



Road Safety Audit

Intersection Sturt Highway & Airport Road, Renmark

May 2018



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RAA

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Revision History

Rev	Date	Author	Approver	Comment
V1.0	9/5/2018	MV	CM	Draft.
V1.1	10/5/2018	MV	CM	Edits.
V1.2	23/5/2018	MV	CM	For Issue.

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1 Introduction

This report presents the findings of a road safety audit carried out on 1/5/2018.

The safety audit was carried out due to a significant complaints primarily regarding freight movements through this intersection and was conducted by an audit team comprising:

- Senior Road Safety Auditor – Charles Mountain; and
- Road Safety Auditor – Matthew Vertudaches.

This road safety audit report identifies issues relating to freight movements and accessibility to and from the Renmark industrial precinct via Airport Road.

1.1 Purpose

The audit is undertaken in accordance with best practise principles in accordance with a safe system framework to ensure that road safety is a primary consideration at all times.

A driver's expectations about the standard of the carriageway, road markings, delineation and a forgiving roadside environment are a major contributing factor in their ability to negotiate the road environment safely.

Traffic safety principles need to be considered in order to provide road users with the safest road environment possible. Such principles include:

- Creating safe carriageways that facilitate appropriate tracking of motor vehicles, specifically at locations where topographical or property boundary constraints require changes to alignment;
- Ensuring all road user types are considered, with appropriate facilities to ensure safe operation and travel of all user types;
- Roadside features and constraints – typically close proximity features and intersections which increase the likelihood of crashes;
- Managing crash severity risk through the implementation of safety design principles to ensure injury is minimised in the event of a crash; and
- Ensuring that safety related design criteria such as appropriate sight distances, have been considered.

The findings, opinions and recommendations in this report are based on an examination of the location, and may not cover every deficiency that is present on site. It is considered that adoption of the recommendations set forth in this report should improve the level of safety at the intersection of Sturt Highway and Airport Road in Renmark.

1.2 Site Location

The intersection is located within the Renmark Paringa Council area and shown in Figure 1. Sturt Highway is under the care and control of the Department of Planning Transport and Infrastructure (DPTI) with Airport Road controlled by the Renmark Paringa Council.



Figure 1: Location Plan

Airport Road is the primary entrance and egress point for heavy vehicles to the Renmark industrial precinct and for access to the Renmark Airport. Multiple large freight operators are based in this precinct with many heavy vehicles entering and exiting the precinct every day.

Figure 2 shows the currently B-Double approved routes at the intersection and in the immediate vicinity. The intersection is currently not approved for general Road Train, B Triple or PBS level 2B use at this stage, however consideration needs to be given to future approval of these vehicles types with any upgrades that are considered.



Figure 2: B-Double approved routes around Airport Road (RAVnet, May 2018)

1.3 Audit Team

The audit team comprised:

- Charles Mountain
Charles is the Senior Manager of Road Safety at RAA. He has extensive experience in transport, traffic and road safety. Prior to joining RAA he had over 25 years' experience in local government managing a wide variety of traffic, access and parking issues. Charles has qualifications in engineering, business management and is a qualified road safety auditor.
- Matthew Vertudaches
Matthew is a Traffic Engineer at RAA and has been with the organisation for 2 years. He has undertaken five days of Road Safety Audit training and Treatment of Crash Location training at the Queensland University of Technology. Matthew has qualifications in civil engineering with experience in civil and traffic engineering, traffic investigations and local government.

1.4 Audit Process Methodology

This Safety Audit has been undertaken in accordance with the Austroads Guide to Road Safety - Part 6: Road Safety Audits, and is aimed at ensuring that appropriate safety consideration is given, thus minimising the potential occurrence of crashes and reducing the severity of crashes that occur.

The site was inspected on foot and also by vehicle on 1/5/2018. A night audit was not undertaken by the auditors as the current issues are most prevalent during business hours. The weather condition at the time of the inspection was fine with no rain. This site inspection forms the basis of the audit findings that are detailed in subsequent sections of this report.

Non-conformances and hazards have been identified using the Austroads guide and relevant guidelines or standards such as, Austroads 'Guide to Traffic Engineering Practice', DPTI technical standards and guidelines, and relevant Australian Standards.

