Geo Transport Solutions

Supermarket Development, Wolli Creek
Proposed Vehicle Access Arrangements

Stage 3 Road Safety Audit

October 2010

Geo Transport Solutions
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Surry Hills
NSW 2010

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1. INTRODUCTION

This report has been prepared to document a Stage 3 Road Safety Audit of a proposed ingress connection on the Princes Highway for a new supermarket development at Wolli Creek. The Audit responds to a requirement of the Sydney Regional Development Advisory Committee in its consideration of the Development Application for a supermarket (with limited period of operation).

A Road Safety Audit is defined in the AUSTROADS Road Safety Audits Guide 2002 as "a formal examination of a future road or traffic project or an existing road in which an independent, qualified examiner reports on the projects accident potential and safety performance".

A Stage 3 Audit is one which assesses the detail design of a proposed road project to ensure that all safety aspects have been considered.

This road safety audit focuses on providing an independent identification of safety issues potential hazards, regardless of current design practices, standards and operations, to enable remedial measures to be identified prior to detailed design or construction.

The report does not provide recommendations about possible remedial actions in response to any identified deficiency as this is ultimately the responsibility of the applicant in consultation with the Roads and Traffic Authority and Council to determine how a deficiency is to be addressed.

LEGEND

N

SITE

2. Description of Project

The project is a new supermarket and liquor store with accesses on Princes Highway and Arncliffe Street. The proposed vehicle accesses on Princes Highway (subject to the audit) comprise:

- a left-turn deceleration lane
- an ingress driveway located towards the middle of the site frontage.

Details of the scheme are illustrated on the plan which is provided in Appendix A.

3. AUDIT DETAILS

Methodology

The methodology adopted for this Stage 3 Road Safety Audit is summarised as follows:

- a road safety auditor attended daytime and nighttime inspections of the site
- observations and review of the existing conditions including road geometry and traffic controls (eg speed restrictions). This included a drive-thru and walk-thru inspection in all directions
- assessment of the surrounding uses and activities
- a review of the relevant concept detail design documentation
- a review of the existing and projected traffic volumes
- a review of relevant statutory design standards and guidelines
- discussions with relevant design personnel.

The site inspection was carried out in order to gain an appreciation of how the proposed development will interface with the existing road geometry and to observe and assess the prevailing traffic conditions, road geometry and safety circumstances.

Road Safety Auditor

The site visits were undertaken on 3rd and 6th of September 2010 by Andrew Morse (Auditor – Geo Transport Solutions). The weather was

generally fine and sunny. Andrew Morse is an accredited Road Safety Auditor and has undertaken numerous Stage 3 Road Safety Audits in recent years.

References

During the undertaking of the audit the following documents were referenced:

- RTA 'Accident Reduction Guide' – Part 2 Road Safety Audits
- Austroads 'Road Safety Audit Manual (2002 – 2nd Edition)
- Austroads 'Guide to Traffic Engineering Practice – Part 5' Intersections at Grade
- Australian Standards AS 2890.1 and 2
- Assessment of Traffic and Parking Implications – TTPA – September 2009.

4. Road Network and Traffic Conditions

Road Network

Princes Highway is a State Road and arterial route which is relatively straight and level at the site frontage. There are 3 through lanes in each direction on Princes Highway at this location separated by a raised median island and there are supplementary right and left-turn bays on the approaches to the adjacent Brodie Spark Drive intersection.

Traffic Controls

The traffic controls relative to the audit comprise:

- the 60 kmph speed restriction in Princes Highway and 50 kmph restriction in Brodie Spark Drive – Arncliffe Street
- the central median island and lane lines in Princes Highway
- the traffic signals on the Princes Highway at the Brodie Spark Drive and Gertrude Street intersections.

Traffic Conditions

Princes Highway at the site carries some 38,000 vpd. According to the TTPA assessment the northbound approach flows during the morning and afternoon peak periods are as follows:

	AM	PM
Northbound	2,500	1,500

It is also observed that the 85th percentile speed for northbound traffic on the Highway is somewhat higher than the signposted 60 kph and is in the range of 65 to 68 kph.

Road Geometry

The road geometry issues relative to the audit issue is as follows:

- the large Telstra pit which defines the commencement of the deceleration lane

- the length of the deceleration lane is 30m (plus 10m taper)

- the width of the lane is 3.2m.

5. DESIGN CRITERIA

The relevant design criteria are provided in:

- Guide to Traffic Engineering Practice Part 5 – Intersections at Grade (NB Austroads now supersedes the former RTA Road Design Guidelines)
- AS 2890.1 and 2.

Section 6.10.3 Urban Property Access in the Part 5 document does not provide any criteria for vehicle access preclusion but defers to AS 2890.1. The AS provides criteria for the prohibition of vehicle access (Figure 3.1), however this does not relate to the left-turn lane circumstance of the Audit.

There are numerous criteria in Section 6.8.2.3 but there is no clear differentiation between a left-turn lane and left-turn lane with a 'slip lane' so there is a need to interpret the criteria. The relevant factors from Section 5 are:

- the subject site represents an 'urban' circumstance
- the approach speed is some 65 kmph and the turning speed is 20 kmph
- there is no 'storage length' requirement due to the slip lane circumstance
- in urban areas the taper can comprise small radius curves (about 8 metres or more) joined by a short straight (10 – 15 metres)
- it is acceptable for some vehicles to decelerate in the through lane before entering the left-turn lane in the urban circumstance
- Table 6.15 indicates the following lengths for deceleration lanes from 60 kmph (includes taper):

	60 kmph
- comfortable (2.5m/s^2) to 0 kph	55m
- maximum (3.5m/s^2) to 0 kph	40m
- to 20 kph	50m

The 'property access' circumstance represents a significant difference to a normal 'road intersection' circumstance and this is not reflected in the Table 6.15 criteria. The RTA have accepted this reality and there is a tacit acceptance of left-turn lanes of 30m in the 50 kmph speed restriction circumstance.

There are numerous examples of the RTA approval of such bays for development access in the Metropolitan area. It is also relevant that vehicles will travel some 15m further into the site before they meet other vehicles (ie a total lane length of 55m).

