University of Southern Queensland

Faculty of Engineering & Surveying

Bridge Approach Guardrail Prioritisation

A dissertation submitted by

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towards the degree of

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Abstract

Bridge approach guardrail is needed to protect errant vehicles on bridge approaches from potentially fatal objects. These approach guardrails are needed to be kept up to current standards to ensure the safety of the general public.

With standards changing periodically and limited funding for these types of projects being available a substantial amount of bridge approach guardrail in the southern district of main roads has fallen behind current expected standards. Therefore the need to prioritise the remedial work to be done on these approach guardrails is apparent.

This project has produced a tool that can be used to prioritise where resources should be allocated for work on approach guardrail. Attempts have previously been made to develop such a tool and have also been used to prioritise guardrail upgrading in other areas however it is believed that these tools have failed to take into account certain features of approach guardrail and its surrounding environment that are believed to have a significant bearing on the safety of the approach guardrail.

The assessment method has been developed as a risk based prioritisation approach. The bridge approach guardrail sites are evaluated against the consequence (guardrail components) and likelihood (external factors) of a collision with the bridge approach guardrail. The prioritisation tool developed in this project has been assessed and shown to be a suitable tool for prioritising remedial work on bridge approach guardrail. This was achieved through the compilation of a priority listing of the bridge sites in the study area.

This project was based in the Southern District of Main Roads and the results will be significantly for their benefit but it is also expected that the prioritisation tool developed will be able to be used in other locations.

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ENG4111 Research Project Part 1 & ENG4112 Research Project Part 2

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Certification

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I further certify that the work is original and has not been previously submitted for assessment in any other course or institution, except where specifically stated.

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Date

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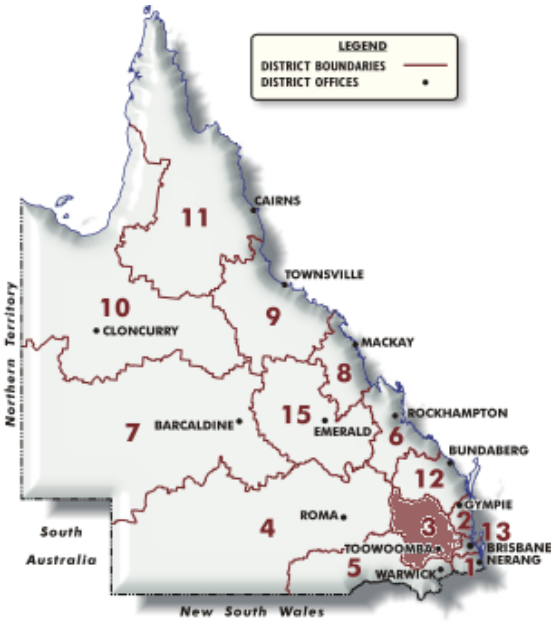
1 Introduction

1.1 Background

The Queensland Department of Main Roads is responsible for 34000 km of state controlled road network. A state controlled road is either a highway or a major connecting road. State controlled roads account for approximately 20% of the state's total road network and carry approximately 70% of the state's traffic.

To be able to manage such a large network the state is divided into 14 separate districts. The district divisions can be seen in Figure 1-1. The southern district has been highlighted.



Dist No.	District	Headquarters
1	SOUTH COAST HINTERLAND	Nerang
2	NORTH COAST HINTERLAND	Gympie
3	SOUTHERN	Toowoomba
4	SOUTH WESTERN	Roma
5	BORDER	Warwick
6	CENTRAL	Rockhampton
7	CENTRAL WESTERN	Barcaldine
8	MACKAY	Mackay
9	NORTHERN	Townsville
10	NORTH WESTERN	Cloncurry
11	PENINSULA	Cairns
12	WIDE BAY	Bundaberg
13	METROPOLITAN	Spring Hill
15	CENTRAL HIGHLANDS	Emerald

Figure 1-1 Main Roads Districts Map
www.mainroads.qld.gov.au

The Southern District of The Department of Main Roads Queensland is responsible for 3118 km of state controlled roads which include 211 bridges. The district extends from Murgon in the north to Millmerran in the south; from Minden in the east to Chinchilla in the west.

The Southern District is comprised of 18 local government councils. These are Toowoomba City, Cherbourg (Community) Council and the Shire Councils of Crows Nest, Cambooya, Esk, Gatton, Millmerran, Murgon, Jondaryan, Laidley, Kingaroy, Rosalie, Nanango, Nanango, Wondai, Chinchilla, Wambo, Dalby Town and Pittsworth.

A map of the Southern District has been provided as Figure 1-2.

Figure 1-2 Southern District Map
www.mainroads.qld.gov.au

The Southern District is such a large area and the time it would take to assess every bridge in the district would be large. Due to time constraints placed on this project a smaller area within the southern district has been chosen for assessment. The area chosen was the South Burnett shires of Nanango, Kingaroy, Murgon and Wondai. These were chosen for their close proximity to each other and they have a high percentage of bridge approach guardrail that is not to current standards compared to the amount of bridges with approach guardrail. These shires have been highlighted on the southern district map.

Table 1-1 shows the number of bridges with approach guardrail in these shires along with the number of these that are believed to not meet the current standards.

Table 1-1 Preliminary Bridge Findings for Selected Areas

Shire	Bridges with approach guardrail	Approach guardrail not to current standards
Nanango	15	13
Kingaroy	12	8
Murgon	7	6
Wondai	4	3

1.1.1 Nanango Shire

Nanango Shire is the eastern gateway to the South Burnett region of Queensland and is located atop the Great Dividing Range at the head of the Brisbane Valley. Nanango Shire covers an area 1735 square kilometres. It also contains 7 state controlled roads with 15 bridges that have approach guardrail. Figure 1-3 is a map that shows the South Burnett and the locations of the shires in this project.

Figure 1-3 South Burnett Map
www.southburnett.com.au

1.1.2 Kingaroy Shire

Kingaroy Shire is the regional capital of the South Burnett region of Queensland and is located north-west of Brisbane and north of Toowoomba. It covers an area of 2422 square kilometres. Kingaroy Shire has 8 state controlled roads within its borders with 12 bridges with approach guardrail.

1.1.3 Murgon Shire

Murgon Shire is located at the northern end of the South Burnett region of Queensland and covers an area 665 square kilometres. Murgon Shire has 6 state controlled roads and 7 state controlled bridges with approach guardrail.

1.1.4 Wondai Shire

Wondai Shire is located at the centre of the South Burnett region of Queensland and covers an area of 3579 square kilometres. It has 10 state controlled roads that contain 4 bridges with approach guardrail.

1.2 Project Aims and Objectives

This project aims to develop a method of assessment that can be used to prioritise remedial works on bridge approach guardrail for the Southern District of The Department of Main Roads.

1.2.1 Specific Objectives

The specific objectives for this project have been taken from the project specification. This section is included to show the path that the project is taking with justification and explanations behind the choice of each specific objective.

Research the background information relating to the upgrading of bridge approach guardrail, the Australian Standards that are to be met by bridge guardrail and assessment procedures used to prioritise the remedial works.

The starting point of this project will be to research previously performed studies that deal with bridge approach guardrail. This will be done to find what has been done before in this area, what standards need to be addressed when dealing with bridge approach guardrail and what prioritisation tools are being used to deal with the problem.

Analyse previously used assessment procedures and find or develop a prioritisation procedure acceptable for bridge approach guardrail in the Southern District.

From what has been found in the research of this project the assessment methods and prioritisation tools that are being used in other places will be analysed to check their suitability for this project. The ideas that have been assessed to be adequate will be considered with ideas of the author to produce a prioritisation tool that can be used to complete this project.

Analyse existing data provided by The Department of Main Roads and as required complete site inspections of bridge approach guardrail in the Southern District to acquire required data.

When the prioritisation tool has been completed the data required for the project will be known. The Southern District of The Department of Main Roads has supplied data that was collected through an audit of all guardrails in the district and also have made available their databases for this project. This information will be analysed to find the data that is required for this project. Any data that is needed and not available from Main Roads will need to be sourced through a field inspection of the bridge approach guardrail. As the data collected in the Main Roads audit is now at least three years old this will also need to be checked for accuracy.

Select a suitable study area and compile a list of all bridges in the area and the characteristics of their approach guardrails.

The Southern District of The Department of Main Roads is a very large district that comprises 17 shires and 211 bridges. To try to inspect the bridge guardrail of the entire district would be an excessive job to complete in the scope of this project. Therefore a suitable study area with a variety of approach guardrail conditions needs to be selected for this project.

Develop a priority listing by analysing the Southern District of The Department of Main Roads Bridge approach guardrails with the prioritisation method found and if necessary amend the prioritisation method.

The priority listing is the main aim of this project. This is to be found by using the prioritisation tool developed and will be used by The Southern District of Main Roads to help with decisions on where remedial work on bridge approach guardrail is most desperately required.

Research and estimate the cost of completing the remedial work on the bridge approach guardrail in the area.

The prioritisation of remedial works is not only assessed on the condition of the bridge approach guardrail but may also need to be assessed in terms of its Cost Benefit Ratio. An estimate of the costing for the remedial work determined to be needed from the prioritisation will be made available so that an estimate of the full cost of remedial works needed will be known and also so that the Cost Benefit Ratio of individual bridge approach guardrail works can be assessed if required.

Present findings and recommendations in the required oral and written formats.

This project as part of the course ENG 4112 has been submitted as a written dissertation and was also presented at the University of Southern Queensland's 2007 Professional Practice Seminar.

2 Literature Review

A comprehensive search of relevant literature for this project has been performed with emphasis on the appropriate standards, components of approach guardrail, risk management and analysis methods.

2.1 Definitions

AADT- Annual Average Daily Traffic (Queensland Department of Main Roads, 2005 p.8-1)

Road Safety Barrier System- A roadside devise that provides a physical restriction to penetration of a vehicle in a way that reduces the risk to vehicle occupants and other traffic. Its purpose is to contain or redirect an errant vehicle. It is used to shield roadside obstacles or non-traversable terrain features. Occasionally, it may be used to protect people from vehicular traffic. (AS/NZS 3845:1999)

Clear Zone- The border area that begins at the edge of each travelled lane and is available for emergency use by errant vehicles that run off the road. This zone includes any adjoining lane/s, road shoulder, verge and batter. (Queensland Department of Main Roads, 2005 p.8-2)

End Treatment- The designed modification at the end of a roadside or median safety barrier. (Queensland Department of Main Roads, 2005 p.8-1)

Transition- The joining of two different safety barrier systems to produce a gradual stiffening of the approach guardrail to prevent vehicular pocketing, snagging or penetration at the connection. This is commonly used where a roadside barrier is connected to a bridge railing, or to a rigid object such as a bridge pier. (Queensland Department of Main Roads, 2005 p.8-3)

2.2 The Need for Approach Guardrail

The Department of Main Roads Timber Bridge Maintenance Manual (2005) tells the importance of bridge approach guardrail with "Approach guardrails are important for the safety of road users, as they help to prevent out of control vehicles from the more serious consequences of running into a stream. Correctly placed, they also prevent a vehicle from impacting directly on to a bridge end post or kerb end. Ideally, they provide a transition between flexible vehicle restraint on approaches and rigid restraint on the bridge."

The installation of bridge approach guardrail is itself a fixed object hazard within the clear zone. With this in mind it is very important that approach guardrail is not installed when not required or if it causes a greater hazard by being erected than would be if it were not installed.

A study completed by the Minnesota Department of Transport in 2005 found that the installation of bridge approach guardrail is cost effective for bridges with an AADT of greater than 300 vehicles per day. The results of this study showed that bridge approach guardrail was effective at reducing the severity of run-off-the-road crashes occurring on the approach or departure of the bridges in the study area. Fatalities accounted for only 6% of crashes occurring at bridges with approach guardrail compared to 28.5% at bridges without approach guardrail.

2.3 Standards

Bridge approach guardrail falls in to the larger category of Road Safety Barrier Systems and is covered by the Australian Standard AS/NZS 3845:1999 Road Safety Barrier Systems. This standard states that:
“The function of these devices is to improve road safety by reducing the consequences of crashes. However, it should be recognized that these devices are themselves a hazard; they have the potential to cause serious injuries. The intention of this Standard is that these devices are only installed

at locations where the risk with the device installed is significantly less than the risk without the device."

This is an important point to remember, it may not be a major issue in this project as it is concerned with the remedial works done on existing bridge approach guardrail but there may be a need to assess when guardrail can be removed to lessen the effects of a hazard.

AS/NZS 3845:1999 relates to road safety barrier systems in general and does not distinguish between different applications of this (e.g. bridge approach guardrail). This standard along with some international publications however are the basis for a number of guidelines written by individual road authorities for use within their jurisdiction. Many standards that are adopted in Australia come from research and documents from the United States. Therefore many of the standards used in Australia have originated from AASHTO (American Association of State Highway and Transportation Officials) 2002 Roadside Design Guide.

The guideline to these devices written by The Department of Main Roads Queensland is included as Chapter 8 Safety Barriers and Roadside Furniture of the Road Planning and Design Manual (2005). This guideline outlines the standards required by Main Roads Queensland for guardrail installations and also has guidelines specific to the standards of bridge approach guardrail. It is noted in this manual that the cost of totally adopting every standard would be a massive cost to the annual road building budget and that a risk management approach to installation and maintenance should be adopted.

Roper et.al(2002) has compared various road authority guidelines and stated that they address different aspects of the selection, installation and maintenance of safety barrier systems. Some requirements and recommendations overlap between different guidelines, and others are mentioned in only some of the guidelines. In the report Roper compares the different standards for such things as Length of Need, Barrier types and End Treatments. As the standards differ between jurisdictions it is important to check the standard for the jurisdiction being assessed.

2.4 End Treatments

"The ends of guardrails have been found to cause severe injuries when impacted and the development of treatments for guard rail ends has been the subject of much literature concerned with roadside hazards. The ends of guard rails were originally turned down but this was found to induce vaulting of impacting vehicles. Since then, guard rail end treatments have become increasingly complex." Kloeden .et.al. (1999)

End treatments, like all parts of a road safety barrier system, if not installed correctly become a hazard to road users. An end treatment ultimately has two tasks, to anchor the barrier system such that longitudinal strength is developed in a crash and to be weak enough that, if hit by an errant vehicle, it will not cause the vehicle's occupants to suffer injury or death by severe deceleration or spearing of the passenger compartment of the vehicle.

End Treatments are defined by Queensland Department of Main Roads, 2005 as either Gating or Non-Gating. A gating end treatment will allow the errant vehicle to pass through it but be slowed and redirected by the dissipation of energy. When using these types of end treatments it is important that there is an adequate clear zone behind the safety barrier system. Non-Gating end treatments do not allow the vehicle to pass though the terminal but redirect the vehicle along the travelled way.

Figure 2-1 shows an example of a type of gating end treatment used by Department of Main Roads Queensland.

Figure 2-1 MELT (Modified Eccentric Loader Terminal) – Gating End Treatment
Sourced (Vic roads 2005)

The test criteria for end treatments require that the impacting vehicle is gradually stopped or redirected by the end treatment or crash attenuator when impacted end-on. In addition to end-on impacts, barrier end treatments and crash attenuators must be capable of safely redirecting a vehicle that impacts the side of the device, both at mid-length and near the nose (AASHTO 2002).

