SINSW Centre Of Excellence (Richmond)

Road Safety Audit

Detailed Design Stage

15th October 2021

JN22024_Report01 Rev01 - TTW Richmond COE

On Behalf of

Taylor Thomson Whitting

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NSW RSA Register Details

Final Signoff Date	TBC
Title of Audit	SINSW Centre Of Excellence (Richmond)
Location of Audit	Richmond
Project Description *(max 300 char)*	The aim of this project is to design and construct a new Centre of Excellence in Agriculture Education at the Western Sydney University Hawkesbury campus in Richmond
Purpose of Audit *(max 300 char)*	The aim of this Road Safety Audit is to assess the detailed design plans of upgrades to existing infrastructure including Vines Drive from Londonderry Rd to Maintenance Ln, intersections, drop-off/pick-up facilities and footpaths
State of Audit	NSW
Stage of Audit	Detailed Design Stage
Client Company	Taylor Thomson Whitting
Client Contact	Michael Babbage
Client Phone	02 9439 7288
Client Email	Michael.Babbage@ttw.com.au
Audit Team Lead	Aaron Walton
Audit Team Member	Mark Keech

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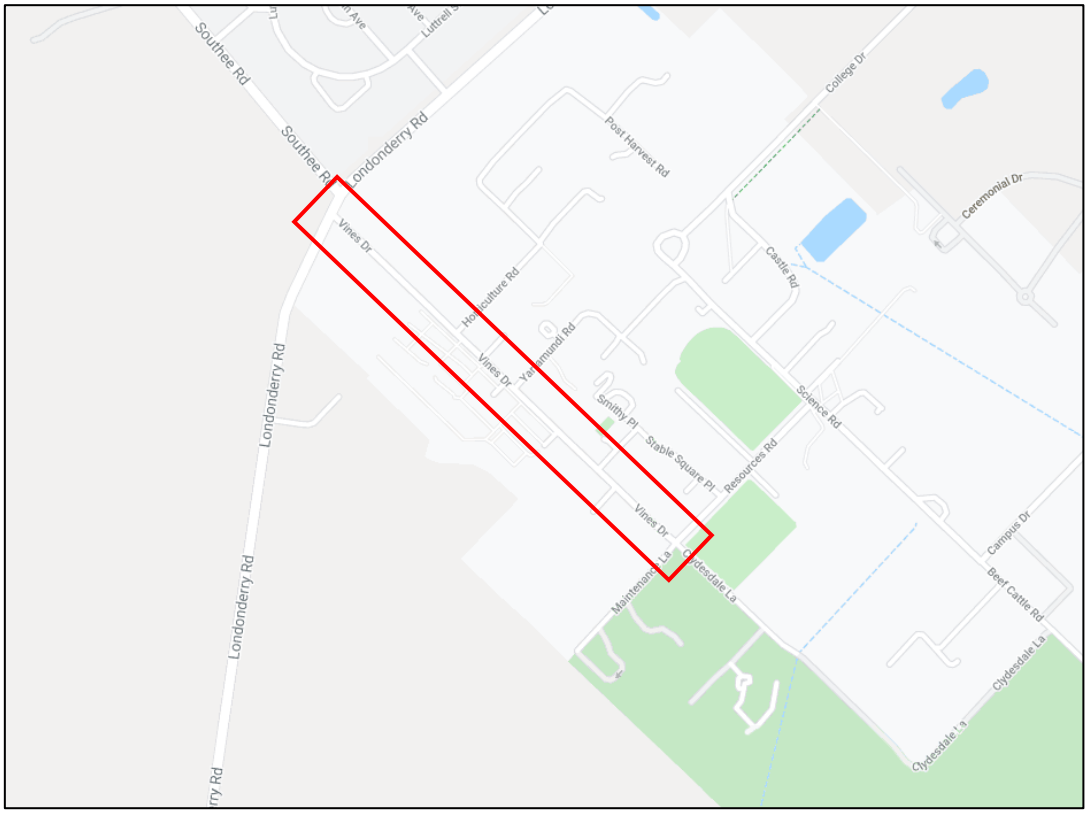
1 Project Description

The aim of this project is to design and construct a new Centre of Excellence in Agriculture Education at the Western Sydney University Hawkesbury campus in Richmond. Works are to include the upgrade of Vines Road, intersection improvements at Londonderry Road and Maintenance Lane, retaining walls, safety barrier, bus bays, pedestrian crossings, signs and linemarking.

The aim of this Road Safety Audit (RSA) is to assess the detailed design plans of upgrades to existing infrastructure including Vines Drive from Londonderry Rd to Maintenance Ln, intersections, drop-off/pick-up facilities and footpaths, in the context of the existing conditions, and the interface between existing and proposed works.

2 Study Area

The general audit location is shown below.



Source – snazzymaps.com

3 Auditable Data

The following data was referenced during the audit:

> SINSW Centre of Excellence (Richmond) (Rev P1 – 08/10/2021)
  - C10-P1, C31-P1, C32-P1, C33-P1, C41-P1, SK11-P1, SK12-P1, SK14-P1, SK15-P1

4 Audit Stage

A Detailed Design Stage Audit was carried out on the 11th of October 2021 including a desktop assessment of the auditable data and a site visit of proposed works during day and night conditions. At the time of the site visit the weather was raining and traffic was light.