6. ASSESSMENT

The following section provides a summary of general comments and specific safety deficiencies:

1. The proposed location does not contravene any specific road design criteria.

2. It is apparent that the length of the taper and the lane are quite acceptable for an urban circumstance.

3. The width of the footway along the lane is only 1.5m.

4. There is a marked footcrossing shown across the lane.

5. There are no signs provided to give priority to ingressing vehicles or to indicate the one-way flow.

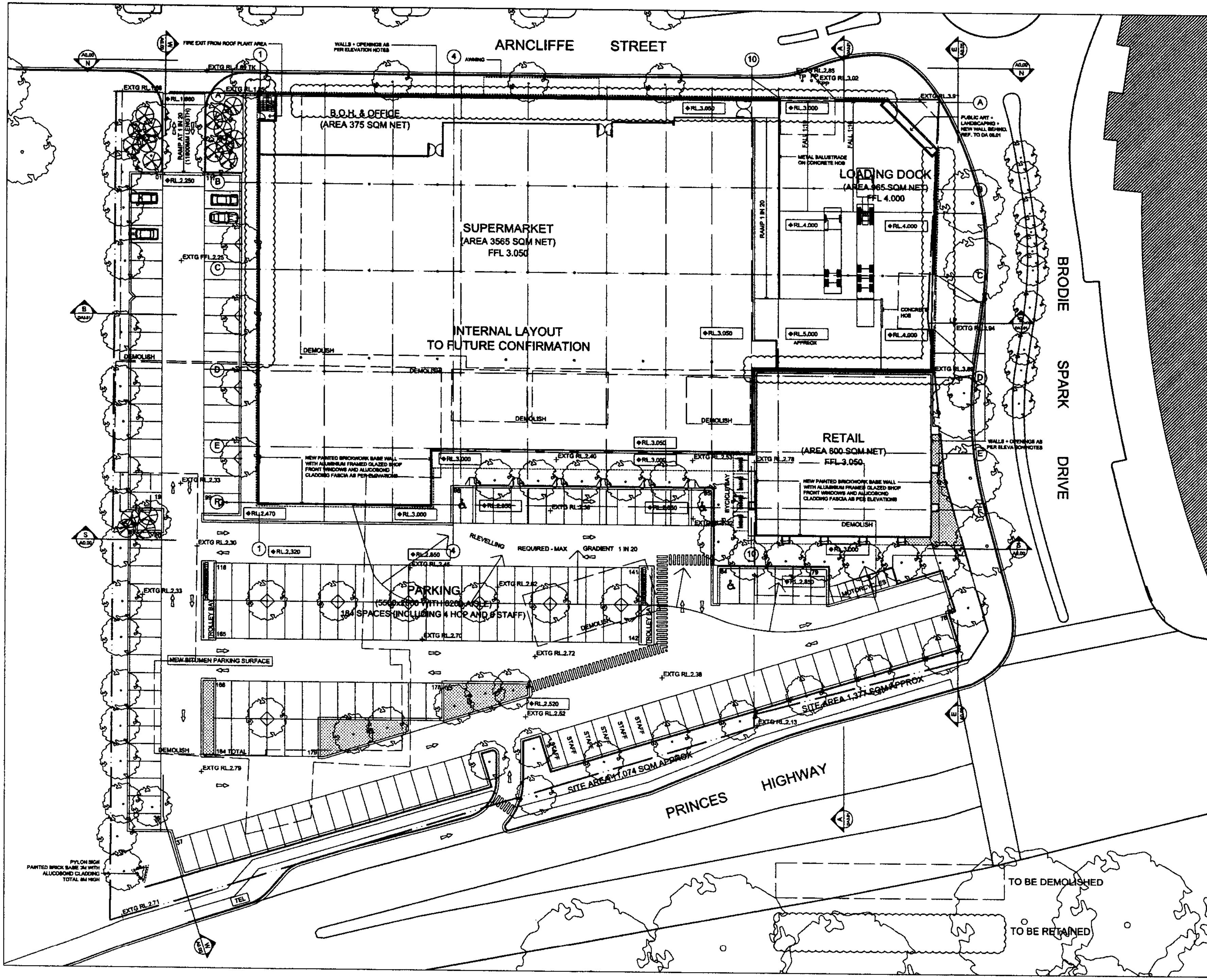
6. There is no roadmarking or turning arrows shown along the lane.

These are the findings of the Road Safety Audit undertaken in relation to the proposed supermarket access at Wolli Creek. The Corrective Action Request Form is contained in Appendix D.

Andrew Morse
Director
Geo Transport Solutions

Appendix A

Development Plan


ARNCLIFFE STREET
BRODIE SPARK DRIVE
PRINCES HIGHWAY
SUPERMARKET
(AREA 3565 SQM NET)
FFL 3.050
INTERNAL LAYOUT
TO FUTURE CONFIRMATION
B.O.H. & OFFICE
(AREA 375 SQM NET)
LOADING DOCK
(AREA 965 SQM NET)
FFL 4.000
RETAIL
(AREA 600 SQM NET)
FFL 3.050
PARKING
(5500x2600 WITH 6200 AISLE)
184 SPACES (INCLUDING 4 HCP AND 6 STAFF)
NEW BITUMEN PARKING SURFACE
SITE AREA 1,371 SQM APPROX
SITE AREA 1,074 SQM APPROX
TO BE DEMOLISHED
TO BE RETAINED
FIRE EXIT FROM ROOF PLANT AREA
WALLS + OPENINGS AS PER ELEVATION NOTES
METAL BALUSTRADE ON CONCRETE HOB
RAMP 1 IN 20
REQUIRED - MAX GRADIENT 1 IN 20
NEW PAINTED BRICKWORK BASE WALL WITH ALUMINIUM FRAMED GLAZED SHOP FRONT WINDOWS AND ALUCOBOND CLADDING FASCIA AS PER ELEVATIONS
PYLON SIGN PAINTED BRICK BASE 3M WITH ALUCOBOND CLADDING TOTAL 8M HIGH
DEMOLISH
TROLLEY BAY
STAFF
TN

IMPORTANT NOTES:

PRELIMINARY
NOT FOR CONSTRUCTION
NOT FOR DA SUBMISSION

FOR LANDSCAPE PLEASE REFER TO THE LANDSCAPE ARCH. DRAWINGS & DOCUMENTATION

ISSUE	DATE	DESCRIPTION	BY
P6	21.05.08	PRELIMINARY	

marchese + partners international
Level 7, 107 Mount Street, North Sydney NSW 2060 Australia
Ph: (02) 9922 4375 Fax: (02) 9929 5786
E: info@marchesepartners.com.au
Web: www.marchesepartners.com.au
Sydney - Melbourne - Brisbane - San Diego