Main Roads Western Australia, 2006 states that most commercially available end treatments meet Test Level 3 TL3 (a 2000 kg pickup truck impacting the end treatment at 100 km/h at a 25 degree angle). The testing done on roadside furniture comes from National Cooperative Highway Research Program Report 350 (NCHRP Report 350).

Design requirements for End Treatments can be found in the Department of Main Roads Road Planning and Design Manual.

2.5 Transition

The transition between two different barrier types is an important part of a bridge approach guardrail system. Tucker (2005) notes “where the bridge rail is protected by an approach guardrail, there should be a smooth,

uninterrupted transition between the approach guardrail and the bridge rail. The object is to safely transition an errant vehicle back into the roadway without impacting a blunt end on the bridge rail."

Ogden (1989) stated comments relating specifically to the guardrail to bridge rail transitions. He wrote "approach guardrails are typically much more flexible than the bridge rail or parapet to which they are attached….these flexible barriers can deflect sufficiently to allow an errant vehicle to impact or "snag" on the end of the rigid barrier, even when the two barriers are securely attached." Therefore the effect of the guardrail not being attached at all will be much greater.

The main way of developing a transition with the required strength is through physical connection with the bridge and through stiffening the guardrail near the bridge.

Design requirements for transition sections can be found in the Department of Main Roads Road Planning and Design Manual.

2.6 Risk Management

Risk Management is a broad subject and as such has an Australian Standard for its implementation. AS/NZS 4360:2004 Risk Management gives a definition of risk that states

RISK: the chance of something happening that will have an impact on objectives.
Note 2: Risk is measured in terms of a combination of the consequences of an event and their likelihood.

When dealing with bridge approach guardrail the consequence of the risk is the standard of the components of the guardrail. The likelihood is external factors such as AADT, speed and traffic composition. AS/NZS 4360:2004 states that "Organisations that manage risk effectively and efficiently are more likely to achieve their objectives and do so at lower overall cost.

2.7 Assessment Methods and Prioritisation Tools

The Department of Main Roads Road Planning and Design Manual (2005) advises a four step process for the treatment of roadside hazards.

1. Identify the Hazard
2. Evaluate the treatment options
3. Recommend Action
4. Prioritise

AS/NZS 3845:1999 says that to upgrade all existing safety barriers to the new standard will take many years to achieve and recommends that risks are analysed and the highest risk sites be addressed first.

The need for prioritisation also comes from legal advice sought by The Department of Main Roads Queensland after the case of Brodie v Singleton Shire Council which saw the removal of non-feasance. The advice given at the time was that given funding constraints it would not be possible to upgrade all guardrails to the new standard but if a prioritisation of the affected sites was adopted Main Roads exposure to liability should be reduced.

The literature reviewed makes reference to the need of road authorities to prioritise guardrail risk. This literature review also looked at the assessment techniques used in jurisdictions both in Australia and in America and reviewed their prioritisation tools. It should be noted that there seems to be very few prioritisation tools to be found. The prioritisation tools found in this literature review will be assessed for their suitability for inclusion in this project.

2.7.1 Department of Main Roads Queensland

Main Roads Queensland currently uses a prioritisation tool developed by Professor Rod Troutbeck in 2005. This tool is for use on all guardrail installations and does not take into account some parts of bridge approach guardrail that may be important.

The Southern District of Main Roads Queensland undertook an audit of its entire guardrail between 2000 and 2004.This data was used to prioritise the guardrail in the district using the method of Professor Troutbeck. It has recently been noted within the district that there is bridge approach guardrail that is at a very low standard but is also very low on this priority list. This priority tool uses a multiplication of certain factors to find a score that is used for the basis of the prioritisation.

Another prioritisation tool developed for the Department of Main Roads was by Troy Anderson in 2005. This also dealt with guardrail in general and not the specific case of bridge approach guardrail.

2.7.2 Road and Transport Authority (RTA) New South Wales

RTA New South Wales advised that their new Design for Errant Vehicles documentation includes procedures for assessing the hazard posed by various types of bridge rail. Unfortunately the documentation is not yet signed off for distribution.

It was also advised that the RTA's prioritisation is dependent upon the best economic return based on the network utilisation and an analysis of the risks during the installation of the new barrier. (Prior N 2007 pers.comm, 27 April and Chirgwin G 2007 pers.comm, 27 April)

2.7.3 Main Roads Western Australia

Main Roads Western Australia advised that they do not yet have a formal programme for prioritisation of guardrail work, largely because no specific funding has been allocated to any barrier upgrade program. The management of bridge barrier upgrades has been to treat hazards as they

are encountered at bridge sites subject to significant structural maintenance projects. (Lim A 2007 pers.comm, 27 April)

2.7.4 Iowa Department of Transportation

The Iowa Department of Transportation has released an instructional memorandum that provides guidelines for determining the need for traffic barriers at roadway bridges and culverts. It considers the need for bridge approach guardrail but is more concerned with bridge rail. It contains a prioritization technique that is a rating system for the upgrade of bridge rail. It does not prioritise bridge approach guardrail upgrading. (Iowa Department of Transportation, 2001).

2.7.5 The Virginia Department of Transportation

The Virginia Department of Transportation have published a report that has developed a cost/benefit/risk aid for the installation and upgrading of guardrail. This prioritisation is however done using electronic means, but the report shows the steps taken to find this tool and the factors that were considered important in the management of guardrail. (The Virginia Department of Transportation, 2001).

2.7.6 The California Transportation Commission

This jurisdiction's Local Assistance Program Guideline on Highway Bridge Replacement and Rehabilitation includes a prioritisation technique for rating barrier rail replacement projects. Although this again is not dealing specifically with approach guardrail some of the factors used may be relevant.

3 Methodology

3.1 Introduction

This project methodology will give an overview of the methods that were employed to satisfactorily complete this project and give justification for their selection.

3.2 Background Information and Data Acquisition

The original data that was used as the starting point for this project was supplied by the Southern District of The Department of Main Roads. This included a list of all bridges in the district and their locations. Main Roads have also supplied details of all guardrails in the district that was found from an audit that was undertaken between 2000 and 2004. This was supplied through a risk analysis completed by Bob Smith in 2005 of the entire guardrail in Southern District and the raw data that was compiled through the audit.

All data that was required for the prioritisation of the bridge approach guardrails in this project was sourced from either Main Roads databases or through site inspections of the bridges.

The research of the background information, standards that were to be met and useful knowledge relating to the project was sourced from the University Library and its electronic databases, Department of Main Roads Library and its electronic sources and from the internet. It was also possible to access hard copies of standards and manuals from The Department of Main Roads Southern District office.

3.3 Prioritisation Tool Development

Prioritisation tools that were found through the background information search were assessed to see how appropriate they are to the project area and the project needs. These tools are those that have been adopted by road authorities throughout Australia and also from international sources.

In order to develop a prioritisation tool that was suitable for the use in this project the prioritisation tools found were assessed and if the ideas were

believed to have some suitable parts they were considered for inclusion in this project's prioritisation tool. By moulding the ideas found through research with those of the author of this project a draft prioritisation tool was developed.

This draft prioritisation tool was then used to assess the bridge approach guardrail in the selected study area. The results from this were then analysed and the prioritisation tool was modified as required.

3.4 Study Area Selection

The size of Southern District would mean it would be a major task to try to inspect the approach guardrail of every bridge in the region. Therefore a suitable study area for this project was selected within the Southern District of Main Roads.

The study area that was used in this project was chosen because of the diverse bridge approach guardrail conditions and the geographical location of the selected shires. To find a suitable study area a list of the amount of bridges with approach guardrail was developed. This also included the amount of bridges with approach guardrail that did not meet current standards. The Main Roads database BIS (Bridge Information System) was utilised to determine which bridges had approach guardrail that did not meet current standards, this was achieved from the condition state ratings given in level 2 bridge inspections and comments given by inspectors.

From these, and in consultation with Southern District of Main Roads, it was decided that a suitable study area would be the South Burnett Shires of Nanango, Murgon, Kingaroy and Wondai. There are 38 bridges with approach guardrail and according to BIS, 30 of these do not meet current standards.

3.5 Data Analysis

Data provided by The Southern District of Main Roads was used to develop a spreadsheet of the bridges in the selected shires. The data used by Bob Smith from the guardrail audit of 2000-2004 was assessed along with other factors believed to have a bearing on the likelihood of the approach guardrail being hit (AADT, % Heavy Vehicles, Width of bridge, and Design Speed).

From these an adjustment factor for the external environment was established.

This was used along with the consequences of the guardrail being hit, which in essence is the condition of the approach guardrail, to find the final rating of the guardrail. The approach guardrail condition was determined by a field inspection which split the approach guardrail into three major parts. These parts are the end treatment, guardrail and transition. Each was inspected and given a rating which is put into the prioritisation tool to calculate the prioritisation score.

3.6 Cost Estimate

A cost estimate of the remedial work on the prioritised bridge approach guardrails was developed from the findings of the site inspections. The pricing of this upgrading was based on pricing that was acquired from Roadtek Guardrail Services Brisbane.

These are presented in table form so that if Southern District of Main Roads desires to do some form of Cost Benefit Analysis this can be used.

3.7 Results

The results that were gained from this project were used to produce a priority list of the remedial work needed on bridge approach guardrail in the Southern District of Main Roads Queensland. These along with recommendations that result from this project have been reported in the required written and oral formats.

3.8 Conclusion

The methodology explained here was the basis used to implement what was required to complete this project to a satisfactory standard. This methodology should be read in tandem with the Project Specification shown in Appendix A.

4 Prioritisation Tool Development

4.1 Introduction

The prioritisation tool developed in this project has come from a mixture of ideas from previously used prioritisation methods and the authors own adaptation of what is the important factors affecting bridge approach guardrail. The starting point for the development of the prioritisation tool for this project was to analyse existing guardrail prioritisation tools and to decide which ideas from them were suitable for use on the bridge approach guardrail in the given situation.

4.2 Existing Prioritisation Tool Analysis

In the literature review section of this project some existing methods were identified that have been used to prioritise guardrail remedial works both nationally and internationally. These methods have been analysed and the conclusions shown below.

4.2.1 Anderson 2005 'Prioritisation of Guardrail Remediation Works'

This method of prioritisation was developed to be used on all guardrail applications in the Southern District of Main Roads and was undertaken as part of the author's undergraduate studies. The prioritisation method developed in this report evaluates individual guardrail sections against three specified criteria: traffic volume, traffic composition and guardrail standard. Each criterion is allocated a score and the final prioritisation ranking is determined by the addition of the three scoring criteria.

The prioritisation tool Anderson developed is shown in Figure 4-1

Road Name: _____

Road Number: _____

Structure ID: _____

Through Chainage: _____

Left / Right: _____

AADT: _____

Heavy Vehicles (%): _____

Points	5	10	15	20	Allocated Score
AADT (current year)	< 500	500 - 1000	1001 - 3000	> 3000	
Traffic Composition	< 4	4 to 8	9 to 13	> 13	
Rail Standard	No delineation Guardrail is compliant with current standard	Guardrail is compliant with previous required standard & has some form of end treatment eg flare, BCT	Guardrail is not compliant with current or previous standard OR no end treatment OR short in length OR incorrect height OR incorrect post spacing	Guardrail is not compliant with current or previous standard has timber posts OR no end treatment & incorrect height OR short in length	
				TOTAL	

Note: If guardrail is compliant with current standard then no assessment is required.

Abbreviations
AADT - Annual Average Daily Traffic
BCT - Breakaway Cable Terminal
Comments:
_____
_____
_____
_____

Figure 4-1 Troy Anderson's Prioritisation Tool 2005

As can be seen in the figure above the three criteria are given scores out of 20 that change in increments of 5.

The three criteria in this method are considered to be of importance to this project and will be considered in the development of the prioritisation tool. The manner in which the scores are allocated and summed will also be considered when developing the prioritisation tool. As this method was developed to cover all guardrail applications not just bridge approach guardrail as in this project it is assumed that more site specific criteria will be applicable however these criteria are likely to be part of what is considered important.

4.2.2 Troutbeck 2005 'Interim Upgrading of Terminals to Steel W Beam Guardrails'

This report was one of a series of reports prepared for The Main Roads Department of Queensland. As part of this report Professor Rod Troutbeck developed a prioritisation method to be used on existing barrier installations. This method was used to prioritise all guardrail installations in the Southern District of Main Roads Queensland after an audit of all guardrail was completed from 2000-2004.

This prioritisation tool allocates rating factors to different criteria that have been determined to influence the safety of guardrail installations. The rating

that is given to each criterion is multiplied with each of the other factors to find the final prioritisation score. The criteria that this prioritisation tool considers are: AADT, Horizontal Curvature, Grade, Horizontal Offset, End Treatment and Design Speed.

All of these criteria will have a bearing on bridge approach guardrail and will be considered for use in the prioritisation tool developed in this project.

4.2.3 Iowa Department of Transportation 2001 'Traffic Barriers (Guardrail and Bridge Rail) – Instruction Memorandum'

This instruction memorandum was developed to provide guidelines for the upgrading of bridge rail and not approach guardrail as in this project, however the factors considered in this method may still have implications for bridge approach guardrail.

This method uses a rating system that assigns points to five factors: Crashes, ADT, Bridge Width and Length and Rail Type. The sum of these factors provides the prioritisation ranking and indicates the degree of upgrading required.

The method from this memorandum is shown below in Figure 4-2

BRIDGE RAIL RATING SYSTEM

5 FACTOR SYSTEM

POINTS	0	5	10	15	20
Crashes (in the last 5 years)	None	1 PDO	1 PI	1 F or 2 PDO's or 1 PI and 1 PDO	2 or more F's/PI's or 3 or more PDO's
ADT (current year)	< 200	200 - 299	300 - 399	400 - 750	> 750
Bridge Width (feet)	≥ 30	28	24	22	≤ 20
Bridge Length (feet)	< 50	50 - 99	100 - 149	150 - 200	> 200
Bridge Rail (type)	Aluminum Rail (1967 Standard)	Steel Box Rail (1964 Standard)	Formed Steel Beam Rail (1951 and 1957 Standards)	Steel Rail (1941 Standard) Concrete Rail (1928 Standard)	Angle Handrail (1928 Standard)

Abbreviations: PDO = Property Damage Only crash
PI = Personal Injury crash
F = Fatality crash

UPGRADING NEEDED

under 25 Points	No Upgrading at this time
25 - 50 Points	Delineation according to Standard RE-48A
51 - 75 Points	Block out with Thrie Beam to curb edge (If existing approach guardrail is W-Beam, W-Beam may be used)
Over 75 Points	Retrofit

Figure 4-2 Iowa Department of Transport's Prioritisation Method

The factors used in this prioritisation method may be of use to the prioritisation tool being developed for this project. All of these factors will be considered except crashes. It is noted that Anderson (2005) stated that fatal crashes with guardrail in the Southern District of Main Roads is a very small minority compared to other means. Therefore crash data will not be considered for the prioritisation tool.

4.2.4 California Transportation Commission 1997 'Highway Bridge Replacement and Rehabilitation'

The prioritisation method described in this report relates to the rating of the entire bridge rail system and not just the approach guardrail as in this project. However ideas from this method may be able to be adapted for use on bridge approach guardrail installations. This method gives rating scores to differing factors that impact on the bridge rails safety and these scores are added together to give the final prioritisation score.