The audit was generally undertaken in accordance with 'TfNSW Guidelines for Road Safety Audit Practices (2011)' and 'Austroads: Guide to Road Safety Part 6 and Part 6a (2019)'.

5 Exclusions

At the time of the audit there were no exclusions presented to the audit team.

6 Audit Team

The audit team and client details are shown below.

Table 6-1 Audit Team & Client Details

Role	Name	
Client (Sponsor)	Taylor Thomson Whitting	
Client Contact	Michael Babbage	Associate (Traffic)
Client Email	Michael.Babbage@ttw.com.au	
Lead Auditor	Aaron Walton	RSA-02-0501 - Level 3 Auditor
Lead Auditor Email	admin@amwc-rsa.com	
Team member	Mark Keech	RSA-02-0124 - Level 3 Auditor

7 Audit Program

The audit program details are shown below.

Table 7-1 Audit Program

Activity	**Date**	**Attendees**
Opening Meeting	06/10/2021	Aaron Walton, Michael Babbage
Site Inspection	11/10/2021	Aaron Walton, Mark Keech
Draft Report Internal Review	14/10/2021	RSA Report (Rev00)
Draft Report External Responses	15/10/2021	RSA Report (Rev01)
Completion Meeting	TBC	Aaron Walton, Michael Babbage
Final Report	TBC	RSA Report (Rev02)

8 Audit Risk Assessment Technique

For each of the safety issues identified, the level of risk with each has been determined. The tables below are extracted from Austroads: Guide to Road Safety Part 6 and Part 6a (2019) and have been used in the assessment of risk for this audit.

Table 8-1 Incident Frequency

Frequency	Description
Frequent	Once or more per week
Probable	Once or more per year
Occasional	Once every five or ten years
Improbable	Less often than once every ten years

Table 8-2 Incident Severity

Severity	Description	Examples
Catastrophic	Likely multiple deaths	> High-speed, multi-vehicle crash on freeway. > Car runs into crowded bus stop. > Bus and petrol tanker collide. > Collapse of bridge or tunnel.
Serious	Likely death or serious injury	> High or medium-speed vehicle/vehicle collision. > High or medium-speed collision with a fixed roadside object. > Pedestrian or cyclist struck by a car.
Minor	Likely minor injury	> Some low-speed vehicle collisions. > Cyclist falls from bicycle at low speed. > Left-turn rear-end crash in a slip lane.
Limited	Likely trivial injury or property damage only	> Some low-speed vehicle collisions. > Pedestrian walks into object (no head injury). > Car reverses into post.

Table 8-3 Resulting Level of Risk Matrix

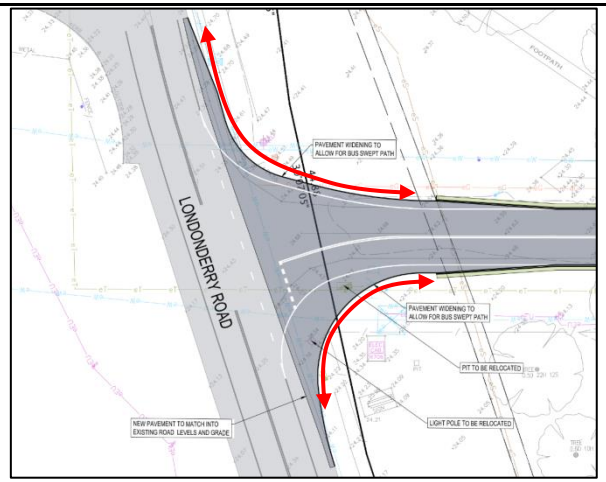
	Frequent	Probable	Occasional	Improbable
Catastrophic	Intolerable	Intolerable	Intolerable	High
Serious	Intolerable	Intolerable	High	Medium
Minor	Intolerable	High	Medium	Low
Limited	High	Medium	Low	Low

9 Audit Findings

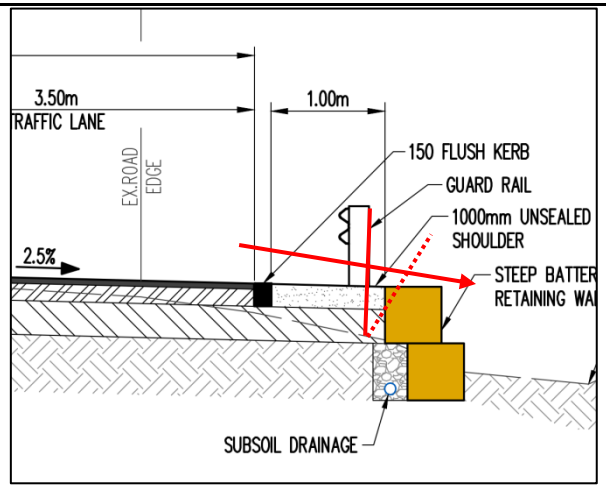
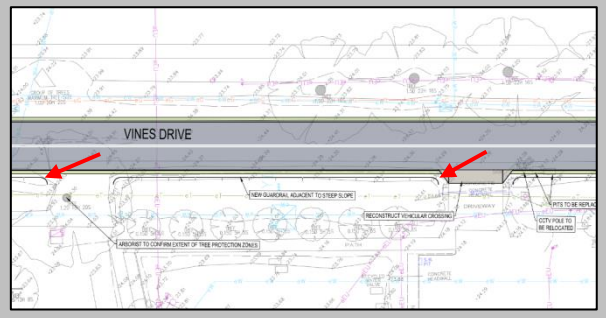
Table 9-1 Audit Findings

