-level mixed use building to the east and there are 2 new multi-level buildings under construction on the western side of Christie Street opposite the site.

The site is currently occupied by:

- a 3 level brick structure containing a Telstra exchange with critical telecommunications infrastructure including 2 basement levels for the cabling network
- 4 attached 2 level buildings with commercial tenancies
- at-grade parking with vehicle accesses on the Pacific Highway and Christie Street frontages

LEGEND

N

SITE

FIG 2

ST LEONARDS TELSTRA EXCHANGE
524 PACIFIC HIGHWAY
ST LEONARDS

SHOWING SELECTED DETAIL, SPOT LEVELS & CONTOURS

MGA NORTH

PACIFIC HIGHWAY

CHRISTIE STREET

DP243632 Proposed Road Widening (to confirm if still current)

LOTS A–D DP 377423

LOT 9–7 SECTION 17 DP 3175

LOT 1 DP 433297

LOT 1 DP 1203289

SP 69455

TWO STOREY BUILDING No. 542

TWO STOREY BUILDING No. 540

TWO STOREY BUILDING No. 538

TWO STOREY BUILDING No. 536

THREE STOREY BUILDING

FIVE STOREY BUILDING No. 99

TWO STOREY BRICK BUILDING No. 524 'TELSTRA EXCHANGE'

NINE STOREY BUILDING No. 504

SUBSTATION PREMISES No.7254

Dealing I682489 (Substation Premises No.7254)
- (a) Right of Way (7 Wide)
- (b) Easement for Electricity Purposes (1-5 Wide)
- (c) Right of Way and Easement for Electricity Purposes

FIRE HYDRANT

DRIVEWAY

FOOT PATH

SCHEDULE OF TREES

	SPREAD	HEIGHT	TRUNK ø
T1	21.28	99.77	99.77
T2	9.21	95.11	95.11
T3	7.33	97.33	97.33
T4	4.15	94.39	94.39

CLIENT: GROCON

A1 SHEET		1 OF 1
JOB REFERENCE		25968B
COMPUTER REFERENCE		25968B-01B-DT
LEVEL DATUM		AHD
ORIGIN OF LEVELS		SSM86485 RL77.473
CONTOUR INTERVAL		0.2M
SURVEYED	DM/GV	05 FEBRUARY 2016
DRAFTED	AD/JC	06 APRIL 2016
CHECKED	DS	06 APRIL 2016
APPROVED	DS	06 APRIL 2016

NOTES:

- THIS PLAN IS TO BE READ IN CONJUNCTION WITH A SITE INSPECTION
- THESE NOTES MUST REMAIN AN INTEGRAL PART OF THE PLAN
- THIS PLAN MAY BE COLOUR CODED. BLACK & WHITE COPIES MAY NOT FULLY DISCLOSE THE INFORMATION HEREON
- NO SERVICE SEARCH HAS BEEN UNDERTAKEN
- UNDERGROUND SERVICES HAVE NOT BEEN INVESTIGATED OR SHOWN
- PRIOR TO CONSTRUCTION A THOROUGH INVESTIGATION SHOULD BE MADE FOR POSSIBLE UNDERGROUND SERVICES
- LEVELS ARE ON AUSTRALIAN HEIGHT DATUM, ORIGIN ADOPTED FROM S.C.I.M.S DATED 29 JANUARY 2016
- BOUNDARIES HAVE NOT BEEN SURVEYED
- BOUNDARY LINES SHOULD BE MARKED ON SITE PRIOR TO ANY EXCAVATION OR CONSTRUCTION NEAR SITE BOUNDARIES
- NO INVESTIGATION AS TO THE FOLIO IDENTIFIER HAS BEEN UNDERTAKEN
- THIS PLAN REFLECTS THE LOCATION OF THE SITE FEATURES ACQUIRED ON 05 FEBRUARY 2016. ANY SUBSEQUENT WORKS PERFORMED AT THE SITE AFTER THIS DATE WILL IMPACT ON THE RESULTS SHOWN IN THIS PLAN
- THIS PLAN HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF THE CLIENT NAMED HEREON. NO RESPONSIBILITY IS TAKEN FOR ANY LOSS INCURRED BY ANY THIRD PARTY RESULTING FROM UNAUTHORISED USE OF THE PLAN
- THIS DRAWING REMAINS THE PROPERTY OF AAM Pty Ltd. IT MAY ONLY BE USED FOR THE PURPOSE FOR WHICH IT WAS COMMISSIONED AND IN ACCORDANCE WITH THE TERMS OF ENGAGEMENT FOR THE COMMISSION. UNAUTHORISED USE OF THIS DRAWING IS PROHIBITED

LEGEND:

- LK — LIP OF KERB RL
- IK — INVERT OF KERB RL
- TK — TOP OF KERB RL
- BK — BACK OF KERB RL
- TRAFFIC LIGHT
- BOLLARD
- OTHER POLE
- SIGN
- POWER POLE
- LIGHT POLE
- GATE
- TREE
- CONCRETE FOOTING
- ELECTRICAL BOX
- RETAINING WALL
- TRAFFIC SIGNAL PIT
- SEWER PIT
- TELSTRA PIT
- DRAINAGE PIT
- UNCLASSIFIED WATER PIT
- UNCLASSIFIED PIT
- LIP OF KERB
- INVERT OF KERB
- TOP OF KERB
- BACK OF KERB
- FENCE LINE
- AWNING
- BUILDING LINE
- GARDEN BED
- PROPOSED EASEMENT
- BOUNDARY
- ADJACENT BOUNDARY
- EASEMENTS

REDUCTION RATIO: 1:200 @ A1

0 5 10 15

ALL DISTANCES IN METRES

REVISION	DESCRIPTION	DATE
A	INITIAL RELEASE	06/04/2016

AAM SURVEY
SUITE 2, 33 WATERLOO ROAD
MACQUARIE PARK
(PH) 02 8879 1600 (FAX) 02 8879 1633

2.2 Proposed Development

It is proposed to demolish the existing buildings, retaining the existing Telstra infrastructure and excavate part of the site to provide for automated podium stacker parking. A new 42 level tower building will be constructed comprising:

Apartments

42 x studio

98 x one-bedroom

121 x two-bedroom

11 x three-bedroom

Total: 272 apartments

10 x Key Worker Housing units at L8

159m^2 of retail space on L1

84 Short Stay Accommodation Units within the 8 Level podium.

A total of 48 parking spaces will be provided in an automated podium car stacker along with loading bays accessed by a driveway on the Christie Street frontage.

Details of the proposed development scheme are provided on the plans prepared by DKO Architects, which accompany the Application and are reproduced in part in Appendix A.

3.0 Road Network and Traffic Conditions

3.1 Road Network

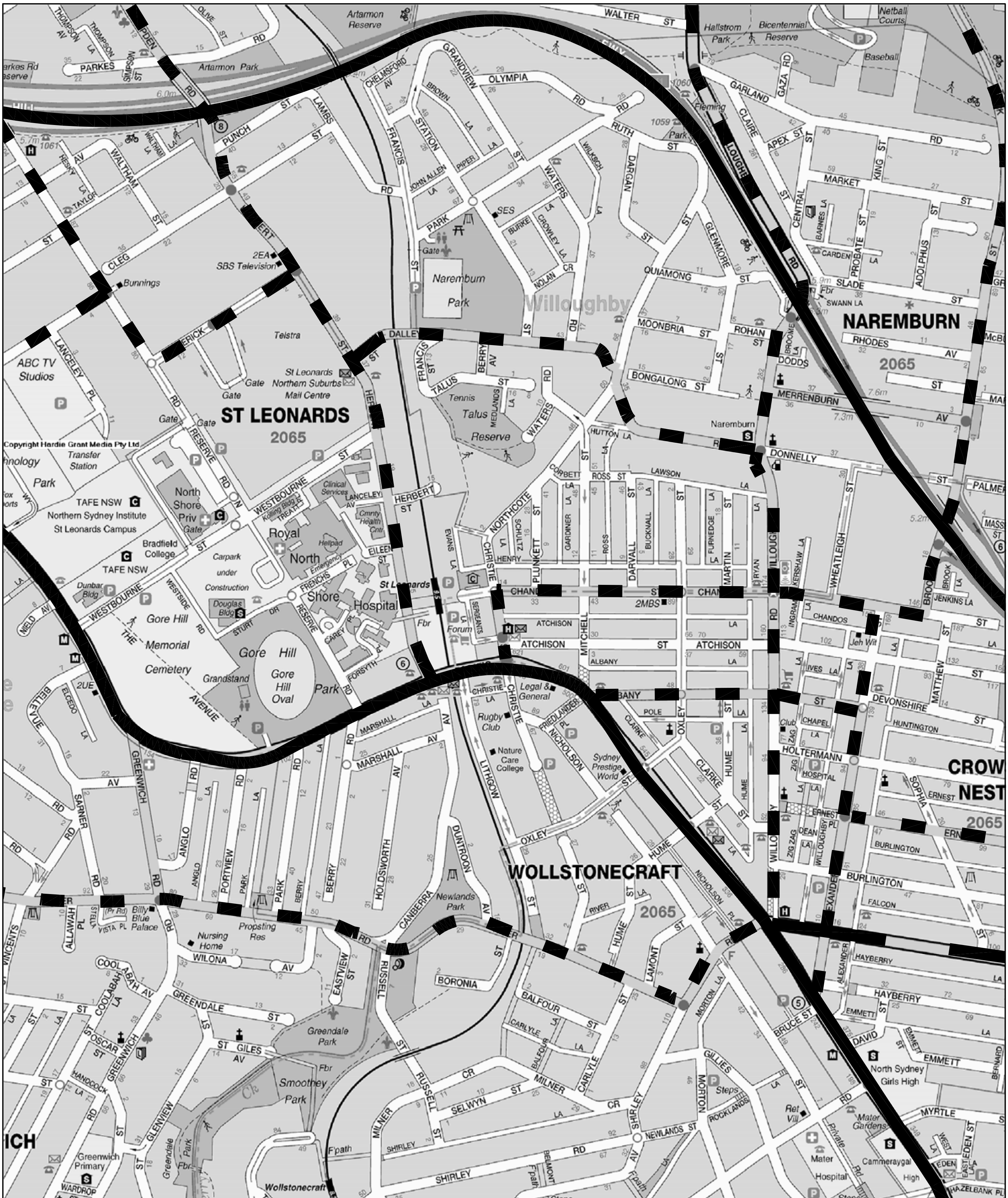
The road network serving the site (Figure 3) comprises:

- *Pacific Highway* – a State Highway and arterial route connecting northwards from the Harbour crossings
- *Falcon Street* – a State Road and sub-arterial route which connects the Pacific Highway to the Warringah Expressway and Military Road
- *Willoughby Road* – a Regional Road and important collector route northwards from Falcon Street
- *Chandos Street* – a Regional Road and collector route
- *Christie Street* – a collector road which connects across the Pacific Highway
- *Nicholson Lane* – a narrow service lane which connects to Christie Street running parallel to the highway.

3.2 Traffic Controls

The existing traffic controls which have been applied to the roads in the vicinity of the site (Figure 4) include:

- the traffic signals at the Pacific Highway and Christie Street intersection with attendant NO RIGHT TURN restrictions (see details overleaf)
- the traffic signals at other intersections along the Pacific Highway including Oxley Street, Albany Street and Herbert Street
- the ONE WAY southerly restriction on Christie Street (South) at the Pacific Highway and then TWO WAY to the south



LEGEND

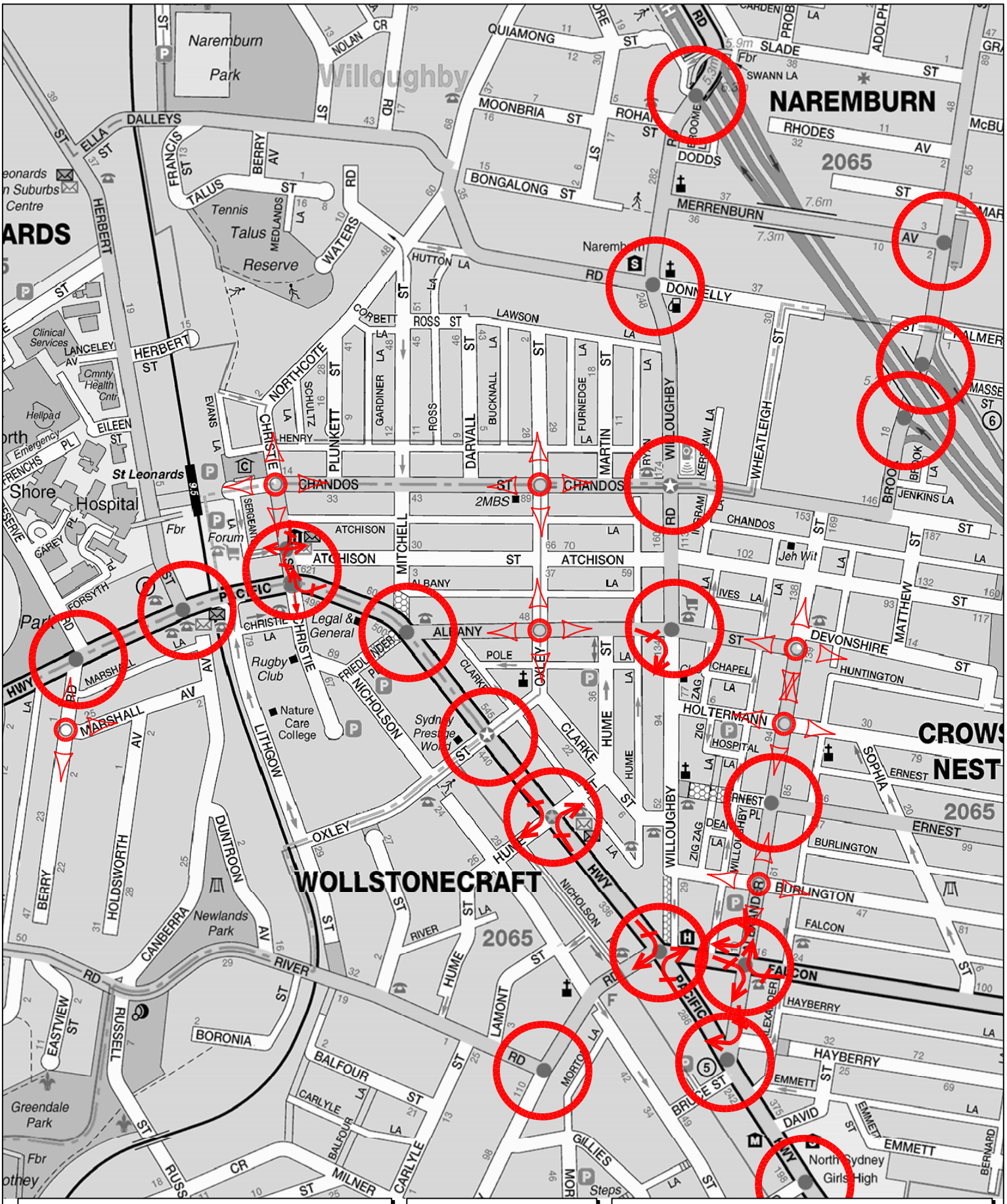
ARTERIAL

SUB-ARTERIAL

COLLECTOR

ROAD NETWORK

FIG 3



LEGEND

- TRAFFIC SIGNAL CONTROL
- ROUNDABOUT
- RESTRICTED TURNING MOVEMENT

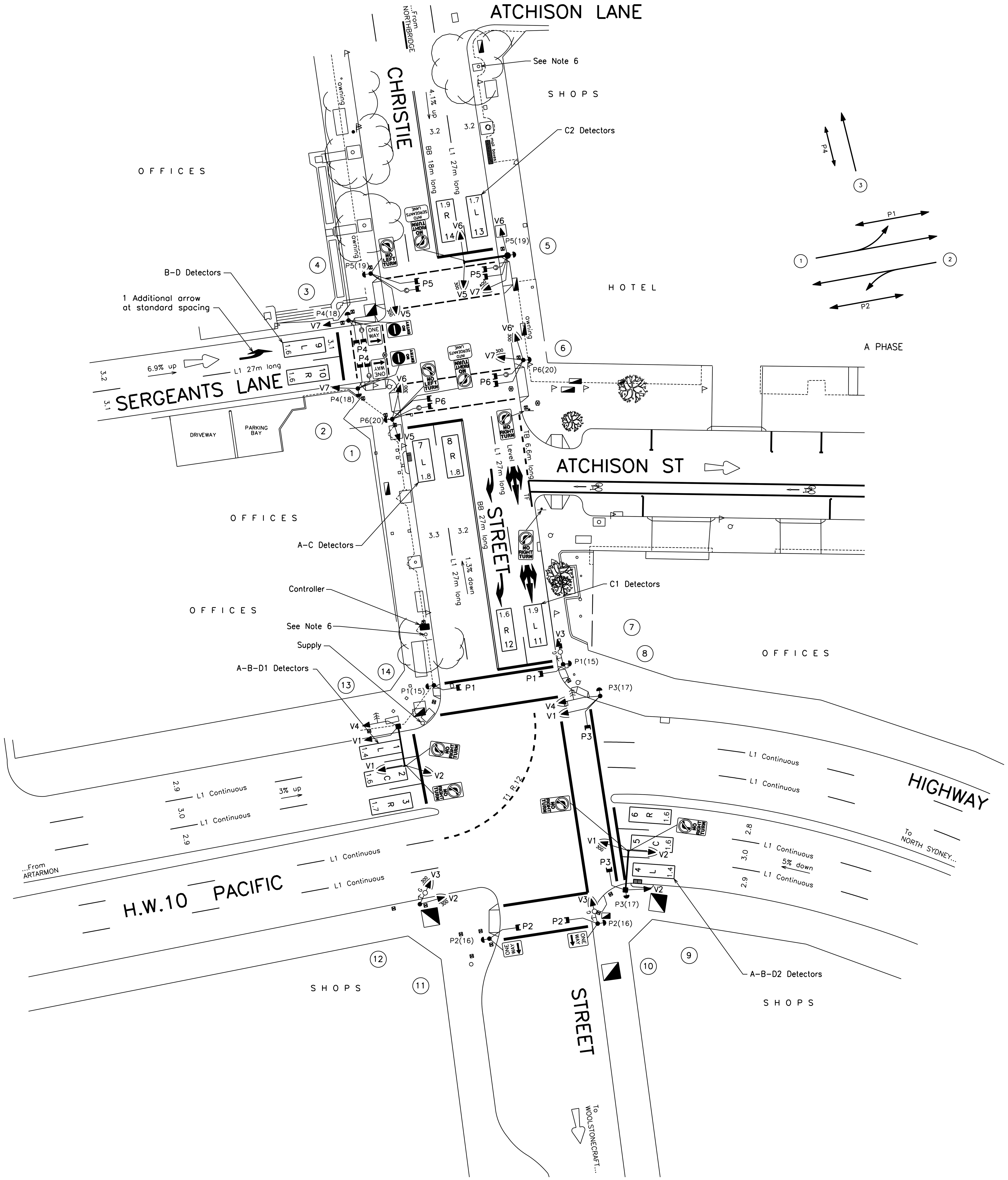
TRAFFIC CONTROLS

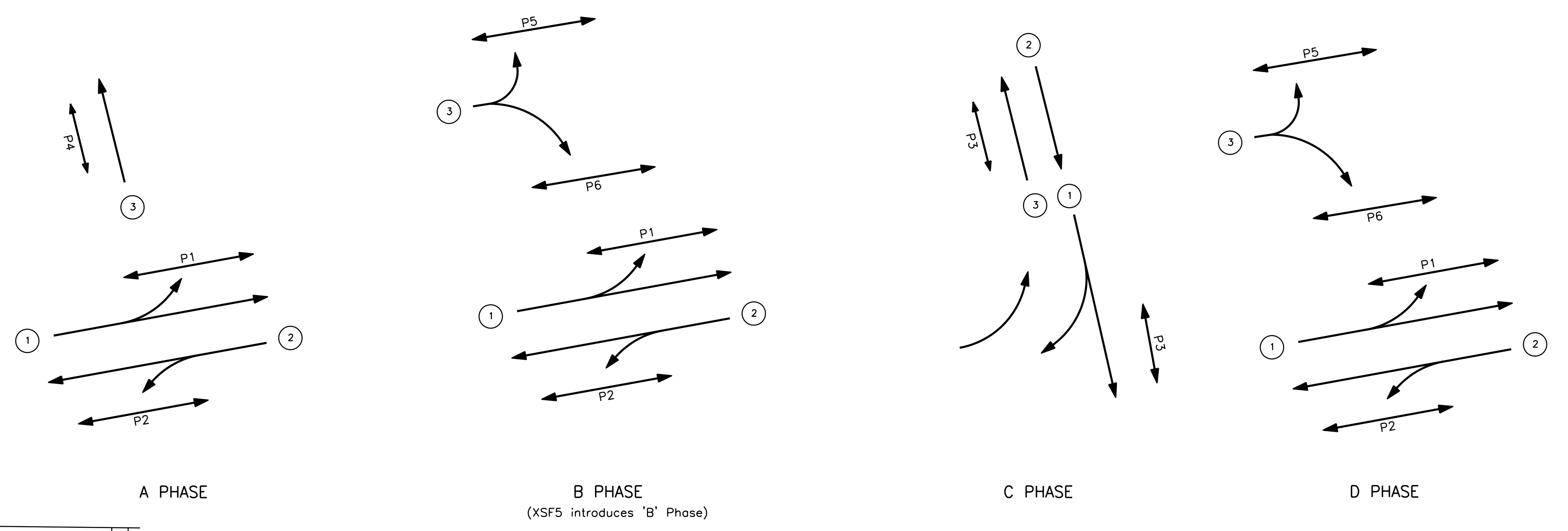
FIG 4

TCS 0769

DATE IN SERVICE: 16/07/73

Transport
Roads & Maritime Services
NSW GOVERNMENT





MOVEMENTS

NOTES

1. This site is SCATS linked.
2. Special Stop sign (R1-4) placed on Posts 2, 3 and 7.
3. All push buttons are audio tactile.
4. Power supply and SCATs connection retained.
5. The V3 lanterns are angled down to restrict visibility from the southbound stopline on Christie Street at Sergeants Lane.
6. Trees denoted to be trimmed and maintained to allow safe and adequate visibility of the V5 and V6 lantern displays.

POSTS

POST	TYPE	LENGTH	OFFSET	REMARKS
1	2	4.1	1.0	EXISTING
2	2	4.1	0.6	EXISTING
3	2	4.1	0.6	EXISTING
4	2	4.1	1.0	EXISTING
5	5L	–	1.0	EXISTING
6	2	4.1	1.0	EXISTING
7	2	4.1	0.6	EXISTING
8	2	4.1	0.6	EXISTING
9	3	–	0.6	EXISTING
10	2	4.1	0.6	EXISTING
11	2	3.2	1.0	EXISTING
12	2	4.1	0.6	EXISTING
13	3	–	0.6	EXISTING
14	2	3.2	0.6	EXISTING

SPECIAL SIGNAL GROUP DISPLAY SEQUENCE

SIGNAL GROUP	PHASE GREEN A	B	C	D	TABLE TYPE	REMARKS
V1	X	X		X	3	—
V2	X	X		X	3	—
V3			X		1	—
V4			X		12	Timed R.A. protection for 'P1' pedestrians. Display flashes YELLOW for 'P1' pedestrian clearance subject to XSF2.
V5	X		X		3	ECO in C
V6			X		51	—
V7		X		X	3	ES from C
P1	X	X		X	7	
P2	X	X		X	6	XSF1 disables auto introduction of 'P2' pedestrians.
P3			X		1	
P4	X		X		8	Auto introduction subject to the absence of XSF3 and reintroduction feature.
P5		X		X	33	Automatic introduction subject to the presence of XSF4.
P6		X		X	33	Automatic introduction subject to the presence of XSF4.

DETECTOR SPECIFICATION

Detector	Specifications				
A-B-D1	FN	A(L)	A(E1)	B(E1)	D(E1)
	SG/PS	$\overline{V1}$	A	B	D
	DS	$\overline{B}.\overline{D}$	$\overline{B(NEXT}.\overline{D(NEXT)}$	$\overline{A(NEXT}.\overline{D(NEXT)}$	$\overline{A(NEXT}.\overline{B(NEXT)}$
A-B-D2	FN	A(L)	A(E2)	B(E2)	D(E2)
	SG/PS	$\overline{V2}$	A	B	D
	DS	$\overline{B}.\overline{D}$	$\overline{B(NEXT}.\overline{D(NEXT)}$	$\overline{A(NEXT}.\overline{D(NEXT)}$	$\overline{A(NEXT}.\overline{B(NEXT)}$
A-C	FN	A(L)	A(E3)	C(E3)	
	SG/PS	$\overline{V5}$	A	C	
	DS	$\overline{C}$	$\overline{C(NEXT)}$	$\overline{A(NEXT)}$	
B-D	FN	B(L)	B(E3)	D(E3)	D(L)
	SG/PS	$\overline{V7}$	B	D	$\overline{V7}$
	DS	XSF5	$\overline{D(NEXT)}$	$\overline{B(NEXT)}$	–
C1	FN	C(L)	C(E1)		
	SG/PS	$\overline{C}$	C		
	DS	–	–		
C2	FN	C(L)	C(E2)		
	SG/PS	$\overline{C}$	C		
	DS	–	–		
P1 P.B.	FN	A(PB)	C(L)		
	SG/PS	$\overline{V1}.\overline{P1(WALK)}$	$V1.\overline{P1(WALK)}$		
	DS	$\overline{B}.\overline{D}$	$\overline{C}$		
P2 P.B.	FN	A(PB)	C(L)		
	SG/PS	$\overline{V2}.\overline{P2(WALK)}$	$V2.\overline{P2(WALK)}$		
	DS	$\overline{B}.\overline{D}$	$\overline{C}$		
P3 P.B.	FN	C(PB)	A(L)		
	SG/PS	$\overline{P3(WALK)}$	$C.\overline{P3(WALK)}$		
	DS	—	$\overline{A}.\overline{B}.\overline{D}$		
P4 P.B.	FN	A(PB)	Re-introduction		
	SG/PS	$\overline{V5}.\overline{P4(WALK)}$	$V5.\overline{P4(WALK)}$		
	DS	$\overline{C}$	$\overline{B}.\overline{D}$		
P5 P.B.	FN	B(PB)	D(PB)	A(L)	C(L)
	SG/PS	$\overline{V7}.\overline{P5(WALK)}$	$\overline{V7}.\overline{P5(WALK)}$	$\overline{V7}.\overline{P5(WALK)}$	$\overline{B}.\overline{P5(WALK)}$
	DS	XSF5	–	–	–
P6 P.B.	FN	B(PB)	D(PB)	A(L)	C(L)
	SG/PS	$\overline{V7}.\overline{P6(WALK)}$	$\overline{V7}.\overline{P6(WALK)}$	$\overline{V7}.\overline{P6(WALK)}$	$\overline{B}.\overline{P6(WALK)}$
	DS	XSF5	–	–	–

A ORIGINAL ISSUE

PUBLIC UTILITY LEGEND	
HYDRANT	☐
STOP VALVE	
GAS VALVE	⌗
SEWER MANHOLE	
TELECOM PIT	
ELECT LIGHT POLE	
POWER POLE	
STAY POLE	
TELEPHONE BOX	
TELECOM PILLAR	

REFERENCE PLANS	
SYMBOLS/ABBS.	VD003-6
STD POSIT	VD001-5
DET SCHED EXP	VD018-10
PRES. DETECT	VC005-17
SSG DIS. SEQ.	VD018-8
DUCT PLAN	SHEET 2
CABLE PLAN	SHEET 3
SURVEYOR : North Sydney CCL	
DATE : 2009	

U.B.D. Ref. Map 21 - N10
I.S.G. CO-ORDS E: 309 290 N: 1 250 000

DESIGNED G VARLEY Road Delay Solutions P/L
CHECKED JAMES MOORE
G Varley SITE CHECKED
G Varley RECOMMENDED

DESIGN APPROVAL
APPROVED
G Varley
Road Delay Solutions P/L
POSITION DIRECTOR
DATE 01/03/2013
Road Delay Solutions Pty Ltd
6 Beaumont Crescent
Bayview NSW 2104 AUSTRALIA

RMS ACCEPTANCE
RECOMMENDED
E. Morson
POSITION TEAM LEADER NETWORK OPERATIONS
DATE 19/08/2013
ACCEPTED
G. Kevill
POSITION ROAD NETWORK MANAGER
DATE 03/09/2013

ROADS AND MARITIME SERVICES

NORTH SYDNEY COUNCIL AREA
H.W.10 PACIFIC HIGHWAY, CHRISTIE ST
AND SERGEANTS LANE
ST LEONARDS

DESIGN LAYOUT

EXISTING ☒ PROPOSED ☐

CADD FILE: VV0769_13B_DES.dgn

SCALE 5 0 (1:250) 5 10

ISSUE B

FILE SF2014/009827

SUPERSEDES SHEET/ISSUE 13/A

REGN. DS2014/001161

TCS No. 0769

SHEET 13

- the closure of Christie Street in the section north of Oxley Street
- the roundabout at the Christie Street / Chandos Street intersection
- the traffic signals at the Christie Street, Atchison Street and Sergeants Lane intersection
- the peak directional CLEARWAY restrictions along the Pacific Highway

In regard to the future site circumstances, Council has proposed changed traffic and parking arrangements in Christie Street, some of which have already been in place and some are in progress. These changes are shown on the diagrams overleaf and include:

- widening of the western footway (recently completed)
- extension of the existing one-way south restriction to Nicholson Street (recently completed)
- removal/relocation of kerb side parking (recently completed)
- provision of a marked footcrossing (wombat style)
- imposition of a “NO LEFT TURN VEHICLES UNDER 6M EXCEPTED” restriction on the turn from the Highway to Christie Street

This proposal provides for the retention of the existing access driveway on Christie Street, for the development site although the development proposal is to widen this to the north.

The principal cause for concern is the proposed restriction on the left turn from the Highway. There is no apparent physical need for this restriction and delivery/service vehicles could avoid this by ingressing from Christie Street (north) although this would just result in added vehicle movements in this congested section of Christie Street (north).

The proposed development is only permitted to have access on the Christie Street frontage and it needs to provide for Telstra service vehicles and 8.0m box vans (home

LEGEND

FUTURE ROAD WORKS BY OTHERS

R5-40(L)

CHRISTIE STREET

PACIFIC HIGHWAY

MAKE SMOOTH CONNECTION WITH EXISTING WORKS

SAWCUT

EXISTING SIGN TO REMAIN

EXISTING SIGNS TO BE REMOVED

EXISTING SIGN TO BE REMOVED

NO STOPPING

ONE WAY

R2-2(R)

R5-400 A

NO RIGHT TURN

R2-6(R)

NO LEFT TURN OVER 6m

R2-6(L)

NO ENTRY

2P 8am–6pm

2P SAT 8am–6pm

R3-1

EXISTING DRIVEWAY

3.7m

EXISTING FOOTPATH (LOCATION TO BE CONFIRMED)

FOOTPATH TO BE RECONSTRUCTED TO SUIT PROPOSED SURFACE LEVELS.