The factors given priority in this method are: Rail Type, Consequence of Penetration (what is under the bridge), Inadequate Approach Rail System (Transition, Rail and End Terminal), Accidents, AADT, Site Conditions (vertical and horizontal alignment, bridge width, access roads close to bridge) and Potential for Future Bridge Replacement. This method seems to have taken into account a lot more factors than others analysed and the factors that have been given priority in this method will be considered for the prioritisation tool in this project.

4.3 Factors Considered from Existing Methods

The preceding methods of prioritisation that have been analysed for use in developing the prioritisation tool for this project have shown ideas that are believed to be valuable when analysing bridge approach guardrail installations. Most of these methods share similar priority factors although some take more factors into account than others. The factors from these existing techniques that require further investigation are:

- AADT (Average Annual Daily Traffic)
- Traffic Composition
- Guardrail Standard (Inadequate Approach Rail System)
- Bridge Width
- Bridge Length
- Horizontal Alignment
- Horizontal Offset
- Design Speed
- Consequence of Penetration
- Potential for Future Bridge Replacement

4.3.1 Average Annual Daily Traffic

AADT is considered to be one of the major elements needed to be assessed in any guardrail prioritisation. It is a feature of all of the existing methods that have been analysed and it is a large contributor to the rate of encroachment

at guardrail sites. It is important to acknowledge that for every vehicle that goes past the guardrail site there is an opportunity for conflict. Therefore the higher the AADT the higher is the potential for a guardrail accident.

AADT will be one of the factors used in this bridge approach guardrail prioritisation tool.

4.3.2 Traffic Composition

Although this factor was only used in one of the existing methods analysed it is considered to be a contributing factor to vehicular safety at bridge approaches. It is regarded as an important factor as the potential for a guardrail accident is believed to be increased as the percentage of heavy vehicles on the road increases. Anderson (2005) wrote “This component is considered to be critical to the method as the measure of AADT will not distinguish between two or more roads that have similar traffic volumes but a dissimilar composition of traffic.”

Traffic Composition will be one of the factors used in this bridge approach guardrail prioritisation tool.

4.3.3 Guardrail Standard

Guardrail Standard is the major reason for the prioritisation need. This is the main basis in which the prioritisation will be done with other factors being used to find the potential for conflict with this guardrail. The guardrail standard will include the three separate parts of bridge approach guardrail, the end treatment, the guardrail and the transition. The standard of the guardrail at a site has a major bearing on the roadside safety to vehicular traffic of that site.

Guardrail standard will be one of the factors used in this bridge approach guardrail prioritisation tool.

4.3.4 Bridge Width

Ogden (1989) stated that “bridge widths are related to crashes, especially for bridges less than 8.4m in width.” From this it is believed that the width of bridges in this project will have an influence on the safety of a bridge approach guardrail site. The closer vehicles are to the guardrail whilst driving past the higher the potential will be for a guardrail accident. This factor was only considered in the two methods that deal with bridges and not the

methods dealing with just guardrail in general. Most guardrails, when not at a bridge structure, are only on one side of the road and therefore the width will not be as great an issue.

Bridge Width will be one of the factors used in this bridge approach guardrail prioritisation tool.

4.3.5 Bridge Length

The length of the bridges in this project is not considered to be a major factor in deciding the safety of the bridge approach guardrail. This project is only rating the approach guardrail and not the bridge rail. The bridge length factor is used in the existing methods that deal with the rail on the bridge itself and not the approach guardrail. It is believed that the length of the bridge will only raise the potential for an accident with the bridge rail when the vehicle is already on the bridge so it will not be a major factor for the approach to the bridge.

Bridge Length will not be a factor that is used in this bridge approach guardrail prioritisation tool.

4.3.6 Horizontal Alignment

The horizontal alignment of guardrail has a major bearing on the potential for collision. The alignment of the road when assessing whether guardrail is required will be a key selection criteria when dealing with guardrail in general. From previous audits done of the guardrail in Southern District it has been found that the majority of bridge approaches are on an alignment of greater than 600m radius. Therefore in this project the horizontal alignment of the bridge approach guardrail is not expected to be a large issue in the majority of cases. However if it is found that the bridge approach is on an alignment that puts it at greater risk then engineering judgement should be used to give these sites a higher priority. For example if the bridge was aligned on a curve with radius less than 300m at approximately 100 km/h speed the external adjustment factor should rise to the next level up.

Horizontal alignment will not be a factor that is used in this bridge approach guardrail prioritisation tool.

4.3.7 Horizontal Offset

Horizontal offset is important when dealing with roadside guardrail but when dealing with bridge approach guardrail it is similar to taking into account the width of the bridge. The width of the bridge determines the distance between the traffic and the guardrail at bridge sites and this is what the horizontal offset determines at roadside guardrail sites therefore there is only a need for one of these factors to be included. The horizontal offset of the end treatment is also taken into account in the guardrail components assessment.

Horizontal Offset will not be a factor that is used in this bridge approach guardrail prioritisation tool.

4.3.8 Design Speed

The speed at which a vehicle approaches the bridge site will be a major factor that will contribute to the safety of the site. The faster a vehicle is travelling the more likely that vehicle is to be affected by any unexpected events or by other vehicles on the road. This will lead to a higher potential for these vehicles to be involved in an accident with the approach guardrail. Vehicle speed also contributes greatly to the severity of a collision with bridge approach guardrail and is therefore needed to be assessed when considering the safety of a bridge approach guardrail site.

Design Speed will be a factor that is used in this bridge approach guardrail prioritisation tool.

4.3.9 Consequence of Penetration

The consequence of penetration that is referred to in this existing method relates to what is directly under the bridge and how an accident with the guardrail could affect it. An example of what is being assessed is if the guardrail is protection on an overpass of a busy road and in the event of an accident the vehicle was to go over the edge and hit traffic below. The bridge approach guardrail that is being assessed in this project is predominantly on rural roads over small creeks and rivers. However if there was to be a bridge approach that if compromised could cause greater damage to others engineering judgement would need to be used to give these sites a higher rating.

Consequence of Penetration as it is described in the existing method will not be a factor that is used in this bridge approach guardrail prioritisation tool.

4.3.10 Potential for Future Bridge Replacement

The potential for future bridge replacement is something that will need to be checked before any upgrading work to bridge approach guardrail is performed. If a bridge is to be replaced then the approach guardrail will be replaced at the same time. This will not be included as a factor influencing the bridge approach guardrail prioritisation but it is something that should be looked into before any remedial work to improve the safety of the bridge site is completed.

4.3.11 Summary

The prioritisation tool developed in this project will have two parts. These will be an external factor score and a guardrail component score. From the analysis of previous methods and the ideas of the author the factors to be used in this prioritisation have been chosen. These are:

External Factors

- Average Annual Daily Traffic
- Traffic Composition
- Design Speed
- Bridge Width

Guardrail Components

- End Treatment
- Guardrail Standard
- Transition

The factors used in previous prioritisations and the factors chosen for this prioritisation can be seen in the following table.

Table 4-1 Summary of Prioritisation Factors

	Anderson 2005	Troutbeck 2005	Iowa 2001	California 1997	Current Prioritisation Tool
AADT	✓	✓	✓	✓	✓
Traffic Composition	✓				✓
Guardrail Standard	✓	✓	✓	✓	✓
Bridge Width			✓		✓
Bridge Length			✓		
Horizontal Alignment		✓		✓	
Horizontal Offset		✓			
Design Speed		✓			✓
Consequence of Penetration				✓	
Potential for Future Bridge Replacement				✓	

4.4 Development of Prioritisation Tool

The prioritisation tool that is being developed in this project will be developed using a Risk Management approach. Risk in this case is defined as the chance of something happening that will have an impact on objectives. Risk is measured in terms of a combination of the consequences of an event and their likelihood.

When developing this prioritisation tool it is acknowledged that the likelihood of a collision happening with a bridge approach guardrail will be determined by the external factors of AADT, Traffic Composition, Design Speed and Bridge Width. The consequences of a collision with bridge approach guardrail will be governed by the standard of the approach guardrail components.

The end result that is required of any prioritisation tool is to find an effective way of determining which sites are the greatest risks to the users. For this to be determined in this case it was decided to incorporate two methods of scoring that were used in existing methods.

The governing factor for this prioritisation tool is to be the standard of the guardrail. Therefore it has been decided to use a method similar to that used by Anderson (2005) where scores will be allocated for each component and these scores are added together to form the guardrail score. The external factors will be combined to give a factor that is multiplied by the guardrail score to find the final prioritisation score. This external factor will be found using a similar technique employed by Troutbeck (2005) where each different

component is given a score that is multiplied together to find the external adjustment factor.

4.4.1 Determination of Factor Scores

To be an effective prioritisation tool the scores given to each factor needed to be found. These factors are explained for each different component below.

4.4.2 External Factors

The external adjustment factor will be determined by multiplying each components score (AADT, Traffic Composition, Design Speed and Bridge Width) together. From the answer that this provides the final External Adjustment Factor will be assessed to effectively represent the risk associated with the external factors. How the rating scores were allocated to each external component is discussed below.

4.4.2.1 AADT

The rating scores that were allocated to different levels of AADT came from what is used by AASHTO (2002) to determine the expected encroachments per kilometre per year for different AADT. Figure 4-3 below shows the graph known as the Cooper Methodology (AASHTO 2002) which was used to establish the rating scores for this factor.

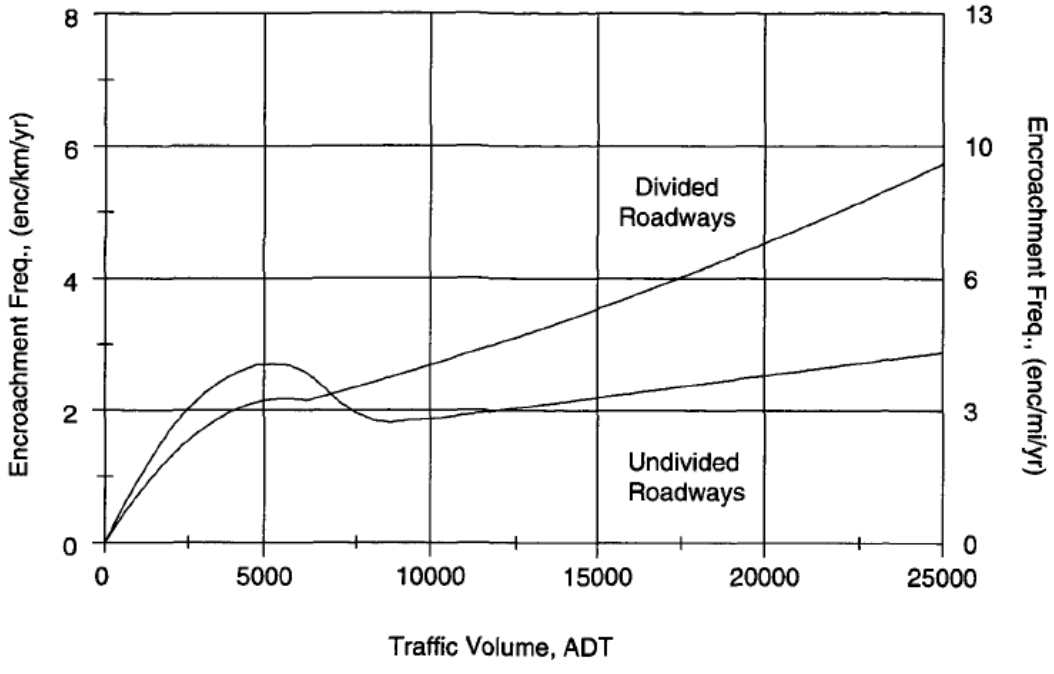


Figure 4-3 Cooper Methodology
(Sourced AASHTO 2002)

As the Southern District of Main Roads has a diverse road network the AADT on these roads differ greatly. Therefore the AADT has been divided into what is believed to be appropriate groupings and the rating score coincides with the encroachment frequency from the Cooper Methodology. The higher the AADT the higher the ratings score.

The rating score for AADT in the prioritisation tool is:

- Less than 500 = 0.5
- 500 – 1000 = 1.0
- 1000 – 2500 = 1.5
- 2500 – 5000 = 2.0
- Greater than 5000 = 2.5

4.4.2.2 Traffic Composition

The composition of the traffic is taken into account with the AADT to be able to distinguish between similar roads. The traffic composition component of this prioritisation tool will be the percentage of heavy vehicles on the road. The AADT data is split into 12 Austroads classes of vehicle with the first two classes being light vehicles and the other ten being heavy vehicles. These twelve classes are:

1. Short
2. Short-towing
3. Two axle truck and bus
4. Three axle truck and bus
5. Four axle truck
6. Three axle articulated
7. Four axle articulated
8. Five axle articulated
9. Six axle articulated
10. B double
11. Double road train

12. Triple road train.

For the purpose of this prioritisation tool the traffic composition will only be split into two classes, light(1&2) and heavy(3,4,5,6,7,8,9,10,11&12) vehicles. This component will be broken into groupings of percentages that reflect the risk associated with this component. The higher the percentage of heavy vehicles the higher the ratings score.

The rating score for Percentage Heavy Vehicles in this prioritisation tool is:

- Less than 5% = 0.5
- 5% – 10% = 1.0
- 10% – 15% = 1.5
- Greater than 15% = 2.0

4.4.2.3 Design Speed

The rating scores allocated for design speed are developed using the severity index from AASHTO (2002) that was developed for different impact speeds. For this component of the external factors the 85th percentile speed will be used for the design speed. By using the 85th percentile speed it ensures that the speed being considered covers what the majority of motorists are travelling at. This speed often exceeds that of the signed speed for the area.

The rating score has been developed from Figure 4-4 Severity Index vs. Impact Speed.

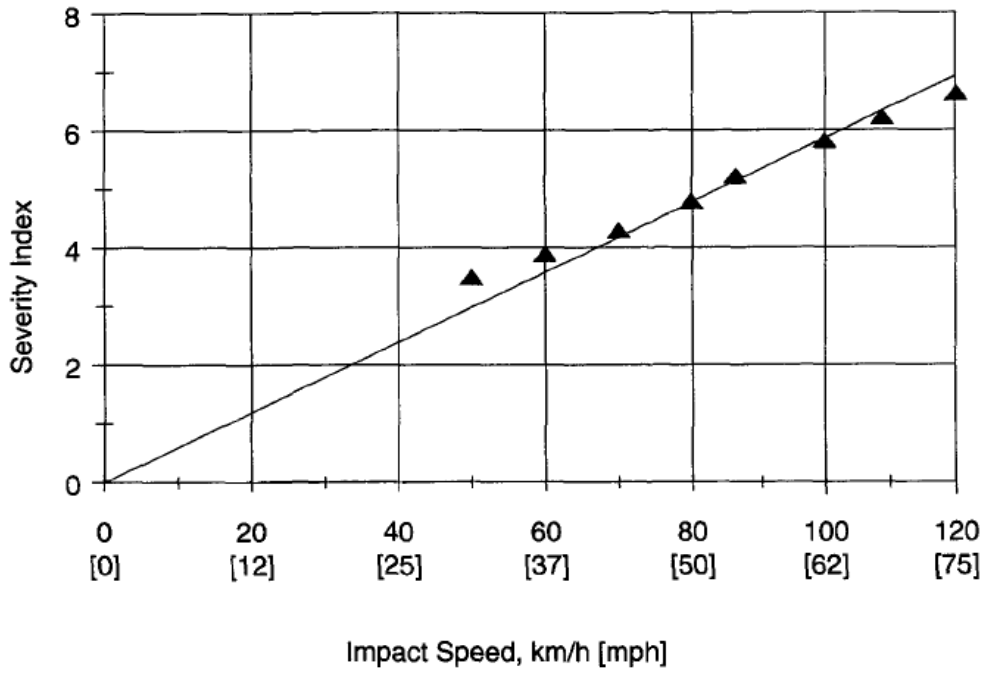


Figure 4-4 Severity Index vs. Impact Speed
(Sourced AASHTO 2002)

From this graph it can be seen that for a car travelling at 70 km/hr the severity index is approximately 4 where for 90km/hr the severity index is approaching 6 which is 1.5 times the severity. This was the method that was used to develop the following rating scores for 85th percentile speed. The higher the speed the higher the ratings score.