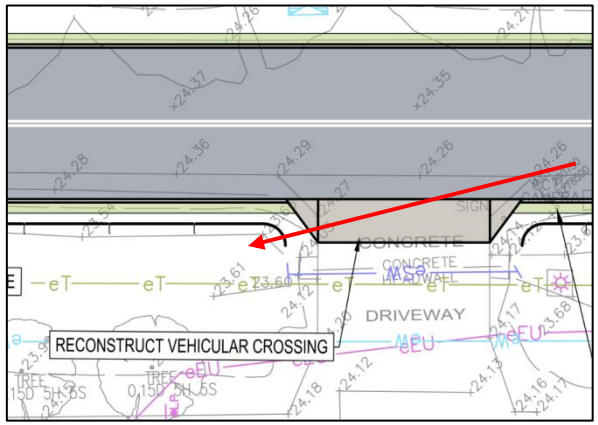
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
1. Intersection Delineation Londonderry Road	There is no delineation on the terminating leg of the T-intersection. There is a risk at night or during adverse weather that a motorist may not sight the intersection point and approach the intersection at high speed (accelerating after exiting the 40 zone) with insufficient time to decelerate to a stop before entering the through lane resulting in side impact collisions from through vehicles. 	Improbable	Minor	Medium	Signage and line marking plan to be developed for this area, including retro-reflective pavement markers (RRPMs), T-intersection advance warning signage, and T-intersection terminating signage (<<< >>>).
2. Drainage Londonderry Road	The proposed widening works at the Londonderry Road intersection creates a road formation cut profile and no drainage infrastructure is proposed. There is a risk that water may pond into the through travel lanes of a 60 km/h zone resulting in aquaplaning incidents. There is a risk that ponding water may damage the pavement surface creating vehicle/motorcycle destabilisation incidents resulting in run-off-road or head-on collisions, particularly when negotiating a corner. There is a risk that water flows may erode the edge of the pavement creating a vertical drop that may	Probable	Serious	Intolerable	Existing blocked pipe to be replaced and improved as part of intersection works which should reduce ponding. A drainage channel to bring water off the roadway will also be considered in the detailed design. Pavement and/or kerb design to be reviewed to avoid erosion.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	snag an errant vehicle resulting in vehicle roll incidents.  				

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
					
3. Overhanging Branches Extent of Works	There are low and overhanging branches throughout the extent of works. There is a risk that a branch may fall on a vehicle or fall into the travel lane and be impacted by a vehicle resulting in injury to vehicle occupants. There is a risk that a vehicle may impact overhanging branches causing them to fall onto the vehicle or into the travel lane and be impacted by another vehicle resulting in injury to vehicle occupants.	Improbable	Minor	Medium	Height clearances and tree conditions under review with arborist, it is anticipated that pruning will be required to various trees. Some residual overhang of trees is expected as part of the urban design of the space and to retain tree canopy coverage of the area. Ongoing review and maintenance may be required by WSU.

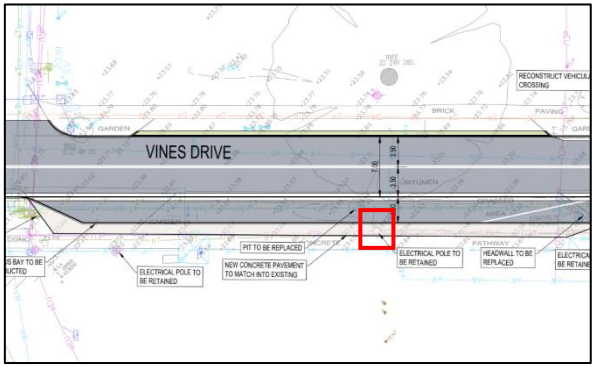
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	 				
4. Barrier Post Support Extent of Works	There is insufficient support provided behind the barrier post. There is a risk that an errant vehicle may not be contained by the barrier resulting in a vehicle reaching a hazard, snag/roll incidents and injury to occupants.	Improbable	Serious	Medium	Road sections will be designed to provide the required support distance behind guard rails; design to manufacturer requirements once a barrier product is selected.