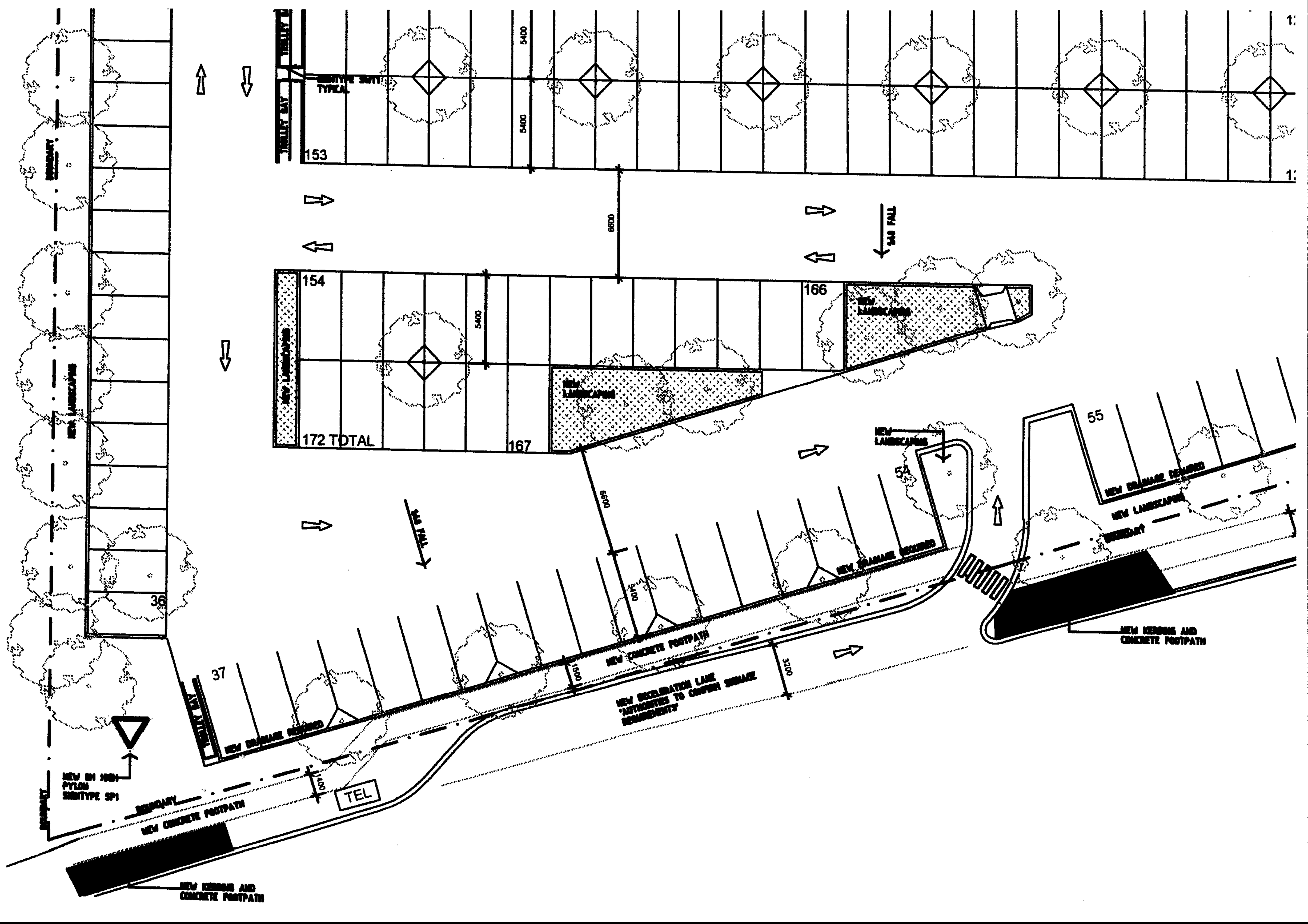
CLIENT
NAHAS CONSTRUCTION PTY. LTD.