The rating score for 85th percentile speed in this prioritisation tool is:

- Less than 60km/h = 0.5
- 60km/h – 80km/h = 1.0
- 80km/h – 100km/h = 1.5
- Greater than 100km/h = 2.0

4.4.2.4 Bridge Width

This component of the external factors has been broken into groupings of width that correspond with the Iowa Department of Transportation (2001) rating system. This system had bridge widths of greater than 30 feet as being a very good width and less than 20 feet as a poor width. With consultation with experienced Main Roads personnel and taking into account the Iowa Department of Transportation's rating system this component has been

broken into groupings and given rating scores that effectively describe the risk that this component exhibits. The narrower the bridge the higher the rating score.

The rating score for Width of Bridge in this prioritisation tool is:

- Greater than 9.0m = 0.5
- 7.5m – 9.0m = 1.0
- 6.5m – 7.5m = 1.5
- Less than 6.5m = 2.0

4.4.2.5 External Adjustment Factor

The external adjustment factor in this prioritisation tool is found by multiplying the four external factor scores together. This will give a number between 0.0625 and 20. To develop a factor that can adequately be used to multiply the guardrail score by, that will show the risk provided by the external factors, these scores again have been grouped together and given rating scores.

If the external factor score is less than 4 it is believed that the approach guardrail should be just judged on its merits and external adjustment factor will be 1. For an external factor between 4 and 8 it is believed that the guardrail score should be multiplied by 1.5 to get a better reflection of the impact the external factors have on the risk shown by the approach guardrail site. Likewise for external factors of 8 to 12 and those greater than 12 the external adjustment factors will be 2 and 2.5 respectively.

The External Adjustment Factor given for the external factors in this prioritisation tool are:

- Less than 4 = 1.0
- 4 – 8 = 1.5
- 8 – 12 = 2.0
- Greater than 12 = 2.5

Example: AADT = 2000 $\rightarrow$ Rating = 1.5

% Heavy Vehicles = 16% $\rightarrow$ Rating = 2

85^{th} Percentile Speed = 105km/h $\rightarrow$ Rating = 2

Width of Bridge = 8.0m $\rightarrow$ Rating = 1

External Factors = 1.5 * 2 * 2 * 1 = 6

Therefore this is in the bracket for external factors of 4 – 8 so the External Adjustment Factor will become **1.5**.

4.4.3 Guardrail Components

The governing part of this prioritisation tool is the guardrail components and how they are assessed. The standard at which these guardrail components are assessed will give the bulk of the final prioritisation tool with this guardrail component score being multiplied by the External Adjustment Factor, depending on the severity of the external factors. Bridge approach guardrail has three important components, the end treatment, the guardrail and the transition to the bridge. These three components will be assessed individually and the scores given to each added together to give the Total Component Score.

This part of the prioritisation will be performed in a similar way to Anderson (2005). Anderson quoted that guardrail ends are 40% more hazardous than line of run guardrail. Therefore in this prioritisation a higher rating will be given to the end treatment component. The end treatment component will be given a score out of 20 while the guardrail and transition will both be scored out of 10. This will give a maximum score of 40 for the guardrail components and when multiplied by the maximum External Adjustment Factor of 2.5 the final Prioritisation Score will be a maximum of 100 and a minimum of 0 for a compliant approach guardrail.

The scoring for each component will be in increments of 5 points. The requirements for each increment will be that of a typical assessment however it will be important to show engineering judgement in the allocation of these scores. It will be possible to interpolate between the 5 point increments when the assessment shows this is required.

The scoring increments for the three components in this prioritisation tool are shown below:

4.4.3.1 End Treatment Score

- 20 Points = Splayed ends (Fish Tail) or no end treatment
- 15 Points = Previous standard end treatment without breakaway terminals or cable anchor
- 10 Points = End treatment meets previous standard (e.g. Breakaway Cable Terminal BCT)
- 5 Points = Current standard end treatment without sufficient clear zone of parabolic flare
- 0 Points = Properly installed current standard end treatment

4.4.3.2 Guardrail Score

- 10 Points = Structurally unsound (timber posts damaged or rotten, accident damage of rusted through)
- 5 Points = Does not meet current standards (incorrect height, length of post spacing)
- 0 Points = Guardrail meets all current standards

4.4.3.3 Transition

- 10 Points = Not connected to bridge
- 5 Points = Connected but does not meet current standards for strengthening
- 0 Points = Properly connected to bridge

4.4.4 Summary

It should be acknowledged at this point that acceptable standards may differ between jurisdictions. For this project the standards that will be used are outlined in Standards Australia *AS/NZS 3845:1999*, Queensland Department of Main Roads *Road Planning and Design Manual (2005)* and Queensland Department of Main Roads Standard Drawings.

The original prioritisation tool developed can be seen in Figure 4-5.

Bridge Name:
Structure ID:
Road Number:
Through Chainage:

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		> 9.0 m = 0.5 7.5-9.0 m = 1.0 6.5-7.5 m = 1.5 < 6.5 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0
								End Treatment Score	

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0
					Guardrail Score

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0
					Transition Score

Comments:

Total Component Score	
X Adjustment Factor	
Prioritisation Score	

Figure 4-5 Original Developed Prioritisation Tool

5 Data Collection and Analysis

5.1 Introduction

The need for accurate and up to date data is paramount to the prioritisation process. For this project, data has been sourced from The Department of Main Roads Queensland Southern District databases and records and from completing site inspections of the bridge approach guardrails in the study area. The data that has been supplied was checked to ensure a high level of accuracy could be achieved.

5.2 Bridge Identification

A full list of the bridges on state controlled roads in the southern district was supplied by Main Roads. From this list and by utilising Digital Video Recordings (DVR) of the roads in the study area a list of the bridges with approach guardrail was developed. This list can be seen in Table 5.1.

Table 5-1 Bridges with Approach Guardrail in Study Area

Road	Shire	Tdist	ID	NAME
40B	89	50.19	369	Railway At Benarkin
40B	89	58.03	406	Nukku Railway O/Bridge
40C	89	5.59	372	Rocky Creek
40C	89	28.942	375	Horse Creek
40C	89	27.041	373	Meandu Creek
40C	89	27.91	374	Barkers Creek
419	89	20.831	271	Barker Creek
419	89	46.208	273	Tanduringie Creek
419	89	23.776	272	Middle Creek
419	89	38.629	274	Tanduringie Creek
41A	89	27.118	377	Wyalla Creek
41A	89	27.276	378	Wyalla Creek Overflow
41A	89	25.182	376	Mudering Hut Creek
41A	89	0.815	20641	Sandy Creek
429	89	9.45	292	Meandu Creek
41A	86	42.46	398	Barambah Creek
437	86	1.542	296	Barambah Creek
439	86	21.502	298	Unnamed Creek
439	86	4.067	297	Oaky Creek
439	86	22.752	299	Windera Creek
439	86	24.591	300	Kratzman'S Gully
45B	86	47.46	390	Sawpit Creek
4206	73	4.64	320	Stuart River
4206	73	11.55	321	Deep Creek
4206	73	15.35	322	Reedy Creek
426	73	98.564	280	Spring Creek

Road	Shire	Tdist	ID	NAME
428	73	3.431	285	Stuart River
428	73	33.16	287	Boyne River
428	73	33.308	289	Sandy Creek
428	73	47.865	291	Ironpot Creek
45A	73	72.63	330	Mannuem Creek
45A	73	69.992	329	Boyne River
45A	73	99.225	389	Stuart River
45A	73	65.414	27777	Spring Ck
426	130	133.506	284	L. G. Smith Bridge
435	130	80.74	294	Boondooma Creek
435	130	66.79	293	Di Di Creek
436	130	16.198	295	Hansen'S Gully

Each bridge can be identified by a set of unique codes that have been allocated to them. Each individual bridge is given an ID number which is used to distinguish between bridges.

The location of these bridges is found through the shire they are in, the road within the shire and the road chainage of the bridge. The code numbers of the shires in this project are:

- Nanango 89
- Murgon 86
- Kingaroy 73
- Wondai 130

Each state controlled road in these shires is given a unique code for identification. The code numbers of the roads that have bridges with approach guardrails in this project are:

Nanango

- 40B, 40C, 419, 41A & 429

Murgon

- 41A, 437, 439 & 45B

Kingaroy

- 4206, 426, 428 & 45A

Wondai

- 426

So that each bridge can be located accurately they are also identified by their through chainage along the road and the name given to the bridge.

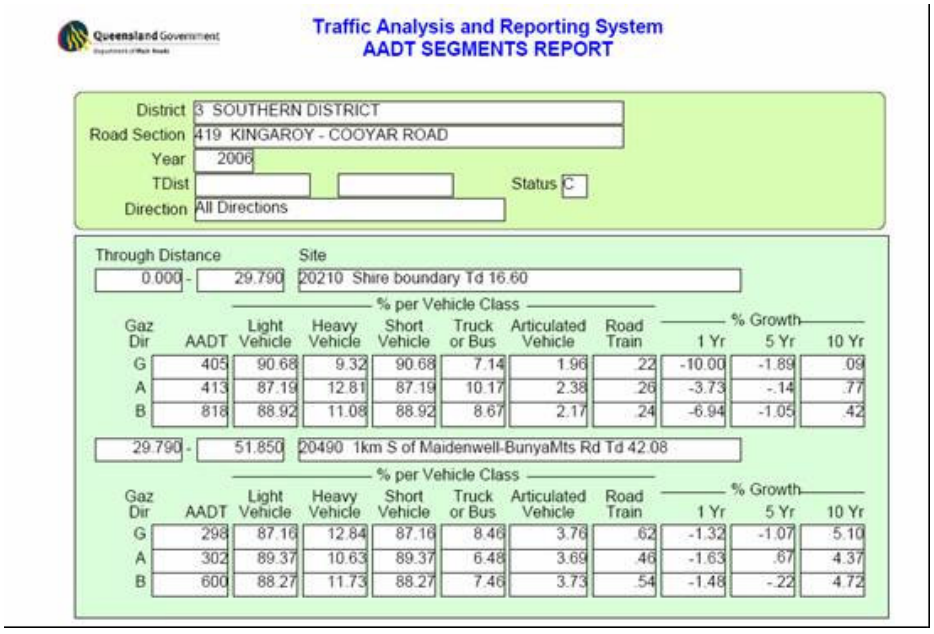
5.3 Prioritisation Data Provided by Main Roads

The Southern District of The Department of Main Roads collects data continually through traffic counters that are placed at temporary and permanent sites throughout the district. This data has been utilised for the AADT, percentage heavy vehicles and 85th percentile speed components of the prioritisation.

The Southern District of Main Roads has also supplied data about all guardrails in the district from an audit that was undertaken between 2000 and 2004. This audit detailed the standard of each guardrail site in the district and could be used for the guardrail components data.

5.3.1 AADT Data

Average Annual Daily Traffic data came from traffic counts carried out by the Southern District of Main Roads. This data was from traffic counts recorded in 2006 so the data can be considered to be up to date. An example of the output from this data base is shown in Figure 5.1. Each state controlled road in the district has at least one set of traffic count data with the longer or more frequented roads being checked at multiple locations.



Traffic Analysis and Reporting System
AADT SEGMENTS REPORT

District 3 SOUTHERN DISTRICT
Road Section 419 KINGAROY - COOYAR ROAD
Year 2006
TDist
Status C
Direction All Directions

Through Distance 0.000 - 29.790 Site 20210 Shire boundary Td 16.60

Gaz Dir	AADT	% per Vehicle Class: Light Vehicle	Heavy Vehicle	Short Vehicle	Truck or Bus	Articulated Vehicle	Road Train	% Growth: 1 Yr	5 Yr	10 Yr
G	405	90.68	9.32	90.68	7.14	1.96	.22	-10.00	-1.89	.09
A	413	87.19	12.81	87.19	10.17	2.38	.26	-3.73	-.14	.77
B	818	88.92	11.08	88.92	8.67	2.17	.24	-6.94	-1.05	.42

29.790 - 51.850 20490 1km S of Maidenwell-BunyaMts Rd Td 42.08

Gaz Dir	AADT	% per Vehicle Class: Light Vehicle	Heavy Vehicle	Short Vehicle	Truck or Bus	Articulated Vehicle	Road Train	% Growth: 1 Yr	5 Yr	10 Yr
G	298	87.16	12.84	87.16	8.46	3.76	.62	-1.32	-1.07	5.10
A	302	89.37	10.63	89.37	6.48	3.69	.46	-1.63	.67	4.37
B	600	88.27	11.73	88.27	7.46	3.73	.54	-1.48	-.22	4.72

Figure 5-1 Example of Output from Traffic Count Database

From the example in Figure 5.1 it can be seen that road 419 Kingaroy – Cooyar has two traffic counters. It also shows the AADT from chainage 0.000 – 29.790 km is recorded at a site at chainage 16.60 km and the AADT is 818 per day. This is further broken up into direction of traffic flow with the gazetted and against gazetted AADT. However in this project the AADT from both directions is to be used.

5.3.2 Percentage of Heavy Vehicles Data

Traffic composition data is also supplied by Main Roads through traffic count data. This data is outputted in the same database as AADT data. Figure 5.1 shows how this data was supplied. Traffic composition data is split into Light and Heavy Vehicles and then further categorised into vehicle types (short vehicle, truck or bus, articulated vehicle and road train). In this project the percentage heavy vehicles is used, so all that is required is the first split of light and heavy vehicles. In Figure 5.1 it can be seen that the Percentage of Heavy Vehicles for chainage 0.000 – 29.790 km in both directions is 11.08%.

5.3.3 85^{th} Percentile Speed Data

85^{th} Percentile Speed data was also supplied by Main Roads. This data is collected through traffic counters throughout the district. The speed of each vehicle that passes over the traffic counter is recorded and is output as a speed histogram as shown in Figure 5.2. This speed histogram gives details of vehicle speed such as maximum, minimum, mean, 85^{th} and 95^{th} percentile and median speed travelled along that section of road. The 85^{th} percentile speed is the speed at which 85% of all vehicles will not exceed; this has been used in this project to give a reasonable idea of the speeds being travelled at the bridge sites.

Speed histograms from 2006 of all the traffic counter sites in the study area were provided by staff at The Southern District of Main Roads.