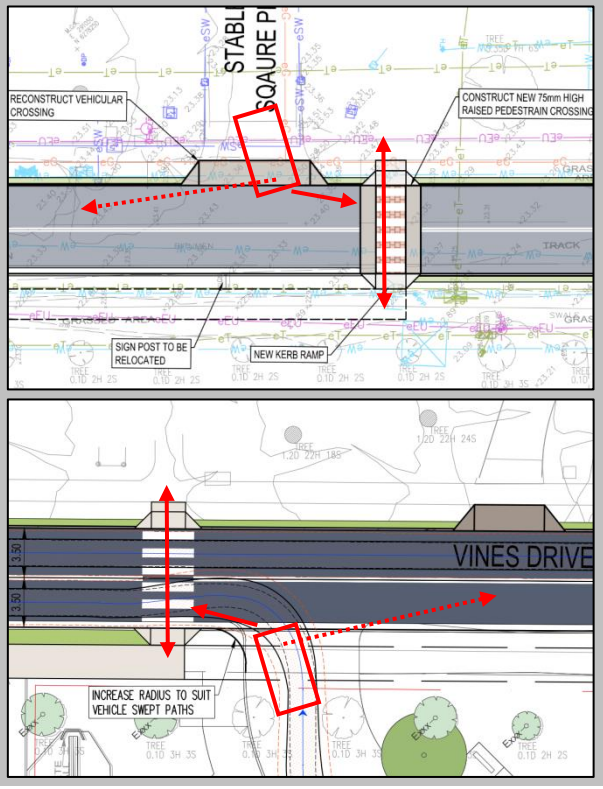
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
					
5. Barrier Terminals Extent of Works	There are no barrier terminals provided. There is a risk that an errant vehicle may impact the exposed end of a barrier rail resulting in spearing of a barrier rail into a vehicle cabin and vehicle occupant. 	Probable	Serious	Intolerable	Terminal treatments to be provided; consider replacing barriers with a suitable swale/runoff treatment where appropriate.
6. Barrier Extents Extent of Works	It is unclear to the audit team if the barrier point of need is met, particularly where short breaks are provided in the barrier system. There is no hazard free zone provided at barrier end points.	Occasional	Minor	Medium	Swale area to be reviewed to remove points of need and delete barrier where possible.

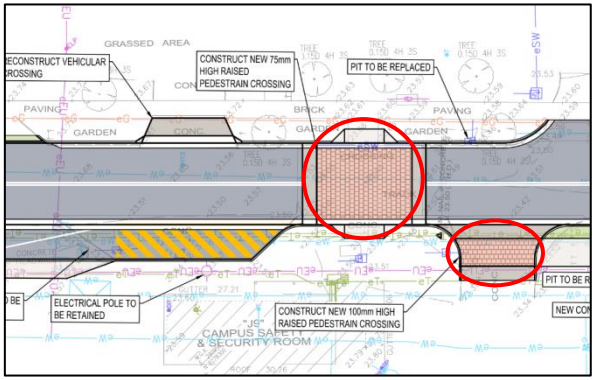
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	There is a risk that an errant vehicle may impact a hazard behind a barrier end resulting in injury to vehicle occupants. 				
7. Large Rocks Extent of Works	There are large rocks adjacent to the travel lane throughout the extent of works. There is a risk that an errant vehicle may impact a non-frangible hazard resulting in vehicle damage or injury to vehicle occupants. 	Occasional	Minor	Medium	To be reviewed with WSU and deleted where possible.
8. Intersection Controls Extent of Works	The existing line marking and signage at intersection points is faded/damaged, particularly Horticulture Road. It is unclear to the audit team on the requirement to replace an intersection control with a vehicle crossing, tying into an existing road and leaving part of the intersection control signage and line marking in place.	Probable	Minor	High	All new signs and line marking to new work.

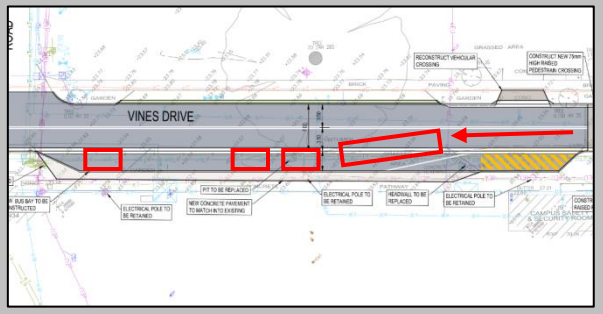
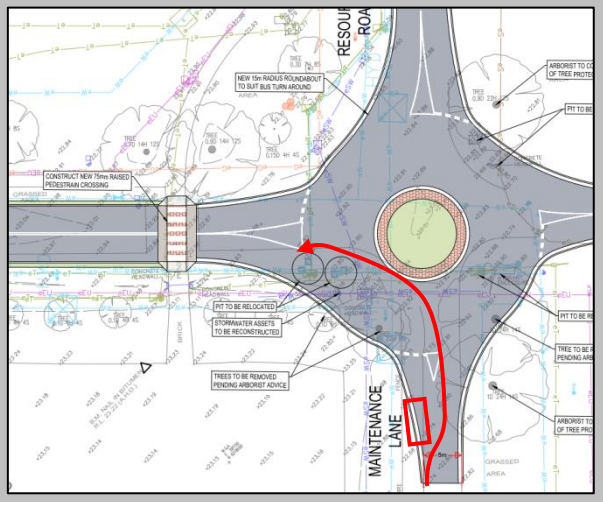
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	Incomplete arrangements may increase driver confusion. There is a risk at night or during adverse weather that a motorist may not sight the intersection point and approach the intersection with insufficient time to decelerate to a stop before entering the through lane resulting in side impact collisions from through vehicles.  				
9. Ponding water Extent of works	On site it was observed that pavement water was ponding against raised pedestrian crossings, against the raised grassed verge, at blocked drains and at pavement depressions throughout the site. Specific locations include Vines Drive at Yarramundi Road and side road opposite Yarramundi Road.	Occasional	Minor	Medium	Stormwater strategy to be finalised in detailed design.