PROJECT
PRINCES HIGHWAY, WOLLI CREEK

DRAWING TITLE
GROUND FLOOR PLAN - STAGE 1 & 2

SCALE	DATE	DRAWN	CHECKED
1:250 @ A1	21.05.08	FR	PS

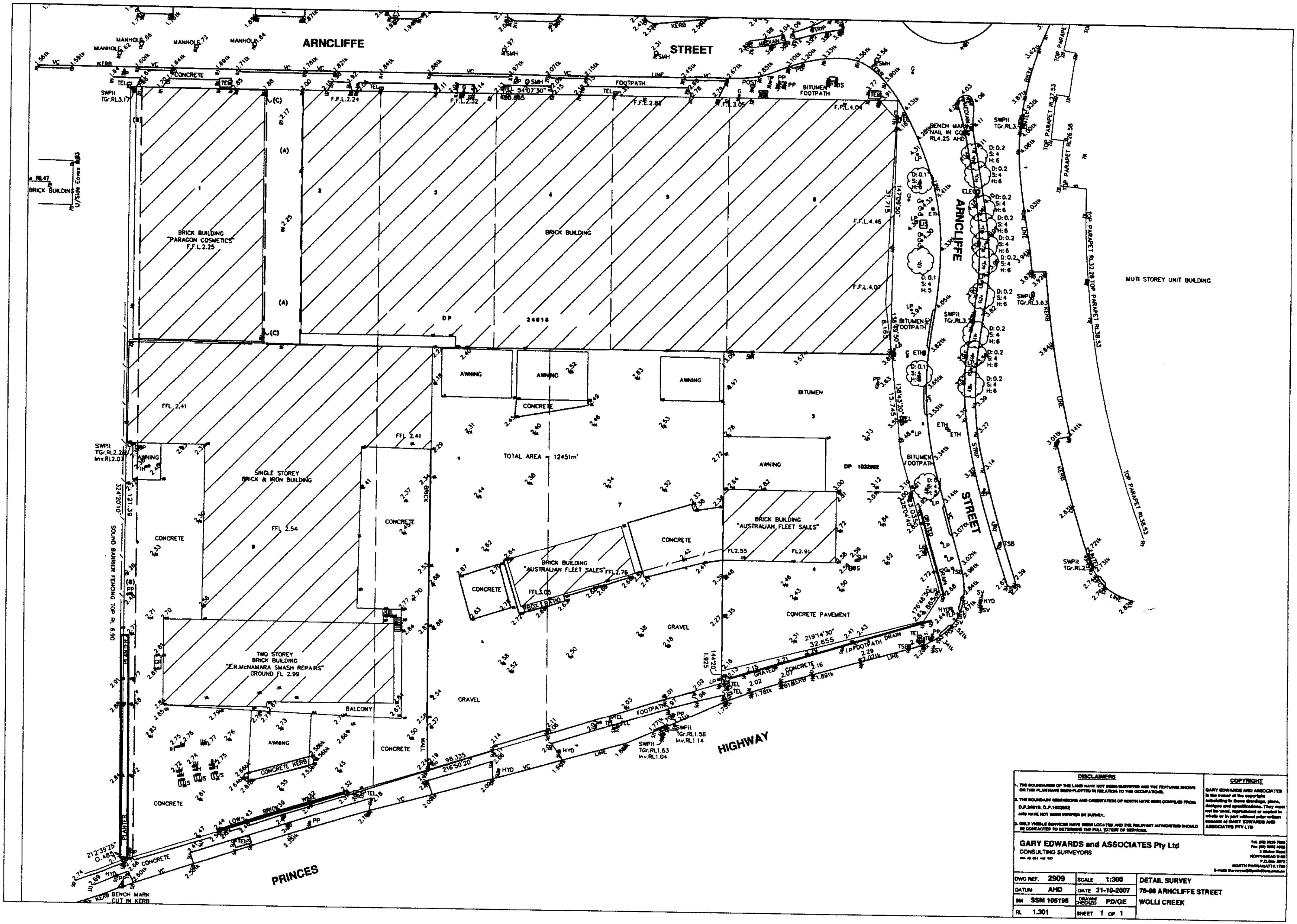
JOB No.	DRAWING No.	ISSUE
07047	DA 02.01	P6



153
154
166
167
172 TOTAL
36
37
55
5400
6600
3200
1500
1400
TEL
NEW LANDSCAPING
NEW DRAINAGE REQUIRED
NEW CONCRETE FOOTPATH
NEW KERBING AND CONCRETE FOOTPATH
NEW DECELERATION LANE "AUTHORITIES TO CONFIRM SIGNAGE REQUIREMENTS"
BOUNDARY
TROLLEY BAY
NEW 6M HIGH PYLON SIGNTYPE SP1

Appendix B

Survey Plan



ARNCLIFFE STREET
PRINCES HIGHWAY
MUTI STOREY UNIT BUILDING
TOP PARAPET RL32.28
TOP PARAPET RL38.53
TOP PARAPET RL26.58
TOP PARAPET RL27.53
BENCH MARK NAIL IN CONC RL4.25 AHD
BRICK BUILDING "PARAGON COSMETICS" F.F.L.2.25
BRICK BUILDING
DP 24818
DP 1032982
TOTAL AREA = 12451m²
SINGLE STOREY BRICK & IRON BUILDING
TWO STOREY BRICK BUILDING "Z.R.McNAMARA SMASH REPAIRS" GROUND FL 2.99
BRICK BUILDING "AUSTRALIAN FLEET SALES"
CONCRETE PAVEMENT
GRAVEL
BITUMEN
AWNING
CONCRETE
BALCONY
BRICK WALL
SOUND BARRIER FENCING TOP RL 6.90
KERB BENCH MARK CUT IN KERB
U/Side Eaves RL

DISCLAIMERS

1. THE BOUNDARIES OF THE LAND HAVE NOT BEEN SURVEYED AND THE FEATURES SHOWN ON THIS PLAN HAVE BEEN PLOTTED IN RELATION TO THE OCCUPATIONS.
2. THE BOUNDARY DIMENSIONS AND ORIENTATION OF NORTH HAVE BEEN COMPILED FROM: D.P.24818, D.P.1032982 AND HAVE NOT BEEN VERIFIED BY SURVEY.
3. ONLY VISIBLE SERVICES HAVE BEEN LOCATED AND THE RELEVANT AUTHORITIES SHOULD BE CONTACTED TO DETERMINE THE FULL EXTENT OF SERVICES.

GARY EDWARDS and ASSOCIATES Pty Ltd
CONSULTING SURVEYORS

DWG REF. 2909	SCALE 1:300	DETAIL SURVEY
DATUM AHD	DATE 31-10-2007	78-96 ARNCLIFFE STREET
BM SSM 105196	DRAWN CHECKED PD/GE	WOLLI CREEK
RL 1.301	SHEET 1 OF 1	

Appendix C

Check List

Checklist 3: Design Stage Audit

	Issue	Yes	No	Comment
3.1	**General topics**			
1.	**Changes since previous audit**			
	Do the conditions for which the scheme was originally designed still apply? (ie no significant changes to the surrounding network or area to be served, traffic mix.)	✓		
	Has the general form of the project design remained unchanged since previous audit (if any)?			NA
2.	**Drainage**			
	Will the scheme drain adequately?	✓		
	Are the road grades and crossfalls adequate for satisfactory drainage?	✓		
	Are flat spots avoided or adequately dealt with at start/end of superelevation?	✓		
	Has the possibility of surface flooding been adequately addressed, including overflow from surrounding or intersecting drains and water courses?	✓		
	Is gully pit spacing adequate to limit flooding?			NA
	Is pit grate design safe for pedal cycles (ie gaps not parallel with wheel tracks)?			NA
	Will footpaths drain adequately?			NA
3.	**Climatic conditions**			
	Has the design taken into account weather records or local experience which may indicate a particular problem (for example, snow, ice, wind, fog)?	✓		
4.	**Landscaping**			
	Will drivers be able to see pedestrians (and visa versa) part or over the landscaping?	✓		
	Will intersection sight lines be maintained past or over the landscaping?	✓		
	Will safety be adequate with seasonal growth (for example, no obscuring of signs, shading or light effects, slippery surface, etc)?	✓		
	Will roadside safety be adequate when trees or plantings mature (no roadside hazard)?	✓		
	Has 'frangible' vegetation been used in possible run-off			NA