Non-conformances or hazards identified in this report have been rated based on the probability and severity of possible crashes that could result from the identified issue. Possible actions have been suggested for the identified issues as a guide for consideration.

1.5 Responding to the Audit Report

Responsibility for road design always rests with the designer/project manager and not with a road safety auditor. A project manager or road authority is under no obligation to accept every recommendation set out in this report and it is not the auditor's role to agree with or approve of the road authorities audit response.

It is expected that this formal road safety audit report will be responded to in writing with reasoning given for rejections of any recommendations made in this report. Written confirmation outlining how or when accepted recommendations may be useful and should be provided wherever possible.

To assist the road authority in responding, an area for formal response is provided in Appendix A of this road safety audit report.

2 Safety Audit Findings

Whilst it is important to ensure that a traffic control treatment and road environment is designed to a consistent standard, there are times when, due to physical or financial constraints, this is not always possible. This report does not consider the potential cost of projects, and makes recommendations based solely upon safety needs.

The following section describes each of the non-conformances or hazards identified during the audit. They are then summarised in section 2.4.

2.1 General Comments

Item 1

Freight Movements

Heavy freight including B-Doubles regularly use this intersection to access the Renmark industrial precinct. All turn movements are supported by the current layout and regularly used however right turn movements are of particular concern due to the time it takes for a heavy vehicle to complete the turn and fully clear the carriageway.



Figure 3: B Doubles regularly turn right from Airport Road

2014 DPTI traffic volume estimates on this section of Sturt Highway are 8300 vehicles per day inclusive of 13.5% (1100) commercial vehicles. B Doubles (Class 10) make up over one third of all commercial vehicles on Sturt Highway in this location, with an estimated 420 vehicles per day. These figures refer to the section between Old Sturt Highway and Twentyseventh Street.

Given these traffic volume figures, and based on observations on site and feedback provided to the audit team by RAA Members, heavy vehicles to turning right from Airport Road can regularly experience delays. This in turn causes drivers to make potentially dangerous turning manoeuvres due to the very limited opportunities where there is sufficient gap in both directions to commence a right turn.

After turning right from Airport Road, the majority of heavy vehicles immediately begin driving on the wide westbound shoulder in order to allow other westbound vehicles to pass whilst they accelerate to speed. This manoeuvre can be risky as the wide shoulder does not extend far enough for heavy vehicles to reach the speed limit and they are then required to merge back onto the busy highway at high speed.

Recommendation

It is recommended that a significant upgrade of this intersection is considered that will reduce speeds in the immediate vicinity, and provide timely opportunities for heavy vehicle operators to safely undertake a right turn from Airport Road on to Sturt Highway.

Options to consider include:

- Installation of a large roundabout suitable for all vehicle types using this intersection
- Installation of formal acceleration lane for right turning vehicles
- Grade Separation, in the long term, dependant on future development

Of these three options, a large roundabout is the preferred option due to the cost restraints of grade separation and the potential introduction of additional safety issues by introducing an acceleration lane prior to the overtaking lane west of the intersection.

Consideration should be given to larger heavy vehicle combinations including B-Triple and PBS level 3 combinations when designing this intersection such that the intersection is not a constraint when considering future freight movements through the Riverland.

Item 2

Speed Limit Change

The speed limit changes from 90km/h to 110km/h approximately 200m west of the intersection, at the beginning of the left turn lane taper.



Figure 4: (Looking west) the speed limit changes from 90km/h to 110km/h just beyond the intersection



Figure 5: (Looking east) the speed limit changes to 90km/h from 110km/h whilst approaching the intersection

At the time of our visit, although speeds were not formally recorded, there appeared to be a lack of compliance with this speed zone. Westbound vehicles were noted to be accelerating to the 110km/h speed limit at the intersection, before the 110km/h signage, however, signage was visible from the intersection. Similarly, westbound vehicles were slow to reduce speed from 110km/h to 90km/h and were noted to 'coast' to the lower speed limit after passing the 90km/h signage, which is fairly common practice.


This causes vehicle speeds on Sturt Highway to be in excess of the 90km/h on occasion, which in turn increases the length of the minimum gap sight distance (MGSD) required to safely turn from Airport Road and can lead to an increase of the severity of a potential crash. Referring to table 3.4 and 3.5 in Austroads Guide to Road Design – Part4A, the MGSD for approach speeds of 90km/h is 125m, and for approach speeds of 110km/h is 153m.