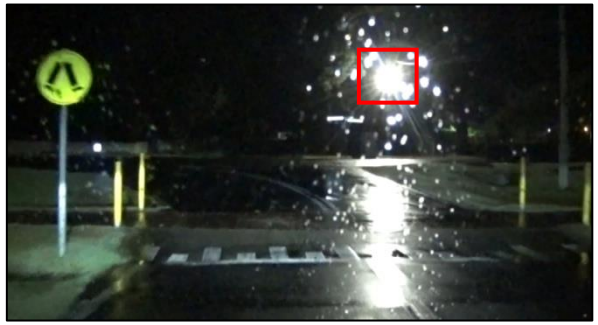
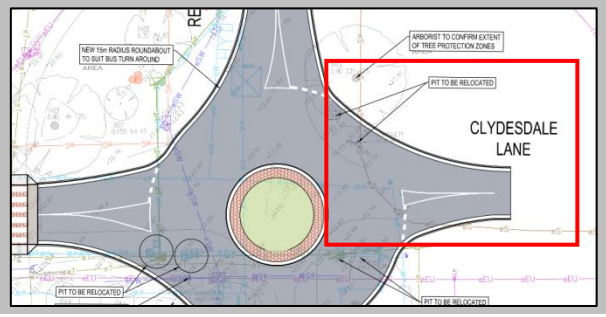
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	There is a risk that ponding water may damage the pavement surface creating vehicle/motorcycle destabilisation incidents resulting in run-off-road or head-on collisions. There is a risk that water flows may erode the edge of the pavement resulting in vehicle snag/roll incidents.  				
10. Existing Pole Bus Zone	There is an existing pole to be retained at the back of kerb in the proposed bus zone. There is a risk that a bus entering the bay may impact the pole, resulting in vehicle damage, or that the falling pole may impact a waiting/passing pedestrian.	Occasional	Limited	Low	Pole to be relocated if possible (TBC by RCC/WSU).

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	There is a risk that the pole may restrict access to the bus doors, including mid/rear doors, and particularly for elderly, ambulant, disabled passengers attempting to enter/exit the bus.  				
11. Pedestrian Crossing Proximity Extent of Works	There are pedestrian crossings proposed adjacent to intersection points throughout the extent of works. There is a risk that a motorist exiting the intersection may focus on vehicles approaching from the right and not sight a pedestrian entering the crossing from the left resulting in pedestrian-vehicle collisions. This risk is increased given an inconsistent application of pedestrian crossing infrastructure such as approach	Occasional	Serious	High	Distance from intersections/driveways to be increased where possible, or pedestrian crossings to be deleted if demand is low to avoid confusion.

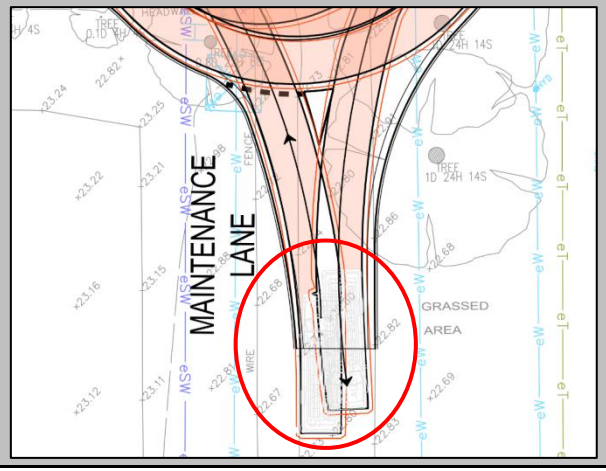
Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	signage from all directions, line marking, and raised thresholds. This risk is increased where vehicle and pedestrian volumes are increasing. 				
12. Pedestrian Crossing Sight Extent of Works	There are multiple pedestrian crossings, both existing and proposed, without line marking, signage and lighting. The legal requirement for a motorist to give-way at a pedestrian crossing that is not line marked and only sign posted in one direction is not clear.	Improbable	Serious	Medium	Consistency of crossing treatments is under review. Any crossings in the final design will have line marking and signage in both directions.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	An inconsistent approach to pedestrian facilities may increase driver confusion/frustration, and decrease pedestrian compliance. There is a risk that an approaching motorist may not anticipate a pedestrian stepping out into the travel lane resulting in pedestrian-vehicle collisions.  				
13. Signage Extent of Works	There is insufficient signage provided throughout the extent of works including roundabouts (no stopping, give way), pedestrian crossings, bus stop/contractor parking restrictions, DO-PU parking restrictions. There is a risk that a motorist may park/stop in a location that restricts through vehicles or pedestrian paths resulting in side-swipe collisions or pedestrian-vehicle collisions.	Probable	Minor	High	Kerbside parking signage to be provided to all areas. Bus restrictions will be nominated. No Stopping restrictions at the roundabout and other relevant locations will be nominated.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	There is a risk that a motorist may not sight approaching intersections, configurations, hazards due to parked vehicles resulting in run-off-road, side-impact or side swipe collisions.  				
14. Lighting Roundabout	There is no proposed lighting at the proposed roundabout. At the existing curve there is an existing flood light on a pole set back in a paddock that is directed into an eastbound driver's eyes. There is a risk at night or during adverse weather that a motorist may not sight the intersection configuration resulting in impacts with roadside	Probable	Minor	High	Lighting anticipated to be provided at roundabout and pedestrian crossing locations, to be reviewed and confirmed by lighting/electrical consultant.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	infrastructure, pedestrians, or other vehicles circulating the roundabout. 				
15. Survey Clydesdale Lane	There is no survey provided at the Clydesdale Lane leg on the roundabout. The proposed alignment of the leg appears to be offset from Vines Drive and from the existing Clydesdale Lane. The proposed width does not match the existing width. There is a risk that staggered alignments and incomplete works may resulting in run-off-road incidents. 	Probable	Limited	Medium	Further survey is being undertaken, final design will suit surveyed configuration.
16. Infrastructure Clydesdale Lane	There is existing infrastructure at the intersection of Clydesdale Lane including a brick hydrant enclosure, stay pole, and CCTV pole. There is a risk that a pedestrian or motorist may impact hazards in pedestrian paths, clear zones, or in the travel lane.	Frequent	Minor	Intolerable	Existing infrastructure to be relocated as part of roundabout works.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
	 				