4.3m EXISTING VEHICULAR CROSSING TO REMAIN

8.6m EXISTING VEHICULAR CROSSING TO REMAIN

2P TICKET 8am–6pm MON-SAT

P ONLY

3.0m

2.4m

1.5m

3.6m PEDESTRIAN CROSSING

1.5m

70°

±2.2m LANDSCAPE

0.2m VERGE

4.0m SHARED PATH

4.0m

SEE DWG. SKC78 FOR ADJOINING INFORMATION

Issue	Description	Date
P2	ISSUED FOR INFORMATION	29-01-21
P1	ISSUED FOR INFORMATION	27-01-21

100mm on Original

Bar Scales

0 2 4 6 8 10m

1 : 100 @ A1 1 : 200 @ A3

Client: JQZ

Scales	1 : 100 @ A1
Grid	MGA
Height Datum	AHD
Drawn	QD
Designed	GB
Checked	PW
Approved	PW

Project: 88 CHRISTIE STREET ST LEONARDS

Title: CHRISTIE STREET PEDESTRIAN CROSSING PLAN SHEET 1

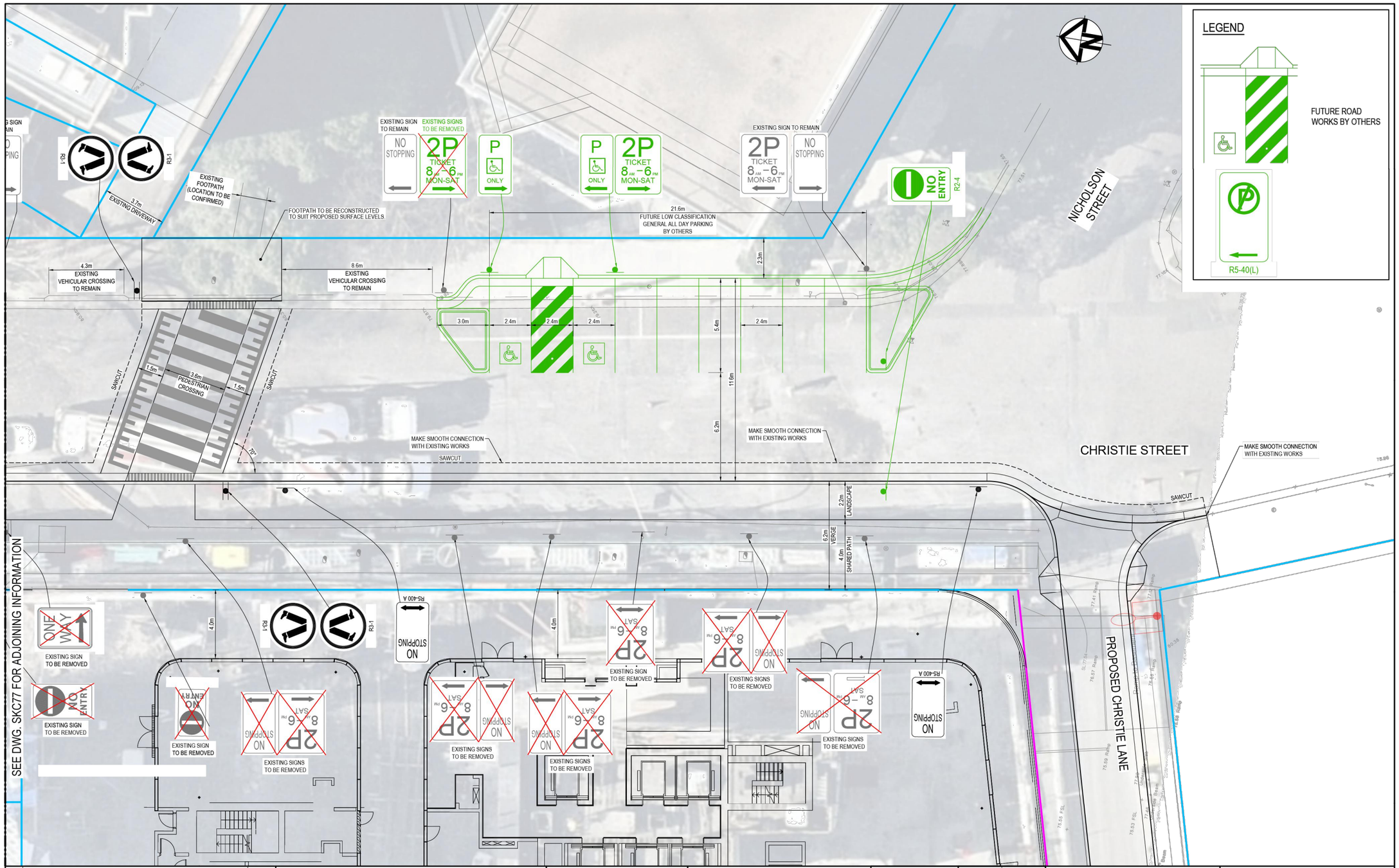
Civil Engineers and Project Managers
at&l
Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9923 1055
www.atl.net.au
info@atl.net.au

Status: FOR INFORMATION NOT FOR CONSTRUCTION

A1

Drawing No.	Project No.	Issue
SKC77	17-481	P2

\\ATLSERVER2\Projects\17-481 Christie Lane\Drgs\Civil\Sketches\SKC77-78 Christie Street Pedestrian Crossing Plan.dwg



Issue	Description	Date
P2	ISSUED FOR INFORMATION	29-01-21
P1	ISSUED FOR INFORMATION	27-01-21

100mm on Original

Bar Scales

0 2 4 6 8 10m

1 : 100 @ A1 1 : 200 @ A3

Client

JQZ

Scales	1 : 100 @ A1	Drawn	QD
		Designed	GB
Grid	MGA	Checked	PW
Height Datum	AHD	Approved	PW

Project

88 CHRISTIE STREET
ST LEONARDS

Title

CHRISTIE STREET
PEDESTRIAN CROSSING
PLAN SHEET 2

Civil Engineers and Project Managers
at&l
Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
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www.atl.net.au
info@atl.net.au

Status		
FOR INFORMATION NOT FOR CONSTRUCTION		A1
Drawing No.	Project No.	Issue
SKC78	17-481	P2

\\ATLSERVER2\Projects\17-481 Christie Lane\Drgs\Civil\Sketches\SKC77-78 Christie Street Pedestrian Crossing Plan.dwg

deliveries, small furniture vans etc). It is intended to request Council to delete the proposed left turn restriction.

There will also be occasions when larger service/delivery vehicles are required for businesses/buildings in the area and it is quite feasible to provide a LOADING ZONE restriction (or NO PARKING) in place of the 2 existing 2 Hour parking spaces on the Christie Street site frontage without any adverse traffic implications.

In addition, the proposed changes will remove the existing ability for vehicles to ingress into the site from the south on Christie Street (and also for the adjacent property on the northern side of Nicholson Street). This is considered to be an unnecessary restriction on access flexibility which increases the volume of vehicles which will turn left from the Highway to Christie Street.

3.3 Traffic Conditions

An indication of the existing traffic conditions in the vicinity of the site is provided by data published by the TfNSW and surveys undertaken as part of this study. The data published by the TfNSW is expressed in terms of Annual Average Daily Traffic (AADT) and the most recent recordings indicate the following:

	AADT
Pacific Highway at Albany Street	35,649

The results of traffic surveys at the Pacific Highway/Christie Street intersection during the weekday morning and afternoon peak periods in 2019 are provided in Appendix B and summarised in the following:

		AM	**PM**
Pacific Highway	EB	1,577	1,491
	LT	451	366
	WB	1,617	1,652
	LT	62	38
Christie Street	SB	96	38

RT	304	347
LT	43	49

These volumes are significantly higher than the recent SCATS counts which are also provided in Appendix B.

The operational performance of this intersection has been assessed using SIDRA and the results are provided in Appendix C and summarised in the following while the criteria for interpreting SIDRA results are reproduced overleaf.

	AM		PM	
	LOS	**AVD**	**LOS**	**AVD**
Pacific Highway/Christie Street	B	16.9	B	15.8

The results indicate that this intersection operates with a satisfactory Level of Service under the prevailing peak traffic circumstances even with the higher 2019 recorded volumes.

There have been recent reports of vehicles travelling northerly along Christie Street South into the highway intersection in contravention of the one-way southerly traffic restrictions. However, it is apparent that this is a result of the removal of the former kerb extension and regulatory signage on the western side of Christie Street in association with the construction work for the development of the site on the Western side.

It is also noted that the western approach of Oxley Street at the Pacific Highway intersection recently been widened to provide additional egress capacity out of the precinct.

3.4 Transport Services

The site is very conveniently located in relation to public transport services which include the St Leonards Railway Station on the North Shore Line, located immediately to the west. The new Crows Nest Metro Station currently under construction is located some 450m to the south-east and these rail services will provide ready access to the

metropolitan transport system. Bus services operate along the Pacific Highway providing frequent high capacity services to the City and North Sydney etc. Details of the available public transport services are provided on the diagrams overleaf.

3.5 Pedestrians and Cyclists

Pedestrian movements in the vicinity of the site are facilitated by the paved footways and traffic signal controlled pedestrian crossings at intersections. Cyclist movements are facilitated by the existing on and off road bike routes shown on the diagram overleaf.

Criteria for Interpreting Results of SIDRA Analysis

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	Good	Good
'B'	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
'C'	Satisfactory	Satisfactory but accident study required
'D'	Operating near capacity	Near capacity and Accident Study required
'E'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
'F'	Unsatisfactory and requires additional capacity	Unsatisfactory and requires other control mode

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below, which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (ie inner city conditions) and on some roads (ie minor side street intersecting with a major arterial route).

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

3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections.

For intersections controlled by **traffic signals** both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a **roundabout or GIVE WAY or STOP signs**, satisfactory intersection operation is indicated by a DS of 0.8 or less.

Sydney rail network

NSW GOVERNMENT | Transport

Metro Trains

Sydney metro and train lines

- **M** Metro North West Line: Chatswood, Tallawong
- **T1** North Shore & Western Line: North Shore, Western, Richmond
- **T2** Inner West & Leppington Line: Inner West, Leppington, City
- **T3** Bankstown Line: Liverpool, Lidcombe, City
- **T4** Eastern Suburbs & Illawarra Line: Eastern Suburbs, Illawarra, Cronulla
- **T5** Cumberland Line: Leppington, Richmond
- **T7** Olympic Park Line: Olympic Park, Lidcombe
- **T8** Airport & South Line: Airport, South, City
- **T9** Northern Line: Northern, Gordon

Stop | Interchange | Interchange | End of line

Line under construction

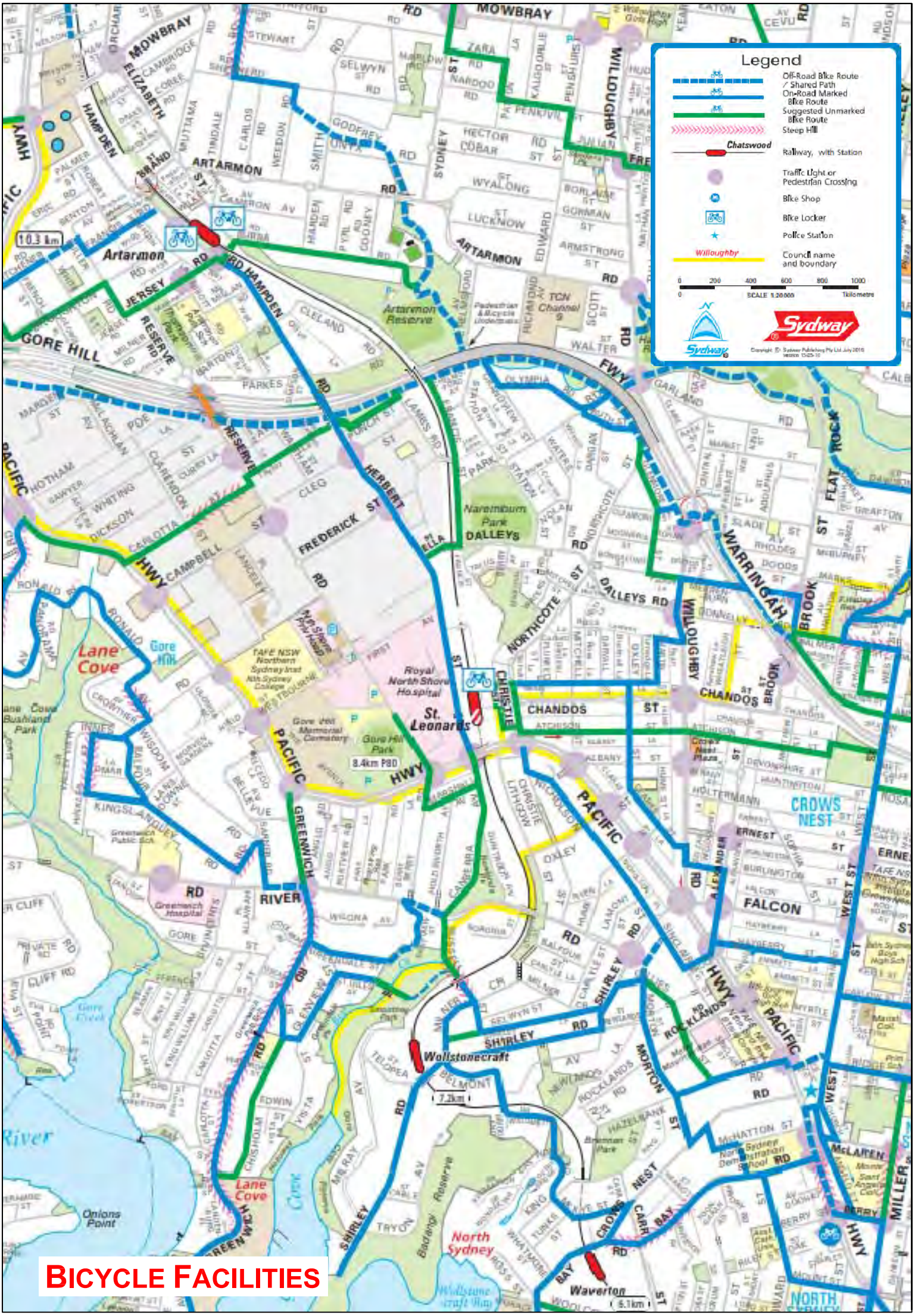
NORTH

Check timetables and trip planners for train services and connections

Visit **transportnsw.info**

1909TMS-E-MWT-A4P-WCAG


Legend
Police Station
Hospital
Shopping Centres
Metro Station
Railway Station
Light Rail Stop
Educational Institutions
Sporting Facility
Local Iconic
Bus Route
Bus Route Terminus
East Killara
Killara
Lindfield
East Lindfield
Forestville
Killarney Heights
Roseville Chase
Roseville
Castle Cove
Chatswood West
Chatswood
North Willoughby
Middle Cove
Willoughby
Castlecrag
Northbridge
Artarmon
Naremburn
Lane Cove
Lane Cove West
Boronia Park
St Leonards
Cammeray
Osborne Park
Crows Nest
Linley Point
Riverview
Northwood
Hunters Hill
Greenwich
Wollstonecraft
North Sydney
Longueville
Woolwich
Waverton
McMahons Point
Milsons Point
Chiswick
Rozelle
White Bay
Glebe
Buses running along dotted line
For more details on City bus routes see Sydney CBD Inset
BUS SERVICES


Legend
Off-Road Bike Route / Shared Path
On-Road Marked Bike Route
Suggested Unmarked Bike Route
Steep Hill
Chatswood
Railway, with Station
Traffic Light or Pedestrian Crossing
Bike Shop
Bike Locker
Police Station
Willoughby
Council name and boundary
0 200 400 600 800 1000
0 SCALE 1:20000 1kilometre
Sydway
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Version 15425-10
MOWBRAY
ARTARMON
Artarmon
GORE HILL
Artarmon Reserve
Narrabeen Park
DALLEYS
CHANDOS
St. Leonards
Royal North Shore Hospital
Lane Cove
Gore Hill
Gore Hill Park
8.4km P&D
CROWS NEST
FALCON
Wollstonecraft
7.2km
Waverton
6.1km
North Sydney
Onions Point
10.3 km
BICYCLE FACILITIES

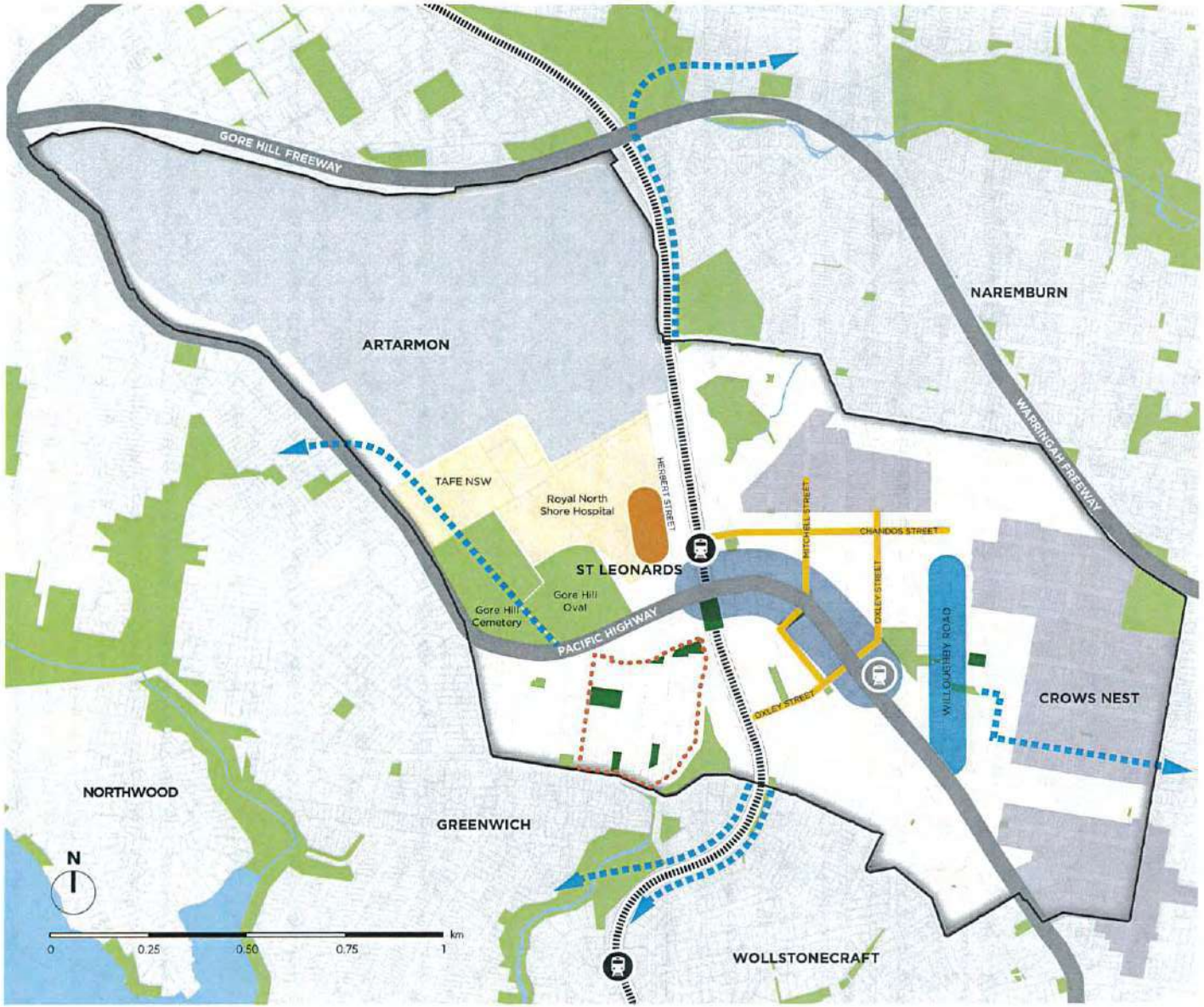
4.0 Precinct Planning

DPIE exhibited the St Leonards and Crows Nest 2036 Plan after identifying the St Leonards and Crows Nest area as a strategic centre which will benefit by the provision of the new Crows Nest Metro Station.

After consultation with the local government and the community, the final plan was published in August 2020 and it includes the following objectives:

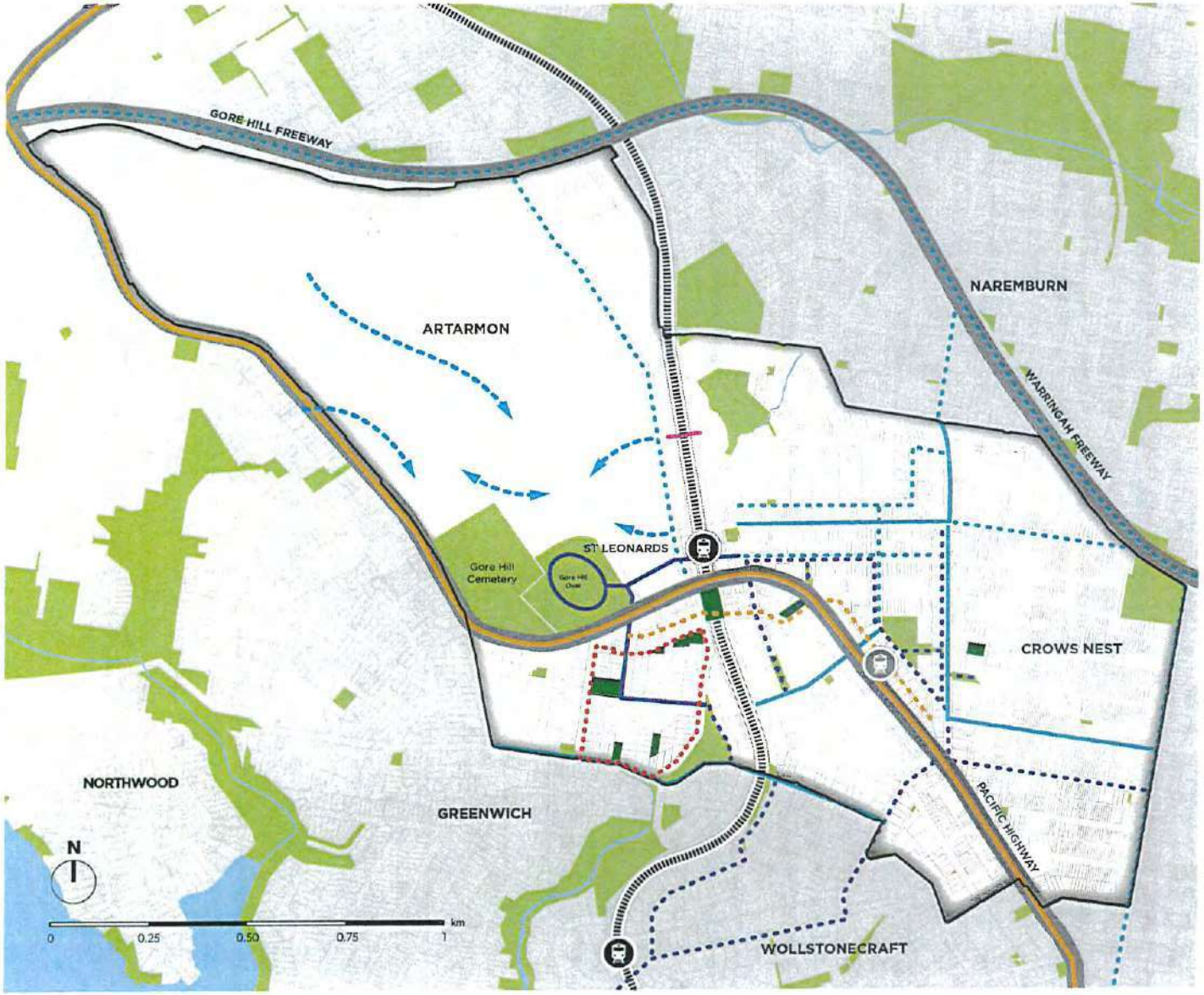
- create some 63,500m^2 of additional commercial floorspace to support some 16,500 new jobs
- create the circumstances for the provision of some 6,683 new dwellings
- create funding mechanisms for open space and infrastructure upgrades
- make suitable provisions to allow for the transition of the St Leonards core to the surrounding residential area
- support the long-term growth of the health and education precinct

Details of the Plan are provided on the Vision Map, Movement Map and Actions and Proposals diagram reproduced overleaf.



Vision Map

- Plan Area
- Railway Line
- Railway Station
- Metro Station
- Existing Open Space
- Potential Open Space
- Waterways
- St Leonards South Rezoning
- Herbert Street Precinct
- Artarmon Employment Area
- Heritage Conservation Area
- Higher Development Between Stations
- Connections to nearby Open Spaces
- Tree Lined Green Streets
- Retained Built Form Along Willoughby Road



Movement Map

- Plan Area
- Railway Line
- Railway Station
- Metro Station
- Existing Open Space
- Potential Open Space
- Waterways
- St Leonards South Rezoning
- Existing Pedestrian Link
- New or Improved Pedestrian Link
- Existing Cycle Infrastructure
- New or Improved Cycle Infrastructure
- Improved Shared Space Connection
- Major Vehicle Corridor including bus
- Improved Connections to the Health and Education precinct for further investigation
- Improved Over-Rail Crossing to Pedestrains and Cyclists

Figure 30: Active transport

- Plan Area
- Railway Line
- Railway Station
- Metro Station
- Existing Open Space
- Proposed Open Space
- Council Proposed Open Space
- Improved connections to the Health and Education precinct for further investigation
- Existing pedestrian link
- New or improved pedestrian link
- Improve crossing for pedestrians and/or cyclists
- Improve or expand crossing over rail for pedestrians and cyclists
- Introduce a new right-turn for south bound vehicles
- Existing 'foreshore to foreshore' link
- Foreshore to Foreshore Link
- Existing cycle infrastructure
- New or improved cycle infrastructure
- Existing through site link
- New through site opportunities
- Improved shared space connection
- Major vehicle corridor including bus

5.0 Traffic

5.1 Vehicles

The TfNSW Development Guidelines (TDT2013-4b) specify peak traffic generation rates for high-density residential apartments of 0.19 vtph in the AM peak and 0.15 vtph in the PM peak. However, the RMS surveyed sites included some sites (Rockdale and Parramatta) which had retail / commercial parking which was not accounted for and sites (Liberty Grove and Pyrmont) which were not near a railway station.

If the results of the comparable surveyed sites at Chatswood, Cronulla and Strathfield (all close to railway stations) are aggregated with the surveyed St Leonards site, the average peak traffic generation is as follows.

vtph / apartment	
AM	**PM**
0.09	0.09

It is reasonable to adopt these factors as the traffic generation rate per parking space as the surveyed sites had an average of more than 1 parking space per apartment. As such, the projected peak traffic generation of the proposed **28** residential parking spaces is some **3** vtph. Even if a sensitivity factor of +50% were applied, this would still only be some **4** vtph as follows:

AM		**PM**	
IN	**OUT**	**IN**	**OUT**
1	**3**	**3**	**1**

In regards to the short term accommodation, TfNSW's traffic generation rate, indicates 0.4 Peak Hour Vehicle Trips per unit, which applied to 84 units indicates a total of 34 vtph. On the basis of projecting the traffic generation off the provided parking spaces, it is essential to estimate what percentage of the reduced provided parking spaces, will be used by the short term accommodation occupants.

	Demanded	Provided
Parking Provision (total)	93	48
Parking Provision (short term accommodation)	37	x

It is evident that 19 of the provided spaces will be dedicated to the short term accommodation, thus projecting 8 vtph.

Following the same ‘’parking provided-traffic generation’’ equation, for the retail area and the affordable housing units, in the worst case scenario there would be 2 vtph.

Thus, the projected worst case total traffic generation resultant to the proposed development is only some 14 vtph maximum with a 50/50 IN and OUT split. There will also be some additional movements generated by taxi, set-down/pick-up (SD/PU) and service vehicle trips related to the proposed development, although these will be quite minor.

The projected distribution of these trips is:

IN	**OUT**
LT from Highway 40%	LT to Christie Street 100%
SB Christie Street 40%	
RT Christie Street 20%	

The egressing vehicles will access the Pacific Highway at the recently upgraded Oxley Street intersection and the peak volumes of the generated movements (i.e. maximum of 10vtph in one direction) will be so minor (i.e. 1vt every 2 cycles of the traffic signals) that there will not be any perceptible traffic implications particularly when discounted by the existing traffic movements generated by the site.

The proposed changes will not significantly impact traffic at the intersection of Christie Street and Pacific Highway. Vehicular access, vehicle movements, parking spaces, and car stacking mechanisms are not expected to be adversely affected. Traffic flow at this intersection should remain largely unchanged, at the quite satisfactory level that has already been presented (see section 3.3).

5.2 Pedestrians

An indication of the pedestrian movements which will be generated by the proposed development is provided by the results of studies undertaken by RMS for High Density Residential Apartments and Commercial Blocks.

The Residential Apartment Study included surveys of a site in Herbert Street, St Leonards adjacent to the Railway Station which contained 70 apartments.

The recorded pedestrian movements during the AM and PM peaks was as follows.

	AM	**PM**
Total movements	45	38
Movements per apartment	0.64	0.54

The Commercial Blocks Study included surveys of sites in North Sydney and Parramatta which had constrained parking provision and convenient access to rail and bus services. The recorded pedestrian movements during the AM and PM peaks was as follows.

	AM	**PM**
North Sydney		
Total Movements	397	338
Movements per 100m^2	1.26	1.08
Parramatta		
Total movements	387	349
Movements per 100m^2	1.43	1.29
Average	**1.35**	**1.19**

Application of these factors to the proposed development would indicate the following:

		Pedestrians Per Hour		
		AM		**PM**
272 apartments	@ 0.64	174	@ 0.54	147
3,840m^2 retail/ short-term accommodation/ key-worker housing	@ 1.35	52	@ 1.19	46
Total:		**226**		**193**

The pedestrian generation of the proposed retail elements will essentially be ancillary (passing not destination) while the pedestrian generation of the existing development on the site is unknown. However, it is apparent that the pedestrian movement outcome will be quite minor and even if all the pedestrians crossed the Highway to/from the Railway Station at the Christie Street intersection, this would only be less than 10 pedestrians two way for each cycle of the traffic signals (without discount for the existing pedestrian movements).

It is apparent that the pedestrian movements generated by the proposed development will not result in any adverse implications.

6.0 Parking

The SEPP specifies a minimum parking provision in relation to the proposed "build to rent" apartments of 0.2 spaces each (i.e. in an "accessible" area) and 1 space per 10 affordable housing units. Application of this to the proposed 272 apartments & 10 units would indicate a provision of 55 spaces.

Council's DCP specifies the following parking provisions.

Retail	-	1 space per 110m^2 GFA
Tourist and Visitor Accommodation	-	2 spaces + 1 per 20 rooms (for residents and employees) & 1 space per 3 rooms + 1 disabled space per 10 spaces (for customers/ visitors)

Application of this criteria to the proposed development would indicate the following provision:

Tourist and visitor accommodation	-	37 spaces
Retail 159m^2	-	1 space
Total:		**38 spaces**

The confines of the site with the need to retain the Telstra Infrastructure limit the ability to provide conventional ramp access parking and the capacity of stacker parking. Thus it is proposed to provide 48 car parking spaces in an automated podium car stacker.

Given the highly accessible public transport services, employment, shopping and entertainment facilities available in the vicinity of the site, it is considered that the proposed parking provision for the development elements will be adequate and appropriate.

The proposed automated stacker parking will provide for accessible parking and EV charging.

The DCP also specifies requirements for bicycle and motorcycle parking as follows.

Bicycles

	Residents / Employees	Visitor / Customers
Residential	1 per 4 dwellings	1 rack + 1 rack per 10 dwellings
Tourist and Visitor Accommodation	1 per 4 staff	1 rack + 1 rack per 20 rooms
Retail	1 per 50m^2 GFA	2 racks + 1 rack per 200m^2 over 200m^2

Provision is proposed on Level 1 for bicycles and EOT facilities as follows:

Residential	-	99 spaces (6 with EV charging)
Tourist and Visitor Accommodation	-	4 staff spaces (16 staff) & 5 visitor spaces
Retail	-	4 spaces

Motorcycle

1 space per 15 car spaces.
Provision is proposed on the Ground Level for 4 motorcycle spaces.

While this proposed provision is not entirely compliant with the DCP, it is considered to be a reasonable and realistic provision which will be supported by EOT facilities comprising shower/change, toilet and personal lockers.

It is apparent that the proposed provision for bicycles and motorcycles will be entirely suitable and appropriate when considering the excellent public transport services available for the site.

7.0 Access, Internal Circulation and Servicing

Access and Internal Circulation

The proposed vehicle access arrangement comprises a wide combined ingress/egress driveway on the Christie Street frontage (i.e. widening of the existing driveway) which provides for ingress from the north and south and egress to the south only.

The driveway will divide within the site to comprise a one-way clockwise circuit on the Ground Level providing access to:

- loading bays (5)
- separate ingress and egress car stacker modules
- a waiting lounge

The car stacker ingress module will be programmed to automatically return and dwell on the Lower Ground level to facilitate the ingress of cars while the egress module will automatically return to the stacker to facilitate the egress of cars. Each module will comprise a turn table and the equipment can be programmed to provide for breakdown/maintenance as follows:

- **Ingress module out of action**
  Cars reverse into the egress module to ingress
- **Egress module out of action**
  Cars reverse out of ingress module to egress

Due to the restraints imposed by retention of the Telstra infrastructure, pedestrians accessing car parking in the stacker will be required to crossover the ingressing vehicle movement in a circumstance of constrained sight distance. In order to improve the safety of these pedestrians, it is proposed to provide “flashing yellow lights” facing incoming vehicles activated for a pre-set time by pedestrians operating switches on the approach to the crossing area which will be marked in a standard pedestrian crossing format.

Servicing

Deliveries and refuse removal will be undertaken in the loading bays provided on the ground level. These bays will provide for trucks up to 8.0m including Council's 6.8m small refuse truck. It is not feasible to accommodate larger trucks (e.g. Council's large refuse truck) due to the confines of the site area and the requirement to retain the Telstra infrastructure. A south approach of vehicles, along Christie Street, is considered feasible, as the NO ENTRY sing is situated on the northern boundary of the site's access.

Details of the swept path assessment are provided in Appendix D. It is anticipated that a 'Dock Management Plan' will be required as a Consent Condition.

8.0 Construction Traffic Management Plan

It is inevitable that a Consent Condition will require a detailed CTMP along with Traffic Guidance Plan to be submitted prior to CC and this will enable an engaged builder to provide a higher level of detail and confirmation in relation to the construction process.

The indicative Construction Traffic Management Plan is as follows:

Working Hours	-	As per Consent Conditions	
Hoardings	-	B Class on all road frontages with A Class fencing at the site boundary and gates on the southern part of the Christie Street frontage	
Time Frame	-	Establishment	1 week
		Demolition	6 weeks
		Excavation	18 weeks
		Construction	80 weeks
		Fit Out	24 weeks
		Total:	**129 weeks**
Works Zone	-	On Christie Street as per Figure 5	
Cranage	-	Site Crane	
Truck Movements	-	Truck Routes as per Figure 6	
	-	Demolition – Bogie	10 per day
		Excavation – Truck & Dog	10 per day
		Construction and Fit Out	10 per day, more for concrete pour (20 per day)

Workers	-	Demolition	15
		Excavation	10
		Construction	110
		Fit Out	50
Traffic Control	-	As required. Traffic Guidance Plans for awning removal/erection and road/footway works.	
Spillage	-	Cattle grid with “scrub & clean” for demolition and excavation.	