	road areas?			
5.	**Services** Does the design adequately deal with buried and overhead services (especially in regard to overhead clearances, etc)?	✓		
	Has the location of fixed objects or furniture associated with services been checked (including any loss of visibility, position of poles, and clearance to overhead wires)?	✓		
6.	**Access to property and developments** Can all accesses be used safely?			SUBJECT OF AUDIT AND CORRECTIVE ACTION REQUEST
	Is the design free of any downstream or upstream effects from points of access, particularly near intersections?	✓		
	Do rest areas and truck parking area have adequate sight distance at access points?			NA
7.	**Emergencies, breakdowns, emergency and service vehicle access** Has provision been made for safe access and movements by emergency vehicles?			NA
	Does the design and positioning of medians and vehicle barriers allow emergency vehicles to stop and turn without unnecessarily disrupting traffic?			NA
	Have broken-down vehicles or stopped emergency vehicles been adequately considered?			NA
	Is provision for emergency telephones satisfactory?			NA
	Are median breaks on divided carriageways safely located (ie frequency, visibility)?			NA
8.	**Future widening and/or realignments** If the scheme is only a stage towards a wider or dual carriageway is the design adequate to impart this message to drivers? (Is the reliance on signs minimal/ appropriate, rather than excessive?)			NA
9.	**Staging of the scheme** If the scheme is to be staged or constructed at different times: - are the construction plans and program arranged to ensure maximum safety? - do the construction plans and program include specific safety measures, signing, adequate transitional geometry, etc for any contemporary arrangements?			NA

10.	**Staging of the works** If the construction is to be split into several subprojects, is the order safe (ie the stages are not constructed in an order that creates unsafe conditions)?			NA
11.	**Adjacent developments** Does the design handle accesses to major adjacent generators of traffic and developments safety?			NA
	Is drivers' perception of the road ahead free of misleading effects of any lighting or traffic signals on an adjacent road?	✓		
	Has the need for screening against glare from lighting off adjacent property been adequately considered?			NA
12.	**Stability of cut and fill** Is the stability of batters satisfactory (for example, no potential for loose material to affect road users)?			NA
13.	**Skid resistance** Has the need for anti-skid surfacing been considered where braking or good road adhesion is most essential (for example, on gradients, curves, approaches to intersection and signals)?			NA
3.2	**Design issues (general)**			
1.	**Geometry of horizontal and vertical alignment** Does the horizontal and vertical design fit together correctly?	✓		
	Is the vertical alignment consistent and appropriate throughout?	✓		
	Is the horizontal alignment consistent throughout?	✓		
	Is the alignment consistent with the function of the road?	✓		
	Is the design free of misleading visual cues (for example, visual illusions, subliminal delineation like lines of poles)?	✓		
2.	**Typical cross sections** Are lane widths, shoulders, medians and other cross section features adequate for the function of the road?	✓		
	Is the width of traffic lanes and carriageways suitable in relation to: - alignment? - traffic volume? - vehicle dimensions? - the speed environment?	✓		

- Combinations of speed and traffic volume?			

	Are the shoulder widths adequate for stationary vehicles and errant vehicles?			NA
	Are median widths adequate for road furniture?			NA
	Is superelevation consistent with the road environment?			NA
	Are the shoulder crossfalls safe for vehicles to traverse?			NA
	Are better slopes drivable for cars, trucks?			NA
	Are side slopes under structures appropriate?			NA
	Have adequate facilities been provided for pedestrians and cyclists?			NA
3.	**Effect of cross sectional variation**			
	Is the design free of undesirable variations to cross section design?			NA
	Are crossfalls safe (particularly where sections of existing highway have been used, there have been compromises to accommodate accesses, at narrowings at bridges, etc)?			NA
	Are any curves with adverse crossfall within appropriate limits?			NA
	I superelevation provided and sufficient at all locations where required?			NA
4.	**Roadway layout**			
	Are all traffic management features designed to avoid creating unsafe conditions?			NA
	Is the layout of road markings and reflective materials able to deal satisfactorily with changes in alignment (particularly where the alignment may be substandard)?			NA
	Is there adequate provision for overtaking?			NA
	Are overtaking lanes provided where required and safely commenced and ended?			NA
	Is the design free of sunrise/sunset problems?			NA
	Have public transport requirements been adequately catered for?			NA
5.	**Shoulders and edge treatment**			
	Are the following safety aspects of shoulder provision satisfactory: - provision of sealed or unsealed shoulders			NA

	- width and treatment on embankments - cross fall of shoulders.			NA
	Are the shoulders likely to be safe if used by slow-moving vehicles or cyclists?			NA
6.	**Effect of departures from standards or guidelines** Any approved departures from standards or guidelines; is safety maintained?			SUBJECT OF AUDIT
	Any hitherto undetected departures from standards; is safety maintained?			SUBJECT OF AUDIT
7.	**Visibility and sight distances** Are horizontal and vertical alignments consistent with visibility requirements?	✓		
	Has an appropriate design speed been selected for visibility requirements?	✓		
8.	**Environmental treatments** Has safety been considered in the location of environmental features (for example, noise fences)?			NA
3.3	**Alignment details**			
1.	**Visibility: sight distance** Are horizontal and vertical alignments consistent with the visibility requirements?	✓		
	Is the design free of sight line obstructions due to safety fences or barriers? - boundary fences? - street furniture? - parking facilities? - Signs? - Landscaping? - Bridge abutments? - Parked vehicles in laybys or at the kerb? - Queued traffic?	✓		
	Are railway crossings, bridges and other hazards all conspicuous?	✓		
	Is the design free of any other local features which may affect visibility?	✓		
	Is the design free of overhead obstructions (for example, road or rail overpasses, sign gantries, overhanging trees) which may limit sight distance at sag curves?	✓		
	Has a clear headroom or a high vehicle detour been provided where necessary?			NA