Recommendation

It is recommended that vehicle speeds on Sturt Highway are surveyed, and that consideration is given to extending the 90km/h zone by 300m to the west so that vehicle speeds on Sturt Highway are more consistent through the intersection.



2.2 Specific Findings

Item No.	Item Description
3	Right turn from Airport Road to Sturt Highway
	<div></div> <p style="text-align: center;">Figure 6: Heavy vehicles currently utilise the wide westbound shoulder to accelerate</p> <p>Turning right from Airport Road is most troublesome turning movement at this intersection and can be frustrating for heavy vehicle drivers due to the high volumes of traffic on Sturt Highway. Risky turn manoeuvres are often made in order to clear the intersection. Drivers currently utilise the westbound shoulder to accelerate to speed.</p> <p>It is recommended that a large roundabout accommodating all freight movements is installed at this intersection to improve safety by reducing frustration and the number of risky turns being made.</p>

4	Right turn from Sturt Highway to Airport Road
	<div></div> <p>Figure 7: Heavy vehicles cut the corner when turning right</p> <p>Heavy vehicles turning right from Sturt Highway onto Airport Road regularly cut the corner, posing a risk to vehicles turning right out of Airport Road. For smaller rigid vehicles this is more down to driver error however the swept path of larger articulated combinations requires this space. It was noted that some vehicles utilised the painted traffic island on the western corner of the intersection to generate additional turning space.</p> <p>As previously stated in the report, a roundabout is the recommended option and will address this issue. If a roundabout is not supported, in the short term, widening of Airport Road at the apron to create additional space for turning vehicles is recommended.</p>

5	Faded/deteriorated line markings
	<div></div> <p>Figure 8: Line marking at the intersection is in poor condition</p> <p>Line marking was noted to be in poor condition due to the constant heavy vehicle traffic. It is recommended that line marking is refreshed, and scheduled for refreshing on a more regular basis than it is currently.</p>

6	Skid resistance
	<div>A wide-angle photograph of a multi-lane asphalt highway stretching into the distance under a clear blue sky. The road surface appears very smooth and dark, indicating high polishing. White lane markings are visible. Trees and a grassy area are on the right side of the road.</div> <div><p>Figure 9: Sturt Highway is highly polished on approach to Airport Road.</p></div> <div>A photograph showing the intersection of two roads. The foreground road has a dark, polished asphalt surface. The intersecting road has a lighter, more textured asphalt surface. A white line marks the edge of the intersection. A person is standing on the grassy shoulder to the left, and a car is visible in the distance on the intersecting road.</div> <div><p>Figure 10: The transition between polished surface and the higher friction surface through the intersection</p></div> <p>The road surface on approach to the intersection is exhibiting heavy surface polishing, which leads to poor skid resistance, especially in wet weather and can lead to aquaplaning.</p> <p>It is recommended that skid testing is undertaken to determine the pavement friction supply, and remediation treatment is conducted if this shows poor skid resistance. RAA have previously tested the effectiveness of high pressure spray treatments to flush out bleeding binder material, with the result of these tests indicating large improvements to skid resistance and stopping distance on wet pavement.</p>

7	Failing pavement surface on Airport Road
	<div></div> <div><p>Figure 11: The surface of Airport Road is in very poor condition</p></div> <div></div> <div><p>Figure 12: Potholes and cracks forming on Airport Road</p></div> <p>The surface on Airport Road is in very poor condition and large lumps are visible between the wheel paths and on the edges due to the turning motion of vehicles on approach to the intersection.</p> <p>Although not an immediate safety concern due to the low speed environment, there is potential to cause vehicle damage, which will increase as the road deteriorates further.</p> <p>It is recommended that Airport Road is resealed in the vicinity of this intersection.</p>

2.3 Guide to Ranking System

The audit team has raised issues in respect to road safety that should be given due consideration. To assist and gauge the relevant importance of each of the safety issues documented in this report, the following risk matrix has been considered in and a priority ranking system shown in Table 4 has been adopted.

Table 1: Likelihood

Likelihood	Description
Highly probably	It is likely that more than one crash of this type could occur within a five year period.
Occasional	It is likely that less than one crash of this type could occur within a five year period.
Improbably	Less than one crash of this type could occur within a 10 year period.