LEGEND

- A CLASS FENCING
- SITE ACCESS
- TFNSW CERTIFIED TRAFFIC CONTROLLER
- B CLASS HOARDING
- WORKS ZONE

N

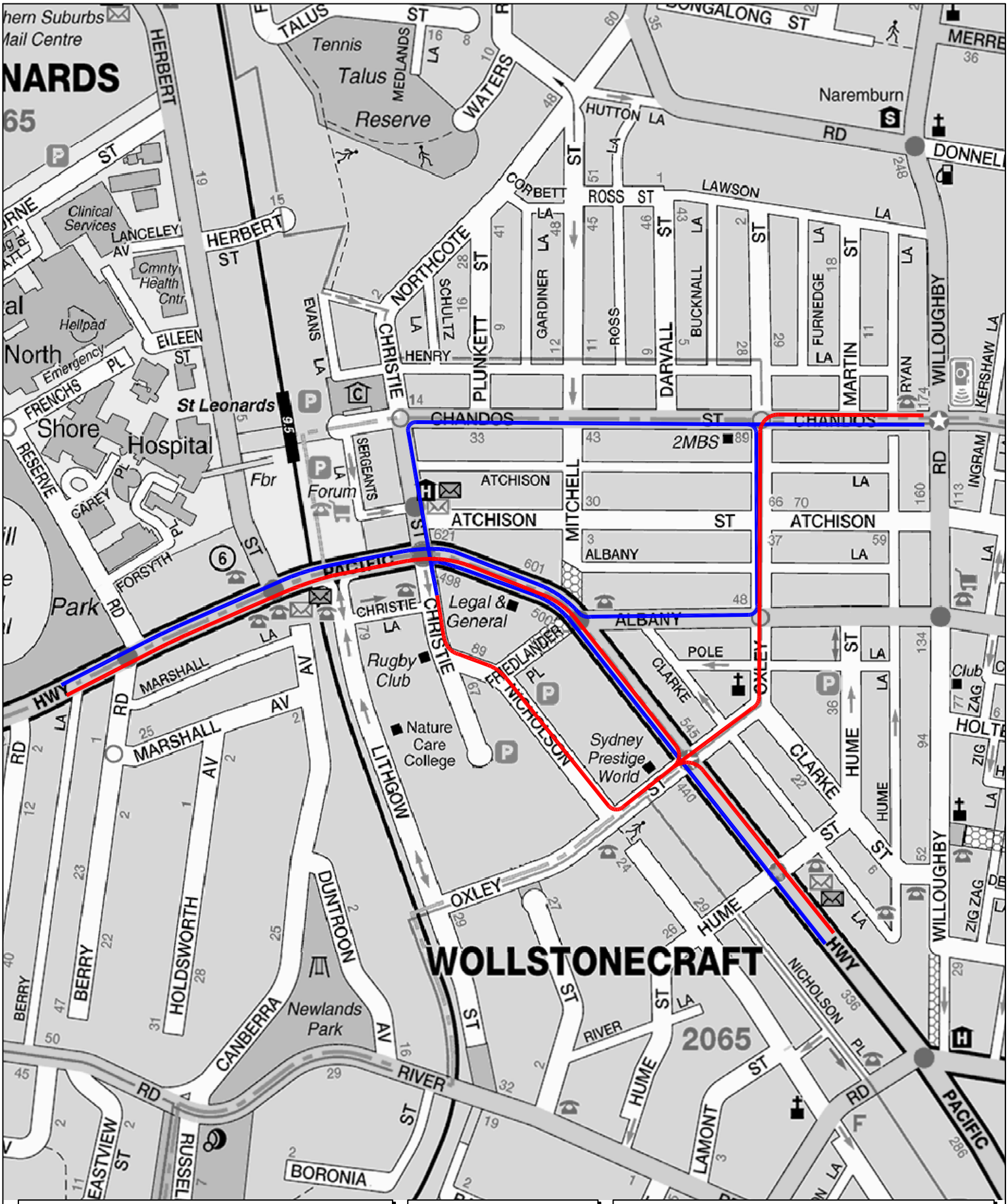
SCALE 1:500

0 5.0 10.0

SCALE A4

TRAFFIC MANAGEMENT PLAN

FIG 5


WOLLSTONECRAFT
2065
St Leonards
Shore Hospital
Clinical Services
Cmnty Health Cntr
Hellpad
Emergency
Tennis
Talus Reserve
Naremburn
Rugby Club
Legal & General
2MBS
Nature Care College
Sydney Prestige World
Newlands Park
HERBERT ST
CHANDOS ST
ATCHISON
ALBANY
PACIFIC HWY
MARSHALL AV
CANBERRA AV
DUNTROON AV
LITHGOW ST
CHRISTIE ST
MITCHELL ST
WILLOUGHBY RD
HUME ST
OXLEY ST
CLARKE ST
POLE
RIVER
BORONIA
LEGEND
ARRIVAL
DEPARTURE
N
TRUCK ROUTES
FIG 6

9.0 Green Travel Plan

The Green Travel Plan is provided in a separate accompanying document.

10.0 DPIE Issues

In response to the submission of SSDA 35631707 the DPIE on 24.10.2022 requested that a number of issues be reviewed and responded to.

The comments in regard to the Traffic and Parking Assessment Report are as follows:

- *The assessment (or EIS section) may benefit from clear plans indicating all access routes into and from the site and within the surrounding road network (turns/one-way etc).*
- *The assessment of potential traffic impacts during construction is inadequate and must be revised to consider trip generation, methods of transport and parking for all construction staff and all potential impacts.*
- *The potential for any additional queuing resulting from the proposed development during construction and operation must be assessed.*
- *Further detail is required on the operation of the car stackers, wait times and the capacity of the development to accommodate queuing on site. The assessment must include consideration of mechanical plant failure, potential traffic impacts and identify appropriate response measures.*
- *Further assessment of parking is required addressing the non-compliance with the car parking controls in the DCP.*
- *Measures to mitigate any traffic impacts, including details of any new or upgraded infrastructure to achieve acceptable performance and safety, and the timing, viability and mechanisms of delivery (including proposed arrangements with local councils or government agencies) of any infrastructure improvements in accordance with relevant standards must be provided.*
- *The Construction Traffic Management Plan is not supported in its current form.*

Response

Access Routes

Subsequent to the Traffic Report being prepared, Council (as identified in P7 of the report) has implemented the changed traffic arrangements which prevent ingress to the site from Christie Street (south). As a consequence, the only available access movements are as follows:

Ingress to the site:

- Left turn from Pacific Highway to Christie Street
- Southbound from Christie Street (north) across the Highway

Egress from the site:

- Left turn to Christie Street then to Nicholson Street and Oxley Street to access the Highway

Construction Traffic (Traffic Impact and Queuing)

There will be nothing unique or complicated for the construction of this development, and because specific details cannot be determined until a builder has been appointed, it has been the accepted practice to provide an Indicative CTMP with the SSD applications and a detailed CTMP subsequently submitted in response to the normal Consent Condition requiring a CTMP to be approved for the CC process.

The truck movements for demolition and excavation will be relatively minor due to:

- the small existing buildings to be removed
- the small excavated area for the podium car stacker as compared to a multi-level ramped basement carpark

The traffic impact will therefore be significantly less than would be the case for a comparable size building let alone the much larger building complex nearing completion on the opposite side of Christie Street.

A Works Zone will be provided on the Christie Street frontage which can accommodate 2 large trucks with an on-site crane used for the unloading/loading of trucks.

The arrival of trucks will be controlled with a “holding area” provided on the Gore Hill Freeway in the “lee area” approaching the Willoughby Road Off Ramp. This arrangement has been utilised for numerous development projects at St Leonards. Trucks will be required to wait in this holding area until cleared to proceed to the site by the Traffic Control at the site.

Trucks will approach the site along Christie Street north crossing the highway at the intersection traffic signals. Alternatively, if the NO LEFT TURN (Vehicles Under 6m Excepted) restriction for the turn from the Highway to Christie Street is removed, trucks will also be able to access by this left turn movement. Trucks will depart by left turn to Christie Street, left turn to Nicholson Street then left turn to Oxley Street to access the Highway.

If an errant truck arrives at the site without prior clearance to do so, the Traffic Controllers will direct the driver to depart to the holding area.

There will be no parking provided on site for workers during the construction processes and workers will be reliant on the very convenient proximity to rail and bus services. Secure storage will be provided on site for workers equipment and materials in order to avoid the need for workers to drive to/from the site.

The movement of construction vehicles throughout the various construction processes will be relatively consistent with some heightened movements during major concrete pours (up to 30 trucks per day). Construction hours will be directed by the relevant Consent Condition.

Car Stacker

Details of a similar car stacker are attached and there will be provision for up to 8 ingressing cars to queue within the site to the entry module. The entry module will nominally auto revert and dwell on the Ground Level to facilitate entry while the egress module will auto revert and dwell at the pick-up level.

A copy of a Timing Analysis (Appendix E) indicates a “parking” (ingress) rate of 30 cars per hour and an egress rate of 27 cars per hour of a relevant car stacker. The projected peak traffic generation of the proposed development is as follows.

	AM		**PM**	
	IN	**OUT**	**IN**	**OUT**
Apartments	5	20	20	5
Tourist and Visitor Accommodation	12	1	1	12
Retail	1	-	-	2
Total:	**18**	**21**	**21**	**18**

Accordingly, the projected peak ingress and egress movements will be significantly less than the movement capacity of the stacker system and it is noted that this is a “worst case” circumstance which incorporates the entering module not being in the waiting position at the Lower Ground Level pick up and the existing module not being in the waiting position at the pick up level. The system incorporates the flexibility for either the entry or exit module to be “out of action” (e.g. maintenance) and the other module is able to provide for both entry and exit movements.

Car Parking

Application of the relevant parking criteria indicates the following provision:

272 x BTR Apartments	54 spaces
10 x Affordable Housing Units	1 space
84 x Short term accommodation units	37 spaces
159m^2 Retail	1 space
Total	**93 spaces**

Due to the Telstra infrastructure constraints on the site, it is proposed to provide **48** spaces. This provision is considered to be adequate and appropriate due to:

- the high level of accessibility to rail and bus services (including the impending Metro Station nearby)
- the universal contemporary principal to reduce reliance on private car travel
- the provision of parking for the non-residential floorspace only being slightly less than the DCP criteria

The Traffic Report provides numerous existing LGA precedents to the reduced parking provision for non-residential floorspace at locations with good public transport services.

Mitigation of Traffic Impacts

DPIE Planning for the St Leonards and Crows Nest 2036 development identified traffic mitigation measures and these included changes at the Pacific Highway and Oxley Street intersection to increase the operational capacity. These changes have been implemented and there are other changes proposed to improve provision for pedestrians and cyclists.

Because of the constrained parking provision within the proposed development, there will be significantly less traffic movements generated than if the parking were unconstrained (like other development sites in the area) as that which formed the basis for the DPIE planning assessment.
The Traffic Report assessment concluded that there are no traffic mitigation measures necessitated by the proposed development for the forgoing reasons.

The DPIE planning identified what measures were required to facilitate development under the 2036 Plan and there is nothing more required particularly as the projected traffic generation of the development “sits comfortably” within the potential traffic attributable under the planning provisions.

11.0 Conclusion

The Traffic and parking assessment provided in this report confirms that the envisaged development will:

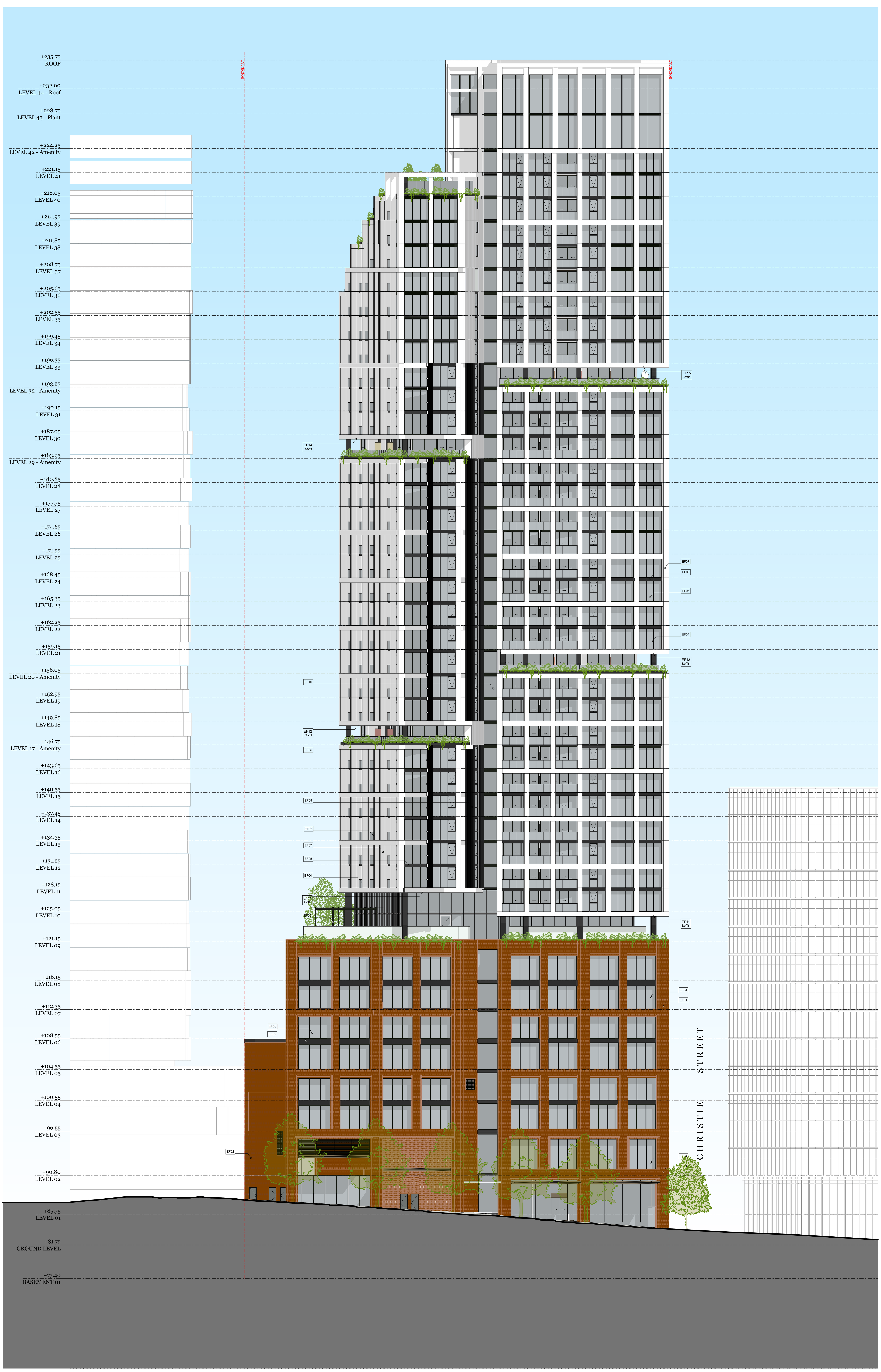
- not present any unsatisfactory traffic capacity, safety or environmental related implications

- incorporate a suitable and appropriate parking provision for the use consistent with the objectives of the Lane Cove DCP

- incorporate suitable vehicle access, internal circulation and servicing arrangement

Appendix A

Development Plans



NORTH ELEVATION
1:250

Rev	Date	By	Chk	Description
A - WIP	Work in Progress	ZZ		Issue for DA

DKO Architecture (NSW) Pty Ltd
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Surry Hills, NSW 2010
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info@DKO.com.au
www.DKO.com.au
ABN: 89597069590
NSW Nominated Architects
Koos de Keijzer 5767
David Randerson 8542

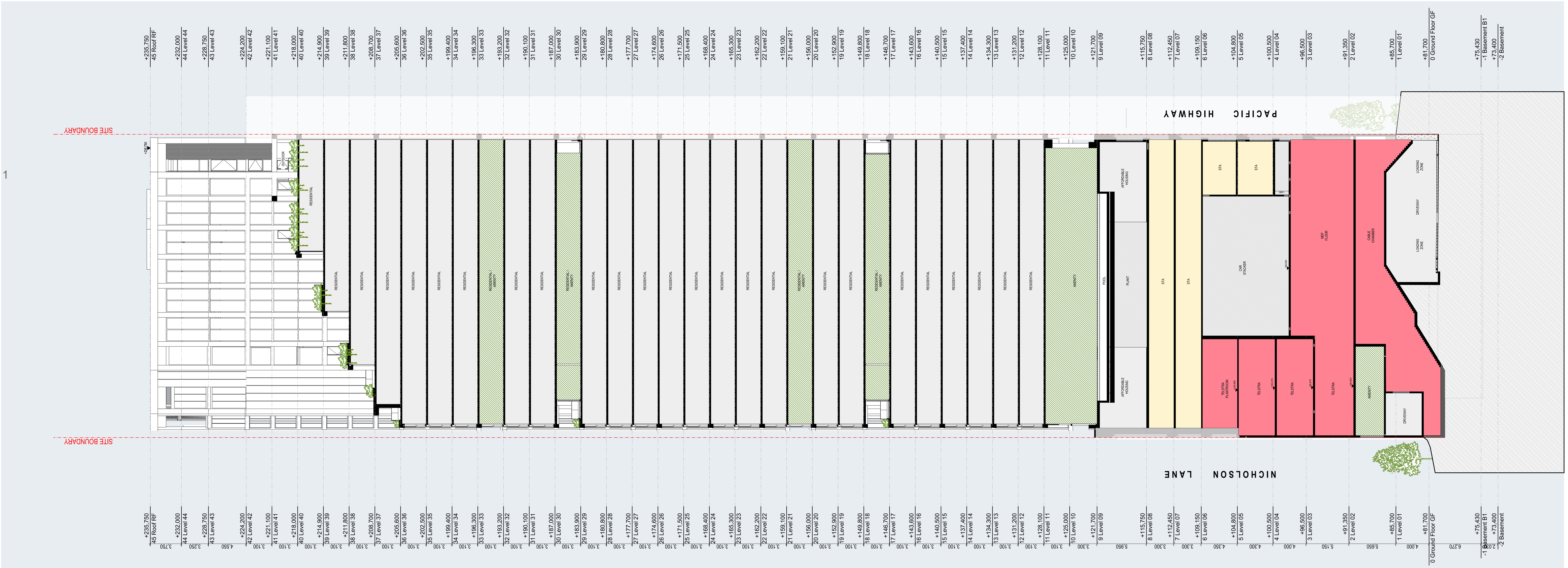
DKO home

Project Name 524-542 Pacific Highway, St Leonards
Project Address 524 - 542 Pacific Highway St Leonards NSW 2xxx Aust.

Project Number 0003070
Drawing Name North Elevation
Scale 1:250 @A1
Date 17/09/2022
Drawing Number DA300
Revision A - WIP

DRAFT

1



Section A
1:250

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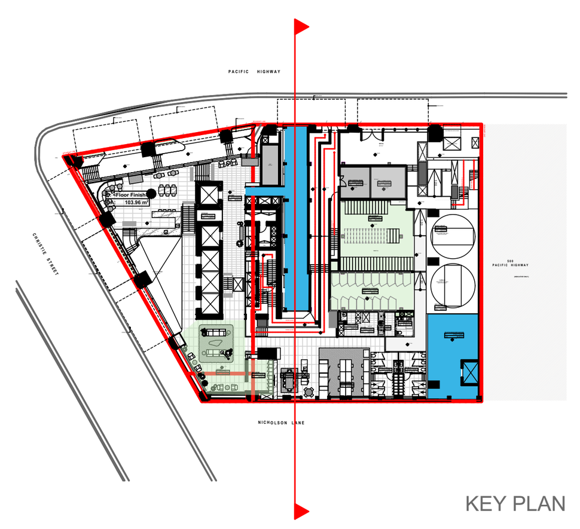

Rev	Date	By	Chk	Description
01	10/08/2023			Issue for Co-ordination
02	4/09/2023			Issue for Information

DRAFT
NOT FOR CONSTRUCTION

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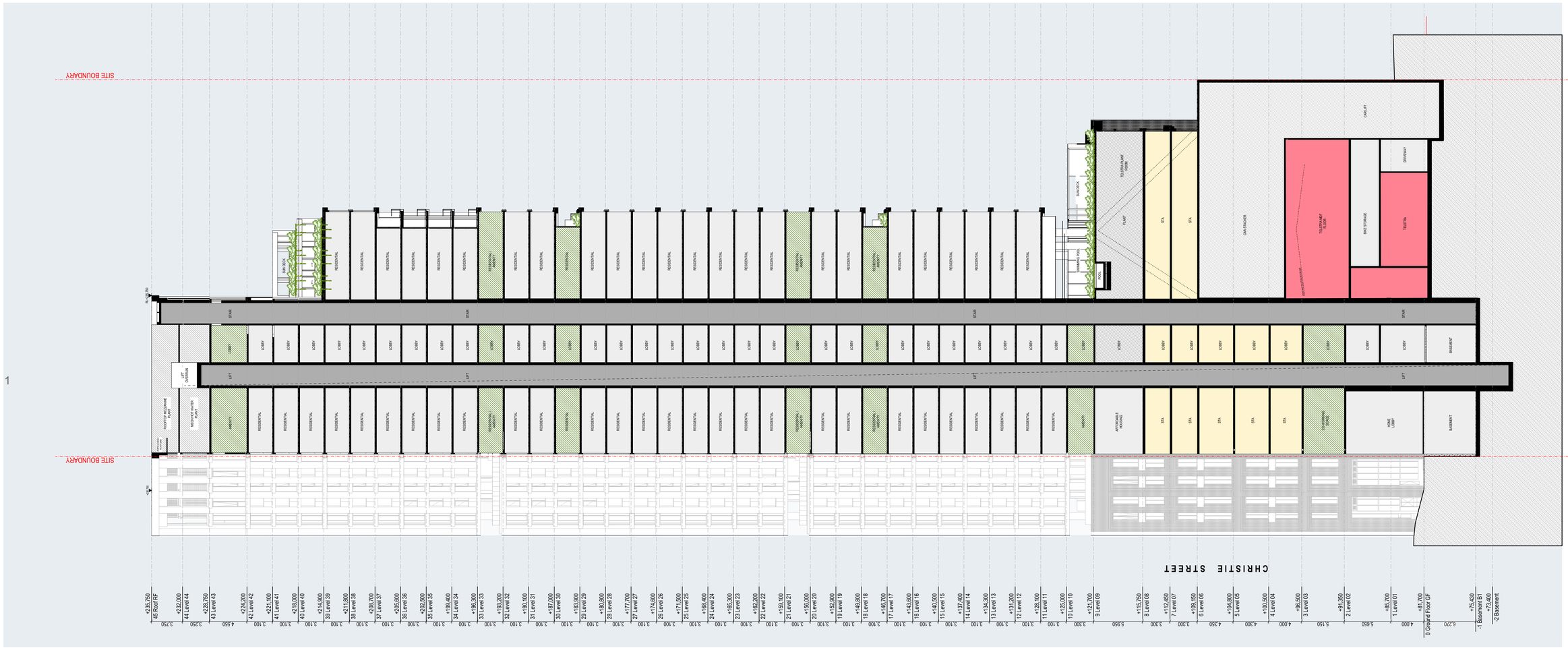
David Randerson 8542

DKO

Project Name	524-542 Pacific Highway	Project Number	00013070
Project Address	524 - 542 , St Leonards, NSW 2065	Drawing Name	Section A.
		Scale	1:250, 1:1000@A3
		Date	4/09/2023
Client	home	Drawing Number	DA304
		Revision	02



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Section A
1:250

KEY PLAN

Rev	Date	By	Chk	Description
01	10/08/2023			Issue for Co-ordination
02	4/09/2023			Issue for Information

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ABN: 81956706590
NSW: Nominated Architects
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Project Name	524-542 Pacific Highway
Project Address	524 - 542 , St Leonards, NSW 2065
Client	home
Project Number	00013070
Drawing Name	Section B
Scale	1:250, 1:1000@A3
Date	4/09/2023
Drawing Number	DA305
Revision	02

PACIFIC HIGHWAY
BOUNDARY LINE
BIN HOLDING AREA
LOADING DOCK
FFL +80.670
STA / G
STA / R
R/G
R
R
RESIDENT SERVICES
STA SERVICES
HOME LOBBY
+81.830
AIR LOCK
LUGGAGE STORE
PUMP SA
PUMP EX
FIRE HYD AND SPRINKLER
1:14
1:8
FROM BASEMENT
CABLE CHAMBER OVER SHOWN DASHED
TELSTRA LOADING BAY
APPROX 2.5M CLEARANCE BELOW CABLE CHAMBER
LOADING BAY
SWITCH ROOM
SSL +81.010
SUBSTATION
TRANSFORMER HATCH
HV PIT & SWITCHES
LV PIT
TX1
TX2
ACCESS CHAMBER
CAR WAITING LOUNGE
+81.250
ENTRY CARLIFT
CABIN #1
CAR STACKER TURN TABLE
(INDICATIVE EXTENT)
CABIN #2
CAR STACKER TURN TABLE
(INDICATIVE EXTENT)
EXIT CARLIFT
+81.425
CABLE CHAMBER
DIESEL AIR VENT
DIESEL PLANT
EX. RL +83.410
TELSTRA LOADING BAY
SSL +81.680
EX. RL +83.180
EX. RL +82.580
+82.280
+81.680
TELSTRA LOADING BAY
UNCRATING AREA
TXG
DIESEL FUEL TANK
MB
EXH
500 PACIFIC HIGHWAY
(INDICATIVE ONLY)
Motor Cycle Parking
M1
M2
NON-RE
CHRISTIE STREET
NICHOLSON LANE
N

Ground Floor
1:100

Rev	Date	By	Chk	Description
01	10/08/2023			Issue for Co-ordination
02	22/08/2023			Issue for Co-ordination
03	4/09/2023			Issue for Information

DRAFT
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David Randerson 8542

DKO

Project Name	524-542 Pacific Highway
Project Address	524 - 542 , St Leonards, NSW 2065
Client	home
Project Number	00013070
Drawing Name	Ground Floor
Scale	1:100@A3
Date	4/09/2023
Drawing Number	DA201
Revision	03

1. Level 01
1:100

Rev	Date	By	Chk	Description
01	10/08/2023			Issue for Co-ordination
02	22/08/2023			Issue for Co-ordination
03	4/09/2023			Issue for Information

DRAFT
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ABN: 81956706590
NSW: Nominated Architects
Koos de Keijzer 5767
David Randerson 8542

Project Name	524-542 Pacific Highway
Project Address	524 - 542 , St Leonards, NSW 2065
Client	home
Project Number	00013070
Drawing Name	Level 1
Scale	1:100@A3
Date	4/09/2023
Drawing Number	DA202
Revision	03

Appendix B

Traffic Survey Results

R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : BarkerRyanStewart
Job No/Name : 6175 ST. LEONARDS Traffic & Pedestrians
Day/Date : Thursday 22nd August 2019

All Vehicles

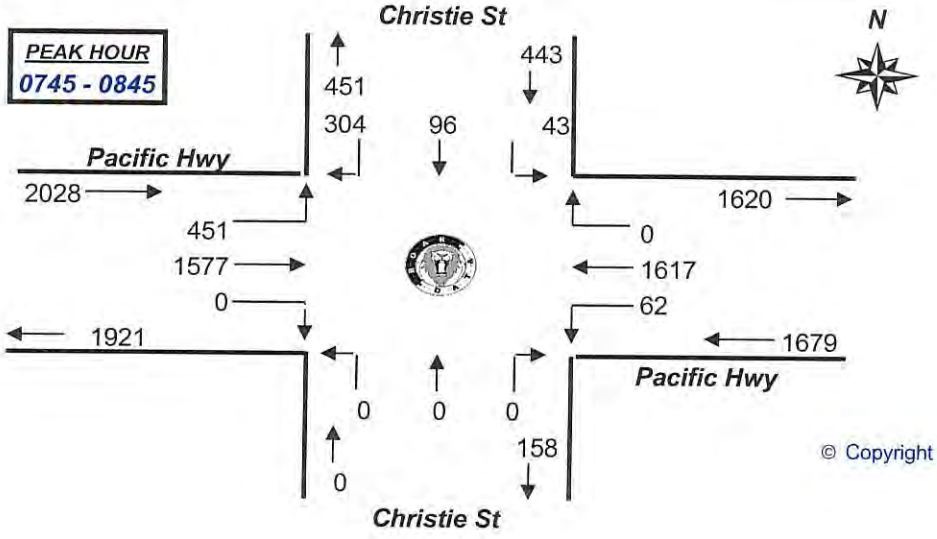
Time Per	NORTH Christie St L	NORTH Christie St T	NORTH Christie St R	WEST Pacific Hwy L	WEST Pacific Hwy T	WEST Pacific Hwy R	SOUTH Christie St L	SOUTH Christie St T	SOUTH Christie St R	EAST Pacific Hwy L	EAST Pacific Hwy T	EAST Pacific Hwy R	TOT
0700 - 0715	4	13	57	78	293	0	0	0	0	5	269	0	**719**
0715 - 0730	5	15	66	86	340	0	0	0	0	8	345	0	**865**
0730 - 0745	7	17	79	107	403	0	0	0	0	7	394	0	**1014**
0745 - 0800	15	19	84	98	415	0	0	0	0	13	408	0	**1052**
0800 - 0815	13	24	65	108	395	0	0	0	0	16	358	0	**979**
0815 - 0830	6	29	85	108	384	0	0	0	0	14	434	0	**1060**
0830 - 0845	9	24	70	137	383	0	0	0	0	19	417	0	**1059**
0845 - 0900	13	28	59	123	373	0	0	0	0	17	419	0	**1032**
Period End	**72**	**169**	**565**	**845**	**2986**	**0**	**0**	**0**	**0**	**99**	**3044**	**0**	**7780**

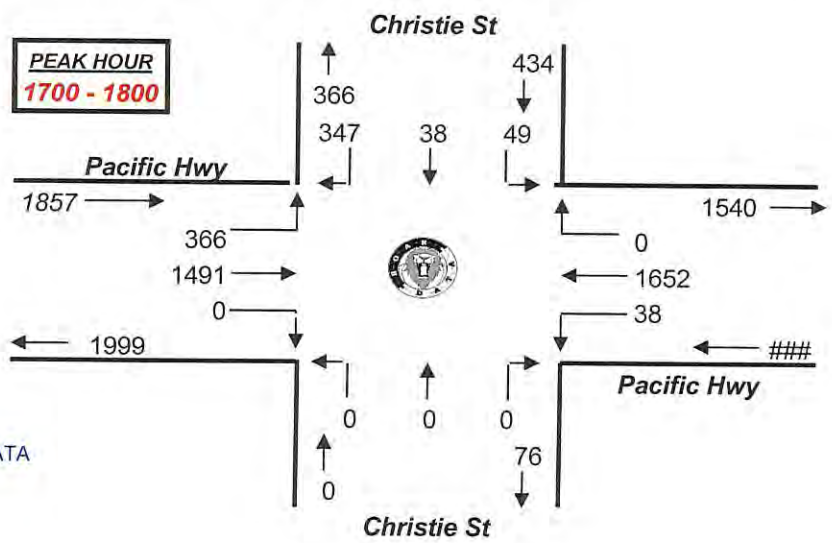
Peak Time	NORTH Christie St L	NORTH Christie St T	NORTH Christie St R	WEST Pacific Hwy L	WEST Pacific Hwy T	WEST Pacific Hwy R	SOUTH Christie St L	SOUTH Christie St T	SOUTH Christie St R	EAST Pacific Hwy L	EAST Pacific Hwy T	EAST Pacific Hwy R	TOT
0700 - 0800	31	64	286	369	1451	0	0	0	0	33	1416	0	**3650**
0715 - 0815	40	75	294	399	1553	0	0	0	0	44	1505	0	**3910**
0730 - 0830	41	89	313	421	1597	0	0	0	0	50	1594	0	**4105**
0745 - 0845	43	96	304	451	1577	0	0	0	0	62	1617	0	**4150**
0800 - 0900	41	105	279	476	1535	0	0	0	0	66	1628	0	**4130**
PEAK HOUR	**43**	**96**	**304**	**451**	**1577**	**0**	**0**	**0**	**0**	**62**	**1617**	**0**	**4150**

All Vehicles

Time Per	NORTH Christie St L	NORTH Christie St T	NORTH Christie St R	WEST Pacific Hwy L	WEST Pacific Hwy T	WEST Pacific Hwy R	SOUTH Christie St L	SOUTH Christie St T	SOUTH Christie St R	EAST Pacific Hwy L	EAST Pacific Hwy T	EAST Pacific Hwy R	TOT
1600 - 1615	13	6	73	80	301	0	0	0	0	5	334	0	**812**
1615 - 1630	17	10	89	81	294	0	0	0	0	12	363	0	**866**
1630 - 1645	15	11	75	74	297	0	0	0	0	5	330	0	**807**
1645 - 1700	8	11	76	85	356	0	0	0	0	10	355	0	**901**
1700 - 1715	13	11	99	95	327	0	0	0	0	10	397	0	**952**
1715 - 1730	13	7	99	100	373	0	0	0	0	13	381	0	**986**
1730 - 1745	12	10	85	88	413	0	0	0	0	6	495	0	**1109**
1745 - 1800	11	10	64	83	378	0	0	0	0	9	379	0	**934**
Period End	**102**	**76**	**660**	**686**	**2739**	**0**	**0**	**0**	**0**	**70**	**3034**	**0**	**7367**