	Is visibility adequate at: - any pedestrian, bicycle or cattle crossings? - access roads, driveways, on and off ramps, etc?			NA
	Has the minimum sight triangle been provided at: - entry and exit ramps? - Gore areas? - Intersections? - Roundabouts? - Other conflict points?	✓		
2.	**New/existing road interface** Have implications for safety at the interface been considered?			SUBJECT OF AUDIT
	Is the transition from old road to the new scheme satisfactory?			NA
	If the existing road is of a lower standard than the new scheme, is there clear and unambiguous warning of the reduction in standard?			NA
	Have the appropriate provisions for safety been made where sudden changes in speed are required?			NA
	Is access or side friction handled safely?			NA
	Does the interface occur well away from any hazard? (for example, a crest, a bend, a roadside hazard or where poor visibility/distractions may occur)	✓		
	If carriageway standards differ, is the change effected safely?			NA
	Is the transition where the road environment changes (for example, urban to rural; restricted to unrestricted; lit to unlit) done safely)?			NA
	Has the need for advance warning been considered?			NA
3.	**'Readability' of the alignment by drivers** Will the general layout, function and broad features be recognised by drivers in sufficient time?			NA
	Will approach speeds be suitable and will drivers correctly track through the scheme?			NA
4.	**Detail of geometric design** Are the design standards appropriate for all the requirements of the scheme?			SUBJECT OF AUDIT
	Is consistency of general standards and guidelines, such as lane widths and cross falls, maintained?			SUBJECT OF AUDIT
5.	**Treatment at bridges and culverts** Is the geometric transition from the standard cross			NA

section to that on the bridge handled safely?			
3.4 Intersections			
1. Visibility to and visibility at intersections Are horizontal and vertical alignments at the intersection or on the approaches to the intersection consistent with the visibility requirements?			NA
Is the standard adopted for provision of visibility appropriate for the speed of traffic and for any unusual traffic mix?			NA
Will the design be free of sight line obstructions due to: - safety fences or barriers? - boundary fences? - street furniture? - parking facilities? - signs? - landscaping - bridge abutments? - parked vehicles in laybys and at the kerb? - queued traffic?	✓		
Are the railway crossings, bridges and other hazards all conspicuous?			NA
Is the design free of any other local features which may affect visibility?	✓		
2. Layout Are intersections and accesses adequate for all vehicular movements?			SUBJECT OF AUDIT
Have the appropriate design vehicle and check vehicle been used for turning dimensions?	✓		
Are swept paths accommodated for all likely vehicles types? (Has the appropriate design vehicle been used?)	✓		
Are the intersections fee of any unusual features which could affect road safety?	✓		
Are the pedestrian fences provided where needed (for example, to guide pedestrians or discourage parking)?			NA
Has pavement anti-skid treatment been provided where needed?			NA
Have islands and signs been provided where required?			NA
Vehicles which may park at or close to the intersection, can they do this safely or does this activity need to be relocated?			NA
Are safety hazards due to parked vehicles avoided?			NA

3.	**Readability by drivers**			
	Will the existence of the intersection and its general layout, function and broad features be perceived correctly and in adequate time?			NA
	Are the approach speeds and likely positions of vehicles tracking through the intersection safe?			NA
	Is the design free of misleading elements?			SUBJECT OF AUDIT
	Is the design free of sunrise or sunset problems which may create a hazard for motorists?			NA
4.	**Detailed geometric design**			
	Can the layout safely handle unusual traffic mixes or circumstances?			NA
	Does any median or any island safely account for: - vehicle alignments and paths? - future traffic signals? - pedestrian storage space and surface? - turning path clearance? - stopping sight distance to the nose? - mountability by errant vehicles?			NA
	Is adequate vertical clearance to structures provided (for example, powerlines, shop awnings)?			NA
	Is the signal phasing/sequence safe?			NA
	Is adequate time provided for traffic movements and pedestrian movements?			NA
	Will the signal lanterns be visible (for example, not obstructed by trees, poles, signs or large vehicles)?			NA
	Are lanterns for other approach directions adequately shielded from view?			NA
	Are high-intensity signals and/or target boards provided if likely to be affected by sunrise/sunset?			NA
	Does the vertical alignment provide satisfactory stopping sight distance to the intersections or back of queue?			NA
	Are pedestrian facilities provided where they are required?			NA
	Will approaching drivers be able to see pedestrians?	✓		
	Are partially or fully controlled turning phases required and provided?			NA
	Are signal posts located where they are not an undue hazard?			NA
	Are road markings for turning traffic satisfactory?			NA

Have adequate pedestrian phases been provided?			NA
6. Roundabouts			
Is adequate deflection provided to reduce approach speeds?			NA
If splitter islands are needed, are they adequate for sight distance, length, pedestrian storage, etc?			"
Is the central island prominent?			"
Can the appropriate design vehicle and check vehicle be accommodated?			"
Are the central island details satisfactory (delineation, mountability, conspicuousness)?			"
Can pedestrians be seen by drivers in sufficient time?			"
Can pedestrians determine whether vehicles are turning (no obstructions to sight lines)?			"
Are direction marking required in approach lines?			"
Is the lighting adequate?			"
7. Other intersections			
Has the need for kerbed or painted islands and refuges been considered?			NA
Do intersections have adequate queue length/storage for turning movements (including in the centre of a staggered intersection)?			"
3.5 Special road users			
1. Adjacent land			
Are all accesses to and from adjacent land/properties safe?			NA
Have the special needs of agriculture and stock movements been considered?			"
2. Pedestrians			
Can pedestrian cross safety at: - intersections? - signalised and pedestrian crossings? - refuges? - kerb extensions? - bridges and culverts? - other locations?			NA
Is each crossing point satisfactory for: - visibility, for each direction?			NA

- use by the disabled? - use by the elderly? - use by children/schools?			"
Is pedestrian fencing on reservations and medians required and provided for each crossing?			"
Is fencing adequate on freeways?			"
Are pedestrians deterred from crossing roads at unsafe locations?			"
Are pedestrian related signs appropriate and adequate?			"
Is width and gradient of pedestrian paths, crossings, etc satisfactory?			"
Is surfacing of pedestrian paths, crossings, etc satisfactory?			"
Have dropped kerbs been provided for each crossing?			"
Have channels and gullies been avoided at each crossing?			"
Is lighting satisfactory for each crossing?			"
Are crossings sited to provide maximum use?			"
Is avoidance of a crossing unlikely (for example, by more direct but less safe alternative)?			"
3. Cyclists Have the needs of cyclists been considered: - at intersections (particularly roundabouts)? - especially on higher speed roads? - on cycle routes and crossings? - at freeway entry and exit ramps?			NA
Are shared cycleway/footway facilities (including subways and bridges) safe and adequately signed?			"
4. Motorcyclists Has the location of devices or objects that might destabilise a motorcycle been avoided on the road surface?			NA
Is the roadside clear of obstructions where motorcyclists may lean into curve?			"
Will warning or delineation be adequate for motorcyclists?			"
Has barrier kerb been avoided in high-speed areas?			"
In areas more likely to have motorcycles run off the road is the roadside forgiving or safely yielded?	N/A		"