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
					
17. Width Maintenance Lane	The turning path plan for the roundabout shows 2-way traffic colliding at the Maintenance Lane splitter island, however the Maintenance Lane Carpark turning path plan indicates there is sufficient width for 2-way traffic. There is a risk that the existing width on Maintenance Lane may not be sufficient for 2-way traffic resulting in side-swipe or head-on collisions with oncoming traffic, run-off-road incidents, or collisions with roadside infrastructure, hazards or pedestrians. 	Frequent	Minor	Intolerable	Treatment for two-way traffic along Maintenance Lane is under review. Traffic movements are generally expected to be one-way (e.g. arrivals in the morning, departures in the afternoon) so limited two-way traffic is expected. A priority system can be designed, and will ensure sufficient space for vehicles off the circulating area of the roundabout.

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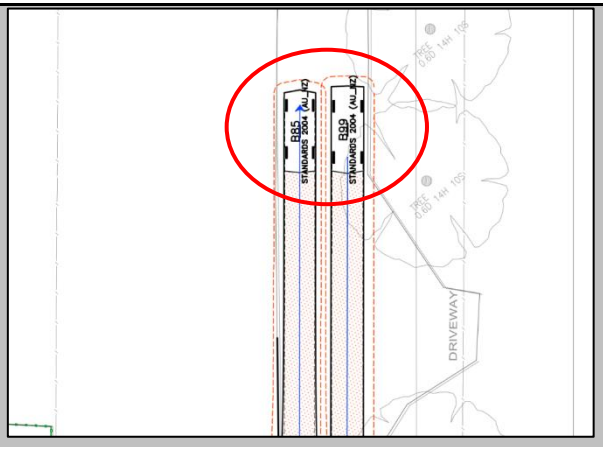
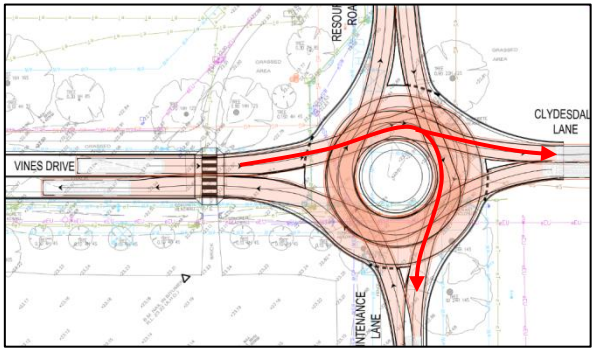
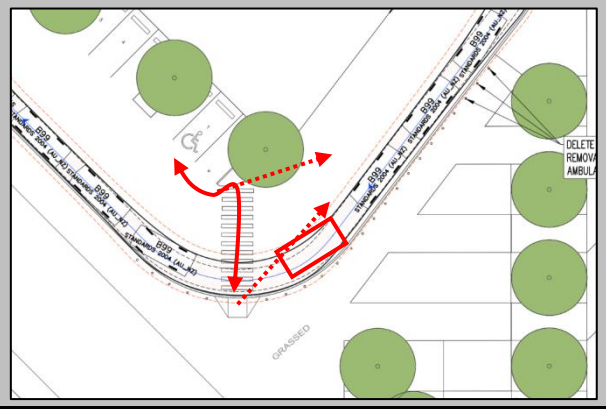
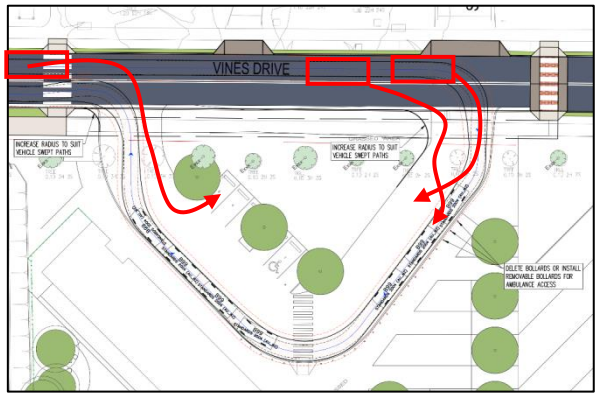
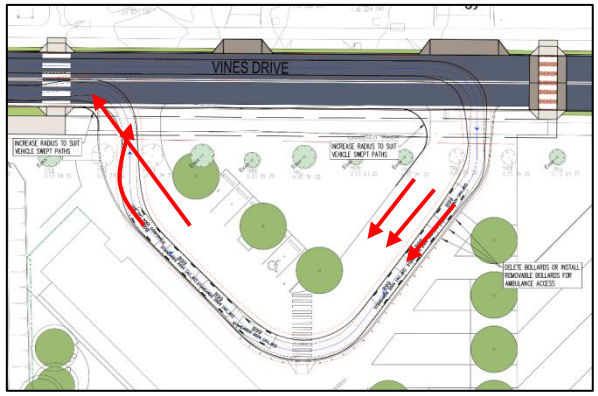
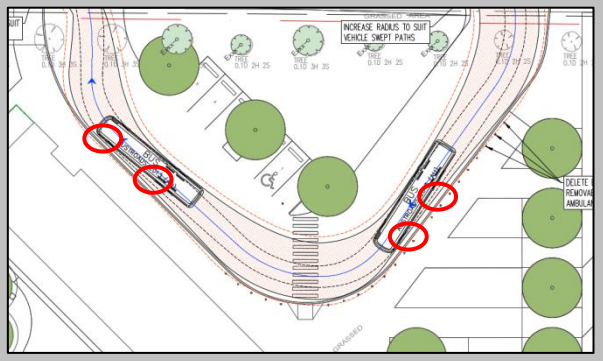
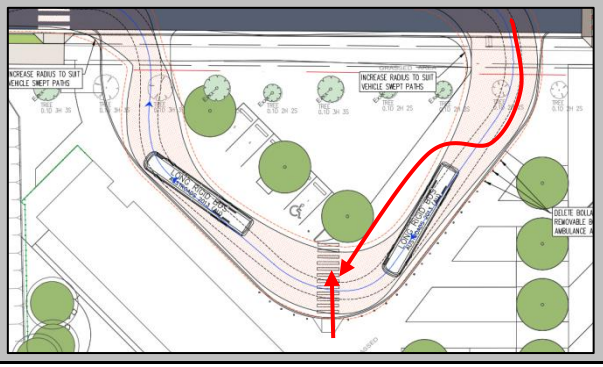
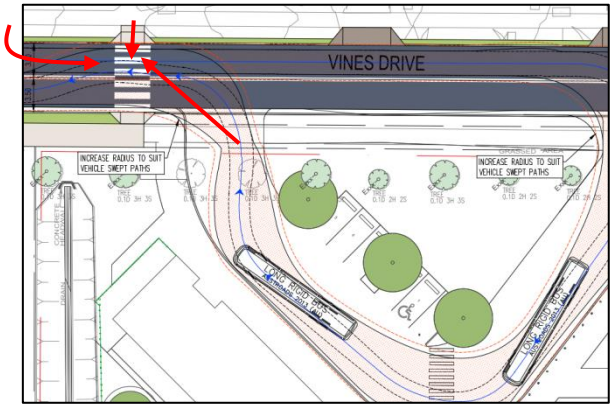
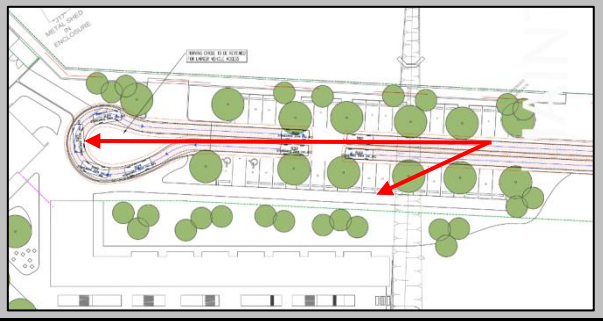
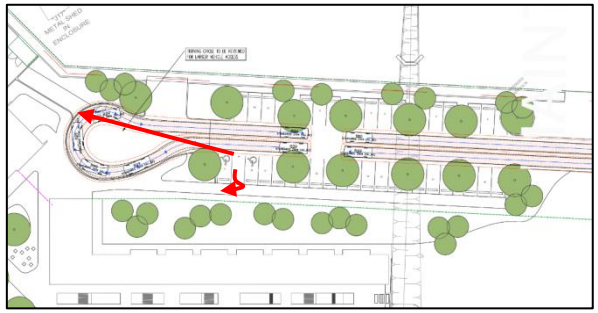
					