Peak Time	NORTH Christie St L	NORTH Christie St T	NORTH Christie St R	WEST Pacific Hwy L	WEST Pacific Hwy T	WEST Pacific Hwy R	SOUTH Christie St L	SOUTH Christie St T	SOUTH Christie St R	EAST Pacific Hwy L	EAST Pacific Hwy T	EAST Pacific Hwy R	TOT
1600 - 1700	53	38	313	320	1248	0	0	0	0	32	1382	0	**3386**
1615 - 1715	53	43	339	335	1274	0	0	0	0	37	1445	0	**3526**
1630 - 1730	49	40	349	354	1353	0	0	0	0	38	1463	0	**3646**
1645 - 1745	46	39	359	368	1469	0	0	0	0	39	1628	0	**3948**
1700 - 1800	49	38	347	366	1491	0	0	0	0	38	1652	0	**3981**
PEAK HOUR	**49**	**38**	**347**	**366**	**1491**	**0**	**0**	**0**	**0**	**38**	**1652**	**0**	**3981**

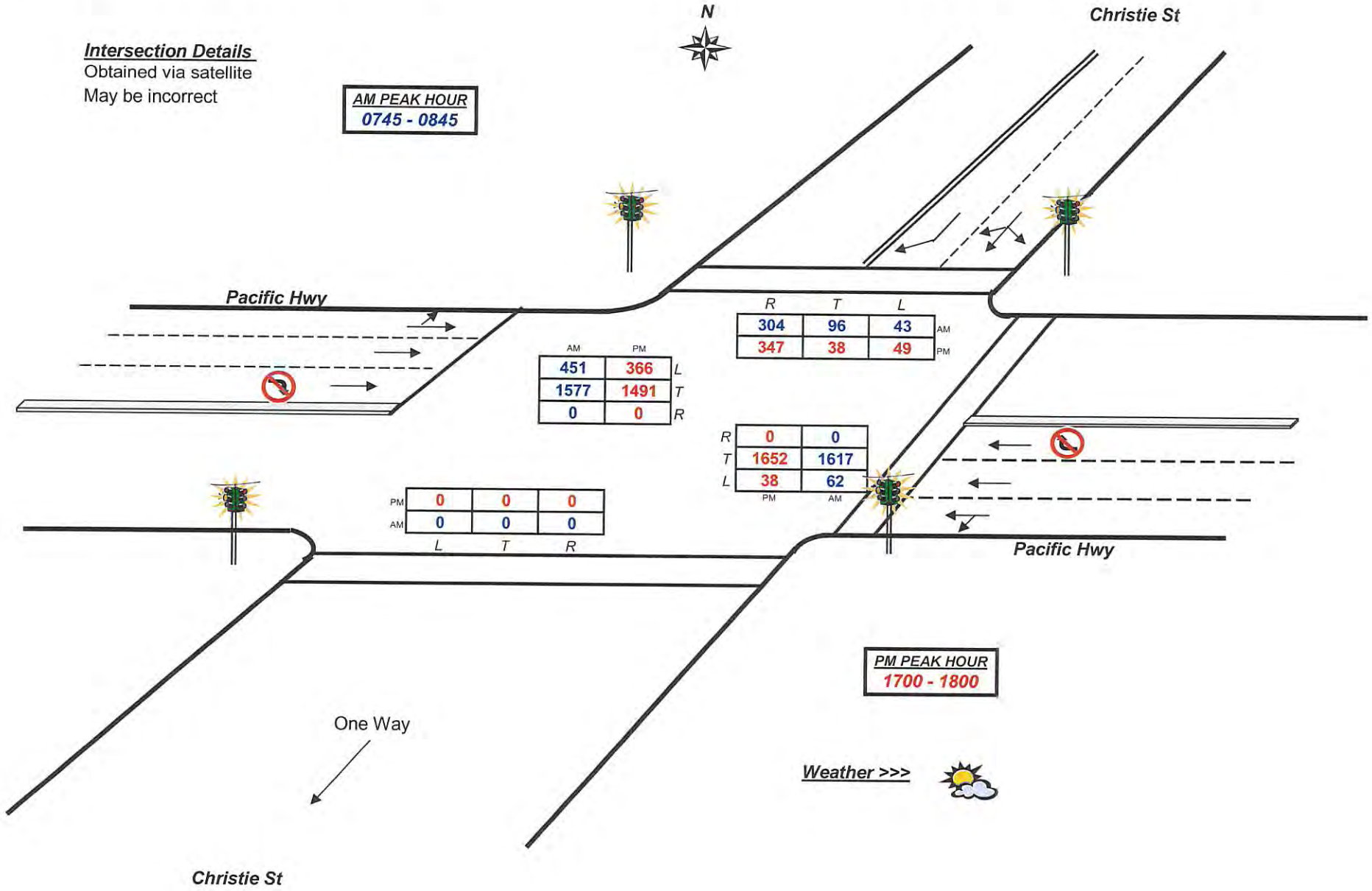




R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Client : BarkerRyanStewart
Job No/Name : 6175 ST. LEONARDS Traffic & Pedestrians
Day/Date : Thursday 22nd August 2019

Intersection Details
Obtained via satellite
May be incorrect



TCS 769

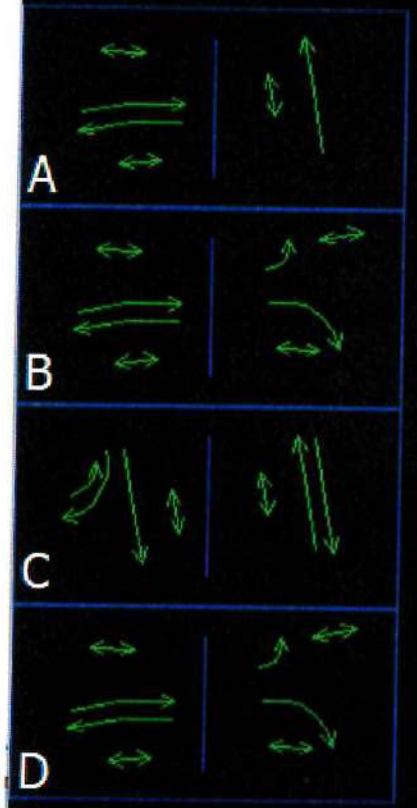
ST LEONARDS

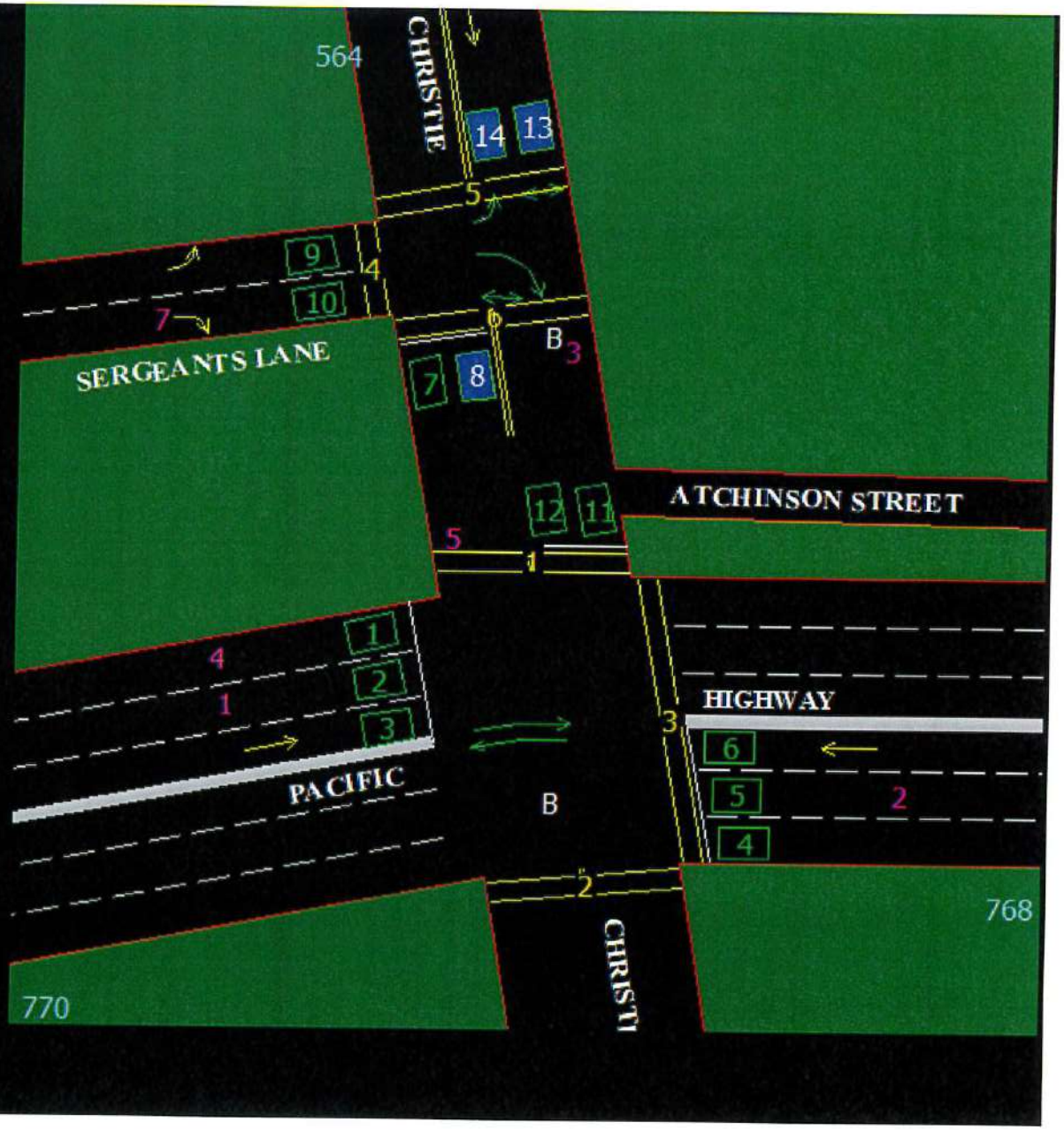
215P5

WILL

SS=25

4 PHASES





Site	Date	Interval sta	Interval en	Detector 1	Detector 2	Detector 3	Detector 4	Detector 5	Detector 6	Detector 7	Detector 8	Detector 9	Detector 1(	Detector 1:	Detector 1:	Detector 1:	Detector 1·	Total
769	Friday, 22 J	12:00:00 A	1:00:00 AM	24	80	25	16	84	53	0	10	0	1	10	20	14	20	357
769	Friday, 22 J	1:00:00 AM	2:00:00 AM	19	51	12	7	40	34	3	14	2	2	10	28	9	25	256
769	Friday, 22 J	2:00:00 AM	3:00:00 AM	16	46	4	1	33	30	0	11	1	9	4	9	4	6	174
769	Friday, 22 J	3:00:00 AM	4:00:00 AM	8	32	10	7	28	20	0	3	0	2	2	5	0	3	120
769	Friday, 22 J	4:00:00 AM	5:00:00 AM	25	54	18	5	37	53	1	17	1	1	6	11	6	11	246
769	Friday, 22 J	5:00:00 AM	6:00:00 AM	81	140	58	17	83	124	3	52	2	8	27	37	29	38	699
769	Friday, 22 J	6:00:00 AM	7:00:00 AM	229	342	253	33	193	284	5	142	10	11	85	84	92	75	1838
769	Friday, 22 J	7:00:00 AM	8:00:00 AM	362	567	466	67	422	585	11	273	18	28	101	176	117	158	3351
769	Friday, 22 J	8:00:00 AM	9:00:00 AM	493	708	551	87	590	736	11	396	17	29	152	243	183	235	4431
769	Friday, 22 J	9:00:00 AM	10:00:00 A	364	573	373	76	460	597	4	281	18	28	130	231	148	232	3515
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769	Friday, 22 J	11:00:00 A	12:00:00 PI	316	617	279	74	476	593	3	265	18	33	91	188	94	192	3239
769	Friday, 22 J	12:00:00 PI	1:00:00 PM	352	617	324	61	534	658	2	307	23	33	103	222	114	216	3566
769	Friday, 22 J	1:00:00 PM	2:00:00 PM	289	558	283	66	534	630	4	233	25	30	91	227	96	213	3279
769	Friday, 22 J	2:00:00 PM	3:00:00 PM	334	553	319	74	527	614	7	247	18	32	91	219	105	205	3345
769	Friday, 22 J	3:00:00 PM	4:00:00 PM	369	596	336	83	630	695	8	276	33	41	129	235	134	218	3783
769	Friday, 22 J	4:00:00 PM	5:00:00 PM	399	681	368	99	603	657	9	290	34	46	125	199	120	194	3824
769	Friday, 22 J	5:00:00 PM	6:00:00 PM	426	664	398	100	571	636	18	307	51	51	142	212	148	183	3907
769	Friday, 22 J	6:00:00 PM	7:00:00 PM	339	582	311	97	474	513	9	240	43	41	112	227	142	211	3341
769	Friday, 22 J	7:00:00 PM	8:00:00 PM	239	414	185	74	376	413	Unknown	174	26	30	85	149	96	144	Unknown
769	Friday, 22 J	8:00:00 PM	9:00:00 PM	178	276	118	56	295	336	Unknown	118	24	30	50	113	55	104	Unknown
769	Friday, 22 J	9:00:00 PM	10:00:00 PI	165	252	114	35	305	335	Unknown	115	27	33	60	104	59	92	Unknown
769	Friday, 22 J	10:00:00 PI	11:00:00 PI	102	232	84	32	304	297	2	67	10	15	25	72	34	68	1344
769	Friday, 22 J	11:00:00 PI	12:00:00 A	76	133	41	25	200	183	0	46	9	15	35	64	39	64	930

Appendix C

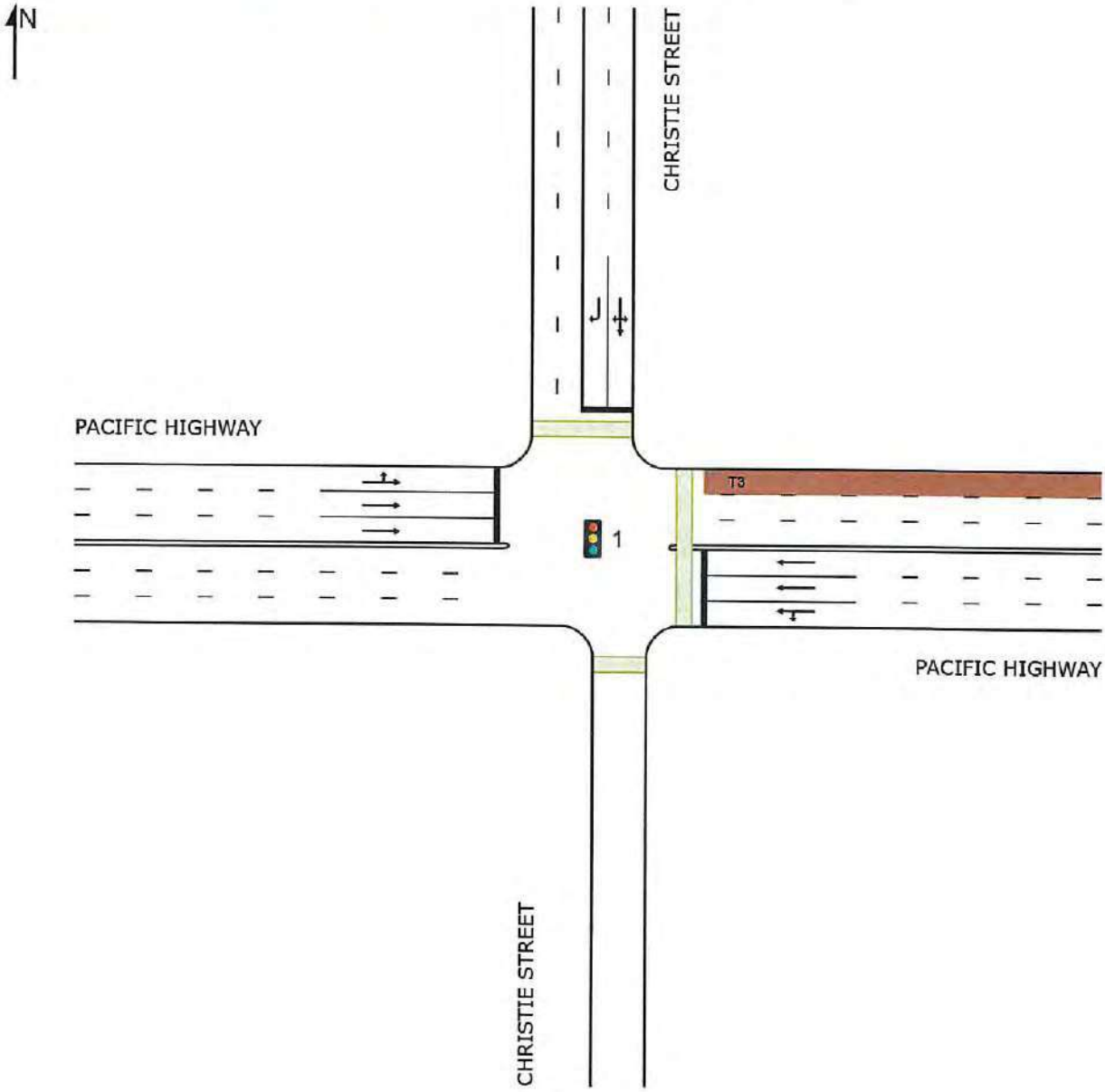
SIDRA Results

SITE LAYOUT

Site: 1 [CHRISTIE-PACIFIC (Site Folder: Existing)]

524-542 Pacific Highway, St Leonards
Site Category: Proposed Mixed-Use Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 1 [AM CHRISTIE-PACIFIC (Site Folder: Existing)]

524-542 Pacific Highway, St Leonards
Site Category: Proposed Mixed-Use Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: PACIFIC HIGHWAY														
4	L2	62	6.0	65	6.0	0.486	17.0	LOS B	17.1	125.9	0.55	0.53	0.55	44.4
5	T1	1617	6.0	1702	6.0	0.486	11.3	LOS A	17.4	128.2	0.55	0.51	0.55	36.2
Approach		1679	6.0	1767	6.0	0.486	11.6	LOS A	17.4	128.2	0.55	0.51	0.55	36.7
North: CHRISTIE STREET														
7	L2	43	6.0	45	6.0	0.596	47.1	LOS D	12.9	95.2	0.95	0.81	0.95	11.2
8	T1	96	6.0	101	6.0	0.596	44.6	LOS D	12.9	95.2	0.95	0.81	0.95	22.9
9	R2	304	6.0	320	6.0	*0.596	48.8	LOS D	12.9	95.2	0.95	0.82	0.95	9.7
Approach		443	6.0	466	6.0	0.596	47.7	LOS D	12.9	95.2	0.95	0.82	0.95	13.5
West: PACIFIC HIGHWAY														
10	L2	451	6.0	475	6.0	*0.601	20.5	LOS B	23.5	172.6	0.66	0.74	0.66	14.9
11	T1	1577	6.0	1660	6.0	0.601	13.0	LOS A	24.2	178.3	0.63	0.59	0.63	33.9
Approach		2028	6.0	2135	6.0	0.601	14.7	LOS B	24.2	178.3	0.63	0.62	0.63	28.9
All Vehicles		4150	6.0	4368	6.0	0.601	16.9	LOS B	24.2	178.3	0.64	0.60	0.64	28.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: CHRISTIE STREET												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	76.6	29.0	0.38
East: PACIFIC HIGHWAY												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	86.9	42.4	0.49
North: CHRISTIE STREET												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	81.3	35.2	0.43
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	81.6	35.5	0.44

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

MOVEMENT SUMMARY

Site: 1 [PM CHRISTIE-PACIFIC (Site Folder: Existing)]

524-542 Pacific Highway, St Leonards
Site Category: Proposed Mixed-Use Development
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: PACIFIC HIGHWAY														
4	L2	38	6.0	40	6.0	0.482	16.4	LOS B	16.9	124.5	0.54	0.51	0.54	45.1
5	T1	1652	6.0	1739	6.0	0.482	10.8	LOS A	17.1	125.8	0.54	0.50	0.54	36.9
Approach		1690	6.0	1779	6.0	0.482	11.0	LOS A	17.1	125.8	0.54	0.50	0.54	37.2
North: CHRISTIE STREET														
7	L2	49	6.0	52	6.0	* 0.545	46.5	LOS D	11.6	85.0	0.93	0.81	0.93	11.1
8	T1	38	6.0	40	6.0	0.545	44.0	LOS D	11.6	85.0	0.93	0.81	0.93	22.8
9	R2	347	6.0	365	6.0	0.545	46.1	LOS D	12.1	89.1	0.93	0.81	0.93	10.1
Approach		434	6.0	457	6.0	0.545	45.9	LOS D	12.1	89.1	0.93	0.81	0.93	11.7
West: PACIFIC HIGHWAY														
10	L2	366	6.0	385	6.0	* 0.542	18.6	LOS B	19.8	145.7	0.60	0.69	0.60	15.8
11	T1	1491	6.0	1569	6.0	0.542	11.7	LOS A	20.4	150.4	0.58	0.55	0.58	35.3
Approach		1857	6.0	1955	6.0	0.542	13.1	LOS A	20.4	150.4	0.58	0.58	0.58	30.8
All Vehicles		3981	6.0	4191	6.0	0.545	15.8	LOS B	20.4	150.4	0.60	0.57	0.60	29.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

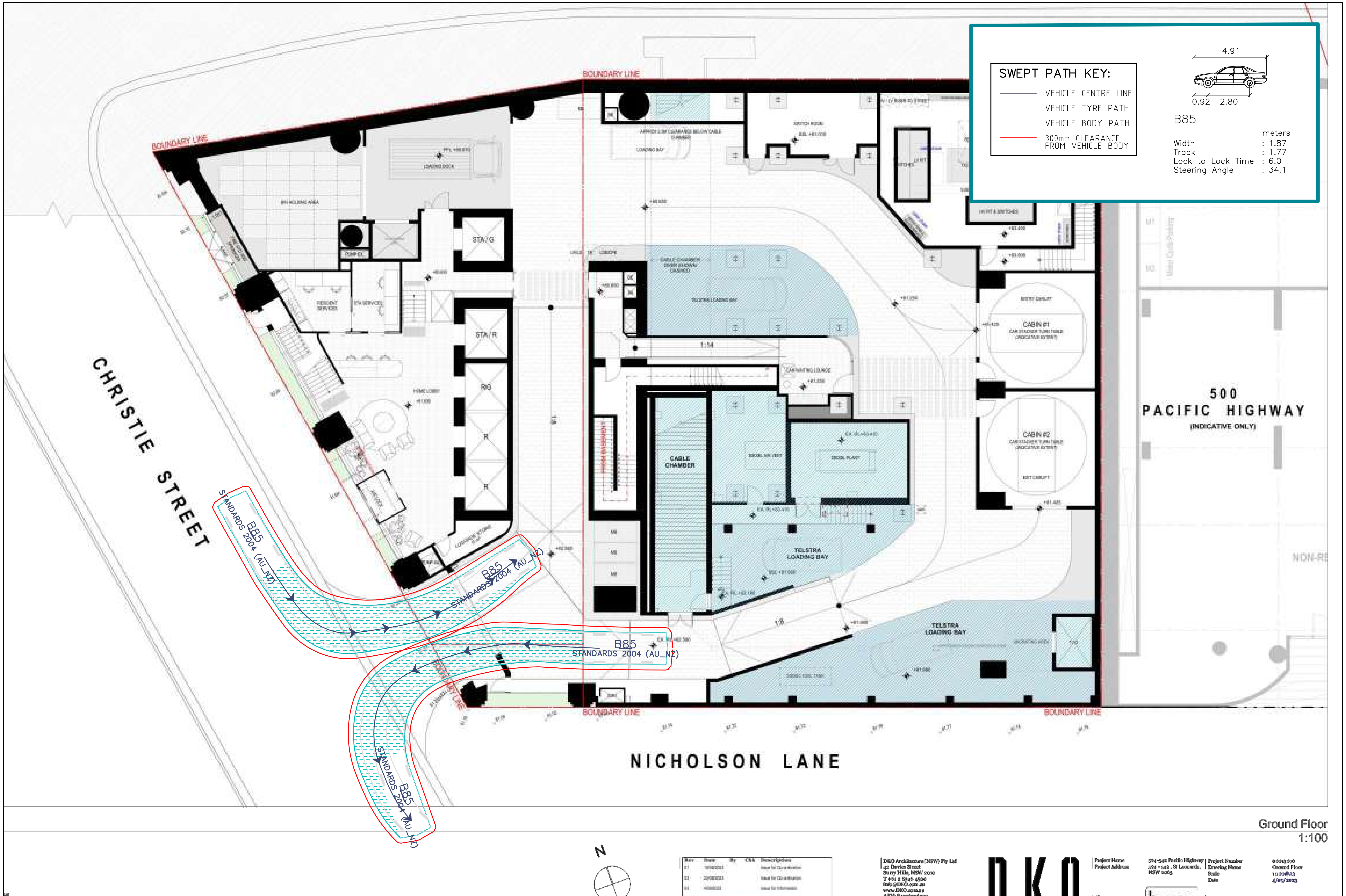
Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: CHRISTIE STREET												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	76.6	29.0	0.38
East: PACIFIC HIGHWAY												
P2	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	86.9	42.4	0.49
North: CHRISTIE STREET												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	81.3	35.2	0.43
All Pedestrians		150	158	54.3	LOS E	0.2	0.2	0.95	0.95	81.6	35.5	0.44

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

Appendix D

Turning Path Assessment



524 PACIFIC HWY, ST LEONARDS NSW 2065

ENTRY AND EXIT OF 85th PERCENTILE VEHICLES

SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP SHEET NO. 01 OF 11 ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 1:200

DISCLAIMER

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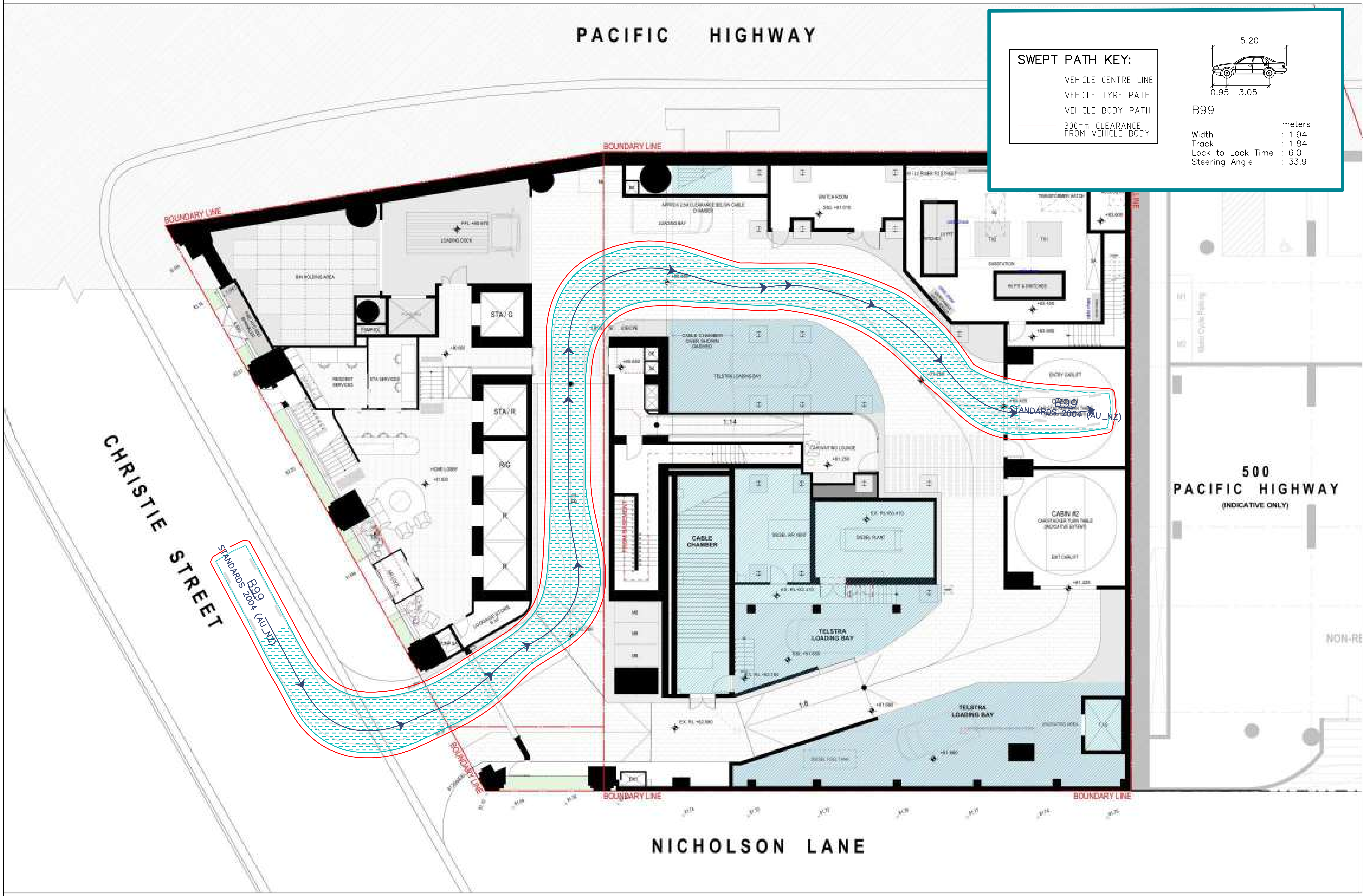
Plotted by Antonios
T:\WORK\22\22086 - 524-542 PACIFIC HIGHWAY, ST LEONARDS\DRAWING\22086-V1.1-SP.dwg



T:\WORK21\22086 - 524-542 PACIFIC HIGHWAY, ST LEONARDS\DRAWING\22086-V1.1-SP.dwg

Plotted by Antonios

524 PACIFIC HWY, ST LEONARDS NSW 2065
ENTRY OF A 99th PERCENTILE VEHICLE
SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP

SHEET NO. 02 OF 11

ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 0 2.0 4.0 1:200

N

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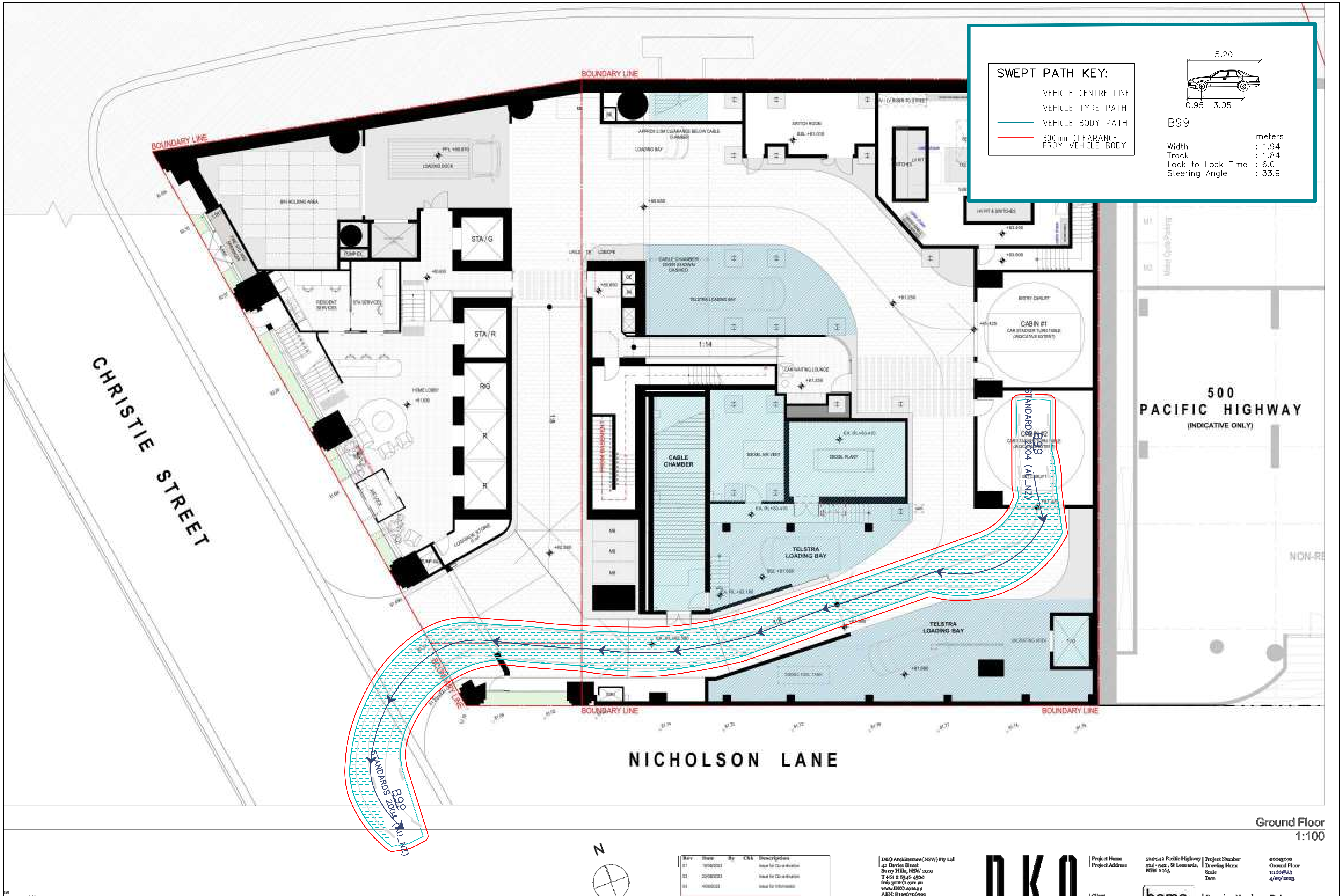

524 PACIFIC HWY, ST LEONARDS NSW 2065
EXIT OF A 99th PERCENTILE VEHICLE
SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP

SHEET NO. 03 OF 11

ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 1:200

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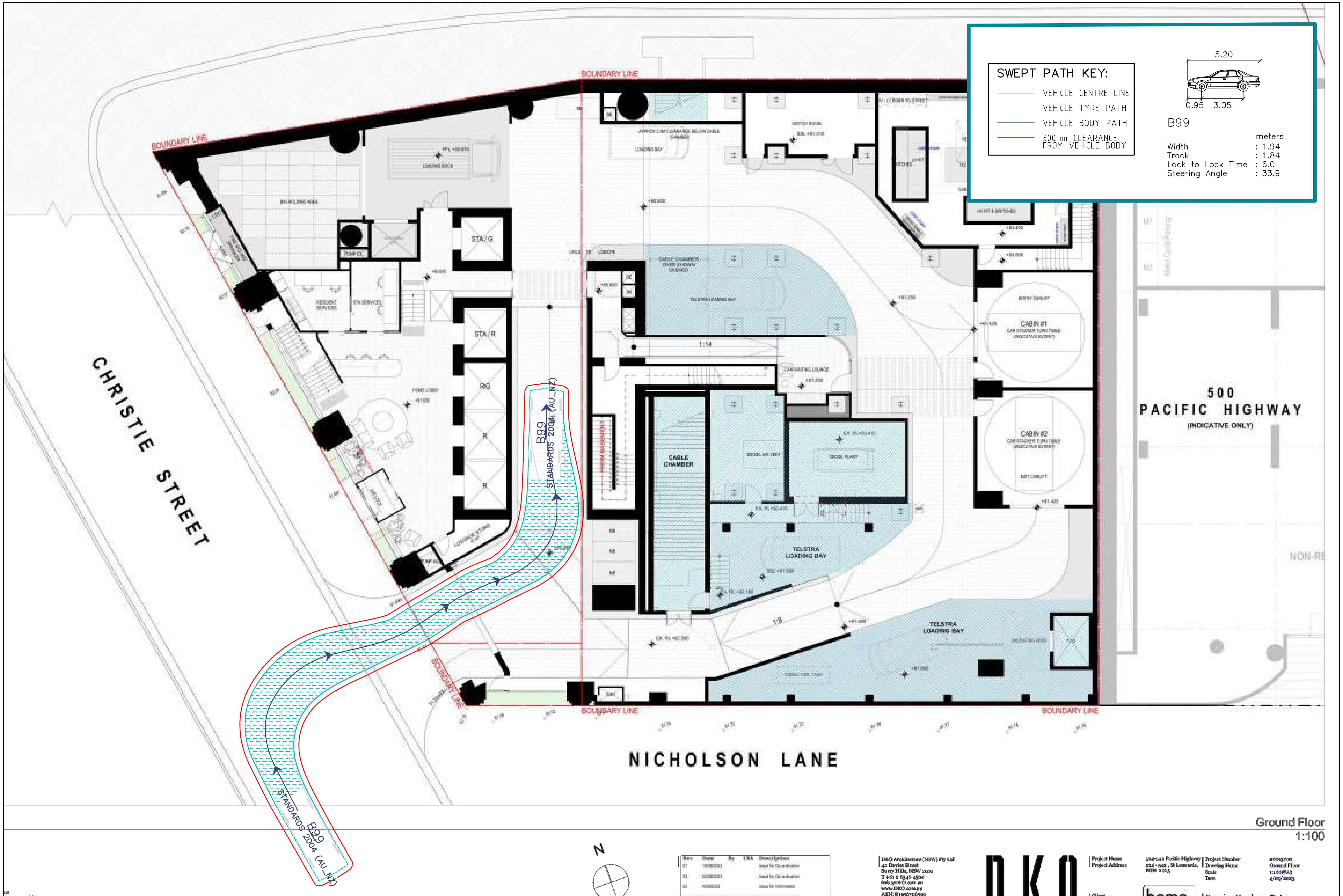
Plotted by Antonios



524 PACIFIC HWY, ST LEONARDS NSW 2065

RIGHT TURN INTO THE SITE OF A 99th PERCENTILE VEHICLE

SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP

SHEET NO. 04 OF 11

ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 0 2.0 4.0 1:200

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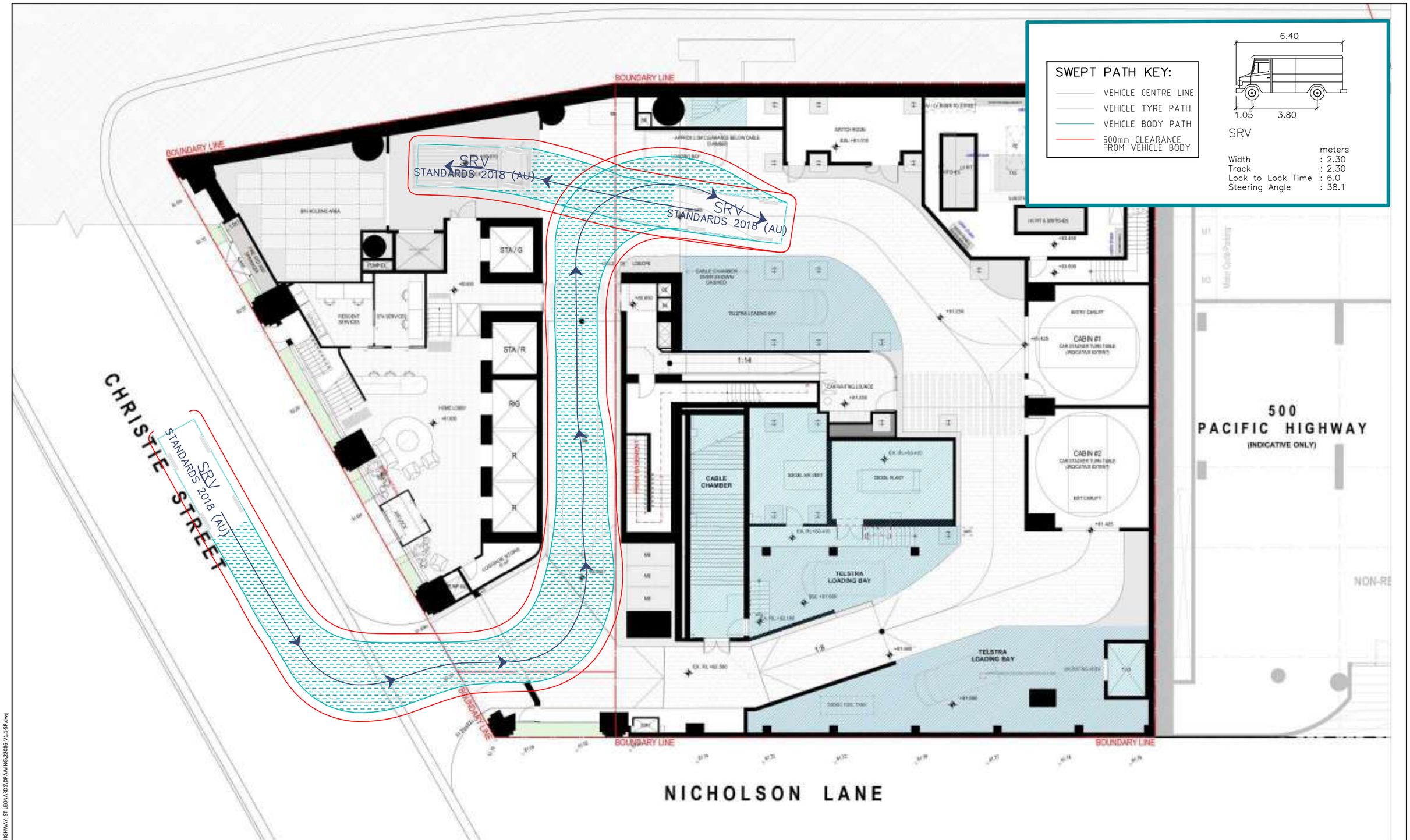

Ground Floor
1:100

N

Rev	Date	By	Chk	Description
01	19/09/2023			Issue for Coordination
02	22/09/2023			Issue for Coordination
03	4/09/2023			Issue for Information

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ABN: 81967096890

DKO

Project Name	
Project Address	524-542 Pacific Highway 524 - 542 , St Leonards, NSW 2065
Project Number	00013070
Drawing Name	Ground Floor
Scale	1:100@A3
Date	4/09/2023

524 PACIFIC HWY, ST LEONARDS NSW 2065
ENTRY OF A 6.4m RIGID VEHICLE
SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP

SHEET NO. 05 OF 11

ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 — 0 2.0 4.0 — 1:200

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Plotted by Antonios

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PACIFIC HIGHWAY

BOUNDARY LINE

BOUNDARY LINE

CHRISTIE STREET

SRV
STANDARDS 2018 (AU)

SRV
STANDARDS 2018 (AU)

SRV
STANDARDS 2018 (AU)

SRV
STANDARDS 2018 (AU)

STA I G

STA I R

R/C

R

R

1:14

CABLE CHAMBER

DIESEL AIR VENT

DIESEL FLUE

TELSTRA LOADING BAY

TELSTRA LOADING BAY

CABIN #1

CABIN #2

EXIT CARLIFT

500
PACIFIC HIGHWAY
(INDICATIVE ONLY)

NON-RE

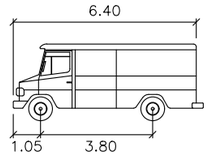
BOUNDARY LINE

BOUNDARY LINE

NICHOLSON LANE

SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY



SRV

	meters
Width	: 2.30
Track	: 2.30
Lock to Lock Time	: 6.0
Steering Angle	: 38.1

T:\WORK22\22086 - 524-542 PACIFIC HIGHWAY, ST LEONARDS\DRAWING\22086-V1.1-SP.dwg

Plotted by Antonios

524 PACIFIC HWY, ST LEONARDS NSW 2065
ENTRY OF A 6.4m RIGID VEHICLE
SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP SHEET NO. 06 OF 11 ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 0 2.0 4.0 1:200

N

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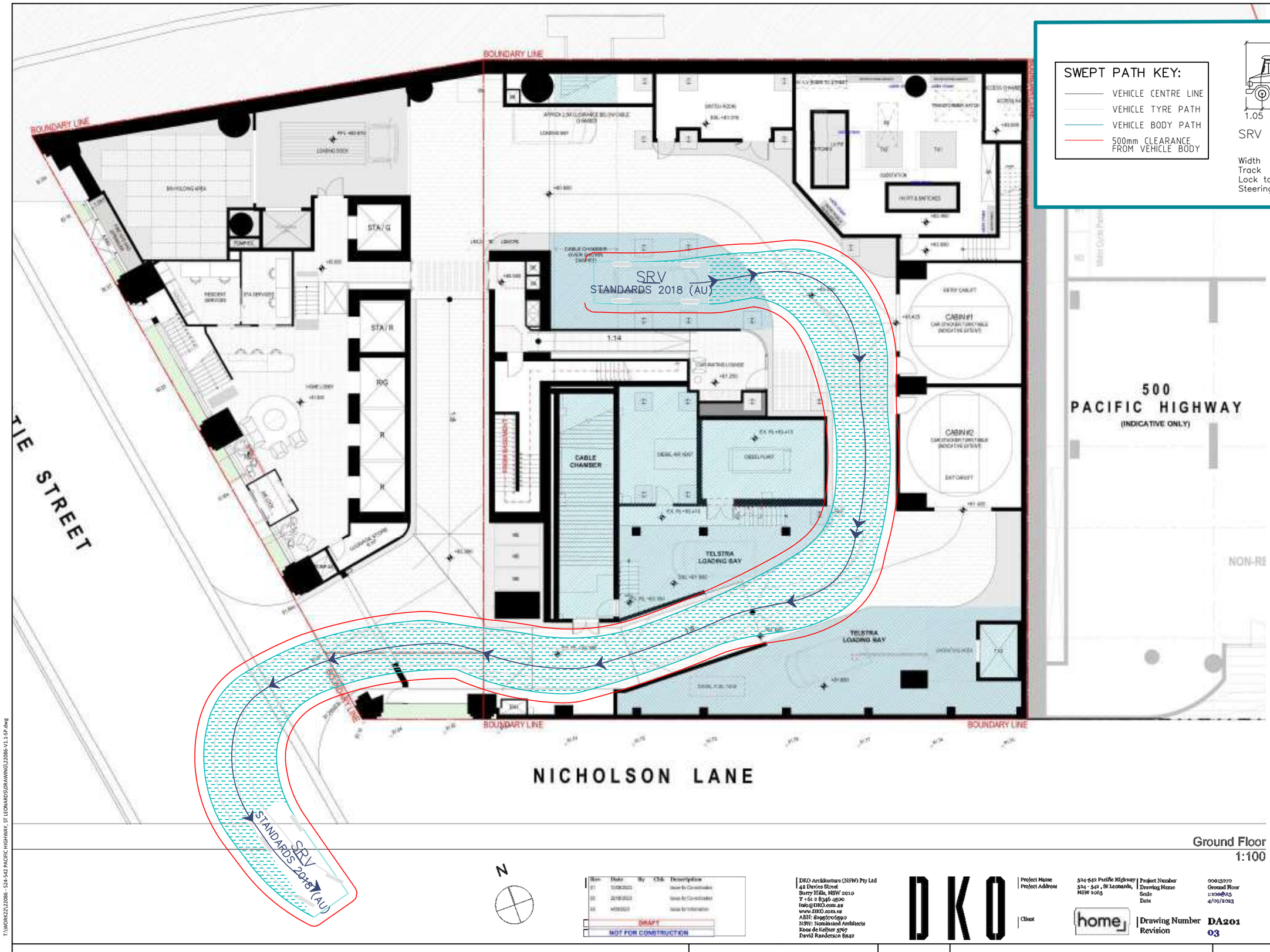
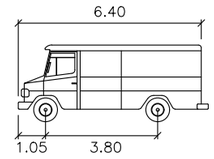


SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY



SRV

	meters
Width	: 2.30
Track	: 2.30
Lock to Lock Time	: 6.0
Steering Angle	: 38.1

Ground Floor
1:100

N

Rev	Date	By	Chk	Description
01	31/08/2023			Issue for Consultation
02	25/08/2023			Issue for Consultation
03	4/09/2023			Issue for Information

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NSW: Nominated Architects
Koos de Keijzer 5767
David Randerson 8842

DKO

Project Name	524-542 Pacific Highway
Project Address	524 - 542 , St Leonards, NSW 2065
Client	home
Project Number	00025070
Drawing Name	Ground Floor
Scale	1:100@A3
Date	4/09/2023
Drawing Number	DA201
Revision	03

524 PACIFIC HWY, ST LEONARDS NSW 2065
EXIT OF A 6.4m RIGID VEHICLE
SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP

SHEET NO. 07 OF 11

ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 — 0 2.0 4.0 — 1:200

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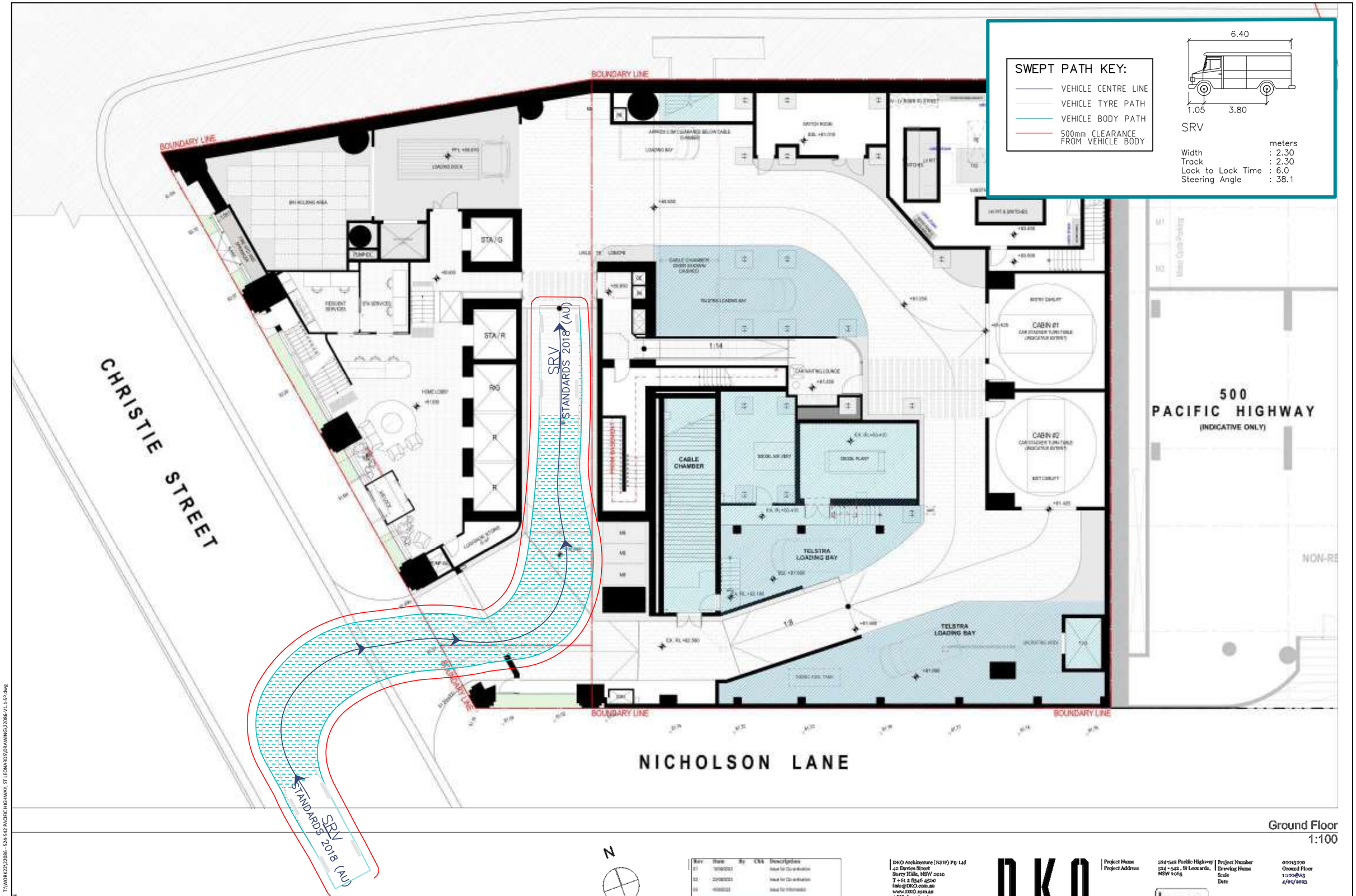
T:\WORK22\22086 - 524-542 PACIFIC HIGHWAY, ST LEONARDS\DRAWING\22086-V1.1-SP.dwg

Plotted by Antonios



T:\WORK22\22086 - 524-542 PACIFIC HIGHWAY, ST LEONARDS\DRAWING\22086-V1.1-SP.dwg

Plotted by Antonios

524 PACIFIC HWY, ST LEONARDS NSW 2065
RIGHT TURN OF A 6.4m RIGID VEHICLE
SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP SHEET NO. 08 OF 11 ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 0 2.0 4.0 1:200

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www.DKO.com.au

Project Name / Project Address: 524-542 Pacific Highway, 524 - 542 , St Leonards, NSW 2065
Project Number: 00013070
Drawing Name: Ground Floor
Scale: 1:100@A3
Date: 4/09/2023

BOUNDARY LINE

BOUNDARY LINE

CHRISTIE STREET

8.01m BOX VAN
Custom

8.01m BOX VAN
Custom

NICHOLSON LANE

500
PACIFIC HIGHWAY
(INDICATIVE ONLY)

NON-RE

BOUNDARY LINE

BOUNDARY LINE

STA / G

STA / R

RIG

R

R

LOADING DOCK

FIRE HOSE REEL

PUMPS

RESIDENT SERVICES

STA SERVICES

SWITCH ROOM

CABLE CHAMBER

TELSTRA LOADING BAY

DIESEL ARRIVE

DIESEL PLANT

TELSTRA LOADING BAY

CABIN #1

CABIN #2

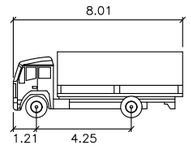
ENTRY GARLIT

EXIT GARLIT

1:14

SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY



8.01m BOX VAN

	meters
Width	: 2.10
Track	: 2.06
Lock to Lock Time	: 4.0
Steering Angle	: 34.0

Ground Floor
1:100

N

Rev	Date	By	Chk	Description
01	10/08/23			Issue for Coordination
02	12/09/23			Issue for Coordination
03	4/09/2023			Issue for Information

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NSW: Nominated Architects
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David Randerson 8642

DKO

Project Name	524-542 Pacific Highway
Project Address	524 - 542 , St Leonards, NSW 2065
Client	home
Project Number	00013070
Drawing Name	Ground Floor
Scale	1:100@A3
Date	4/09/2023
Drawing Number	DA201
Revision	03

524 PACIFIC HWY, ST LEONARDS NSW 2065
ENTRY AND EXIT OF AN 8.01m BOX VAN
SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP

SHEET NO. 09 OF 11

ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 — 0 2.0 4.0 — 1:200

N

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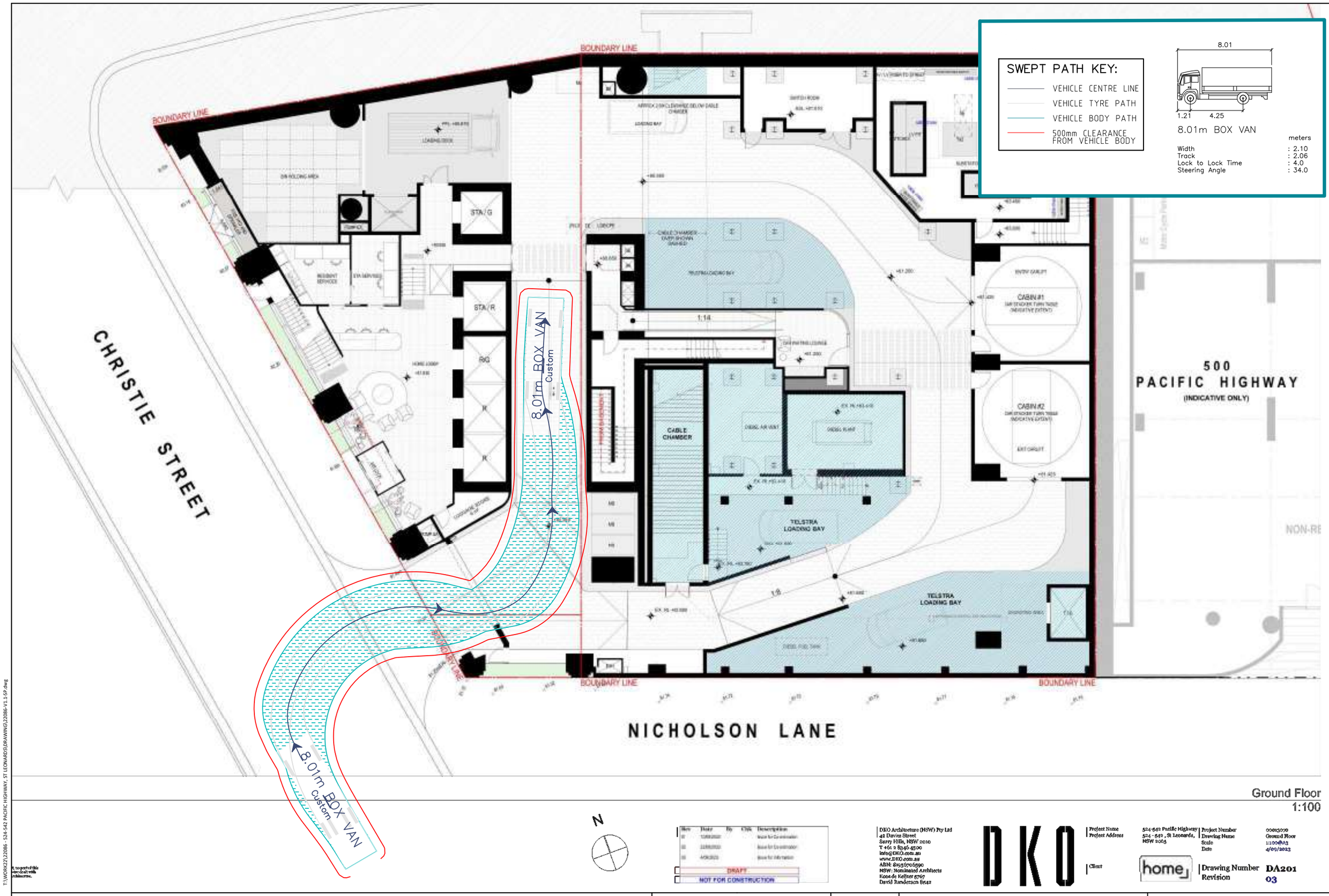
Plotted by Antonios



Ground Floor
1:100

N

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NSW: Nominated Architects
Koon de Kelter 6767
David Randerson 8642

DKO

Project Name
Project Address
524-542 Pacific Highway
524 - 542 , St Leonards,
NSW 2065
Client
home

Project Number 00013070
Drawing Name Ground Floor
Scale 1:100@A3
Date 4/09/2023
Drawing Number DA201
Revision 03

524 PACIFIC HWY, ST LEONARDS NSW 2065
RIGHT TURN OF AN 8.01m BOX VAN
SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP
SHEET NO. 10 OF 11
ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 0 2.0 4.0 1:200

DISCLAIMER

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Plotted by Antonios

PACIFIC HIGHWAY

8.01m BOX VAN
Custom

8.01m BOX VAN
Custom

CHRISTIE STREET

NICHOLSON LANE

BOUNDARY LINE

BOUNDARY LINE

BOUNDARY LINE

BOUNDARY LINE

STA / G

STA / R

R/G

CABLE CHAMBER

TELSTRA LOADING BAY

TELSTRA LOADING BAY

CABIN #1

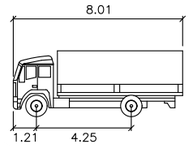
CABIN #2

1:14

500
PACIFIC HI
(INDICATIVE ONL

SWEPT PATH KEY:

- VEHICLE CENTRE LINE
- VEHICLE TYRE PATH
- VEHICLE BODY PATH
- 500mm CLEARANCE FROM VEHICLE BODY



8.01m BOX VAN

	meters
Width	: 2.10
Track	: 2.06
Lock to Lock Time	: 4.0
Steering Angle	: 34.0

T:\WORK22\22086 - 524-542 PACIFIC HIGHWAY, ST LEONARDS\DRAWING\22086-V1.1-SP.dwg

Plotted by Antonios

524 PACIFIC HWY, ST LEONARDS NSW 2065
LEFT TURN OF AN 8.01m BOX VAN FROM PACIFIC HWY TO CHRISTIE ST
SWEPT PATH ASSESSMENT

DRAWING REF NO. 22086-V1.1-SP SHEET NO. 11 OF 11 ISSUE DATE 13 September 2023

DESIGNED BY A.LAFKAS

SCALE A3 0 2.0 4.0 1:200

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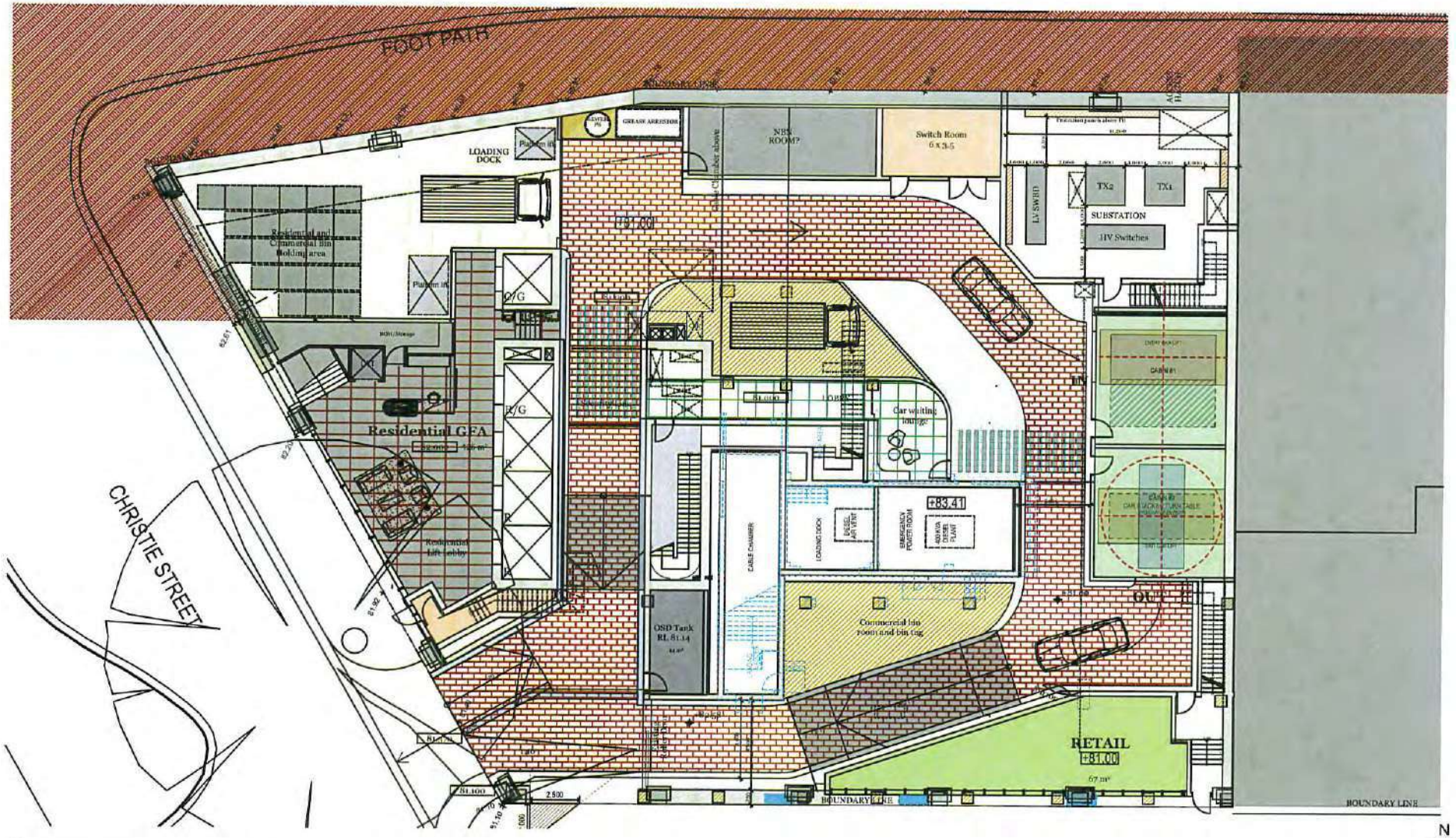
Appendix E

Similar Car Stacker Details



1. Basement 2 Floor Plan
1:200

XSPACIAL

KLAUS multiparking

Drawn | Checked	SG
Plot Date:	2/8/2022
Project NO.	tbd
Project Status	Concept
Client	#Client Full Name
Site:	524-542 Pacific Hwy St Leonards NSW

Drawing Title : Sketch Plans

Lower Ground Floor Plans

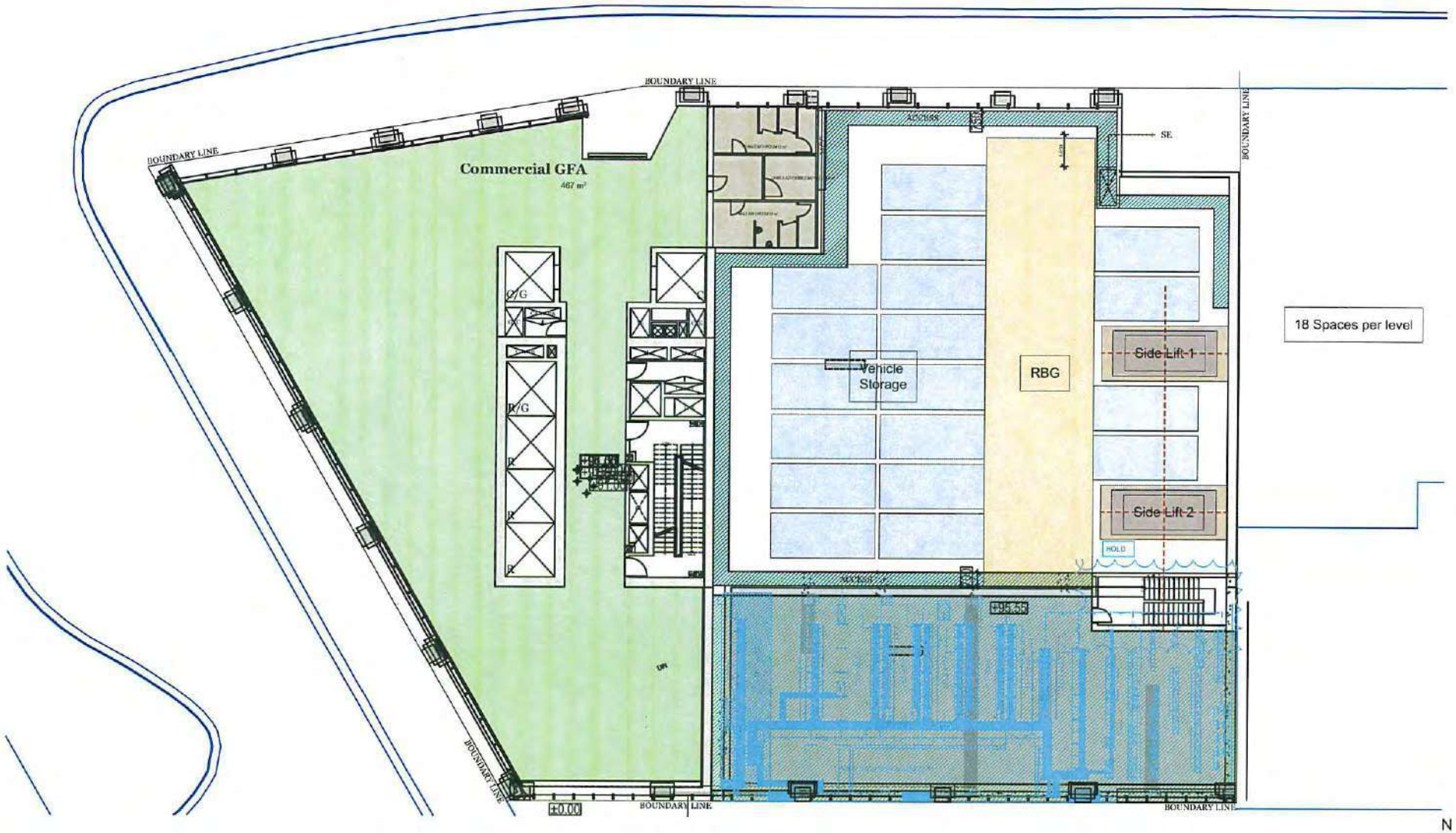
Project Name :

524-542 Pacific Hwy, St Leonards NSW

REVISION NO.