	Are all poles, posts and devices necessary? (If so, is shielding an option?)			"
	Are drainage pits and culverts traversable by motorcycle?			"
5.	**Equestrians and stock**			
	Have the needs of equestrians been considered, including the use of verges or shoulders and rules regarding the use of the carriageway?			NA
	Can underpass facilities be used by equestrians/stock?			"
6.	**Freight**			
	Have the needs of truck drivers been considered, including turning radii and lane widths?	✓		
	Have the needs of freight transport been considered, adequately signed and catered for?	✓		
7.	**Public Transport**			
	Have the needs for public transport been considered, adequately signed and catered for?			NA
	Have the needs of public transport users been considered?			"
	Have the manoeuvring needs of public transport vehicles been considered?			"
	Are bus stops well positioned for safety?			"
8.	**Road maintenance vehicles**			
	Have the needs of road maintenance vehicles been considered, adequately signed and catered for?			NA
	Can maintenance vehicles be safely located?			"
3.6	**Lighting, signs and delineation**			
1.	**Lighting**			NA
	Lighting required and, if so, has it been adequately provided?			
	Is the design free of features which interrupt illumination (for example, trees or overbridges)?			"
	Do any lighting poles present a fixed roadside hazard?			"
	Are frangible or slip-base poles to be provided?			"
	Ambient lighting; if it creates special lighting needs, have these been satisfied?			"

Is the lighting scheme free of confusing or misleading effects on signals or signs?			"
Does the lighting adequately illuminate crossings, nearby paths, refuges etc?			"
Are all merge areas adequately illuminated?			"
Is the scheme free of any lighting black patches?			"
If there are locations with accident problems that are known to be amenable to treatment with improved lighting, has this lighting been provided?			"
2. Signs Are signs appropriate for their location?		✓	
Are signs located where they can be seen and read in adequate time?			N/A
Will signs be readily understood?			"
Are signs appropriate to the driver's needs (for example, direction signs, advisory speed signs, etc)?			"
Are signs located so that drivers' sight distance is maintained?			"
Are signs located so that visibility is maintained: - to/from accesses and intersecting roads? - to/from pedestrians and important features on the road?			"
Have the consequence of vehicles striking signposts been considered?			"
Are sign supports out of the clear zone?			"
If not, are they - frangible - shielded by barriers (for example, guard fence, crash cushions)?			"
Has an over-reliance on signs (in lieu of adequate geometric design) been avoided?			"
Are signs on the new scheme consistent with those on the adjoining section of road (or will the previous signs need to be upgraded)?			"
3. Marking and delineation Are markings (lines, arrows, etc) consistent with standard markings?		✓	
Have any locations where standard markings might be confusing or misread been identified and treated in a way which considers users' likely responses?			N/A

Are Raised Retroreflective Pavement Markers (RRPMs) provided where necessary			"
Are curve warning signs, advisory speed plates or chevron alignment markers provided where required?			"
Are markings on the new scheme consistent with those on the adjoining section of road (or will the previous markings need to be upgraded)?			"
Are diagonal markings or chevrons painted where required?			"
Will markings and delineation be visible at nighttime?			"
Will markings and delineation be visible in wet weather?			"
Has the need for profiled (audible) linemarking been considered?			"
Have both high and low-beam cases been considered?			"
Are guide posts of the frangible type?			"
3.7 Physical objects			
1. Median barriers			
Have median barriers been considered and properly detailed?			NA
Have all design features that require special attention (for example, end treatments) been considered?			"
2. Poles and other obstructions			
Are all poles located well away from moving traffic?			NA
Have frangible or breakaway poles been included where required?			"
Are median widths adequate to accommodate lighting poles or trees?			"
Is position of traffic signal controllers and other service apparatus satisfactory?			"
Is the roadside clear of any other obstructions that may create a safety hazard?			"
Have all necessary measures been taken to remove, relocate or shield all hazards?			"
Can roadside drains and channels be safely traversed by any vehicle that runs off the road?			"
3. Crash barriers			

Are crash barriers provided where necessary and properly detailed (for example, at embankments, structures, trees, poles, drainage channels, bridge piers, gore areas)?			NA
Is the crash barrier safe (ie unlikely to create a danger for road users including pedestrians, cyclists, motorcyclists etc)?			"
Are the end conditions of the crash barrier safe and satisfactory?			"
Is the guard fence designed according to standard for: - end treatments? - anchorages? - post spacing? - block outs? - post depth? - rail overlap? - stiffening at rigid obstacles?			"
Is all guard fence necessary (ie what it shields is a greater hazard than the fence)?			"
Where pedestrians and cyclists travel behind guard fence, is the rear of the fence safe for them?			"
4. Bridges, culverts and causeways/floodways Are bridge barriers and culvert end walls safe regarding: - visibility? - easy of recognition? - proximity to moving? - the possibility of causing injury or damage? - collapsible or frangible ends? - signs and markings? - connection of crash barriers? - roadside hazard protection?			NA
Is the bridge railing at the correct level and strong enough?			"
Is the shoulder width on the bridge the same as on the adjacent road lengths?			"
Is safe provision made for non-vehicular traffic over structures? (for example, pedestrians, pedal cycles, horses/stock etc)			"
Are all culvert end walls (including driveway culverts) drivable or outside the clear zone)?			"
Have causeways/floodways etc been given correct signing and adequate sight distance?			"
3.8 Additional questions to be considered for			

	development proposals			
1.	**Horizontal alignment**			
	Is visibility adequate for drivers and pedestrians at proposed accesses?	✓		
	Is adequate turning space provided for the volume and speed of traffic?	✓		
	Are curve radii and forward visibility satisfactory?	✓		
	Are sight and stopping distances adequate?	✓		
2.	**Vertical alignment**			
	Are gradients satisfactory?			NA
	Are sight and stopping distances adequate?			"
3.	**Parking provision**			
	Is on-site parking adequate to avoid on-street parking and associated risks?			NA
	Are parking areas conveniently located?			"
	Is adequate space provided in parking areas for circulation and intersection sight distance?			"
4.	**Servicing facilities**			
	Are off-street loading/unloading areas adequate?			NA
	Are turning facilities for large vehicles provided in safe locations?			"
	Is emergency vehicle access adequate?			"
5.	**Signs and markings**			
	Have necessary traffic signals and roadmarkings been provided as part of a development?			NA
	Is priority clearly defined at all the intersection points within the carpark and access routes?		✓	
	Will the signs and markings be clear in all conditions, including day/night, rain, fog, etc?			N/A
6.	**Landscaping**			
	Does landscaping maintain visibility at intersections, bends, accesses and pedestrian locations?			NA
	Has tree planting been avoided where vehicles are likely to run off the road?			"
7.	**Traffic management**			