Table 2: Severity

Severity	Description
Major	The crash is likely to result in a fatality or serious injuries
Moderate	The crash is likely to result in minor injuries or large scale of property damage.
Minor	The crash is likely to result in minor property damage or many near miss crash events.

Table 3: Safety Issue Ranking System

SEVERITY \ LIKELIHOOD	Improbable	Occasional	Highly Probable
Minor	Low	Low	Medium
Moderate	Low	Medium	High
Major	Medium	High	High

Table 4: Safety Issue Ranking System

Safety Issue Ranking	Likelihood of a crash resulting in serious or fatal injury
Priority 'A' (High)	A major concern that should be addressed and requires changes to avoid serious safety problems.
Priority 'B' (Medium)	A significant safety concern that requires consideration of changes to improve safety.
Priority 'C' (Low)	A safety concern of lesser significance, but which should be addressed as it may improve overall safety.
Comment	A concern or an action that may be outside the scope of the RSA, but which may improve the overall design or be of wider significance. The responsibility for any action on comments may fall to the response road authority.

2.4 Summary of Recommendations

The road safety audit findings and suggested actions detailed throughout this report have been summarised in Table 5.

Table 5: Audit Recommendations Summary

Item	Deficiency	Suggested Action	Risk Rating
1.	Freight movements	Construct a roundabout or consider other treatments suitable for a high volume of freight. Consideration needs to be given of future freight demand and designing for B-Triple combinations to prevent this intersection from becoming a future bottleneck.	A
2.	Location of speed limit change	Extend 90km/h zone by 300m to the west	A
3.	Right turn Airport Road to Sturt Highway	Construct Roundabout suitable for high volume of freight traffic.	A
4.	Right turn from Sturt Highway to Airport Road	Roundabout suitable for high volume of freight traffic. If roundabout not adopted, widening of Airport Road at the apron to cater for swept path of heavy vehicles.	B
5.	Faded/deteriorated line markings	Refresh line marking and schedule refreshing on a more regular basis.	B
6.	Skid resistance	Undertake skit testing on Sturt Highway and consider remediation should this show poor skid resistance in the wet.	A
7.	Failing pavement on Airport Road	Comment: Pavement was noted to be in very poor condition and it is suggested that a reseal is considered in the vicinity of the intersection.	Comment

Audit Team Statement

The above safety audit findings and suggested actions are the opinion of the audit team, and are aimed at changes that may be implemented in order to improve safety. The issues raised in this report, together with recommendations, should be considered for implementation.



Date: 23/5/18

Charles Mountain
Senior Manager of Road Safety
Lead Road Safety Auditor



Date: 23/5/18

Matthew Vertudaches
Traffic Engineer
Road Safety Auditor

Appendix A

Decision Tracking Form

Road Safety Audit Report Recommendations

DECISION TRACKING FORM

Project Title: Intersection Sturt Highway & Airport Road, Renmark RSA
 Department of Planning Transport and Infrastructure,
Project Manager: Renmark Paringa Council
Road Safety Auditors: Charles Mountain, Matthew Vertudaches

Road Safety Audit Stage: Existing Road Safety Audit

Designer: N/A

Item No.	Recommendation	Risk Rating	Road Authority Response/Comments	Road Authority Decision
1.	Construct a roundabout suitable for high volume of freight traffic, considering future freight needs.	A		
2.	Extend 90km/h zone by 300m to the west Roundabout suitable for high volume of freight traffic.	A		
3.	To address issues turning right from Airport Road. Construct a roundabout suitable for high volume of freight traffic, considering future freight needs.	A		
4.	To address issues turning right from Sturt Highway. If roundabout not adopted, in the short term, widening of Airport Road at the apron is recommended to cater for swept path of heavy vehicles.	B		
5.	Refresh line marking and schedule refreshing on a more regular basis.	B		
6.	Undertake skid testing on Sturt Highway and consider remediation should this show poor skid resistance in the wet.	A		

Item No.	Recommendation	Risk Rating	Road Authority Response/Comments	Road Authority Decision
7.	Comment: Pavement was noted to be in very poor condition and it is suggested that a reseal is considered in the vicinity of the intersection.	Comment		