DRAWING NO.

SK 100



2. Typ Parking Level 1-2
1:200

XSPACIAL

KLAUS multiparking

Drawn | Checked	SG
Plot Date:	2/8/2022
Project NO.	tbd
Project Status	Concept
Client	#Client Full Name
Site:	524-542 Pacific Hwy St Leonards NSW

Drawing Title : Sketch Plans

Lower Ground Floor Plan

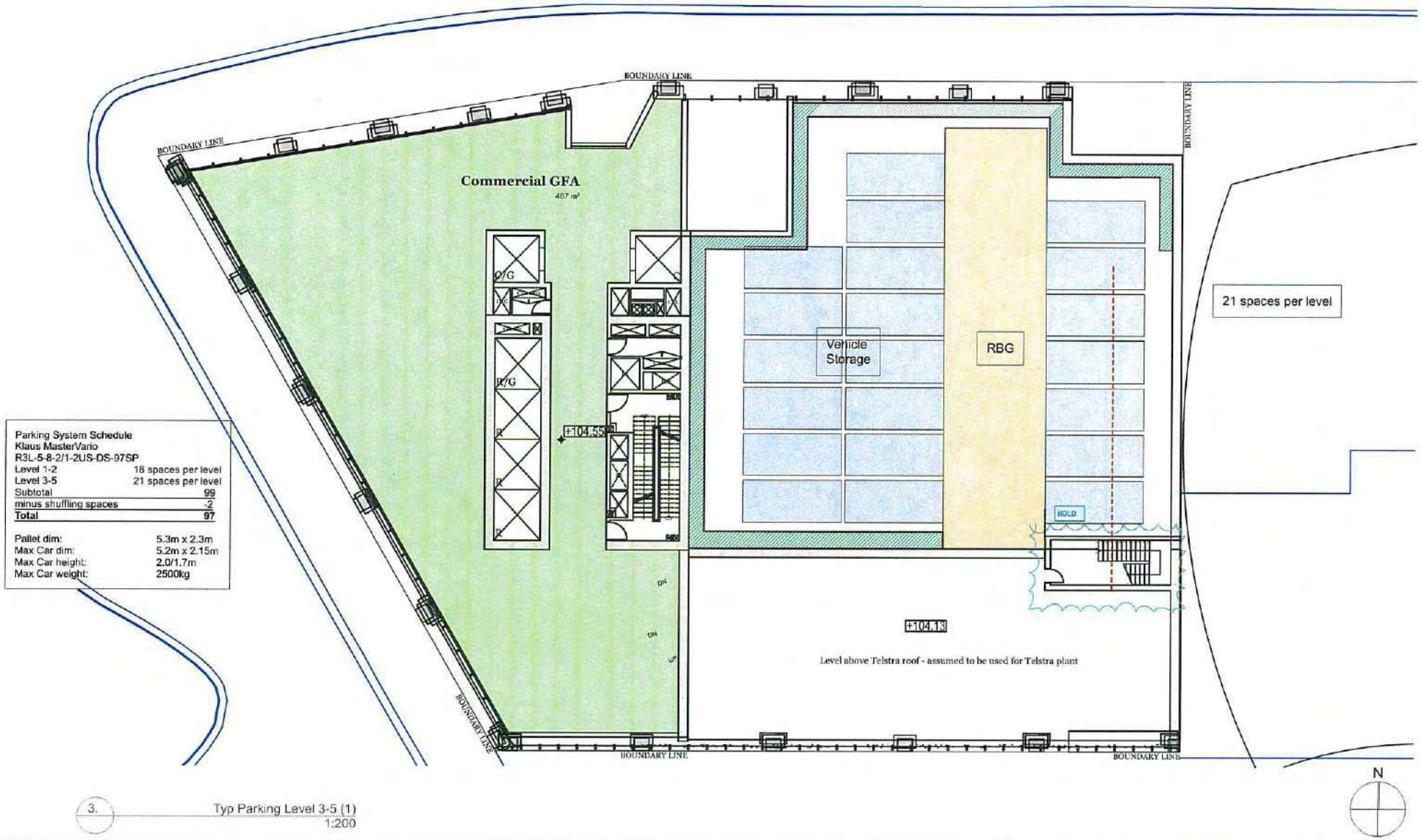
Project Name :

524-542 Pacific Hwy, St Leonards NSW

REVISION NO.

DRAWING NO.

SK 101



Parking System Schedule	
Klaus MasterVario	
R3L-5-8-2/1-2US-DS-97SP	
Level 1-2	18 spaces per level
Level 3-5	21 spaces per level
Subtotal	99
minus shuffling spaces	-2
Total	**97**
Pallet dim:	5.3m x 2.3m
Max Car dim:	5.2m x 2.15m
Max Car height:	2.0/1.7m
Max Car weight:	2500kg

3. Typ Parking Level 3-5 (1)
1:200

XSPACIAL

KLAUS multiparking

Drawn | Checked	SG
Plot Date:	2/8/2022
Project NO.	tbd
Project Status	Concept
Client	#Client Full Name
Site:	524-542 Pacific Hwy St Leonards NSW

Drawing Title : Sketch Plans

Typ Parking Level 3-5

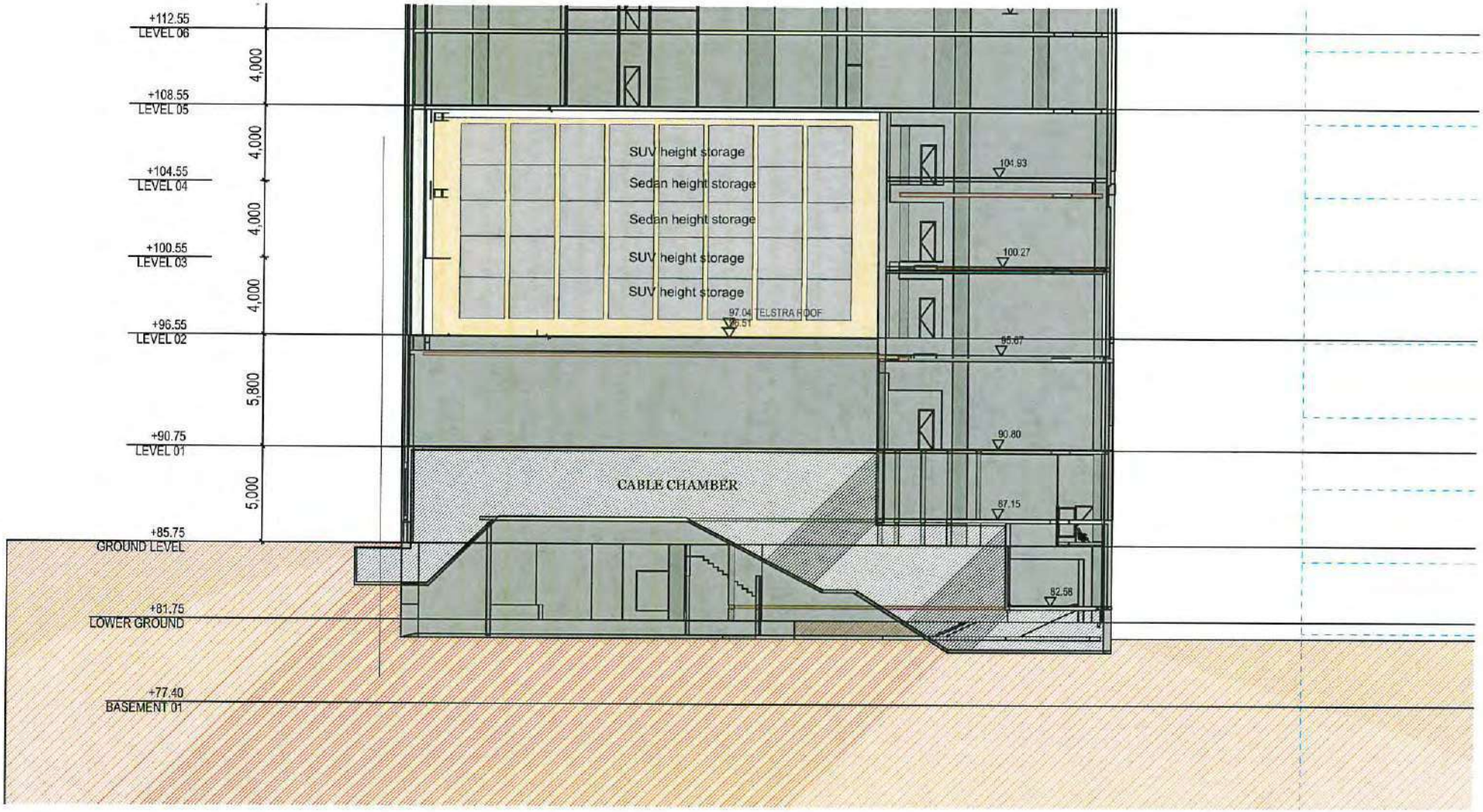
Project Name :

524-542 Pacific Hwy, St Leonards NSW

REVISION NO.

DRAWING NO.

SK 102



4. Section
1:200

XSPACIAL

KLAUS multiparking

Drawn | Checked	SG
Plot Date:	2/8/2022
Project NO.	tbd
Project Status	Concept
Client	#Client Full Name
Site:	524-542 Pacific Hwy St Leonards NSW

Drawing Title : Sketch Plans

Section

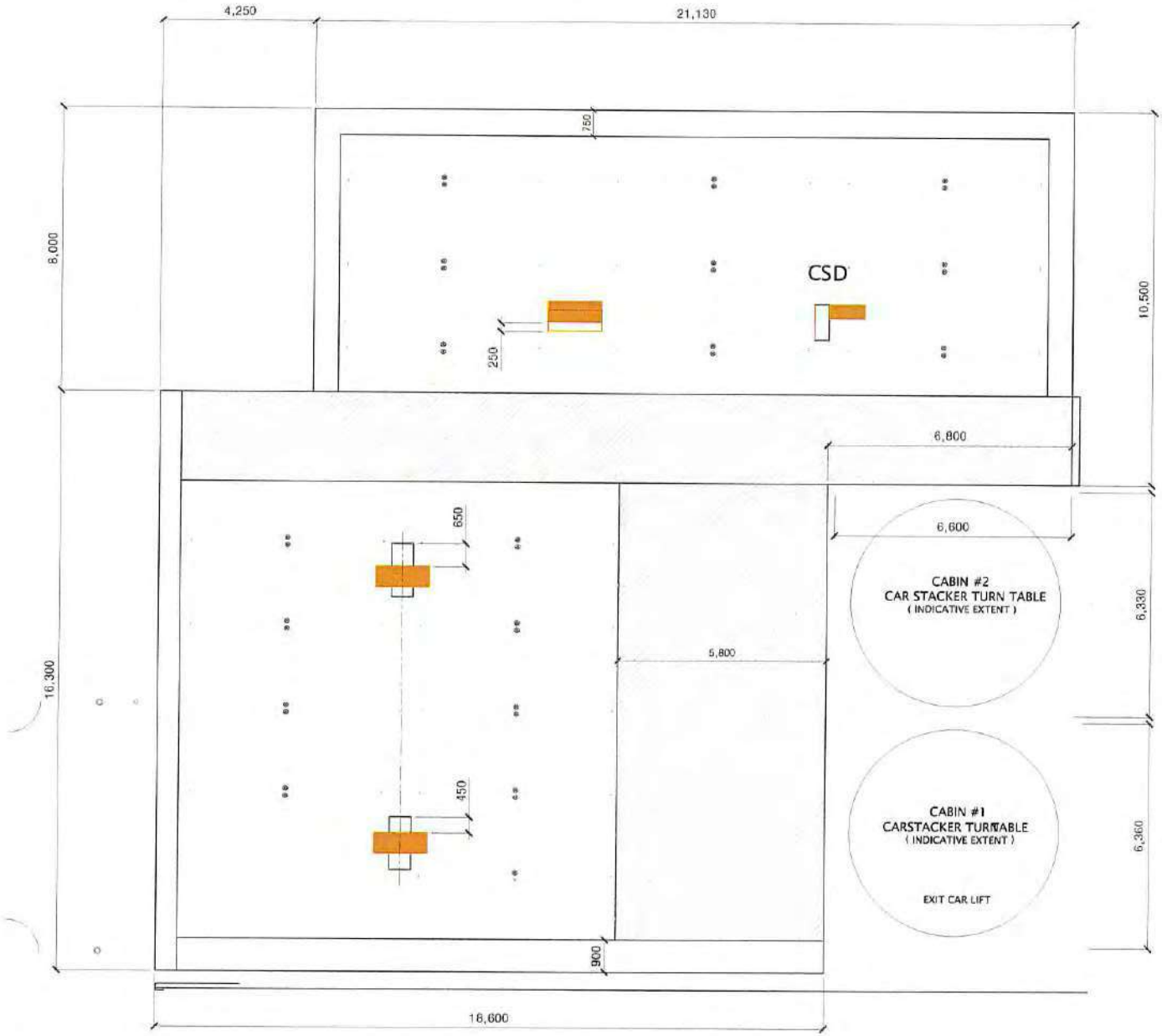
Project Name :

524-542 Pacific Hwy, St Leonards NSW

REVISION NO.

DRAWING NO.

SK 200



ISSUED FOR APPROVAL

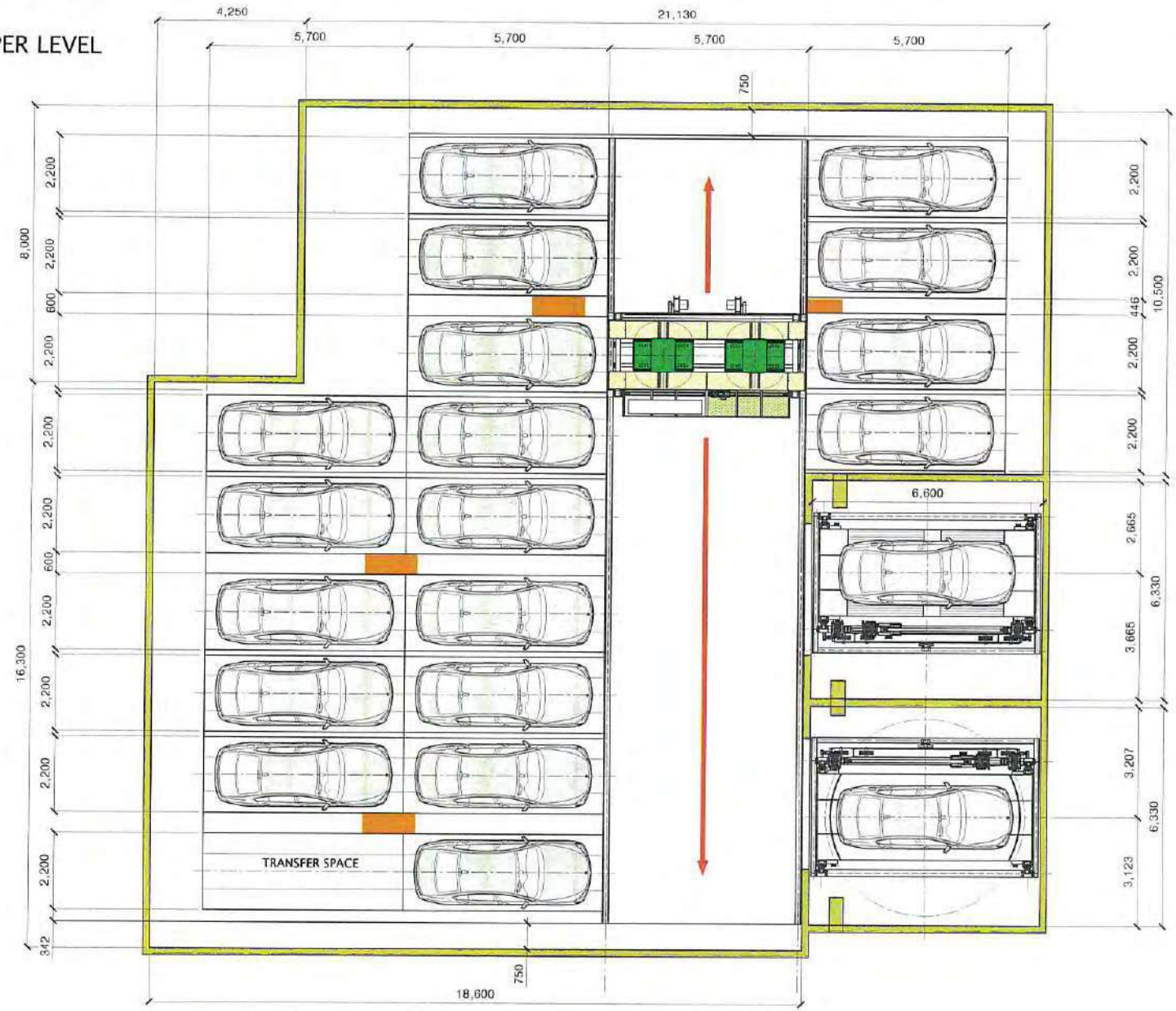
NO.	DATE	REVISIONS & DESCRIPTION	ENG'R	APPR'D

HERCULES CARPARKING SYSTEMS

MODEL NAME	HCP-SH05-090				JOB	524-542 Pacific Highway, St Leonards NSW	
DATE	15 June 2022		SCALE	1/120	SUBJECT	LAYOUT	
DRAWN	DESIGNED	CHECKED	REVIEWED	APPROVED	PROJECT NO.	P22-083	REV. 0
	James Han				DRAWING NO.	HCP-SH5-001	

TITLE: SHUTTLE CAR STACKER

18 CARS PER LEVEL



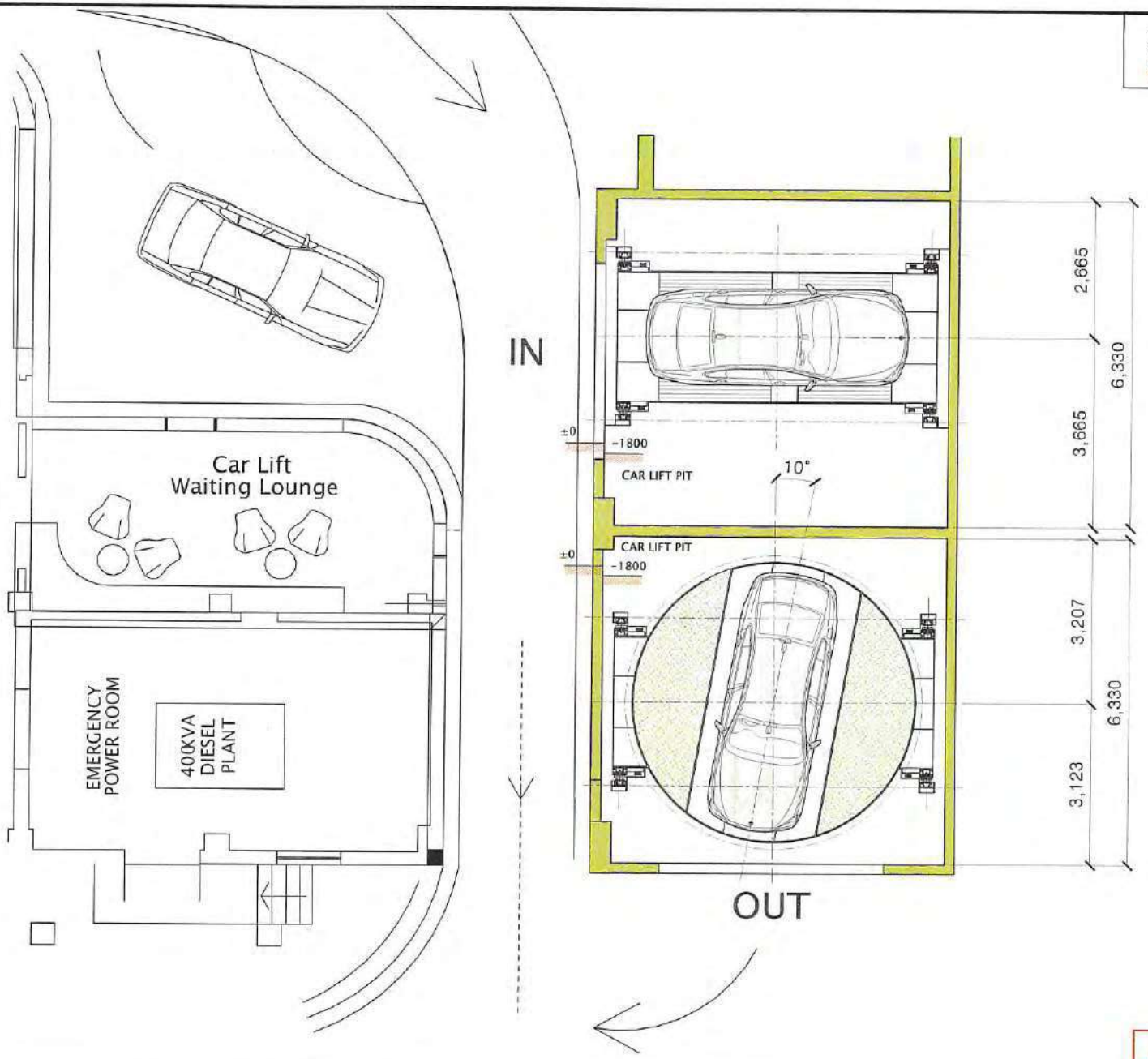
ISSUED FOR APPROVAL

NO.	DATE	REVISIONS & DESCRIPTION	ENG'R	APPR'D

MODEL NAME	HCP-SH05-090				JOB	524-542 Pacific Highway, St Leonards NSW	
					DATE	15 June 2022	SCALE 1/120
					DRAWN	DESIGNED James Han	CHECKED / REVIEWED / APPROVED

HERCULES CARPARKING SYSTEMS

TITLE	SHUTTLE CAR STACKER
SUBJECT	TYPICAL FLOOR PLAN
PROJECT NO.	P22-083
DRAWING NO.	HCP-SH5-002
REV.	0



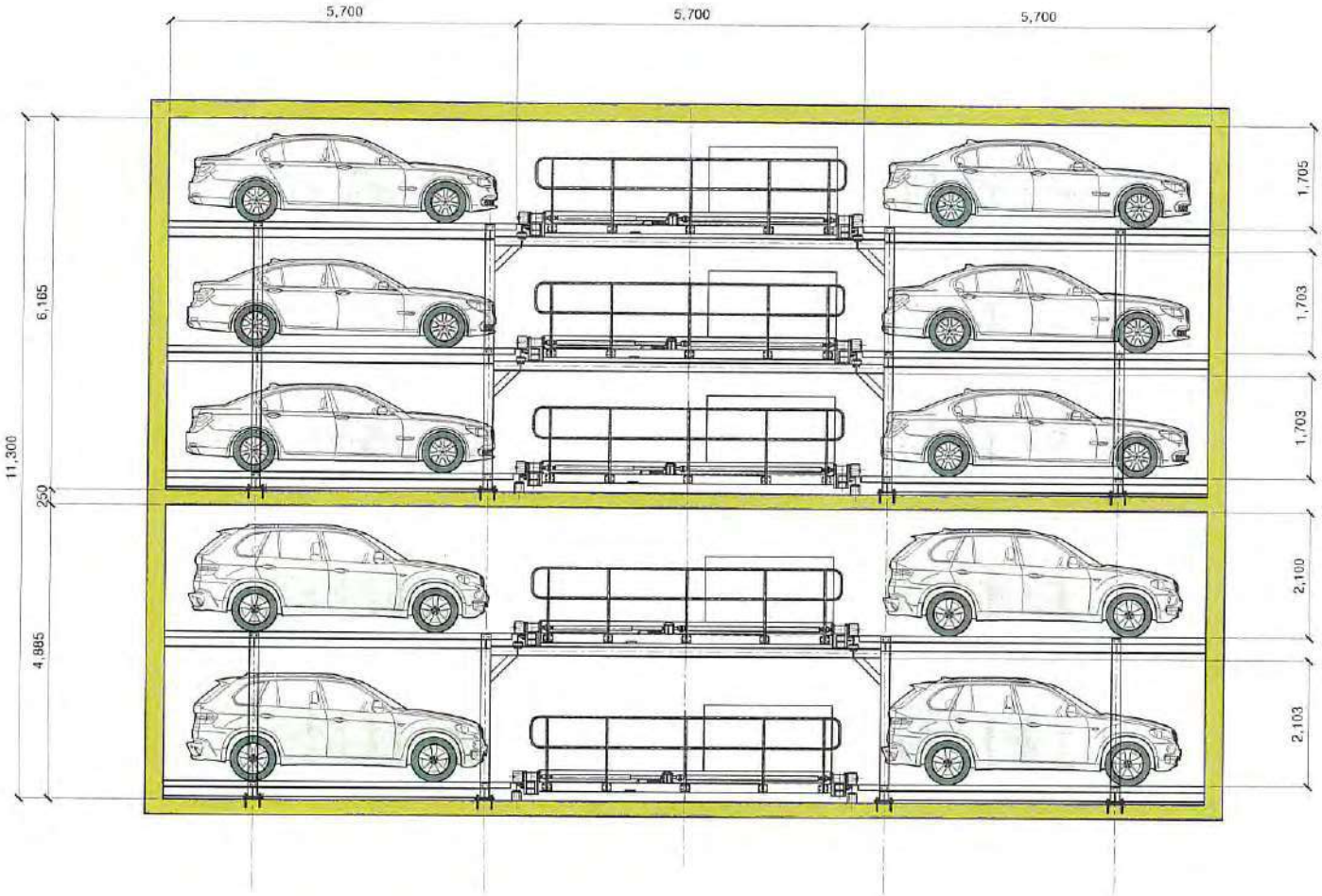
ISSUED FOR APPROVAL

NO.	DATE	REVISIONS & DESCRIPTION	ENG'R	APPR'D

HERCULES CARPARKING SYSTEMS

MODEL NAME	HCP-SH05-090				JOB	524-542 Pacific Highway, St Leonards NSW	
					DATE	15 June 2022	SCALE 1/80
					DRAWN	DESIGNED	CHECKED	REVIEWED	APPROVED
						James Han			

TITLE	SHUTTLE CAR STACKER
SUBJECT	LOWER GROUND FLOOR PLAN
PROJECT NO.	P22-083
DRAWING NO.	HCP-SH5-003
REV.	0



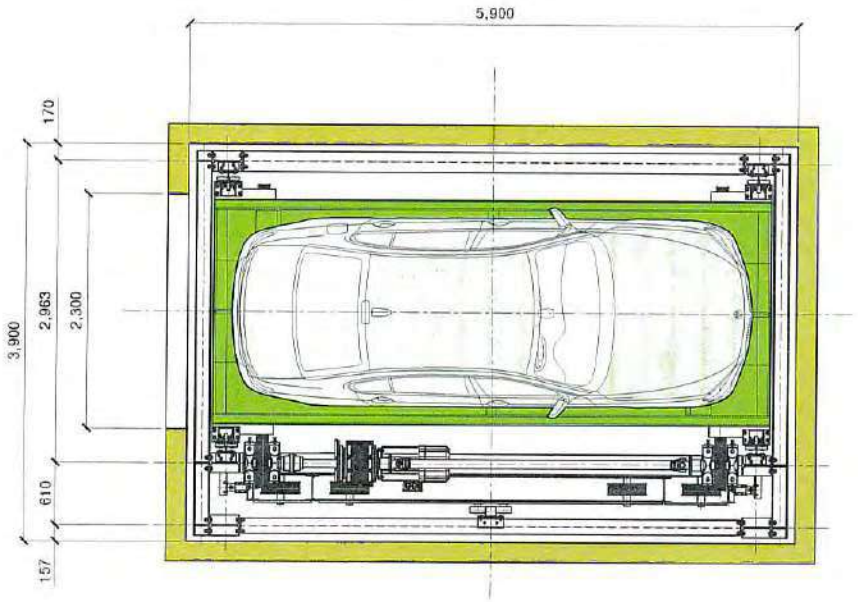
ISSUED FOR APPROVAL

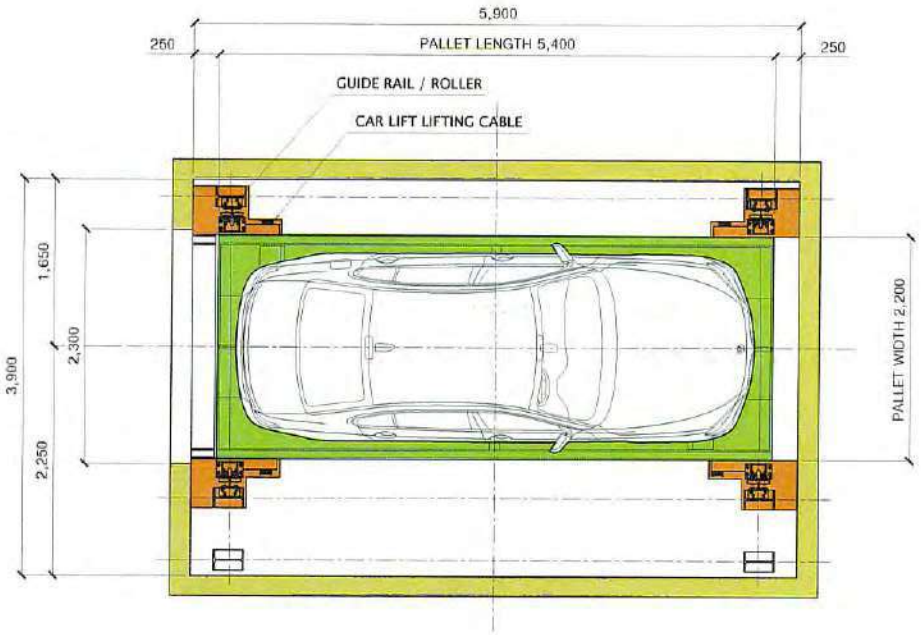
NO.	DATE	REVISIONS & DESCRIPTION	ENG'R	APPR'D

HERCULES CARPARKING SYSTEMS

MODEL NAME	HCP-SH05-090				JOB	524-542 Pacific Highway, St Leonards NSW	
					DATE	15 June 2022	SCALE
					DRAWN	DESIGNED	CHECKED	REVIEWED	APPROVED
						James Han			