Main Roads Cloncurry
Speed Histogram

SpeedHist-85 -- English (ENA)

Datasets:

Site:	**[20210] 20210 ON 419**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	10:00 Wednesday, 3 May 2006 => 12:39 Monday, 15 May 2006
File:	G:\MainRoads\NP\ARMIS\TARS\2006 Metros\20210\2021015May2006.EC0 (Plus)
Identifier:	L419V8GX MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)
Profile:	
Filter time:	**10:00 Wednesday, 3 May 2006 => 12:39 Monday, 15 May 2006**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Main Roads Cloncurry
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 10054 / 10056 (99.98%)

Speed Statistics

Vehicles = 10054
Posted speed limit = 100 km/h, Exceeding = 5812 (57.81%), Mean Exceeding = 107.86 km/h
Maximum = 154.1 km/h, **Minimum** = 26.6 km/h, **Mean** = 100.7 km/h
85% Speed = 110.2 km/h, **95% Speed** = 117.0 km/h, **Median** = 101.5 km/h
15 km/h Pace = 95 - 110, **Number in Pace** = 6012 (59.80%)
Variance = 133.20, **Standard Deviation** = 11.54 km/h

Speed Histogram

SpeedHist-85 (Metric) **Site:** 20210.0N
Description: 20210 ON 419
Filter time: 10:00 Wednesday, 3 May 2006 => 12:39 Monday, 15 May 2006
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)
Scheme: Vehicle classification (AustRoads94)

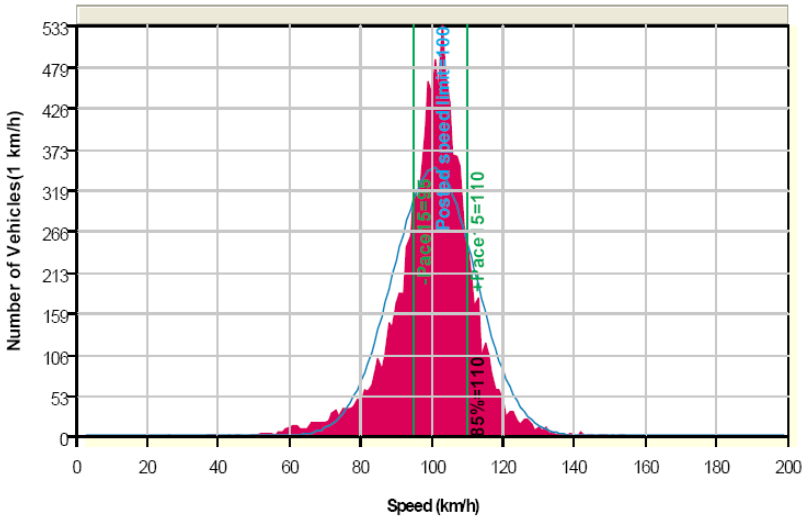


Figure 5-2 Example of Speed Histogram

5.3.4 Bridge and Guardrail Components Data

Bridge and guardrail components data was supplied by Main Roads from the audit that the Southern District performed from 2000 – 2004. The hard copies of the audit forms were supplied which detailed the condition of the guardrail components. However since this data is at least four years old and there is a

possibility that this data may not be completely accurate it was decided that site inspections of all bridge sites would be undertaken.

The width of each bridge could have been determined from Main Roads databases as well but since site inspections of each bridge were performed this data was measured in the field.

5.4 Site Inspections

Site inspections of all bridge sites in the study area were undertaken to ensure accurate data was used in the prioritisation process. The study area for this project is approximately 200 kilometres from the Toowoomba offices of Main Roads so it was important that site inspections were conducted in a safe and efficient way.

5.4.1 Inspection Safety

As sites were inspected individually under full traffic conditions it was imperative that a high regard was given to safety while on site. To reduce the risk to the inspector a number of safety measures were identified and adhered to while conducting inspections, these were:

- Where possible park vehicle clear of the roadway and have orange flashing light on at all times while on site
- Satellite location beacon to be carried at all times while on site.
- High visibility vest or clothing to be worn at all times
- Where possible inspections to be carried out from behind the guardrail
- When on roadway always face approaching traffic
- Always be aware of other vehicles
- Always where sun protection

5.4.2 Site Inspection Data

The data collected from site inspections was the width of each bridge and the condition of the approach guardrail components. This was achieved through a visual inspection of the site, the use of a measuring wheel for distances and a tape measure for heights.

Before the site inspections were undertaken a site inspection checklist was developed so that the inspections could be carried out efficiently. These checklists ensured that all the data that was required was collected first time which would decrease the likelihood of needing to return to the site. Figure 5.3 shows an example of the checklist used in this project.

Site Inspection Checklist

Site Name: 369 Railway at Benarkin

External Factors

Width of Bridge: 8.7m

End Treatment

Type: Modified fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): Yes

Clear Zone: Drop off behind guardrail

Parabolic Flare: No, straight flare

Comments: Fish tail has curved section welded to it.

Guardrail

Height: 650mm to top

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Good

Delineation (Y/N): Yes

Comments: Guardrail not to standard for height

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected but no reduced post spacing for transitioning

Photo #: 31-34

Figure 5-3 Example of Site Inspection Checklist

The first piece of data that was required from the site inspections was the external factor, width of bridge. This was measured using a measuring wheel between the end posts of the bridge.

The rest of the site inspection was to determine the condition of the guardrail components. Each guardrail component is assessed against current standards. The data that was needed for this was:

End Treatment

- What type of end treatment is it (e.g. fish tail, previous standard BCT, current standard)?
- Does the end treatment have breakaway terminals and a cable anchor?
- Does the end treatment have a sufficient clear zone behind it?
- Does the end treatment have a parabolic flare?

Guardrail

- Does the guardrail meet current standards for height, length and post spacing?
- What types of posts attach the guardrail (e.g. Timber, Steel)?
- Is the guardrail structurally compromised (e.g. Rotten posts, Rusted through)?
- Does the guardrail have delineation?

Transition

- Is the guardrail attached to the bridge?
- Is there reduced post spacing for transitioning to the bridge?

The data recorded from these site inspections was utilised to complete the prioritisation of the bridge approach guardrail at these sites. Photos were also taken at each bridge site and the photo numbers were recorded on the site inspection checklist sheet as to alleviate confusion when finding which photo matched which bridge.

Completed site inspection checklists for all bridge approach guardrail sites in the study area can be found in Appendix C.

5.4.3 Modification of Prioritisation Tool

After completing the site inspections and through consultation with Main Roads staff it was found that the original prioritisation tool developed required some modification.

During the site inspections it was found that there were a number of one-lane bridges in the study area. The external factor, Width of Bridge, originally only took into account two lane bridges and the safety risk of what would be described as a narrow two lane bridge would not be as great to a one-lane bridge.

Ogden (1989) states “based on studies of driver behaviour at bridges and bridge crash records, any bridge less than 5.5m should be considered a one-way bridge and any bridge less than 4.5m should be considered a hazardous site”. Therefore the groupings of the width of bridge factor for one-lane bridges will reflect these comments.

The Width of Bridge factor groupings now has a two lanes and one lane component. The two lane rating system will remain the same with the one lane added to it. The break up of the groupings for one lane bridges is:

- Greater than 5.5m = 0.5
- 4.5 m – 5.5 m = 1.0
- 4.0 m – 4.5 m = 1.5
- Less than 4.0 m = 2.0

The other modification that was made to the original prioritisation tool was to the layout of the tool. Through consultation with Main Roads staff it was decided that the comments for each guardrail component should be directly underneath the score for that component. In the original tool all the comments were placed together underneath the tool. This made it difficult to understand why a score had been given to the component.

Figure 5.4 shows the modified prioritisation tool that was employed in the prioritisation process for this project.

Bridge Name:
Structure ID:
Road Number:
Through Chainage:

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score

Comments:

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score

Comments:

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score

Comments:

Total Component Score	
X Adjustment Factor	

Total Component Score

Prioritisation Score

Figure 5-4 Modified Prioritisation Tool

5.5 Data Validation

While collecting the traffic data from Main Roads databases it was discovered that some of the bridge sites were a considerable distance away from the traffic counter sites that supplied their data. As this may lead to inaccuracies in the traffic data used for the prioritisation it was decided that checks would be completed on the bridges the furthest away from counters. A table showing each bridge in the study area and its distance from the traffic counter supplying its data can be seen in Appendix D. Figure 5.3 is a map showing the location of the permanent and short term traffic counter sites in the Southern District.

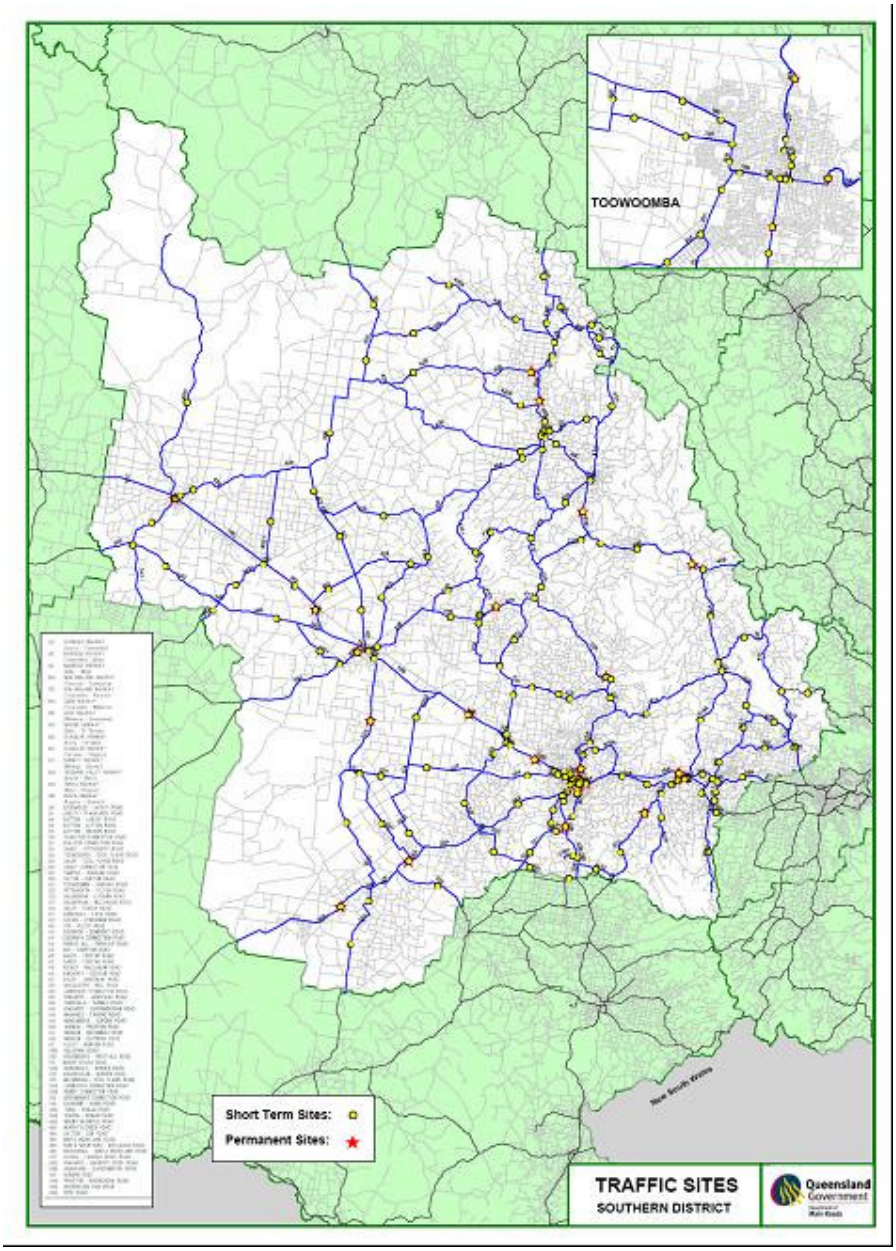


Figure 5-5 Southern District Traffic Counter Site

5.5.1 Traffic Count Checks

Five bridge sites were chosen to be checked as a sample to establish that the supplied data could be used with reasonable confidence of accuracy. These sites and their distance from the closest traffic counter were:

- 373 Meandu Creek – 11.959 km
- 398 Barambah Creek – 17.46 km
- 291 Ironpot Creek – 40.665
- 27777 Spring Creek – 25.296 km
- 284 L.G. Smith Bridge – 13.794 km

Traffic counters were placed at these sites by Main Roads staff for three weeks so that the data collected could be compared with the supplied data for the sites. It is believed that the data collected in this time should be a reasonable representation of the annual traffic flow.

Figure 5-6 Traffic Counter at Ironpot Creek

The results of these traffic counter checks and the difference between the originally supplied data and the checks can be seen in Tables 5.2, 5.3 & 5.4. The data that was collected from these traffic counter checks are located in Appendix E.

Table 5-2 AADT Checked Traffic Count Data

AADT	Supplied	Checked	Difference
Meandu Creek	3332	3367	35
Ironpot Creek	120	43	77
Barambah Creek	931	833	98
L.G. Smith Bridge	475	397	78
Spring Creek	905	498	407

Table 5-3 % Heavy Vehicles Checked Traffic Count Data

% Heavy Vehicles	Supplied	Checked	Difference
Meandu Creek	7.81	7.74	0.07
Ironpot Creek	13.25	47.9	34.65
Barambah Creek	18.88	19.11	0.23
L.G. Smith Bridge	14.74	17.67	2.93
Spring Creek	17.71	22.95	5.24

Table 5-4 85th Percentile Speed Checked Traffic Count Data

85th Percentile Speed	Supplied	Checked	Difference
Meandu Creek	102.6	103.3	0.7
Ironpot Creek	92.9	69.1	23.8
Barambah Creek	107.3	110.9	3.6
L.G. Smith Bridge	110.9	105.8	5.1
Spring Creek	108.7	112	3.3

5.5.2 Findings of Traffic Counter Checks

The data found from the Traffic Counters that were placed at the five bridge sites showed that in most cases the supplied data is a true indication of the traffic flows. The three sites that were less than 20 kilometres from their counter sites matched well with the supplied data and the slight differences would not be likely to have a bearing on factor ratings in the prioritisation tool. However for Spring Creek and Ironpot Creek which are 25 and 40 kilometres from there counter sites respectively greater discrepancies were encountered.

The Spring Creek checked traffic data showed that the actual AADT was 498 vehicles per day compared to 905 at the traffic counter site. This would change the AADT factor rating from 1.0 to 0.5 in the prioritisation. The % Heavy Vehicles data also differed by 5% however this did not change the rating factor as this site was already in the highest bracket.

Ironpot Creek showed the largest difference with the supplied data, which was to be expected as it was also the furthest distance from the traffic counter site. The AADT data supplied was 120 vehicles per day where the

checked value was 43. As this is already a very low volume road this difference will not change the prioritisation but the large discrepancy is worth noting. The % Heavy Vehicles and 85th Percentile Speed data for this site however will make a difference to the prioritisation. The supplied Heavy Vehicle data showed the site had 13.25% where the actual was 47.9% changing the rating from 1.5 to 2.0. The 85th Percentile Speed supplied data was 92.9 km/h with the actual being recorded as 69.1 km/h which would change the rating factor from 2.0 to 1.0.

The checks performed on these bridges shows that when the Traffic Counter Site supplying the data is a considerable distance away from the bridge sites that inaccuracy in the data can occur. This inaccuracy can have an effect on the final prioritisation score and for that reason it should be avoided.

From the findings of the traffic count checks it is recommended that when a bridge site is more than 20 km from its traffic counter site or if there is a major road turning off the road of the bridge site between the bridge and the counter than traffic count checks should be performed at the bridge site.