18. Vehicle Restrictions Roundabout	There are roads with no through route, turn around areas, or termination warnings provided at decision points. There are no vehicle restrictions provided where large vehicle turning paths are not provided to confirm access is achievable. There is a risk that a vehicle may enter a restricted road and undertake unsafe movements such as long reversing, U-turns, multiple point turns, or mounting pedestrian areas to exit out of the road resulting in pedestrian-vehicle collisions, collisions with other vehicles or roadside infrastructure. 	Occasional	Minor	Medium	Vehicle restriction signage will be reviewed and considered with the university, however large vehicles may be required to service the surrounding facilities. No Through Road signage may be suitable.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
					
19. Pedestrian Crossing DO-PU	The pedestrian crossing inside the DO-PU area has no lighting, no signage, no kerb ramp on the northern side, a tree blocking sight from the northern side and requires a pedestrian to cross 2 lanes of approaching traffic. There is a risk that an approaching motorist may not sight a pedestrian stepping out into the travel lane resulting in pedestrian-vehicle collisions. There is a risk that a parked vehicle may restrict sight between a through vehicle and a pedestrian resulting in pedestrian-vehicle collisions. 	Probable	Serious	Intolerable	Zebra crossing to be deleted to avoid confusion, signage and line marking for PUDO vehicles and tree to be reviewed.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
20. Delineation DO-PU	There is insufficient delineation provided to advise motorists of the proposed entry/access points, lane configuration and parking areas. There is a risk that a motorist may not comprehend the proposed arrangement and attempt unsafe manoeuvres including U-turns, 3 point turns, long reversing movements, angled parking or stopping in unsafe locations resulting in pedestrian-vehicle collisions, vehicle sideswipe collisions or impacts with roadside infrastructure.   	Probable	Minor	High	Signage and line marking plan under development. One-way circulating system including 'No Entry' signage will be provided. Wide driveway (multiple lanes across) are required to facilitate bus/coach movements but can be line marked to a narrower access for typical car usage.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
21. Large Vehicle Angle DO-PU	The provided turn paths for the large vehicle in the DO-PU facility indicates the vehicle cannot pull up parallel to the kerb, particularly at mid/rear doors. There is a risk that large vehicle may pull up a significant distance from the kerb and require a pedestrian to step across a wide gap or step down onto the road and up to the bus/kerb resulting in trip-fall injuries. There is a risk that a stopped bus may partially block the through lane, encouraging a motorist to travel around the bus in close proximity to a pedestrian crossing, resulting in pedestrian-vehicle collisions.   	Probable	Limited	Medium	Acknowledged that some blockages may occur for the largest vehicles. Buses to be encouraged to use Vines Drive bus stop wherever possible. Buses may be required to manoeuvre to be parallel / closer to the kerb.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
22. Large Vehicle Turning DO-PU	The provided turning paths show a large vehicle requiring oncoming travel lanes to exit the DO-PU area in close proximity to intersections and pedestrian crossings. It is unclear to the audit team of the proposed timing of small vehicles and large vehicles using the DO-PU area. There is a risk that a turning vehicle may impact a pedestrian or an oncoming/turning/queued vehicle. 	Occasional	Minor	Medium	Frequency of buses is expected to be very low, and not at times when car usage for the drop-off and pick-up area is occurring. Acknowledged that large vehicles may need to use the full carriageway of Vines Drive; visibility in this area is generally good. Pedestrian crossing to be deleted to avoid conflict of priority.
23. Pedestrian Access Southern Parking	It is unclear to the audit team of the proposed pedestrian access from parking spaces to facilities, particularly for the northern side. There is a risk that a pedestrian may travel along vehicle lanes resulting in pedestrian-vehicle collisions. 	Improbable	Minor	Low	Footpath is provided along southern side of car park. Some pedestrian activity through the car park aisle may occur.

Item Location	Safety Hazard Finding	Frequency	Severity	Level Of Risk	Project Manager Response
24. Disabled Access Southern Parking	It is unclear to the audit team of disabled access from disabled parking spaces to facilities, particularly at kerbs and paths. There is a risk that a disabled pedestrian may trip/fall at the kerb or may attempt to access the path at another location and enter the circulating aisle/ access road resulting in pedestrian-vehicle collisions. 	Improbable	Minor	Low	Flush path or kerb ramp to be provided from accessible spaces.

10 Formal Statement

We, the undersigned, declare that we have reviewed the site and data listed in this report and identified the safety and operational deficiencies above.

It should be noted that while every effort has been made to identify potential safety hazards, no guarantee could be made that every deficiency has been identified.

A project sponsor is under no obligation to accept the findings outlined in this audit report. This report simply provides the opportunity to review potential safety issues highlighted by the auditors.

This audit will be recorded on the NSW Register of Road Safety Auditors and the project sponsor should expect email notification from the register to confirm the audit has been carried out.

We recommend that points of concern be investigated, and necessary corrective actions undertaken.

Aaron Walton
Level 3 Road Safety Auditor
Team Leader

Mark Keech
Level 3 Road Safety Auditor
Team Member