TITLE	SHUTTLE CAR STACKER	
SUBJECT	PARKING BAY SECTION VIEW	
PROJECT NO.	P22-083	REV. 0
DRAWING NO.	HCP-SH5-004	



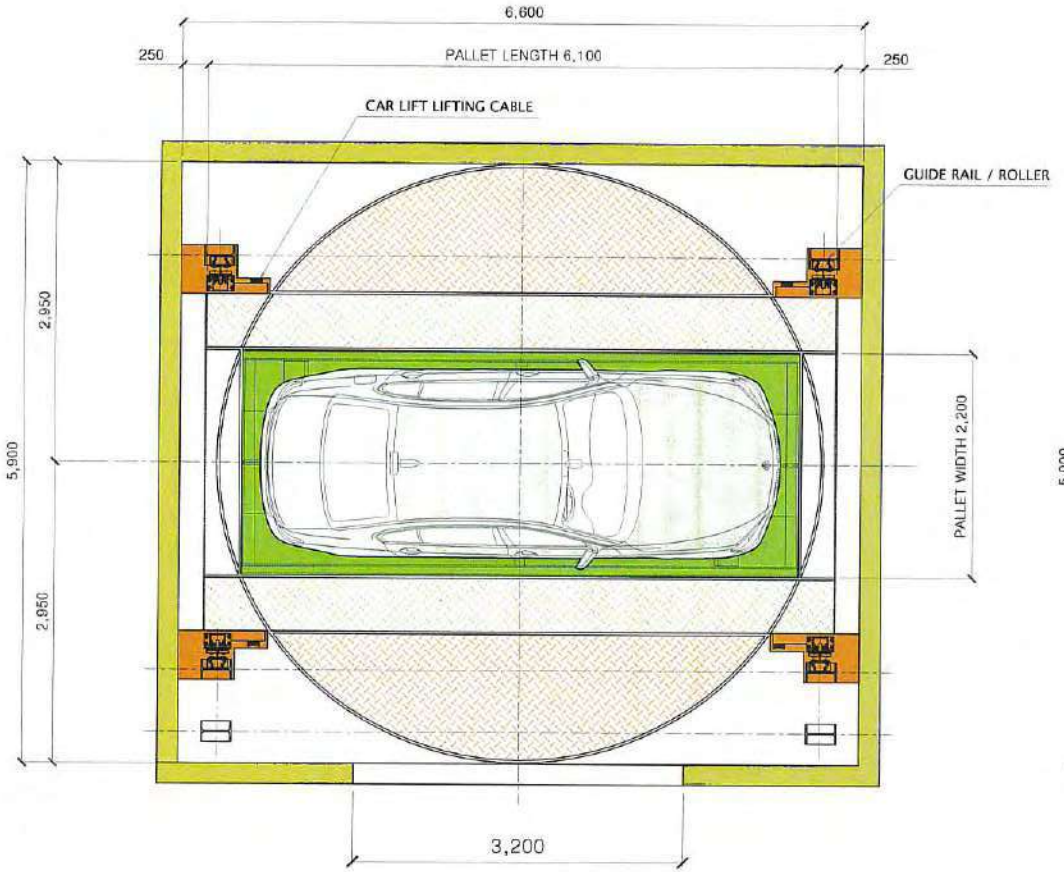


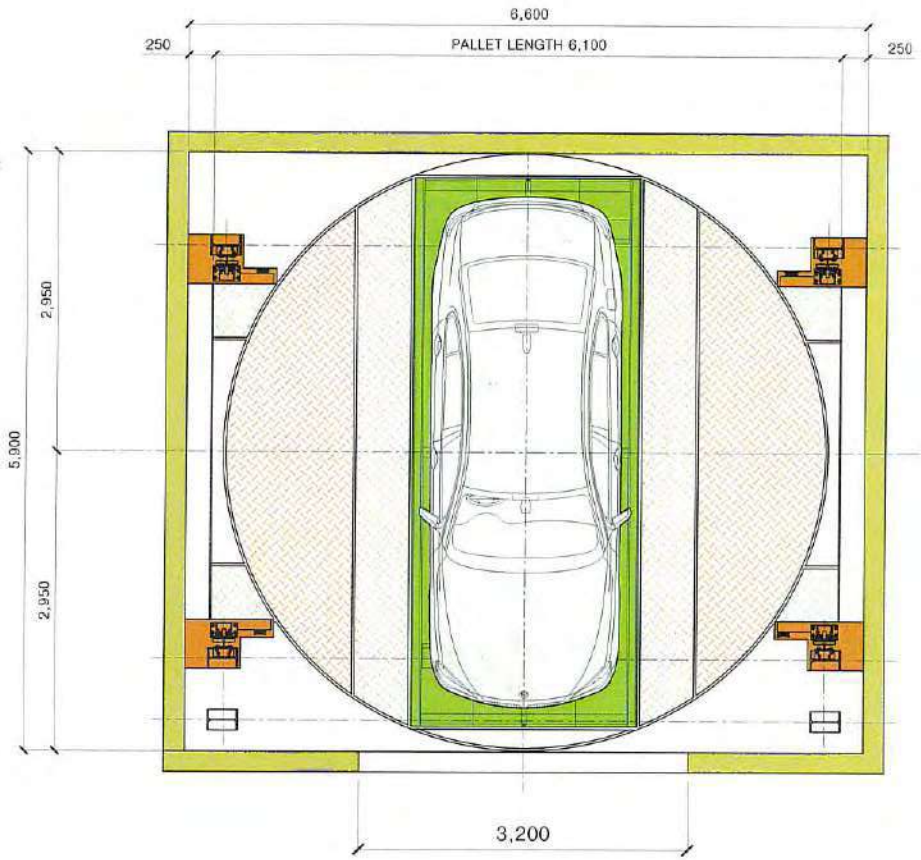
ISSUED FOR APPROVAL

NO.	DATE	REVISIONS & DESCRIPTION	ENG'R	APPR'D

MODEL NAME	HCP-SH05-090	JOB	524-542 Pacific Highway, St Leonards NSW			TITLE	SHUTTLE CAR STACKER
HERCULES CARPARKING SYSTEMS		DATE	8 July 2022	SCALE	1/50	SUBJECT	ENTRANCE ROOM (NO TRUNTABLE)
		DRAWN	DESIGNED / CHECKED / REVIEWED / APPROVED			PROJECT NO.	P22-083
			James Han			DRAWING NO.	HCP-SH5-010

REV. 0





ISSUED FOR APPROVAL

NO.	DATE	REVISIONS & DESCRIPTION	ENG'R	APPR'D

HERCULES CARPARKING SYSTEMS

MODEL NAME	HCP-SH05-090	JOB	524-542 Pacific Highway, St Leonards NSW			TITLE	SHUTTLE CAR STACKER
		DATE	8 July 2022		SCALE 1/50	SUBJECT	ENTRANCE ROOM (TRUNTABLE)
		DRAWN	DESIGNED	CHECKED	REVIEWED / APPROVED	PROJECT NO.	P22-083 REV. 0
			James Han			DRAWING NO.	HCP-SH5-011

524-542 Pacific Highway, St Leonards NSW

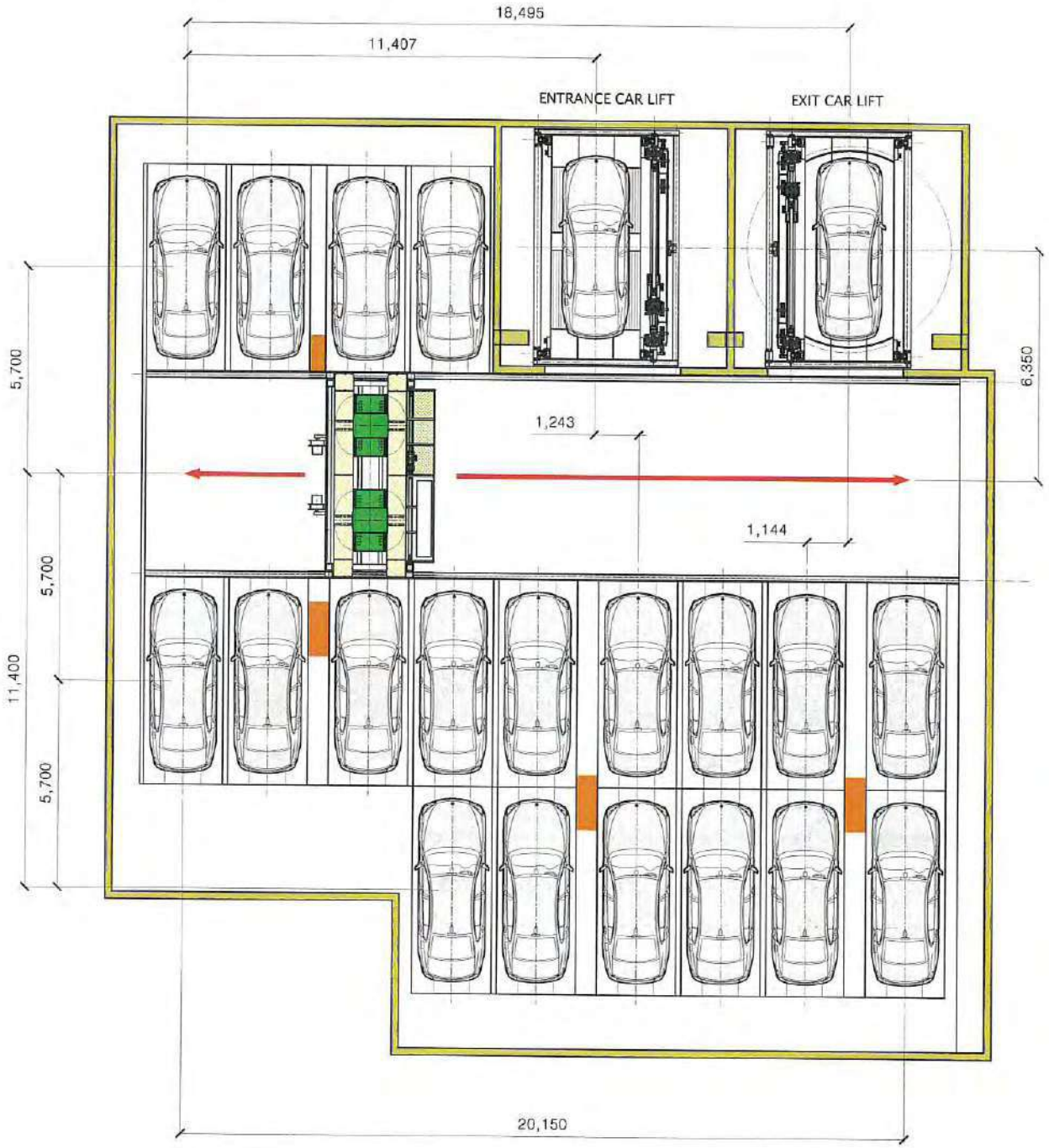
TIMING ANALYSIS

CAR PICKER TYPE

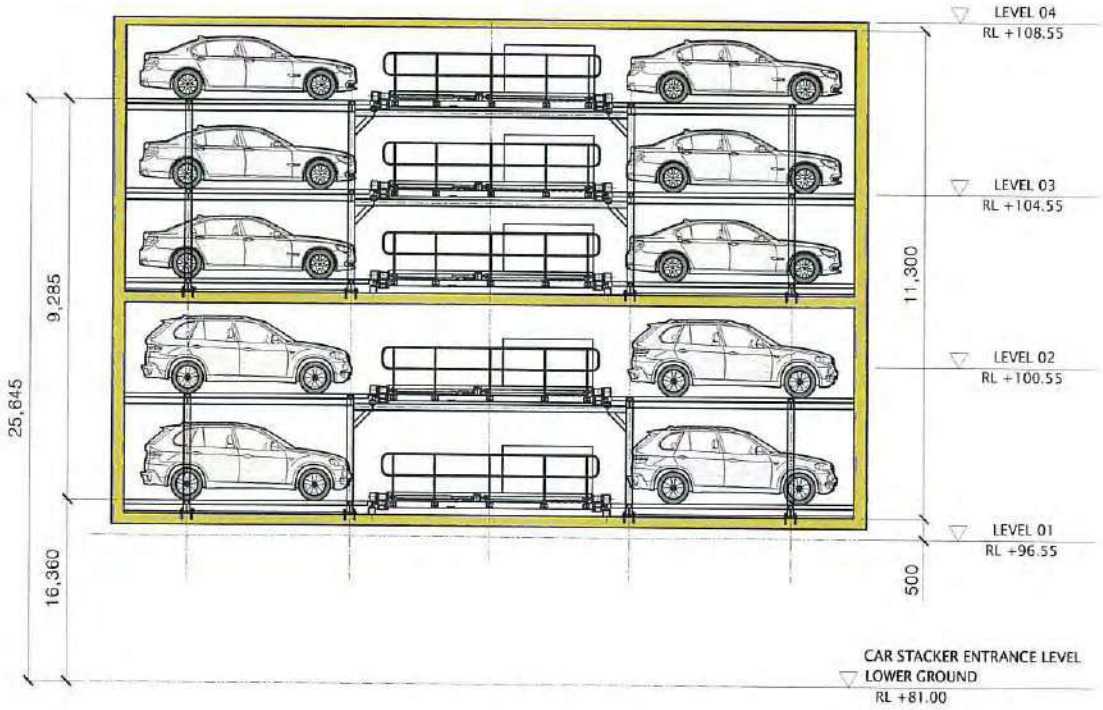
HERCULES
CARPARKING SYSTEMS

HERCULES
CARPARKING SYSTEMS

1. PLAN



2. SECTION



3. Speed

- Car lift lifting : 60.0 m/min = 1.0 m/sec
- Shuttle traveling : 50.0 m/min = 0.83 m/sec
- Car picker traveling : 40.0 m/min = 0.66 m/sec
- Turntable turning : 22.0 m/min = 0.36 m/sec

4. Parking time at the Car Lift

4-1. Entrance room door opening time : 5 sec

4-2. Car Drives in time : 10 sec

4-3. Car stops time : 2 sec

4-4. Get out of car time : 5 sec

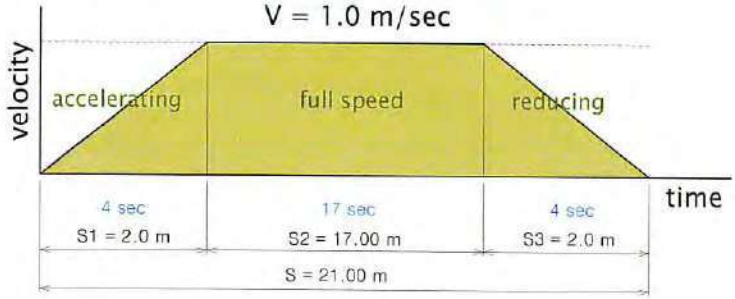
4-5. Driver walks out time : 8 sec

4-6. Swipes card time : 3 sec

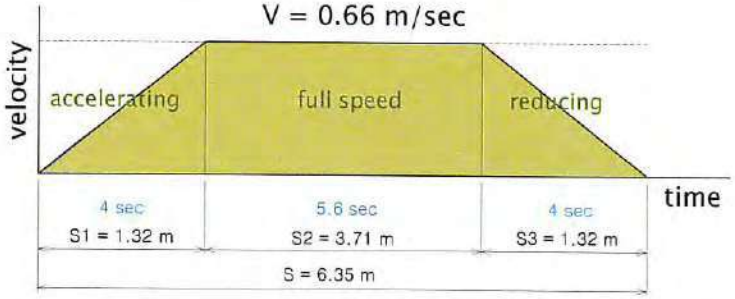
4-7. Entrance room door closing time : 5 sec
(Vehicle centering device working)

4-8. Car lift lift up time to park : 25 sec

stroke = (longest + shortest) / 2 = (16,360 + 25,645) / 2 = 21,000 mm



4-9. car picker traveling time from shuttle to car lift : 13.6 sec



4-10. car picker arms opening (car getting up) time : 5 sec

4-11. car picker travelling time from car lift to shuttle : 13.6 sec

4-12. Car lift down time to the entrance level : 25 sec

4-13. A car lift parking time : 120.2 sec

5. Parking time at shuttle

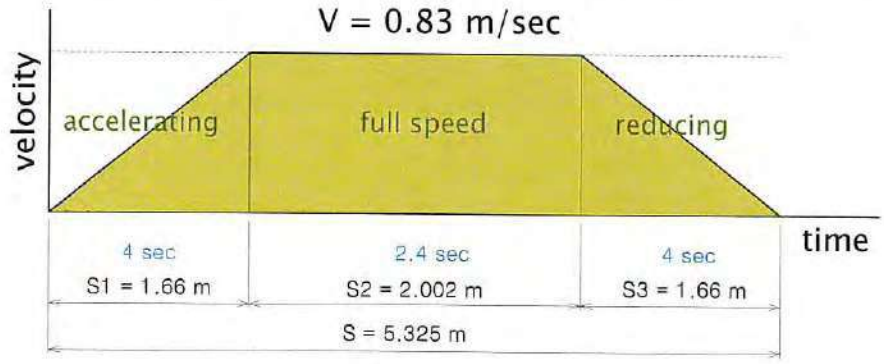
5-1. Car picker traveling time from shuttle to car lift : 13.6 sec

5-2. Car picker arms working for car picking up time : 5 sec

5-3. Car picker traveling time from car lift to shuttle : 13.6 sec

5-4. Shuttle average traveling time to parking bay : 10.4 sec

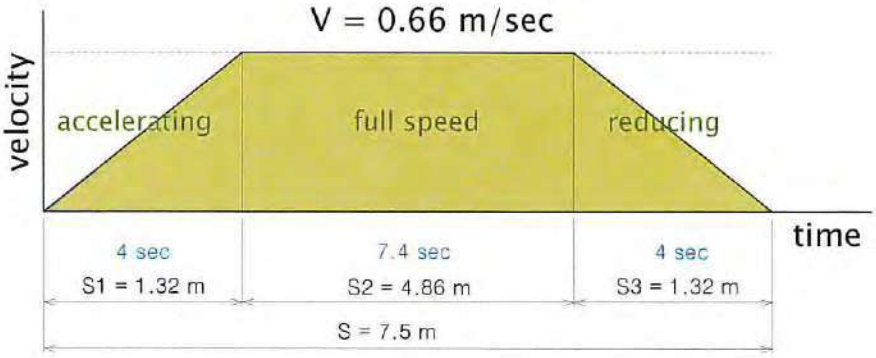
- average traveling = (shortest 1,243 + longest 11,407) / 2 = 5,325mm



5-5. Car picker traveling time from shuttle to parking bay : 15.4 sec

- average traveling = shortest 5,700 x $\frac{13}{19}$ + longest 11,400 x $\frac{6}{19}$

= 7500 mm



5-6. Car picker arms closing (car getting down) time : 5 sec

5-7. Car picker travelling time from parking bay to shuttle : 15.4 sec

5-8. Shuttle average traveling time to car lift : 10.4 sec

5-9. Parking time at Shuttle : 88.8 sec

5-10. average parking time at five shuttles = 88.8 / 5 = 17.76 sec

5-11. parking time = 120.2 sec (Because car life working time would be longer)

5-12. parking rate per hour = 30 cars

6. Retrieving time at Car lift

6-1. Car lift lift up time to retrieve a vehicle : 25 sec

6-2. Car picker traveling time from car lift to shuttle : 13.6 sec

6-3. Car picker arms closing (car getting down) time : 5 sec

6-4. Car picker traveling time from shuttle to car lift : 13.6 sec

6-5. Car lift down time to the entrance level : 25 sec

6-6. Turntable working time : 25 sec

6-7. Entrance room door opening time : 5 sec

6-8. Driver walking time in Entrance Room : 4 sec

6-9. Car unlocking time : 3 sec

6-10. Car starting time : 5 sec

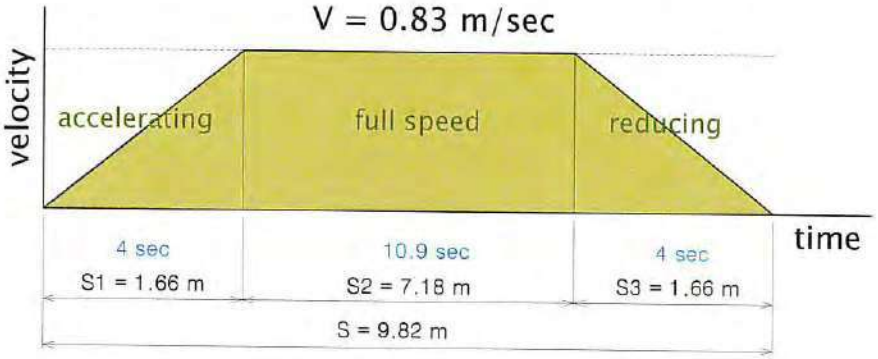
6-11. Car driving out time : 4 sec

6-12. Entrance room door closing time : 5 sec

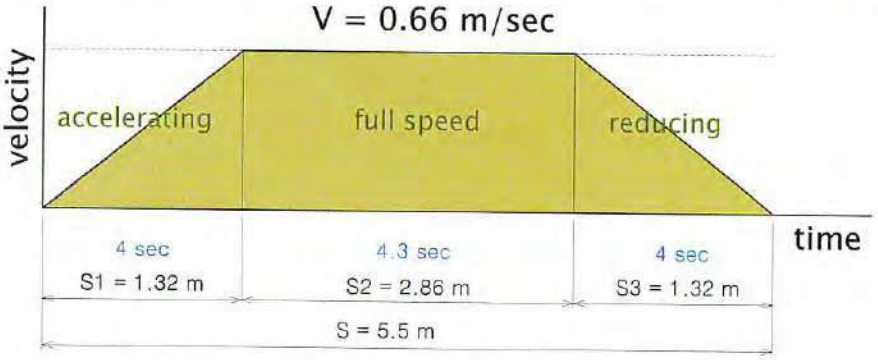
6-13. Car lift retrieving time = 133.2 sec

7. Shuttle Retrieving time at aisle 13 parking bays

7-1. Shuttle average traveling time to parking bay : 18.9 sec
- average traveling = (shortest 1,144 + longest 18,495) / 2 = 9,820mm



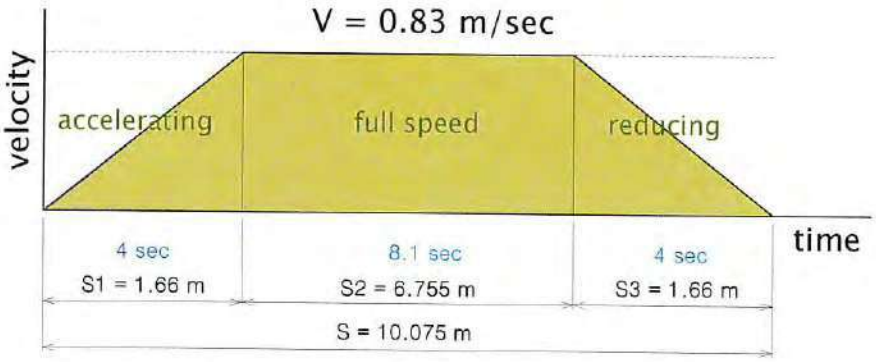
7-2. Car picker traveling time from shuttle to parking bay : 12.3 sec



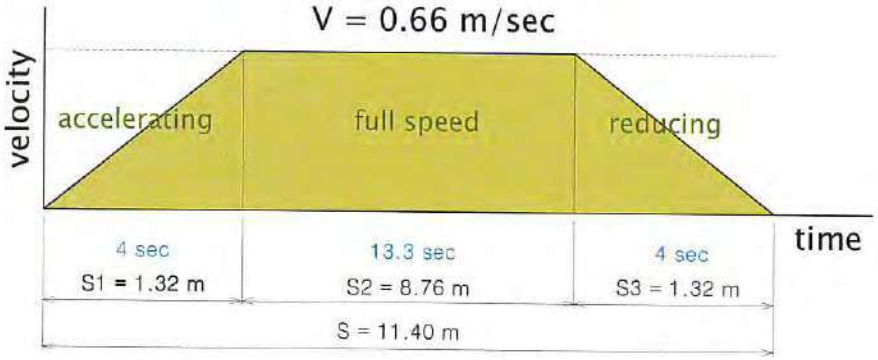
7-3. Car picker arms working for car picking up time : 5 sec
7-4. Car picker traveling time from parking bay to shuttle : 12.3 sec
7-5. Shuttle average traveling time to car lift : 18.9 sec
7-6. Car picker traveling time from shuttle to car lift : 13.6 sec
7-7. Car picker arms closing (car getting down) time : 5 sec
7-8. Car picker traveling time from car lift to shuttle : 13.6 sec
7-9. Retrieving time at aisle parking bays : 99.6 sec (PT-a)

8. Shuttle Retrieving time at tandem 6 parking bays
8-1. Shuttle average traveling time to parking bay : 18.9 sec
8-2. Car picker traveling time from shuttle to parking bay : 12.3 sec
8-3. Car picker arms working for car picking up time : 5 sec
8-4. Car picker traveling time from parking bay to shuttle : 12.3 sec

8-5. Shuttle average travelling time (for aisle parking bay clearing) : 16.1 sec
- average traveling = (shortest 0 + longest 20,150) / 2 = 10,075mm



8-6. Car picker traveling time from shuttle to parking bay : 12.3 sec
8-7. Car picker arms closing (car getting down) time : 5 sec
8-8. Car picker traveling time from parking bay to shuttle : 12.3 sec
8-9. Shuttle average traveling time to retrieve tandem vehicle : 16.1 sec
8-10. Car picker traveling time from shuttle to tandem parking bay : 21.3 sec



8-11. Car picker arms working for car picking up time : 5 sec
8-12. Car picker traveling time from parking bay to shuttle : 21.3 sec
8-13. Shuttle average traveling time to car lift : 18.9 sec
8-14. Car picker traveling time from shuttle to car lift : 13.6 sec
8-15. Car picker arms closing (car getting down) time : 5 sec
8-16. Car picker traveling time from car lift to shuttle : 13.6 sec
8-17. Parking time at tandem parking bays : 209.0 sec (PT-t)

9. Retrieving time

9-1. average retrieving time at a shuttle :

$$= \frac{\text{PT-a x 13}}{19} + \frac{\text{PT-t x 6}}{19} = \frac{99.6 \text{ x } 13}{19} + \frac{209.0 \text{ x } 6}{19}$$

= 134.15 sec

9-2. average parking time at Five shuttles = 134.15 / 5 = 26.83 sec

9-3. Retrieving time = 133.2 sec

(Because car life working time would be longer)

9-4. Retrieving rate per hour = 27 cars

HERCULES CARPARKING SYSTEMS 2004 PTY LTD

ABN: 67 077 434 452

Unit J, 10-16 South Street

Rydalmere NSW 2116

Toll Free: 1800 649 603

Hercules Carparking Systems Reliability

524-542 Pacific Highway St. Leonards

02/11/2022

Reliability of the Car Lift

The main operation of the automated car parking system is the lift and Hercules Car parking systems goes beyond the minimum standards to provide innovative system designs with high quality and reliability. The Main lift for the St Leonards tower car stacker is a highspeed wire rope traction lift. This is a very similar design to passenger rated lifts that are commonly employed all over the world. Hercules also provides passenger rated car lifts that share similar designs based off the automated carparking systems main lift. High levels of engineering design are provided by Hercules to exceed Australian Standards and are complimented by a full Finite Element Analysis (FEA) for structural integrity, strength, and fatigue. As we are the manufacturer, we also pay very close attention to build quality and fabrication details.

These high engineering standards that we invest into our lift designs, results in a highly reliable lift. The wire rope traction lift utilizes a counterweight design, this reduces the amount of energy required from the motor to operate the lift. The wire rope design also results in a smooth operation as no hydraulic stages are required or physical mechanical brakes to slow down the system. These features reduce stress on the motor, making it last longer and requires less power to operate. This increases reliability while reducing power consumption and overall cost to run the system.

The motor is the core of the lift and Hercules spares no expenses when it comes to selection of the driving motor. Hercules selects SEW Euro Drive motors for the driving motor. SEW is a leading manufacturer of drive technology worldwide. The motor is designed to extremely high standards, the parts are manufactured in Germany and assembled all over the world. The SEW motor is known for its efficiency and reliability. These motors have a 96% efficiency which is extremely high resulting in more power saving and offers a long service life increasing reliability. Correctly employed and serviced these motors have a lift expectancy of over 25 years plus minimum.

To highlight the reliability of these lifts here are two examples of fully automated system which employs a single lift entry/exit room and have been running for a long period of time without any failures of the main lifts. The first fully automated system was installed in 2004 at Commonwealth St, Surry Hills. This project has been operating and still is operating with its original lifting motor. A second reference site is the Hampton Court, Kings Cross Project. Installed in 2006. This Fully automatic stacker has a single lift for its entry/exit room and has also been operating since with its original lifting motor. (*See Figure 1 and Figure 2 for reference drawings)*

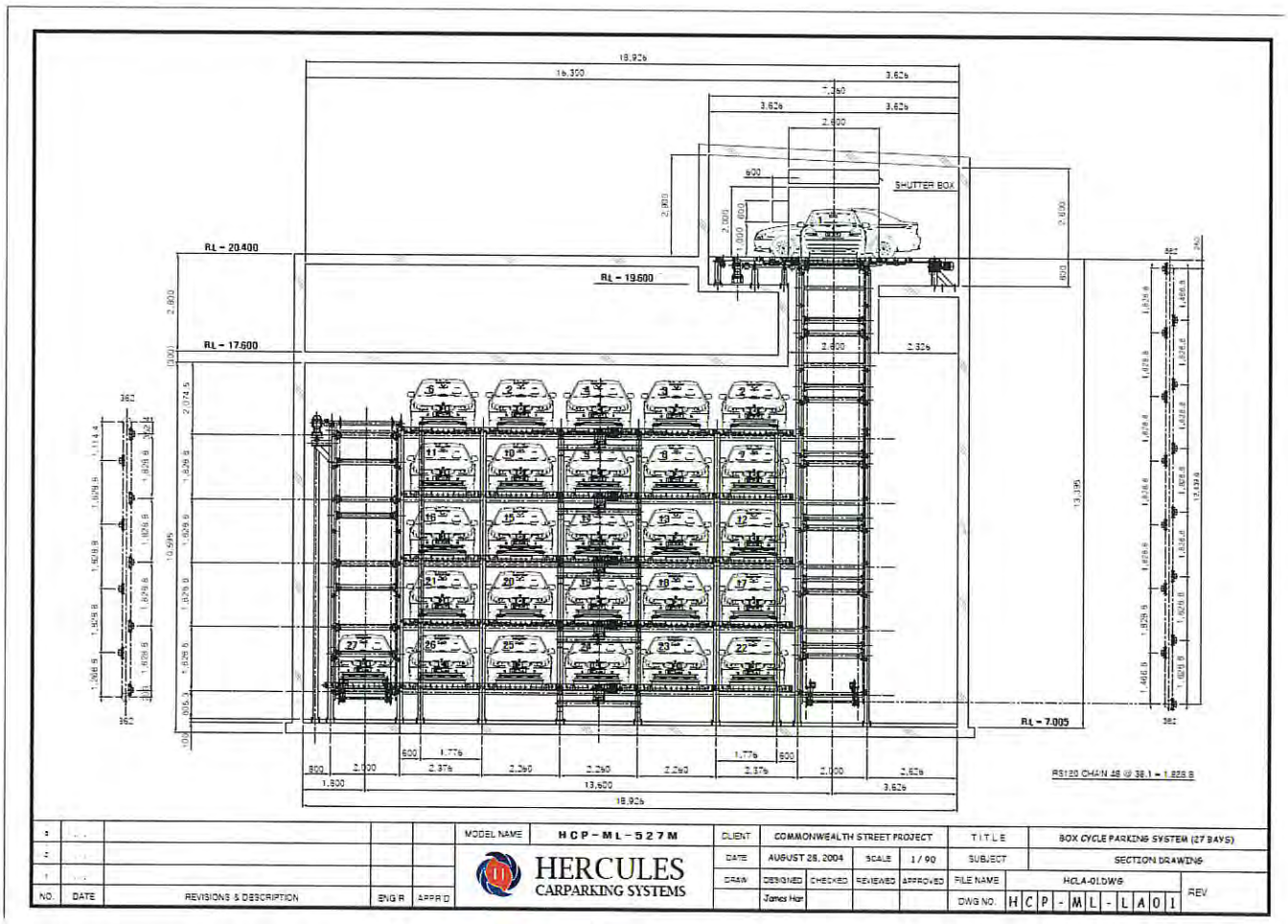
The failure of a lift in an automated car parking system is extremely low due to the amount of R&D invested into the designs. Once Hercules installs the automated system, we also provide a maintenance agreement where our skilled technicians service the system. The servicing of the system is accomplished with a goal of preventative maintenance to eliminate the chance of a failure and increase the reliability of the system.

SEW has multiple branches in Australia which provide Hercules with support such as instructions to maintain the motors and warehouses that stocks all parts required to rebuild a motor in Australia.

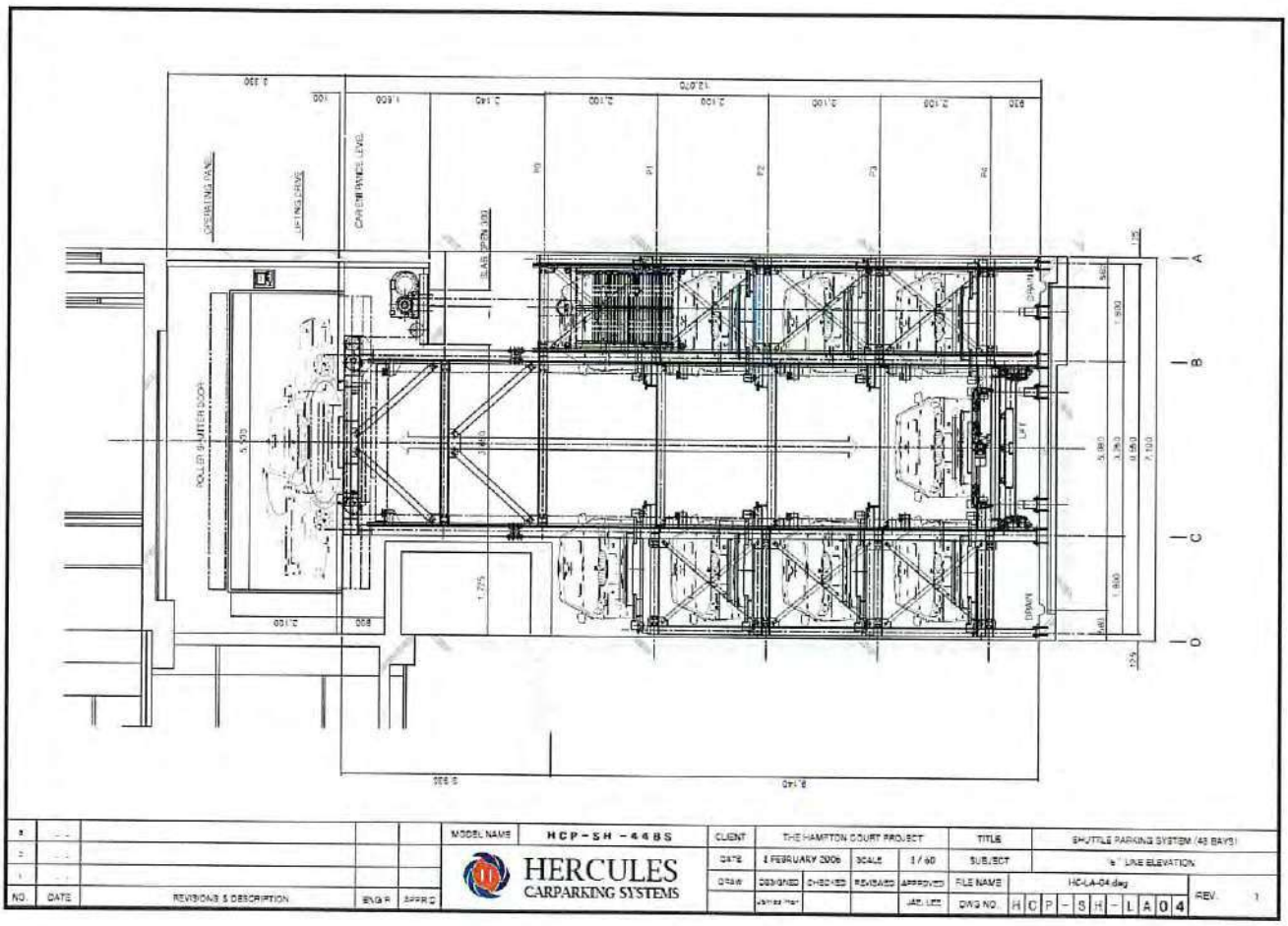
Even though the possibility of a motor failure occurring is extremely low Hercules is always prepared for the worst situation, with its fulltime expert technician team and warehouse stocking spare parts including lift motors and wide range of sensors. If in the case of a failure Hercules are always prepared for the fastest response times when repairing/replacing parts. See *Figure7* is a current photo of the SEW motors we have in stock in our warehouse which is enough to replace any motor in a fully automated system in the event of a motor failure.