5.6 Costing Data

To be able to come up with a realistic cost for the remedial work needed at each bridge site a number of aspects needed to be taken into account. Along with the cost of the guardrail components other aspects such as the cost of site establishment and disestablishment, provision for traffic, environmental management plans, location of services, clearing and grubbing of the site and the removal of the existing guardrail needed to be included.

5.6.1 Unit Rates of Items

Approximate unit rates for the factors affecting the cost of remedial works have been sourced from Roadtek Guardrail Services in Brisbane. The unit rates quoted were for the supply and installation of the components in the study area. These unit rates were:

- W Beam Guardrail = $125 / metre
- MELT End Treatment = $3900 each
- Transition to Bridge = $3000 each

- Remove and dispose of existing guardrail = $35 / m
- Site Establishment = $6500 / site
- Clearing and Grubbing of Site = $1500 / day
- Traffic Control = $1800 / day
- Environmental Management Plan = $1000 / site
- Location of Services = $1000 / site

5.6.2 Costing Accuracy

The approximate unit rates supplied were for the installation of approach guardrail in the study area. Therefore the accuracy at the time of quoting would have been quite reasonable. However these prices represent the cost for an installation team to go from Brisbane to the study area and install bridge approach guardrail at one site only. In reality this will probably not be the case as more than one site is likely to be upgraded by the crew before returning to Brisbane. If this is the case than site establishment, environmental management plans and service location prices will come down per site because they will be able to be done on a larger scale and the costs shared between sites.

Another inaccuracy that may occur with this pricing is that the quoted prices are only valid at the time of quoting. The work to be undertaken to upgrade the bridge approach guardrail may not happen for some time and then the prices may have risen due to inflation.

Because of the possibility of unavoidable inaccuracies in the pricing of remedial work the unit rates used in this project should only be used as a guide to actual prices. The pricing of the remedial work required will be included in chapter 7 but these prices can only be expected to be approximations of the actual cost.

5.7 Conclusion

By performing site inspections at the bridge sites and checks on the supplied traffic data the accuracy of the data used in this prioritisation can be considered as being of a high standard.

Remedial work costing data should be taken as a guide only to prices because of the possibility of inaccuracies.

6 Prioritisation

6.1 Introduction

The prioritisation of remedial works for the bridge approach guardrail in the study area is the main objective of this project. By utilising the prioritisation procedure a priority ranking list of the bridge sites will be able to be developed.

6.2 Procedure of Prioritisation

The prioritisation procedure in this project is a systematic task that when followed should allow anyone to use the prioritisation tool. The prioritisation tool has been developed so that the complexity of use is kept to a minimum. However it is important that the tool is used properly to ensure that an appropriate prioritisation ranking list is developed. The prioritisation procedure is explained below and to aid in the explanation, examples of the use of the prioritisation tool are also included.

6.2.1 Identification of Site

The starting point of the prioritisation procedure is to determine which bridge approach guardrail sites are going to be included in the prioritisation. Each of these bridge sites must be identifiable by shire, road number, through chainage, ID number and bridge name. It is important that all this information be known to avoid confusion, as it is possible for two bridges to have the same name. All of this information should also be known before data collection takes place so that locations are accurately known.

6.2.2 Data Collection

The data that is required for this procedure is found from databases, traffic counters or site inspections. The data for AADT, % Heavy Vehicles and 85th Percentile Speed were sourced from Main Roads databases. However it is important to be aware of the correlation between the bridge site and the traffic counter site that supplies its data. Inaccuracies can occur in the data when the bridge site is a considerable distance from its traffic counter site. It is advised that traffic counts be collected directly from the bridge site when

the nearest traffic counter site is greater than 20 kilometres away or there is a major road turning off between the bridge and the traffic counter. This will ensure that the data being used can be considered to be of a high standard of accuracy.

Bridge width and guardrail component data where possible should be obtained through site inspections. The site inspection checklist used in this project can be seen in Chapter 5 Data Collection and Analysis.

6.2.3 External Adjustment Factor

Once the data for the external factors has been obtained each factor is given a rating score depending on the grouping that the data falls into. The external adjustment factor is found by multiplying the four external factor ratings together. The score that is found is then compared with the groupings supplied and the appropriate external adjustment factor is allocated.

6.2.4 Guardrail Component Score

The guardrail components score is found from the scores given to the three guardrail components. The end treatment, guardrail and transition are all given a score depending on their condition. These components are to be assessed against relevant standards. In this project the standards that are to be assessed against are those of The Queensland Department of Main Roads. However other jurisdictions may have different standards and should assess the components to their own standards.

The guardrail component scores are broken up into groupings that represent common conditions however engineering judgement can be used to interpolate where required between these groupings.

The Total Component Score is calculated by adding the end treatment, guardrail and transition scores together.

6.2.5 Prioritisation Score

The prioritisation score is designed to represent the condition of the approach guardrail and the added risk associated with the external factors affecting it.

Hence the Prioritisation Score is calculated by multiplying the Total Component Score by the External Adjustment Factor.

6.2.6 Prioritisation Ranking List

The ultimate goal of the prioritisation procedure is to develop a list that shows which bridge sites are the highest priorities for remedial works. In this project this is developed from the Prioritisation Scores found for each bridge approach guardrail site. The higher the prioritisation scores the higher the priority for remedial work.

From this prioritisation the bridge approach guardrail sites can then be described as high, medium or low risk sites and remedial works can be allocated accordingly. This is discussed in more detail in chapter 7.

6.3 Examples of Use of Prioritisation Tool

Examples of the use of the prioritisation tool have been included to show how the process is to be achieved. An example of a high, medium and low risk bridge approach site have been chosen so that different situations can be explained.

6.3.1 Murdering Hut Creek

6.3.1.1 Bridge Information

Shire: 89 (Nanango)
Road: 41A (Burnett Highway Nanango – Goomeri)
Through Chainage: 25.182
Structure ID: 376
Bridge Name: Murdering Hut Creek

6.3.1.2 Data

External Factors
AADT: 931
85th Percentile Speed: 107.3 km/h
Width of Bridge: 7.3 m
% Heavy Vehicles: 18.88%

Guardrail Components

End Treatment: Fish Tail

Figure 6-1 Photo of Murdering Hut Creek End Treatment

Guardrail: Structurally unsound due to timber posts rotting

Figure 6-2 Photo of Murdering Hut Creek Guardrail

Transition: Not connected and no reduced post spacing

Figure 6-3 Photo of Murdering Hut Creek Transition

6.3.1.3 Prioritisation

The first part of the prioritisation is to find the external adjustment factor. For this example the ratings are:

- AADT: 500 – 1000 = 1
- 85th Percentile Speed: >100 = 2
- Width of Bridge: 6.5 – 7.5 = 1.5
- % Heavy Vehicles: >15% = 2

Therefore to find the external adjustment factor these ratings are multiplied together: 1 * 2 * 1.5 * 2 = 6

- External Adjustment Factor: 4 – 8 = 1.5

The next stage is to find the guardrail component score. Each component is given a score depending on their condition. The scores given in this example are:

- End Treatment: Splayed ends (Fish Tail) or no end treatment = 20
- Guardrail: Structurally unsound = 10
- Transition: Not connected to the bridge = 10

Therefore the guardrail component score is the addition of these three components: 20 + 10 + 10 = 40

To find the Prioritisation Score the guardrail component score is multiplied by the external adjustment factor.

- Prioritisation Score: 40 * 1.5 = 60

The prioritisation tool that was completed for this bridge site can be seen in Figure 6.4.

Bridge Name: Murdering Hut Creek
Structure ID: 376
Road Number: 41A
Through Chainage: 25.182

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
931	1	107.3	2	7.3	1.5	18.88%	2	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	10

Comments: Guardrail structurally unsound due to timber post rotting. Guardrail not to height, length or post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: Not connected and no reduced post spacing for strengthening with concrete end post.

Total Component Score	40
X Adjustment Factor	1.5

Total Component Score	40

Prioritisation Score

60

Figure 6-4 Prioritisation of Murdering Hut Creek

6.3.2 Rocky Creek

6.3.2.1 Bridge Information

Shire: 89 (Nanango)

Road: 40C (D'Aguilar Highway Yarraman – Kingaroy)

Through Chainage: 5.59

Structure ID: 372

Bridge Name: Rocky Creek

6.3.2.2 Data

External Factors

AADT: 2898

85th Percentile Speed: 108 km/h

Width of Bridge: 7.3 m

% Heavy Vehicles: 14.88%

Guardrail Components

End Treatment: End treatment meets previous standard (BCT)

Figure 6-5 Photo of Rocky Creek End Treatment

Guardrail: Structurally sound but not to standard for height

Figure 6-6 Photo of Rocky Creek Guardrail

Transition: Connected with reduced post spacing to 1 metre but does not quite meet current standards

Figure 6-7 Photo of Rocky Creek Transition

6.3.2.3 Prioritisation

As for the previous example the starting point of using the prioritisation tool is to determine the external adjustment factor.

For this example the ratings are:

- AADT: 2500 – 5000 = 2

- 85th Percentile Speed: >100 = 2
- Width of Bridge: 6.5 – 7.5 = 1.5
- % Heavy Vehicles: 10% - 15% = 1.5

Therefore to find the external adjustment factor these ratings are multiplied together: 2 * 2 * 1.5 * 1.5 = 9

- External Adjustment Factor: 8 – 12 = 2

The next stage is to find the guardrail component score. Each component is given a score depending on their condition. The scores given in this example are:

- End Treatment: End Treatment meets previous standards = 10
- Guardrail: Does not meet current standards for height = 3 (This has been given a lesser score than the average because it only doesn't meet the standard for one criteria and provisions are included to interpolate between scores)
- Transition: Connected with reduced post spacings that don't quite meet current standards = 3 (This is given a lesser score than the average because it is connected with reduced post spacing for transitioning. However the transitioning doesn't meet current standards and provisions are included to interpolate between scores)

Therefore the guardrail component score is the addition of these three components: 10 + 3 + 3 = 16

To find the Prioritisation Score the guardrail component score is multiplied by the external adjustment factor.

- Prioritisation Score: 16 * 2 = 32

The prioritisation tool that was completed for this bridge site can be seen in Figure 6.8

Bridge Name: Rocky Creek
Structure ID: 372
Road Number: 40C
Through Chainage: 5.59

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
2898	2	108	2	7.3	1.5	14.88%	1.5	9	2
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminal and cable anchor.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	3

Comments: Guardrail structurally sound but is not to standard height.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Connected to bridge with reduced spacing for transitioning but not quite to standard.

Total Component Score	16
X Adjustment Factor	2

Prioritisation Score

32

Total Component Score	16

Figure 6-8 Prioritisation of Rocky Creek

6.3.3 Kratzman's Gully

6.3.3.1 Bridge Information

Shire: 86 (Murgon)

Road: 439 (Murgon – Gayndah Road)

Through Chainage: 24.591

Structure ID: 300

Bridge Name: Kratzman's Gully

6.3.3.2 Data

External Factors

AADT: 493

85th Percentile Speed: 107.3 km/h

Width of Bridge: 6.1 m

% Heavy Vehicles: 26.94%

Guardrail Components

End Treatment: Recently upgraded to current standards

Figure 6-9 Photo of Kratzman's Gully End Treatment

Guardrail: Recently upgraded to current standards

Figure 6-10 Photo of Kratzman's Gully Guardrail

Transition: Recently upgraded to current standards

Figure 6-11Photo of Kratzman's Gully Transition

6.3.3.3 Prioritisation

As for the previous example the starting point of using the prioritisation tool is to determine the external adjustment factor.

For this example the ratings are:

- AADT: < 500 = 0.5
- 85th Percentile Speed: >100 = 2

- Width of Bridge: < 6.5 = 2
- % Heavy Vehicles: >15% = 2

Therefore to find the external adjustment factor these ratings are multiplied together: 0.5 * 2 * 2 * 2 = 4

- External Adjustment Factor: 4 – 8 = 1.5

The next stage is to find the guardrail component score. Each component is given a score depending on their condition. The scores given in this example are:

- End Treatment: Properly installed current standard end treatment = 0
- Guardrail: Guardrail meets all current standards = 0
- Transition: Properly connected to the bridge = 0

Therefore the guardrail component score is the addition of these three components: 0 + 0 + 0 = 0

To find the Prioritisation Score the guardrail component score is multiplied by the external adjustment factor.

- Prioritisation Score: 0 * 1.5 = 0

As can be seen from this example if the approach guardrail installation meets all current standards the Prioritisation Score will always be zero no matter what the external adjustment factor is.

The prioritisation tool that was completed for this bridge site can be seen in Figure 6.12

Bridge Name: Kratzmans Gully
Structure ID: 300
Road Number: 439
Through Chainage: 24.591

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
493	0.5	107.3	2	6.1	2	26.94%	2	4	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	0

Comments: Recently upgraded to current standard.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Recently upgraded to current standard.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	0

Comments: Recently upgraded to current standard.

Total Component Score	0
X Adjustment Factor	1.5

Prioritisation Score

0

Total Component Score	0

Figure 6-12 Prioritisation of Kratzman's Gully

6.4 Conclusion

Prioritisations of each bridge site in the study area were completed and can be seen in Appendix F. These prioritisations have been used to develop the prioritisation ranking list discussed and shown in chapter 7.

7 Results

7.1 Introduction

The aim of this project was to develop a prioritisation tool that could assess the need for remedial works on bridge approach guardrail in the study area. The major result required from this was to be able to use the prioritisation tool to compile a list showing which bridge approach guardrails need the most urgent attention.

7.2 Prioritisation Ranking List

So far in this project a prioritisation tool that rates bridge approach guardrail against current standards and external factors has been developed. However the prioritisation is not complete by just finding a prioritisation score for a bridge approach guardrail site. For the score to have any meaning it needs to be compared with scores from the other bridge approach guardrail sites in the study area.

The prioritisation tool has been developed to allocate higher scores to the higher risk sites. Therefore the highest ranked sites will be those with the highest prioritisation scores. The prioritisation ranking list found by comparing all the bridge approach guardrail sites in the study area is shown in Table 7.1.

The prioritisation ranking list compiled using the prioritisation tool scores has been checked by the Main Roads Area Engineer for the study area and various other staff. These staff acknowledged that the prioritisation ranking list was an accurate representation of the standard of the approach guardrail in the area and the need for remedial works.

Table 7-1 Prioritisation Ranking List

Prioritisation Rating	ID	Bridge Name	Prioritisation Score
1	273	Tanduringie Creek	60
2	376	Mudering Hut Creek	60
3	292	Meandu Creek	60
4	389	Stuart River	57
5	406	Nukku Railway O/Bridge	52.5
6	374	Barkers Creek	52.5
7	375	Horse Creek	49.5
8	390	Sawpit Creek	49.5
9	373	Meandu Creek	45
10	369	Railway At Benarkin	42
11	274	Tanduringie Creek	40
12	299	Windera Creek	40
13	280	Spring Creek	40
14	294	Boondooma Creek	40
15	293	Di Di Creek	38
16	291	Ironpot Creek	35
17	320	Stuart River	33
18	372	Rocky Creek	32
19	330	Mannuem Creek	30
20	329	Boyne River	27
21	296	Barambah Creek	26
22	297	Oaky Creek	26
23	271	Barker Creek	24
24	287	Boyne River	21
25	289	Sandy Creek	21
26	377	Wyalla Creek	19.5
27	378	Wyalla Creek Overflow	19.5
28	398	Barambah Creek	19.5
29	321	Deep Creek	18
30	322	Reedy Creek	16
31	284	L. G. Smith Bridge	16
32	20641	Sandy Creek	13
33	298	Unnamed Creek	10
34	285	Stuart River	10
35	295	Hansen'S Gully	5
36	272	Middle Creek	0
37	300	Kratzman'S Gully	0
38	27777	Spring Ck	0

7.3 Guide to Prioritisation Scoring and Remedial Works

The Prioritisation Ranking List shown in Table 7.1 provides an insight into the risk associated with the bridge approach guardrail sites when compared with other sites in the study area. This is an important tool when limited funding for guardrail projects means that only a few of the top ranked sites will be able to be upgraded. However this does not give an overall guide to what should be considered to be a high risk site. It also does not give a direct indication at what prioritisation score the planning of remedial work is recommended.