Have any adverse area-wide effects been addressed?			NA
Will the design keep travel speeds at a safe level?	✓		
Are the number and location of accesses appropriate?			SUBJECT OF AUDIT
Are the facilities for public transport services safely located?			NA
Are any bicycle facilities safely located in respect of vehicular movements?			"
Are pedestrian facilities adequate and safely located?			"
8. Other Has appropriate street lighting been provided?			NA
Are all roadside hazards appropriately dealt with?			"
Has safe pedestrian access to the development been provided?			"
3.9 Any other matter **1. Safety aspects not already covered** Will there be special events? Have any consequent unusual or hazardous conditions been considered?			NA
Is the road able to safely handle oversize vehicles, or large vehicles like trucks, buses, emergency vehicles, road maintenance vehicles?			"
If required, can the road be closed for special events in a safe manner?			"
If applicable, are special requirements of scenic or tourist routes satisfied?			"

Appendix D

Corrective Action Request Forms

ROAD SAFETY AUDIT
Corrective Action Request № 1

PROJECT:	**Audit Stage:** Three
Proposed Supermarket access Princes Highway, Wolli Creek	**Audit Date :** Sept 2010

PROJECT MANAGER AND AUDITOR:
Andrew Morse (Principal Auditor)

ROAD SAFETY DEFICIENCY:	Preliminary Risk Assessment
Proposed left-turn lane does not maintain sufficient footway width (3.5m).	☒ High ☐ Moderate ☐ Low
SIGNATURE: (Lead Road Safety Auditor)	

ACTION ON DEFICIENCY

Corrective Action: X ☐ **Accept** ☐ **Reject**

Details of Corrective Action:
Proposed modification of left-turn lane (see attached letter)

Signature ..... Date .....
(Project Manager)

CLIENT REPRESENTATIVE CONCURRENCE:

Signature ..... Date .....

ADMINISTRATION
Follow-Up And Close Out

Correction Action Accepted ☐ Yes ☐ No ☐ Na
Reason For No Action Accepted ☐ Yes ☐ No

Proposed Follow-Up Date .....
Follow-Up Action
Car Close Out:
Signature ..... Date .....
(Operations and Service Road Safety)

ROAD SAFETY AUDIT
Corrective Action Request № 2

PROJECT: Proposed Supermarket access Princes Highway, Wolli Creek	**Audit Stage:** Three **Audit Date :** Sept 2010

PROJECT MANAGER AND AUDITOR:
Andrew Morse (Principal Auditor)

ROAD SAFETY DEFICIENCY: Proposed left-turn lane does not havea any roadmarking.	Preliminary Risk Assessment ☒ High ☐ Moderate ☐ Low
SIGNATURE: (Lead Road Safety Auditor)	

ACTION ON DEFICIENCY

Corrective Action: X ☐ **Accept** ☐ **Reject**

Details of Corrective Action:
Proposed modification of left-turn lane (see attached letter)

Signature ..... Date .....
(Project Manager)

CLIENT REPRESENTATIVE CONCURRENCE:

Signature ..... Date .....

ADMINISTRATION
Follow-Up And Close Out

Correction Action Accepted ☐ Yes ☐ No ☐ Na
Reason For No Action Accepted ☐ Yes ☐ No

Proposed Follow-Up Date .....
Follow-Up Action
Car Close Out:
Signature ..... Date .....
(Operations and Service Road Safety)

ROAD SAFETY AUDIT
Corrective Action Request № 3

PROJECT: Proposed Supermarket access Princes Highway, Wolli Creek	**Audit Stage:** Three **Audit Date :** Sept 2010

PROJECT MANAGER AND AUDITOR:
Andrew Morse (Principal Auditor)

ROAD SAFETY DEFICIENCY: Proposed left turn lane has a marked footcrossing	Preliminary Risk Assessment ☒ High ☐ Moderate ☐ Low
SIGNATURE: (Lead Road Safety Auditor)	

ACTION ON DEFICIENCY

Corrective Action: X ☐ **Accept** ☐ **Reject**

Details of Corrective Action:
Proposed modification of left-turn lane (see attached letter)

Signature ..... Date .....
(Project Manager)

CLIENT REPRESENTATIVE CONCURRENCE:

Signature ..... Date .....

ADMINISTRATION
Follow-Up And Close Out

Correction Action Accepted ☐ ✓Yes ☐ No ☐ Na
Reason For No Action Accepted ☐ Yes ☐ No

Proposed Follow-Up Date .....
Follow-Up Action
Car Close Out:
Signature ..... Date .....
(Operations and Service Road Safety)

ROAD SAFETY AUDIT
Corrective Action Request № 4

PROJECT:	**Audit Stage:** Three
Proposed Supermarket access Princes Highway, Wolli Creek	**Audit Date :** Sept 2010

PROJECT MANAGER AND AUDITOR:
Andrew Morse (Principal Auditor)

ROAD SAFETY DEFICIENCY:	Preliminary Risk Assessment
Proposed access does not have any priority signage or directional signage.	☒ High ☐ Moderate ☐ Low
SIGNATURE: (Lead Road Safety Auditor)	

ACTION ON DEFICIENCY

Corrective Action: X ☐ **Accept** ☐ **Reject**

Details of Corrective Action:
Proposed modification of left-turn lane (see attached letter)

Signature ..... Date .....
(Project Manager)

CLIENT REPRESENTATIVE CONCURRENCE:

Signature ..... Date .....

ADMINISTRATION
Follow-Up And Close Out

Correction Action Accepted ☐ ✓Yes ☐ No ☐ Na
Reason For No Action Accepted ☐ Yes ☐ No

Proposed Follow-Up Date .....
Follow-Up Action
Car Close Out:
Signature ..... Date .....
(Operations and Service Road Safety)