If a motor was to fail Hercules has the support, skilled team, and machinery to replace a motor in a day. Other components used on the lift such as limit switches, photo sensors and proximity sensors can be easily replaced and fixed on the spot.

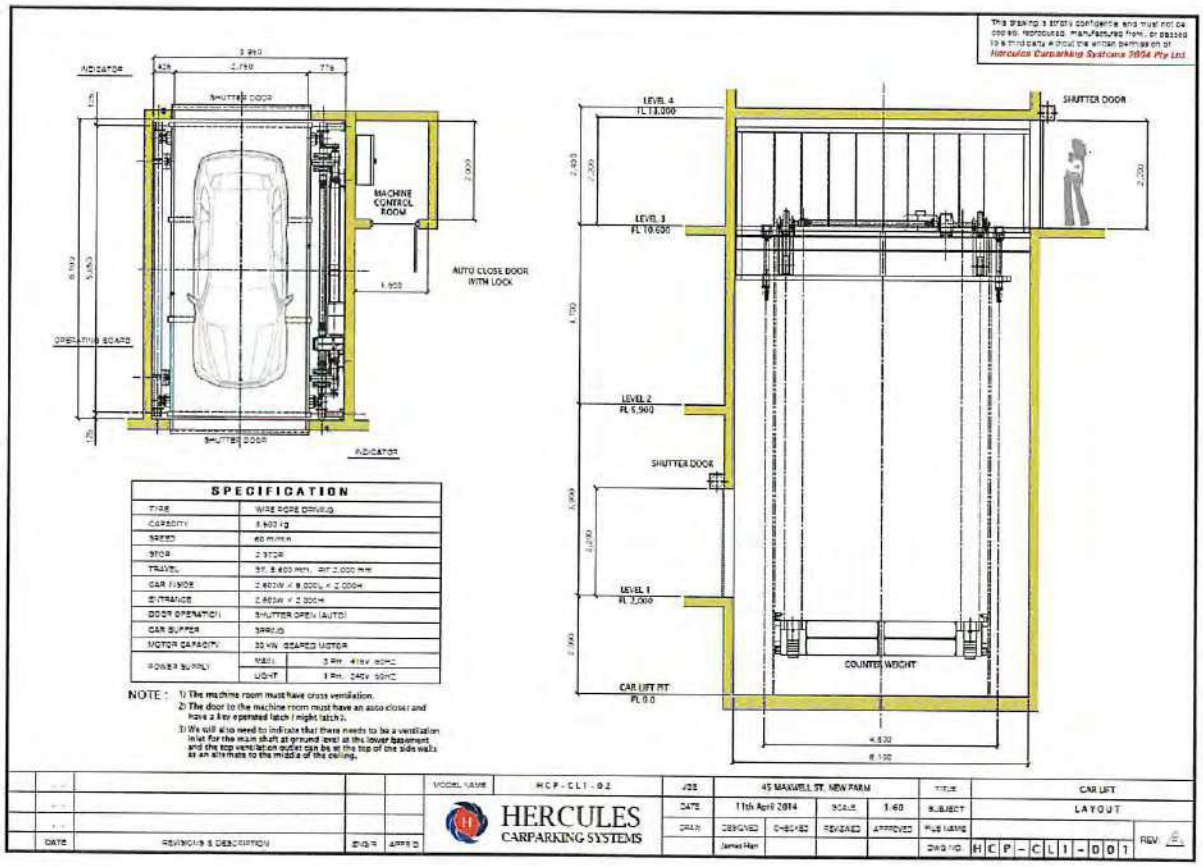
As reliable and consistent as the lifts have proven to be, in the very rare event that one lift was non-functioning, we have designed redundancy into the entire carparking system, whereby the second lift would automatically take over the work of the first lift. This would halve the parking and retrieval rate but would allow the system to function as per normal until repairs were carried out. The same goes for the shuttles on every level. Should there be any issue with one of these shuttles, then the carparking system which has redundancy designed in, would isolate that one level, and just utilise the remaining four levels until such time as a technician could attend site.



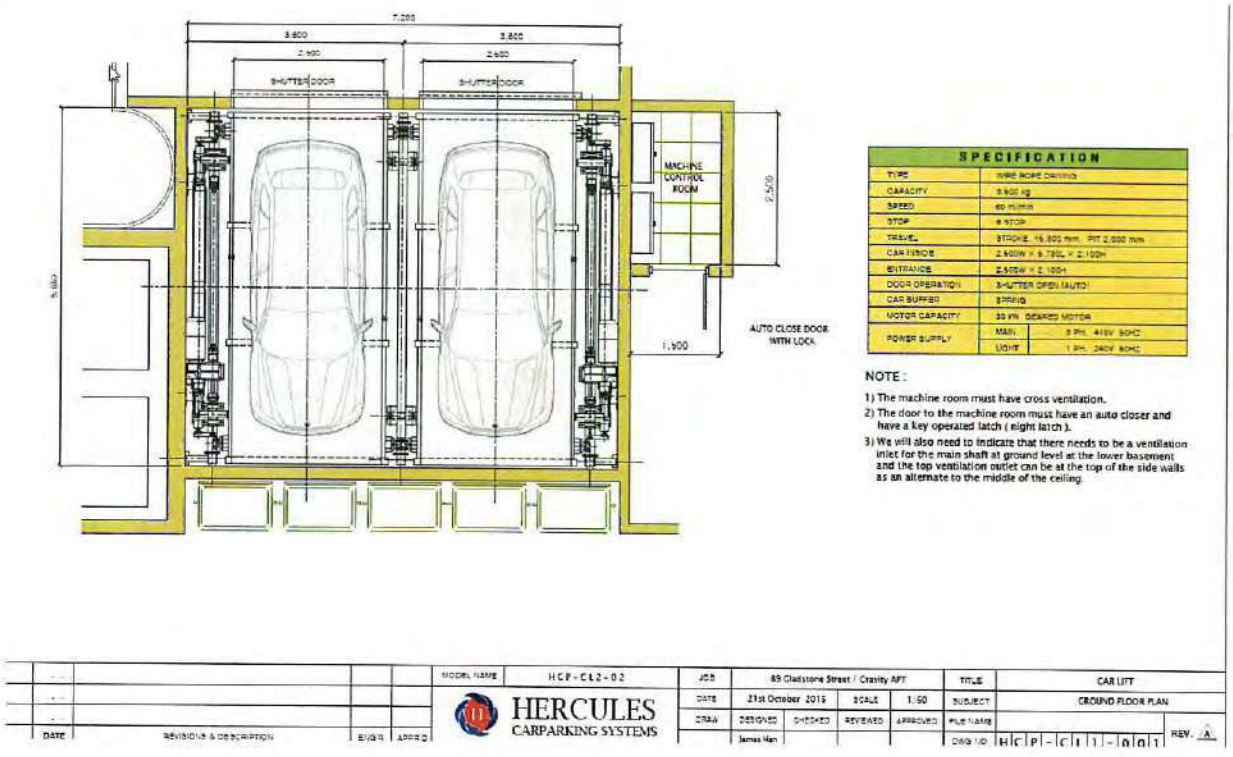
(Figure 1; Commonwealth St, Surry Hills Project. Installed in 2004 has been operational since and still has its original main lift motor)



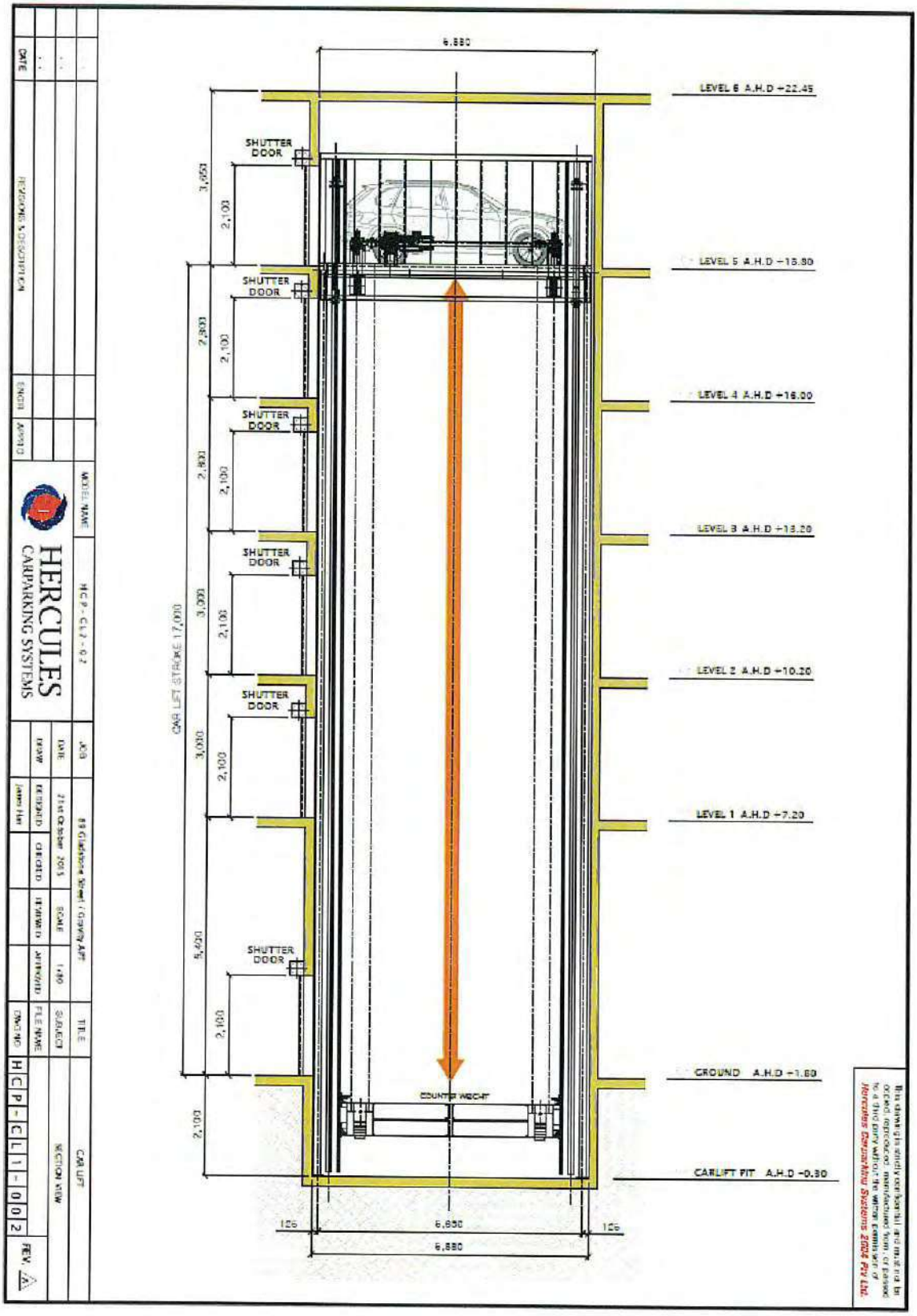
(Figure 2; Hampton Court, Kings Cross Project. Installed in 2006 has been operational since and still has its original main lift motor)



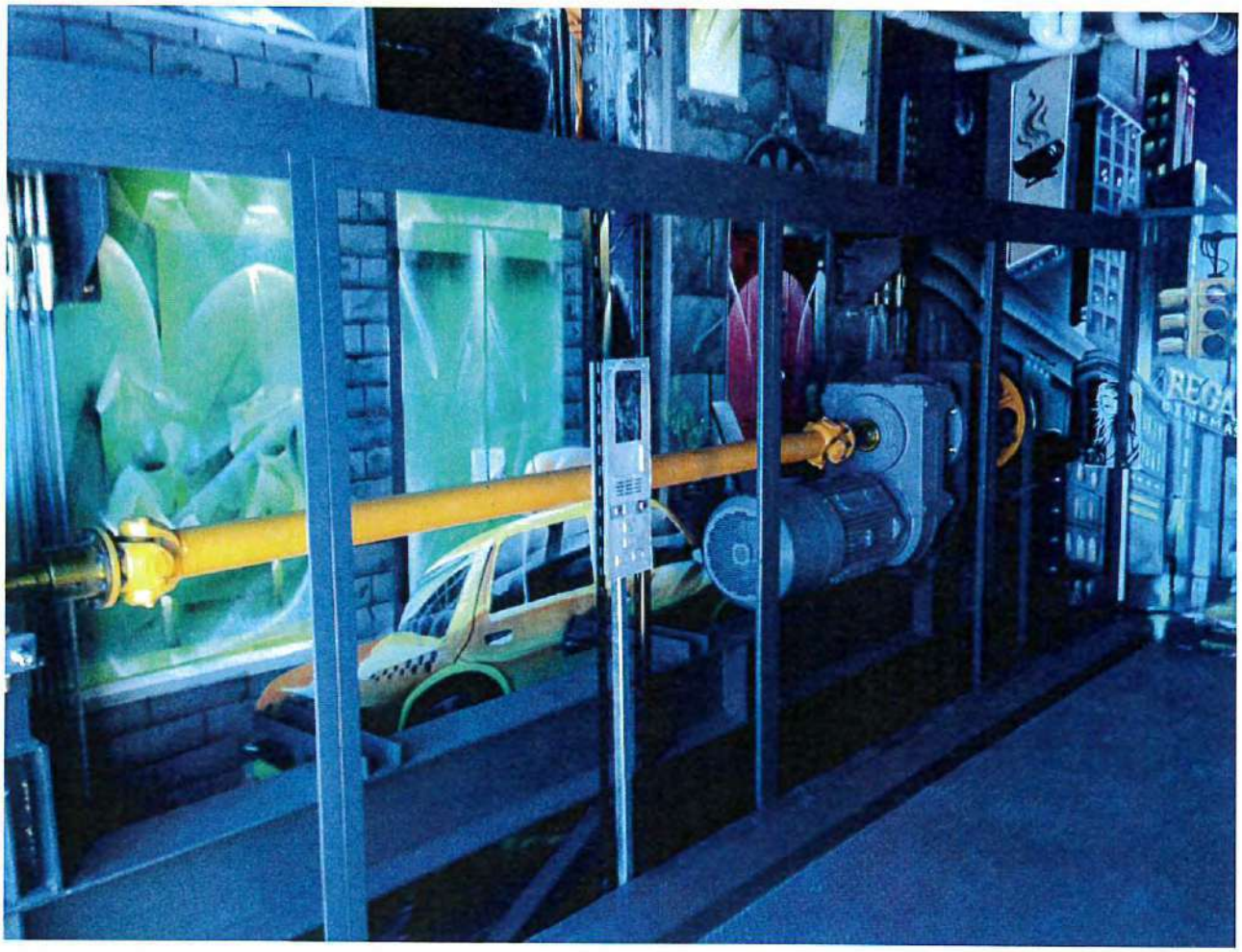
(Figure 3; High Speed Wire Rope Traction Passenger Rated Car Lift based of the fully automated car parking system main lift design. Installed Project 45 Maxwell St, New farm)



(Figure 4; High Speed Wire Rope Traction Passenger Rated Car Lift based of the fully automated car parking system main lift design. Installed Project 89 Gladstone St, Melbourne)



(Figure 5; High Speed Wire Rope Traction Passenger Rated Car Lift based of the fully automated car parking system main lift design. Installed Project 89 Gladstone St, Melbourne)



(Figure 6; 45 Maxwell St, Newfarm. Main lifting motoring and driving mechanism)

(Figure 7; Spare Motors Always kept in stock in Hercules Warehouse, including main lift, shuttle running, shutting picking and turntable motors)

Maintenance

Hercules has a service centre which can be called 24/7/365 on an 1800 number for assistance with 4 staff members who live locally in the Lower North Shore. Our standard service response times are usually within 2-3 hours, but due to the location of the project in St. Leonards, the reality is that Hercules would be able to attend within the hour should an urgent breakdown occur.

Below is an example of a routine maintenance contract which provides routine maintenance and our 24/7 service. All maintenance services will be conducted through the building manager and strata where the maintenance will be completed at agreed times where it limits impact to the users. If required and urgent we can quickly park or retrieve a vehicle is needed during maintenance.

SERVICE AGREEMENT	**CONTACT SERVICE**
(Maintenance, breakdown and support service)	1800 649 603

Parties to the Contract:

Contractor:

Hercules Carparking Systems 2004 Pty Ltd

ABN: 67 077 434 452

Unit J, 10-16 South St,

RYDALMERE NSW 2116

AND

The Principal

CONTACT	**SITE ADDRESS**

COMPANY	
ADDRESS	
PHONE	

Equipment to be Serviced:

No. Of:	Equipment Type	Number of Carspaces

Fees

Maintenance Service Program Fee

2 Services per year @ half-yearly intervals	**$#### + GST Per Service** Per Annum $#### + GST (Payable prior to Service being completed)

Breakdown Response Fees*

Response between: 7:30am to 4:30pm, Monday to Friday (excluding public holidays)	$### + GST Service Call Out. $### + GST per 15 mins or part thereof. Minimum 2 hours.
Callouts outside the above hours including Saturdays: (excl. Public Holidays & Sundays)	$### + GST Service Call Out. $###+ GST per 15 minutes thereafter. Minimum 2 hours.
Sunday or Public Holiday callout:	$### + GST Service Call Out. $### + GST per 15 minutes thereafter. Minimum 2 hours.

*I, an authorised representative of the Principal, permit/do not permit the Contractor to attend Breakdown Service calls from the Car Parking Systems users and instruct the Contractor to treat such calls as being made by the Principal or its representatives under the above Terms and Conditions.

Initial_____ Date_____

Commencement Date	

Signed as acceptance of this agreement and its Terms and Conditions* on behalf of the **Principal** by its duly authorised signatory:	Signed as commitment to this agreement and its Terms and Conditions* on behalf of the **Contractor** by its duly authorised signatory:
Signature	Signature
Print Name	Print Name
Date	Date

Terms & Conditions for Car Parking Equipment Services Agreement

The Parties agree to the following terms:

1. General

1.1 Bold terms are defined terms in this Contract and such terms have the meaning given herein.

1.1.1. **Contract** means this contract.

1.1.2. **Parties** mean the Contractor and Principal and **Party** means either one of them.

1.1.3. **Sale Contract Warranty** means the warranty covering the Car Parking Equipment on the terms set out in the contract pursuant to which such equipment was purchased.

1.1.4. **Site** means the location at which the Car Parking Equipment is located.

1.1.5. **Summary Page** means the front page of this Contract executed by the Parties.

1.2 This Agreement and the documents to be entered into pursuant to it shall be governed by, and construed in accordance with, the laws of NSW, Australia.

1.3 Any amendment or modification to this Contract will only be effective if made in writing and signed by both Parties.

2. Commencement and expiration

2.1 This Contract commences on the date it is executed by the Parties (the **Commencement Date**).

2.2 This Contract terminates on the date that is Sixty (60) calendar months following the Commencement Date (the **End Date**) the contract will automatically renew unless either Party give notice to terminate the agreement with 1 month of the end date by written notice. The Parties acknowledge and agree there is no limitation on the number of times they may extend the Contract.

3. Contractor Maintenance Service Program

3.1 The Contractor shall complete the **Maintenance Service Program** (set out in Annexure A) for the **Car Parking Equipment** (listed on the Summary Page) two times a year during the term of this Contract at approximately six monthly intervals in consideration for the Principal paying the **Maintenance Service Program Fee** (set out on the Summary Page) as adjusted in accordance with Clause 7 below.

3.2 The Contractor shall complete the Maintenance Service Program for the Car Parking Equipment between the hours of 7:30am to 4:30pm on weekdays (excluding public holidays and office closures) unless the Parties agree a different time for completion of such program.

3.3 The Principal shall pay the Maintenance Service Program Fee prior to the Contractor completing the relevant Maintenance Service Program for the Car Parking Equipment.

3.4. The Principal acknowledges and agrees that the Maintenance Service Program contains an exhaustive list of the services to be provided by the Maintenance Service Program. The Principal acknowledges and agrees that it will incur additional charges for: (i) any services or repairs not listed in the Maintenance Service Program; and (ii) any parts or components required to repair the Car Parking Equipment unless such parts or components are covered by the Sale Contract Warranty.

3.5. The Principal undertakes to purchase any parts or components related to the Car Parking Equipment from the Contractor. Refer Clause 9 of these Terms and Conditions of Agreement.

3.6. The Contractor shall keep a record of each Maintenance Service Program completed for the Car Parking Equipment. The Contractor shall provide to the Principal a copy of these records upon the Principal's written request.

4. Contractor Breakdown Service

4.1. For the purposes of this agreement **Breakdown Service** means a visit by the Contractor, at the request of the Principal, the car park operator or user of the Car Parking Equipment, to the Site using reasonable endeavours to fix any breakdown or malfunction of the Car Parking Equipment.

4.2. The Contractor shall provide the Breakdown Service for the Principal twenty-four hours a day during each day of the term of this Contract in consideration for the Principal paying the relevant Breakdown Service Fee (set out in the Summary Page) as adjusted in accordance with Clause 7 below.

4.3. The Contractor shall use reasonable endeavours to provide the Breakdown Service within a reasonable time of receiving a request for the Breakdown Service from the Principal, car park operator or user of the Car Parking Equipment.

4.4. The Principal shall pay the Breakdown Service Fee within five calendar days of the Contractor's completion of the relevant Breakdown Service for the Car Parking Equipment. **For the purposes of clarification, the Principal is obligated to pay the Breakdown Service Fee even if the Principal has not requested the Breakdown Service provided the request for the Breakdown Service was issued by a car park operator or user of the Car Parking Equipment and the Contractor provided the Breakdown Service.**

4.5. The Principal acknowledges and agrees that the Breakdown Service Fee does not include the cost of any parts or components required to repair the Car Parking Equipment. The Principal acknowledges and agrees that it will incur additional charges for any parts or components required to repair the Car Parking Equipment unless such parts or components are covered by the Sale Contract Warranty.

4.6. The Contractor shall keep a record of each Breakdown Service completed for the Car Parking Equipment. The Contractor shall provide to the Principal a copy of these records upon the Principal's written request.

5. Contractor Support Service

In consideration for the Principal entering this Contract, during each 12-month period of the term of this Contract, when requested by the Principal, the Contractor shall provide to the Principal (the **Support Service**):

(a). (*telephone support*) general instruction on how to use the Car Parking Equipment over the telephone during normal business hours on weekdays (excluding public holidays) up to a total of 2 hours for the 12-month period (this support may consist of one phone call for 2 hours or a number of shorter calls totalling 2 hours in duration); and

(b). (*in person support applies only to new machines installed by Hercules*) a one-off attendance at the Site within the first 12-month period during normal business hours on a weekday (excluding public holidays) to give general instruction on how to use the Car Parking Equipment with such attendance duration capped at 1 hour.

6. Additional Services outside the scope of this Contract and force majeure

6.1. **Additional Services** means any services that are not provided as part of the Maintenance Service Program, the Breakdown Service and the Support Service. A non-exhaustive list of Additional Services is set out in Annexure B.

6.2. **Additional Services Fees** means the charge imposed on the Principal by the Contractor for providing Additional Services.

6.3. The Principal may request the Contractor to provide Additional Services. The Contractor shall reasonably consider performing Additional Services requested by the Principal.

6.4. If the Contractor provides Additional Services:

6.4.1. at the time of performing a Maintenance Service Program, the Contractor shall not charge the Principal a fee to visit the Site to complete the Additional Services; or

6.4.2. at any time, other than when performing a Maintenance

Service Program, the Contractor shall charge the Principal the relevant Breakdown Service Fee for visiting the Site to complete the Additional Services.

For the purposes of clarification, the Principal undertakes to pay the relevant Breakdown Service Fee anytime the Contractor visits the Site excluding when the Contractor visits the Site to perform the Maintenance Service Program.

6.5. The Principal authorises the Contractor to complete Additional Services up to the amount of $400.00 + GST. The Contractor undertakes to obtain the Principal's authorisation prior to completing Additional Services that exceed the amount of $400.00 + GST.

6.6. The Contractor is not liable in any way to the Principal for failure to provide services under this Contract if such failure arises from industrial action, acts of God and any other interruptions or circumstances beyond the reasonable control of the Contractor.

7. Indexing of Contractor fees

7.1. The Parties acknowledge and agree that the Maintenance Service Program fee set out on the Summary Page shall be increased by the CPI or 5% whichever is the greatest

(the **Indexing Increase**) every 12 months following the Commencement Date.

7.2. The Indexing Increase shall take effect on the anniversary date of the Commencement Date during the term of this Contract.

8. Contractor insurance obligations and OHS obligations

8.1. For the purposes of this Contract, **Worker** means any employee of the Contractor that provides services under this Contract or any subcontractor or third party the Contractor uses to provide services under this Contract.

8.2. During the term of this Contract, the Contractor shall hold public liability insurance to cover the Contractor and any Worker that provides services under this Contract for

an amount not less than $20,000,000.

8.3. The Contractor shall ensure any Worker it uses to provide services under this Contract complies with legally applicable OH&S requirements when performing such services.

9. Spare Parts

9.1. The Contractor will source and provide spare parts for products which were originally supplied and installed by the Contractor or for which it is the authorised agent or which are freely available.

9.2. The Contractor will provide assistance to the Principal for spare parts where the Contractor was not the supplier of the system and/or is not the agent for the product in Australia and/or the parts are not freely available.

9.2.1. In such circumstances where the Contractor is prevented from procuring spare parts through actions/inactions by others (such as competitors), the Principal will be required to procure the spare parts through placement of orders as written by the Contractor.

9.2.2. The Contractor will provide content for such orders such that the effort of the Principal is minimised.

9.2.3. The Principal may elect to pay the supplier of the procured parts directly.

10. Default and Consequences of Default

10.1. Interest on overdue invoices shall accrue daily from the date when payment becomes due, until the date of payment, at a rate of two and a half percent (2.5%) per calendar month (and at Hercules's sole discretion such interest shall compound monthly at such a rate) after as well as before any judgment.

10.2. If the Principal owes the Contractor any money the Principal shall indemnify the Contractor from and against all costs and disbursements incurred by the Contractor in recovering the debt (including but not limited to internal administration fees, legal costs on a solicitor and own Principal basis, the Contractor's contract default fee, and bank dishonour fees).

10.3. Without prejudice to any other remedies the Contractor may have, if at any time the Principal is in breach of any obligation (including those relating to payment) under these terms and conditions the Contractor may suspend or terminate the supply of Services to the Principal. The Contractor will not be liable to the Principal for any loss or damage the Principal suffers because the Contractor has exercised its rights under this clause.

10.4. Without prejudice to the Contractor's other remedies at law the Contractor shall be entitled to cancel all or any part of any order of the Principal which remains unfulfilled and all amounts owing to the Contractor shall, whether or not due for payment, become immediately payable if:

10.4.1. any money payable to the Contractor becomes overdue, or in the Contractor's opinion the Principal will be unable to make a payment when it falls due;

10.4.2. the Principal becomes insolvent, convenes a meeting with its creditors or proposes or enters into an arrangement with creditors, or makes an assignment for the benefit of its creditors; or

10.4.3. a receiver, manager, liquidator (provisional or otherwise) or similar person is appointed in respect of the Principal or any asset of the Principal.

11. General

11.1. The failure by the Contractor to enforce any provision of these terms and conditions shall not be treated as a waiver of that provision, nor shall it affect the Contractor's right to subsequently enforce that provision. If any provision of these terms and conditions shall be invalid, void, illegal or unenforceable the validity, existence, legality and enforceability of the remaining provisions shall not be affected, prejudiced or impaired.

11.2. These terms and conditions and any contract to which they apply shall be governed by the laws of NSW in which the Contractor has its principal place of business, and are subject to the jurisdiction of the Courts in that state.

11.3. The Contractor shall be under no liability whatsoever to the Principal for any indirect and/or consequential loss and/or expense (including loss of profit) suffered by the Principal arising out of a breach by the Contractor of these terms and conditions (alternatively the Contractor's liability shall be limited to damages which under no circumstances shall exceed the Price of the Goods).

11.4. The Principal shall not be entitled to set off against, or deduct from the Price, any sums owed or claimed to be owed to the Principal by the Contractor nor to withhold payment of any invoice because part of that invoice is in dispute.

11.5. The Contractor may license or sub-contract all or any part of its rights and obligations without the Principal's consent.

11.6. The Principal agrees that the Contractor may amend these terms and conditions at any time. If the Contractor makes a change to these terms and conditions, then that change will take effect from the date on which the Contractor notifies the Principal of such change. The Principal will be taken to have accepted such changes if the Principal makes a further request for the Contractor to provide Goods to the Principal.

11.7. Neither party shall be liable for any default due to any act of God, war, terrorism, strike, lock-out, industrial action, fire, flood, storm or other event beyond the reasonable control of either party.

Annexure A – Maintenance Service Program

The following is an exhaustive list of the services the Contractor provides under the Maintenance Service Program:

1. Lubrication including top up of oil and moving parts as required.
2. Spring tensions checked and adjusted.
3. Rails cleaned and checked for secure and accurate operation.
4. Proximity sensors checked for secure and accurate operation.
5. Mechanical fasteners checked for tightness.
6. Wheels checked for freedom, wear and cracking.
7. Drive wheels checked for wear.

8. Run system and check for correct and normal operation.
9. Check operation of emergency stops and operating controls.
10. Check all safety features of equipment to ensure good working order.

Annexure B – Examples of Additional Services

The following is a non-exhaustive list of examples of Additional Services:

1. Cleaning of car park bays or similar daily domestic maintenance duties.
2. Re-fitting derailed platforms.
3. Full system change of hydraulic oil including filter.
4. Replacement of parts or components not covered by the Sale Contract Warranty.
5. Attaching to car parking equipment signage that details user requirements such as the maximum height and weight of cars that are able to use the equipment.
6. Painting line marking on the ground to provide guidance for cars to drive on to the car parking equipment.

Safety and Compliance

Hercules Carparking Systems are designed and implemented to comply with safety regulations of Australia. Experienced Australian functional safety (TUV Certified) engineers ensure compliance of these systems to meet Australian regulatory requirements around machine safety under all modes of operation. Applicable Australian Standards these systems must comply to are as follows:

- AS5124-2017: Safety of Machinery - Equipment for Power driven parking of motor vehicles - Safety and EMC requirements for Design, manufacturing, erection and commissioning stages
- AS4024.1-2014: Safety of machinery series (contains 26 Parts that are European (EN) and Internationally based (ISO) safety and design Standards with some modifications to meet Australia's tough safety practices and regulations)
- AS3000-2018: Electrical installations (known as the Australian/New Zealand Wiring Rules)

Hercules Carparking Systems ensure that maintenance personnel can perform works at the site safely as required under the Work Health and Safety Act 2011.

The control system is fully designed and developed in Australia by engineers well versed in Australian regulatory requirements and applicable standards. Supply of all equipment is by Australian vendors, able to support, service and provide warranty across Australia.

Safety controls are designed and implemented to ensure maintenance personnel can both access the equipment and perform maintenance activities safely throughout the life of the system.

Safety integrity and reliability is incorporated using proper safety rated and configured equipment.

Safety deliverables available upon handover of the system are as follows:

- Safety Risk Assessment (covering all modes of operation)
- Safety Requirements Specification
- TUV Safety Verification Certificate (Post Commissioning)

The Functional Safety TUV qualified designed system to meet applicable Australian Standards AS5124- 2017, AS4024.1-2014, and AS3000-2018. Safety deliverables provided are as follows:

Functional Safety TUV qualified designed system:

- Safety Risk Assessment
- Safety Requirements Specification
- Safety Compliance Certificate

Electrical Design:

- Electrical Schematics (Preliminary design, Detailed Design, For Construction, As-built)
- Cables Schedules
- Device Schedules
- Maximum Demand Calculations
- O&M Manual
- Code

Health, Safety & Environment

Hercules Carparking Systems aspire to a zero harm philosophy for people, property and the environment. We are committed to having a proactive, preventative approach to occupational health & safety management which promotes a culture of 'safety is a shared responsibility'.

Best Regards,

P. Elsley

Phil Elsley

General Manager