To assist the user with the significance of the prioritisation score given to an individual bridge approach guardrail site, suggested risk ratings and guides to remedial work have been included.

Suggested Risk Rating and Guide to Works:

1. Prioritisation Score 0 – 20 = Low Risk Site
    - No remedial work required at present unless through general maintenance

2. Prioritisation Score 21 – 40 = Medium Risk Site
    - Upgrade deficient components where possible or put a plan in place for future works

3. Prioritisation Score 41 – 60 = High Risk Site
    - Full upgrade of bridge approach guardrail should be completed if funding is available or should be planned for future works

4. Prioritisation Score > 60 = Very High Risk Site
    - Full upgrade of bridge approach guardrail should be completed as soon as possible

7.4 Cost Estimates of Remedial Work

An estimate for the cost of remedial work needed to bring each bridge approach guardrail up to current standards can be seen in Table 7.2. The unit rates used for this estimation are the same quoted in Chapter 5 from Roadtek Guardrail Services Brisbane.

It should be remembered that these estimates are based on each approach guardrail site being upgraded as an individual project and that quoted prices may no longer be current. Therefore the pricings should be only taken as a guide to the price of remedial works. The sites highlighted in yellow do not have bridge rail to connect to. Because of the complexities with the installation of bridge rail this has not been included in the pricing.

From these cost estimates it can be seen that to provide a full upgrade of a site to current standards the cost will be approximately $50,000. The cost of bringing the entire study area up to current standards would be approximately $1.2 million and to just upgrade high risk sites would be approximately$485,000.

Table 7-2 Cost Estimates of Remedial Work

			Site Establishment $6500/site		Provision for Traffic $1800/day		Environmental Management Plan $1000/site		Location of Services $1000/site		Clearing and Grubbing $1500/day		Demolition and Removal of Existing $35/m		Transition $3000 each		W Beam Guardrail $125/m		MELT End Treatment $3900 each			Total Amount
Prioritisation Rank	ID	Bridge Name	Units	Amount	Units	Amount	Units	Amount	Units	Amount	Units	Amount	Units	Amount	Units	Amount	Units	Amount	Units	Amount		
1	273	Tanduringie Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	16	560	4	12000	48	6000	4	15600		$47,910
2	376	Mudering Hut Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	32	1120	4	12000	48	6000	4	15600		$48,470
3	292	Meandu Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	92	3220	4	12000	48	6000	4	15600		$50,570
4	389	Stuart River	1	6500	2.5	4500	1	1000	1	1000	0.5	750	64	2240	4	12000	48	6000	4	15600		$49,590
5	406	Nukku Railway O/Brid	1	6500	2.5	4500	1	1000	1	1000	0.5	750	48	1680	4	12000	48	6000	4	15600		$49,030
6	374	Barkers Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	80	2800	4	12000	48	6000	4	15600		$50,150
7	390	Sawpit Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	32	1120	4	12000	48	6000	4	15600		$48,470
8	375	Horse Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	50	1750	4	12000	48	6000	4	15600		$49,100
9	373	Meandu Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	80	2800	4	12000	48	6000	4	15600		$50,150
10	369	Railway At Benarkin	1	6500	2.5	4500	1	1000	1	1000	0.5	750	32	1120	4	12000		0	4	15600		$42,470
11	274	Tanduringie Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	32	1120	4	12000	48	6000	4	15600		$48,470
12	299	Windera Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	32	1120	4	12000	48	6000	4	15600		$48,470
13	280	Spring Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	32	1120	4	12000	48	6000	4	15600		$48,470
14	294	Boondooma Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	16	560	4	12000	48	6000	4	15600		$47,910
15	293	Di Di Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	32	1120	4	12000	48	6000	4	15600		$48,470
16	291	Ironpot Creek	1	6500	2.5	4500	1	1000	1	1000	0.5	750	24	840	4	12000	48	6000	4	15600		$48,190
17	320	Stuart River	1	6500	2.5	4500	1	1000	1	1000	0.5	750	48	1680	4	12000	48	6000	4	15600		$49,030
18	372	Rocky Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
19	330	Mannuem Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
20	329	Boyne River	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
21	271	Barker Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
22	296	Barambah Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
23	297	Oaky Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
24	287	Boyne River	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
25	289	Sandy Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
26	377	Wyalla Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
27	378	Wyalla Creek Overflo	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
28	398	Barambah Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
29	321	Deep Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
30	322	Reedy Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
31	284	L. G. Smith Bridge	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
32	20641	Sandy Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
33	298	Unnamed Creek	0.5	3250	1.25	2250	1	1000	0.5	500	0.25	375							4	15600		$22,975
34	285	Stuart River	0.5	3250	1	1800	1	1000	0.5	500	1	1500	Removal of tree from clear zone									$8,050
35	295	Hansen'S Gully	0.5	3250	1	1800	1	1000	0.5	500	1	1500	Removal of tree from clear zone									$8,050
36	272	Middle Creek																				$0
37	300	Kratzman'S Gully																				$0
38	27777	Spring Ck																				$0

	No bridge rail

Grand Total	$1,208,620

7.5 Comparison of Results against Other Methods

The results from the prioritisation tool developed in this project have been compared with existing methods. These methods were that of Troutbeck 2005 and Anderson 2005 whose methods have been explained in previous chapters. Although the two methods that the comparison is made with were developed to be used on all guardrail applications and not specifically bridge approach guardrail, these are the two methods most related to the prioritisation tool in this project. These two methods were also examined when developing the prioritisation tool for this project.

In order to do a comparison of the three prioritisation tools the Troubeck and Anderson methods were completed using the required data. Table 7.3 shows the scores and rankings that were allocated by each method for the sites in the study area.

Table 7-3 Comparison with Existing Methods

ID	Bridge Name	Current Prioritisation Score/Ranking		Troutbeck 2005 Score/Ranking		Anderson 2005 Score/Ranking	
273	Tanduringie Creek	60	**1**	17.6	**4**	45	**9**
376	Mudering Hut Creek	60	**1**	13.7	**9**	50	**4**
292	Meandu Creek	60	**1**	10.4	**10**	45	**9**
389	Stuart River	57	**4**	4.8	**18**	50	**4**
406	Nukku Railway O/Bridge	52.5	**5**	21.1	**2**	55	**1**
374	Barkers Creek	52.5	**5**	15.5	**6**	50	**4**
375	Horse Creek	49.5	**7**	17	**5**	50	**4**
390	Sawpit Creek	49.5	**7**	15.5	**6**	55	**1**
373	Meandu Creek	45	**9**	15.5	**6**	50	**4**
369	Railway At Benarkin	42	**10**	18.3	**3**	55	**1**
274	Tanduringie Creek	40	**11**	5.5	**15**	45	**9**
299	Windera Creek	40	**11**	8.8	**13**	45	**9**
280	Spring Creek	40	**11**	2.9	**23**	45	**9**
294	Boondooma Creek	40	**11**	2	**27**	45	**9**
293	Di Di Creek	38	**15**	1.4	**29**	45	**9**
291	Ironpot Creek	35	**16**	1.2	**31**	45	**9**
320	Stuart River	33	**17**	2.3	**26**	45	**9**
372	Rocky Creek	32	**18**	21.5	**1**	45	**9**
330	Mannuem Creek	30	**19**	9.6	**12**	45	**9**
329	Boyne River	27	**20**	4.8	**18**	40	**21**
296	Barambah Creek	26	**21**	5.8	**14**	45	**9**
297	Oaky Creek	26	**21**	4.4	**20**	45	**9**
271	Barker Creek	24	**23**	4.3	**21**	35	**28**
287	Boyne River	21	**24**	0.5	**35**	40	**21**
289	Sandy Creek	21	**24**	0.5	**35**	35	**28**
377	Wyalla Creek	19.5	**26**	9.9	**11**	40	**21**
378	Wyalla Creek Overflow	19.5	**26**	4.9	**16**	40	**21**
398	Barambah Creek	19.5	**26**	4.9	**16**	40	**21**
321	Deep Creek	18	**29**	1	**32**	35	**28**
322	Reedy Creek	16	**30**	1	**32**	35	**28**
284	L. G. Smith Bridge	16	**30**	2.5	**25**	35	**28**
20641	Sandy Creek	13	**32**	3.8	**22**	35	**28**
298	Unnamed Creek	10	**33**	2.6	**24**	35	**28**
285	Stuart River	10	**33**	0.4	**38**	0	**34**
295	Hansen'S Gully	5	**35**	0.5	**35**	0	**34**
272	Middle Creek	0	**36**	1.4	**29**	0	**34**
300	Kratzman'S Gully	0	**36**	1	**32**	0	**34**
27777	Spring Ck	0	**36**	1.8	**28**	0	**34**

7.5.1 Troutbeck 2005

The Troutbeck method was used by The Southern District of Main Roads for the prioritisation of every piece of guardrail in the district. This was completed from the data found in its audit from 2000 – 2004.

The need for the current project was born from the fact that Main Roads staff found that clearly unsatisfactory bridge sites were very low on the priority listing. The Troutbeck method is used on all guardrail applications and hence uses factors that are not as appropriate to bridge approach guardrail. This existing method also puts a large weighting on the AADT, therefore to have a high score the traffic volumes also need to be high. This method also only assesses the end treatment and not the other guardrail components.

The Troutbeck method is quite a good tool for assessing side of the road guardrail applications but does not transfer well to assessing bridge approach guardrail. The prioritisation method developed in this project has taken into account factors that are vital to the safety of a bridge approach guardrail installation and for that reason is a more suitable alternative for this application than Troutbecks existing method.

When comparing the scores and rankings from Troutbecks method and the developed tool it can be seen that the majority of the highly ranked sites remain near the top of the ranking but in a different order.

7.5.2 Anderson 2005

The Anderson method only assesses sites against three criteria, AADT, % Heavy Vehicles and Guardrail Standard. Although this method is very simplistic to use it fails to differentiate between similar sites. When data from this study was entered into the method it was found that a lot of the sites were given the same rating. This makes it difficult to achieve the major goal of prioritising remedial works.

The prioritisation tool developed in this project has more factors to assess the site against and differentiates more successfully between bridge approach guardrails of a similar standard. Therefore the developed tool is considered

to be a more suitable tool for the use of prioritising the remedial works on bridge approach guardrails.

When comparing the prioritisation scores and rankings of Anderson's method and the developed tool it can be seen that the high risk sites remain at the top of the rankings in both methods. However a lot of the top ranked bridge sites in the Anderson method have the same score. This will make it difficult to decide which sites to upgrade when limited funding is available.

7.6 Conclusion

The cost of remedial work to meet current standards is very high and limited funding for guardrail projects means that prioritising the works is essential. By utilizing the prioritisation tool developed in this project a priority ranking list and guide to works based on the prioritisation has been completed.

The developed prioritisation tool when compared with existing methods showed that it was a more suitable tool for assessing bridge approach guardrail.

8 Conclusions and Recommendations

This project has developed a method of assessment that can be used to prioritise remedial works on bridge approach guardrail for the Southern District of The Department of Main Roads Queensland. Its suitability has been shown through its use to prioritise the bridge approach guardrail in this projects study area of the South Burnett shires of Nanango, Kingaroy, Wondai and Murgon.

The assessment method has been developed as a risk based prioritisation approach. The bridge approach guardrail sites are evaluated against the consequence (guardrail components) and likelihood (external factors) of an accident. The criteria used in the prioritisation tool developed in this project to assess the need for remedial works are:

External Factors

- AADT
- 85th Percentile Speed
- Width of Bridge
- % Heavy Vehicles

Guardrail Components

- End Treatment
- Guardrail
- Transition

8.1 Achievement of Aims and Objectives

The aims and objectives set out in the Project Specification shown in Appendix A have been met in this project. These specific objectives are stated below with an explanation of how each was achieved.

Research the background information relating to the upgrading of bridge approach guardrail, the Australian Standards that are to be met by bridge approach guardrail and assessment procedures used to prioritise the remedial works.

An extensive literature review of standards and existing prioritisation methods was undertaken and discussed in Chapter 2 of this dissertation. The research of current standards was a critical part of assessing the bridge approach guardrail in the study area and hence being able to develop a suitable prioritisation tool for this project.

Analyse previously used assessment procedures and find or develop a prioritisation procedure acceptable for bridge approach guardrail in the Southern District.

A number of existing prioritisation methods were analysed for their suitability for this project. These methods came from both within Australia and internationally. It was found that most existing methods were aimed at guardrail in general and not specifically bridge approach guardrail as in this project. Therefore the existing methods did not include some of the factors that affect the safety at a bridge site.

The factors used for assessing guardrail installations in the existing prioritisation methods were analysed to find if they were suitable for inclusion in this projects prioritisation tool. From this a risk based prioritisation tool was developed to analyse bridge approach guardrail sites.

The development of the prioritisation tool in this project is discussed in detail in Chapter 4.

Analyse existing data provided by The Department of Main Roads and as required complete site inspections of bridge approach guardrail in The Southern District to acquire required data.

Main Roads supplied information about each bridge site in the district, data from traffic counter sites in the district and guardrail component data from a guardrail audit completed between 2000 and 2004.

The traffic counter data was utilised to ascertain the severity of the external factors of AADT, % Heavy Vehicles and 85th percentile speed. It was found that this data was often collected a considerable distance away from the bridge site so checks were carried out on some sample bridge sites to assess the accuracy of the supplied data.

It was also decided that because the guardrail data was collected over four years ago that site inspections of every bridge approach guardrail site in the study area would be performed to ensure accurate data was used for the prioritisation process.

An in depth explanation of the data collection and analysis can be seen in Chapter 5.

Select a suitable study area and compile a list of all bridges in the area and the characteristics of their approach guardrails.

The South Burnett shires of Nanango, Kingaroy, Wondai and Murgon were chosen as the study area for this project. These shires were chosen because they had a large percentage of bridge approach guardrail sites that did not meet current standards and they are situated in close proximity to each other to aid in the efficiency of site inspections. A list of the bridges in the study area was compiled from the list of all bridges in the district supplied by Main Roads.

Develop a priority listing by analysing the Southern District of The Department of Main Roads bridge approach guardrails with the prioritisation method found and if necessary amend the prioritisation method.

From the site inspections undertaken in this project it was recognised that modifications were required to the original prioritisation tool. This modified prioritisation tool was then used to assess all the bridge approach guardrail sites in the study area. Each site was allocated a Prioritisation Score depending on the condition of the bridge approach guardrail components and the severity of the external factors. This Prioritisation Score was then used as the basis to develop a priority listing of the sites in the study area. This priority listing is shown in Chapter 7.

Research and estimate the cost of completing the remedial work on the bridge approach guardrail in the area.

Approximate unit rates for the estimate of costs associated with remedial work of bridge approach guardrail were sourced from Roadtek Guardrail Services Brisbane. From these unit rates an estimated cost of upgrading each approach guardrail site in the study area to current standards was calculated. The table that shows these cost estimates is available in Chapter 7.

Present findings and recommendations in the required oral and written formats.

This project has been presented in the current dissertation format and as an oral presentation at the 2007 University of Southern Queensland Project Conference.

8.2 Findings from the Project

The major outcome of this project was the development of a prioritisation tool that has been assessed as being suitable to prioritise the remedial works on bridge approach guardrail for the Southern District of The Department of Main Roads Queensland. The developed tool however is not limited to just this section and has been developed so that it may be used on any bridge approach guardrail installation. Through the development of the Prioritisation Tool and Priority List in this project a number of key findings have been identified.

The key findings to come out of this project are:

- Existing methods of prioritising guardrail are not suitable for the specific task of assessing bridge approach guardrail. Important factors that are considered to contribute to crashes at bridge sites have been overlooked in existing methods. Therefore there is a definite need for the prioritisation tool developed in this project.

- It is essential for the prioritisation process to be completed successfully that accurate data is used. This project found that supplied data often was collected a considerable distance from the bridge site it was supplied for. Checks were performed on the accuracy of the data supplied for the bridge approach guardrail sites. It was found that additional traffic counts directly at the bridge approach guardrail site should be undertaken when the bridge site is further than 20 kilometres away from its traffic counter site or where a major road turns off between the bridge and traffic counter sites.

- To assist the user with the significance of a given prioritisation score a rating of Very High, High, Medium and Low Risk Site has been suggested for score groupings. A suggestion for the planning of remedial works based on the category of risk allocated to a score has also been recommended.

- The cost of upgrading all bridge approach guardrail in the district to current standards would require a massive funding boost to that currently available for guardrail projects. As it is unlikely that funding will be available immediately for the work required the remedial works indicated in this project should be programmed so that the highest priority sites are upgraded first.

8.3 Recommendations for Future Work

This project has endeavoured to complete a comprehensive evaluation of what factors directly affect the safety of bridge approach guardrail and the prioritisation tool has been developed accordingly. The data supplied and collected was assessed to ensure accuracy and a priority listing was compiled from the use of the developed prioritisation tool.

Although the prioritisation tool developed in this project has been successful in prioritising bridge approach guardrail remedial work there are some parts that could be analysed more closely which could improve the prioritisation tool developed.

Some recommendations for future work that could be completed to improve the outcome of this project and add to the value of the prioritisation tool developed are:

- A study of the factors that affect the safety of a bridge site would be useful. Factors used in this project were taken from existing methods and researched to find how the severity changed for different factors. Limited research was found that linked factors with crashes exclusively at bridge sites.

- Further assessment of the implications the distance between the bridge site and the traffic counter site supplying its data has on the accuracy of data is required. In this project only five sites with differing distances were able to be assessed and recommendations were made based on those results. To be

able to validate these recommendations more sites and sites in different locations should be assessed to find if there is a correlation between the distance away from traffic counter sites and the accuracy of the data.

- This project only prioritised a small section of the Southern District. Before remedial work is programmed it is recommended that the entire district be assessed using the developed prioritisation tool so that funding is allocated to the highest risk sites.

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Appendices

Appendix A Project Specification

University of Southern Queensland

FACULTY OF ENGINEERING AND SURVEYING

ENG 4111/4112 Research Project
PROJECT SPECIFICATION

FOR: **WARREN JOHN HARVEY**
TOPIC: BRIDGE GUARDRAIL PRIORITISATION

SUPERVISORS: Ron Ayres
Phil Tweddell, Dept. of Main Roads

ENROLMENT: ENG 4111-S1, D, 2007; ENG 4112-S2, D, 2007

PROJECT AIM: This project aims to develop a method of assessment that can be used to prioritise remedial works on bridge approach guardrail for the Southern District of The Department of Main Roads.

SPONSORSHIP: Southern District of The Department of Main Roads

PROGRAMME: **Issue B, 28 September 2007**

1. Research the background information relating to the upgrading of bridge approach guardrail, the Australian Standards that are to be met by bridge approach guardrail and assessment procedures used to prioritise the remedial works.

2. Analyse previously used assessment procedures and find or develop a prioritisation procedure acceptable for bridge approach guardrail in the Southern District.

3. Analyse existing data provided by The Department of Main Roads and as required complete site inspections of bridge approach guardrail in the Southern District to acquire required data.

4. Select a suitable study area and compile a list of all bridges in the area and the characteristics of their approach guardrails.

5. Develop a priority listing by analysing the Southern District of The Department of Main Roads bridge approach guardrails with the prioritisation method found in 2 and if necessary amend the prioritisation method.

6. Research and estimate the cost of completing the remedial work on the bridge approach guardrails in the area.

7. Present findings and recommendations in the required oral and written formats.

AGREED: _____ (student)_____, _____(supervisors)
__/__/__ __/__/__ __/__/__

Appendix B Southern District Bridges

DIST	Road	CWY	Tdist	ID	NAME	Construction Type	Construction Material	Design Length	Width	Construct_Date
3	18A	3	30.49	338	Plain Creek	Deck Unit	Pre-Stressed Concrete	40	8.5	01-JAN-1977
3	18A	2	30.732	339	Plain Creek	Deck Unit	Pre-Stressed Concrete	36	9.3	01-JAN-1977
3	18A	3	47.87	340	Jack Martin Bridge	Girder/Beam	Steel	80	8.53	01-JAN-1959
3	18A	2	48.03	341	Jack Martin Bridge	Deck Unit	Pre-Stressed Concrete	100	9.84	01-JAN-1984
3	18A	2	53.2	941	Qacc Overpass - Gatton Colleg	Girder/Beam	Pre-Stressed Concrete	40	16	01-JAN-1986
3	18A	X	55.405	33372	Gatton Flyover	Deck Unit	Pre-Stressed Concrete	65	9.4	26-AUG-2003
3	18A	2	56.45	342	Lockyer Creek	Deck Unit	Pre-Stressed Concrete	110	9.3	01-JAN-1989
3	18A	3	56.45	33373	Lockyer Creek	Deck Unit	Pre-Stressed Concrete	103	9.8	26-AUG-2003
3	18A	2	59.32	343	Allan Street	Deck Unit	Pre-Stressed Concrete	30	11.1	01-JAN-1989
3	18A	3	59.34	33374	Adare Underpass	Deck Unit	Pre-Stressed Concrete	20	11	26-AUG-2003
3	18A	3	62.65	33375	Smithfield Underpass	Deck Unit	Pre-Stressed Concrete	14	11	21-OCT-2003
3	18A	3	66.76	33376	Philips Underpass	Deck Unit	Pre-Stressed Concrete	18	11	21-OCT-2003
3	18A	2	66.82	346	Service Road "C"	Deck Unit	Pre-Stressed Concrete	18	11.11	01-JAN-1989
3	18A	2	69.69	344	Sandy Creek	Deck Unit	Pre-Stressed Concrete	100	9.2	01-JAN-1989
3	18A	3	69.69	33377	Sandy Ck	Deck Unit	Pre-Stressed Concrete	110	9.8	21-OCT-2003
3	18A	2	75.01	345	Western Railway	Deck Unit	Pre-Stressed Concrete	104	9.2	01-JAN-1987
3	18A	3	75.01	33378	Helidon Rail Overpass	Box Girder	Pre-Stressed Concrete	110	11	23-SEP-2003
3	18A	3	75.69	8671	Lockyer Creek	Girder/Beam	Steel	92	7.3	01-JAN-1956
3	18A	2	75.7	347	Lockyer Creek	Deck Unit	Pre-Stressed Concrete	100	9.22	01-JAN-1990
3	18B	1	25.26	348	Gowrie Creek	Deck Unit	Pre-Stressed Concrete	34	9.3	01-JAN-1981
3	18B	1	29.495	14211	Oakey Creek	Deck Unit	Pre-Stressed Concrete	75	9.2	01-JUL-1997
3	18B	1	83.604	350	Myall Creek	Girder/Beam	Steel	92	15.8	01-JAN-1958
3	18C	1	23.875	335	Jimbour Creek	Deck Unit	Pre-Stressed Concrete	99	9.3	01-JAN-1993
3	18C	1	45.47	351	Cooranga Creek	Deck Unit	Pre-Stressed Concrete	90	8.64	01-JAN-1976
3	18C	1	81.837	352	Charleys Creek	Deck Unit	Pre-Stressed Concrete	56	9.3	01-JAN-1979
3	18C	1	83.482	353	Rocky Creek	Deck Unit	Pre-Stressed Concrete	45	9.3	01-JAN-1982
3	22A	1	27.34	336	Cooyar Creek	Girder/Beam	Steel	53.35	6.7	01-JAN-1962
3	22A	1	27.962	354	Back Creek	Girder/Beam	Steel	34.74	6.1	01-JAN-1958
3	22A	1	47.491	355	Bum Bum Creek	Girder/Beam	Timber	36.6	5.49	01-JAN-1938
3	22A	1	54.707	356	Emu Creek	Girder/Beam	Timber	45.75	6.1	01-JAN-1937
3	22A	2	113.814	358	Railway At Harlaxton	Deck Unit	Pre-Stressed Concrete	13.63	8.6	01-JAN-1991
3	22A	3	113.814	357	Picnic Bridge	Girder/Beam	Steel	11	8.8	01-JAN-1917
3	22B	1	9.61	359	Claude Luck Bridge	Deck Unit	Pre-Stressed Concrete	24	8.5	01-JAN-1966
3	22B	1	16.197	360	Eatonvale Bridge	Deck Unit	Pre-Stressed Concrete	46	8.5	01-JAN-1968
3	28A	1	15.52	16698	Westbrook Creek Bridge	Deck Unit	Pre-Stressed Concrete	36	9	15-NOV-1996
3	28A	1	66.831	361	Condamine River	Deck Unit	Pre-Stressed Concrete	58	8.6	01-JAN-1980
3	28A	1	78.29	24899	Back Creek	Deck Unit	Pre-Stressed Concrete	40	10	10-SEP-2001
3	3083	1	0.785	303	Laidley Creek	Girder/Beam	Timber	30.18	6.1	01-JAN-1964
3	3083	1	2.518	25730	Coopers Bridge	Deck Unit	Pre-Stressed Concrete	39.7	8.6	21-DEC-2001
3	3083	1	25.175	301	Laidley Creek	Deck Unit	Pre-Stressed Concrete	30	7.4	01-JAN-1975
3	3102	1	5.115	304	Budgee Creek	Girder/Beam	Timber	27.4	5.5	01-JAN-1935
3	311	1	0.017	215	Lagoon Gully No 1	Deck Unit	Pre-Stressed Concrete	26	8.5	01-JAN-1974
3	312	1	14.363	216	Laidley Creek	Deck Unit	Pre-Stressed Concrete	34.3	8	01-JAN-1970
3	313	1	12.447	217	Dry Creek	Girder/Beam	Timber	45.7	6.1	01-JAN-1940
3	313	1	18.096	24898	Ma Ma Creek	Deck Unit	Pre-Stressed Concrete	76	9.3	28-JAN-2000
3	313	1	19.611	222	Ma Ma Creek	Girder/Beam	Timber	36.6	7.1	01-JAN-1936

DIST	Road	CWY	Tdist	ID	NAME	Construction Type	Construction Material	Design Length	Width	Construct_Date
3	313	1	23.29	223	Heifer Creek No 1	Girder/Beam	Timber	54.9	5.5	01-JAN-1937
3	313	1	26.117	224	Heifer Creek No 2	Girder/Beam	Timber	45.7	6.1	01-JAN-1936
3	313	1	27.371	225	Heifer Creek No 3	Girder/Beam	Timber	36.6	5.5	01-JAN-1936
3	313	1	27.942	226	Heifer Creek No 4	Girder/Beam	Timber	36.6	5.5	01-JAN-1934
3	313	1	28.396	227	Heifer Creek No 5	Girder/Beam	Timber	27.4	5.5	01-JAN-1936
3	313	1	29.126	228	Heifer Creek No 6	Girder/Beam	Timber	27.4	6.1	01-JAN-1935
3	313	1	29.535	220	Unnamed Creek	Girder/Beam	Timber	9.1	6.1	01-JAN-1935
3	313	1	29.996	229	Heifer Creek No 7	Girder/Beam	Timber	27.4	5.5	01-JAN-1936
3	313	1	34.05	219	Horse Trough Creek	Girder/Beam	Timber	18.3	5.5	01-JAN-1935
3	313	1	41.791	218	Back Creek	Girder/Beam	Timber	36.6	6.1	01-JAN-1961
3	313	1	43.716	213	King Creek	Girder/Beam	Timber	27.4	5.5	01-JAN-1936
3	3131	1	8.91	305	Tenthill Creek	Deck Unit	Pre-Stressed Concrete	41.2	6.7	01-JAN-1969
3	3131	1	14.729	306	Blackfellow Creek	Deck Unit	Pre-Stressed Concrete	41.2	6.7	01-JAN-1969
3	314	1	3.04	237	Railway Overpass At Gatton	Deck Unit	Pre-Stressed Concrete	39	9.3	01-JAN-1977
3	314	1	6.749	231	Robinsons Bridge	Girder/Beam	Pre-Stressed Concrete	82.3	8.5	01-JAN-1972
3	314	1	9.553	230	Lockyer Creek	Girder/Beam	Steel	112.8	8.5	01-JAN-1966
3	323	1	2.3	233	Westbrook Creek	Deck Unit	Pre-Stressed Concrete	45.7	7.4	01-JAN-1972
3	324	1	15.453	234	Westbrook Creek	Deck Unit	Pre-Stressed Concrete	42	8.6	01-JAN-1996
3	324	1	72.129	235	Condamine River	Girder/Beam	Steel	41.1	6.7	01-JAN-1963
3	324	1	77.989	236	Condamine River	Girder/Beam	Timber	100.6	7.2	01-JAN-1956
3	325	1	10.92	238	Oakey Creek	Deck Unit	Pre-Stressed Concrete	60	7.4	01-JAN-1976
3	325	1	20.664	239	Ashall Creek	Girder/Beam	Timber	27.4	5.5	01-JAN-1940
3	325	1	26.942	8674	Condamine River	Girder/Beam	Steel	54.9	6.7	01-JAN-1969
3	326	1	3.495	349	Oakey Creek	Girder/Beam	Steel	69	7.3	01-JAN-1947
3	331	1	19.436	240	Emu Creek	Deck Unit	Pre-Stressed Concrete	28	8	01-JAN-1986
3	331	1	27.031	241	Sandy Creek	Deck Unit	Pre-Stressed Concrete	36.6	7.3	01-JAN-1962
3	332	1	19.543	242	Hodgson Creek	Girder/Beam	Timber	34.1	5.5	01-JAN-1960
3	335	1	0.38	243	Grasstree Creek	Deck Unit	Pre-Stressed Concrete	60	8	01-JAN-1986
3	335	1	20.826	244	Dogtrap Creek	Girder/Beam	Timber	27.4	5.5	01-JAN-1946
3	335	1	22.956	245	Canal Creek	Girder/Beam	Timber	27.4	5.5	01-JAN-1946
3	337	1	33.4	246	Bringalily Creek	Deck Unit	Pre-Stressed Concrete	30.5	6.7	01-JAN-1964
3	340	1	12.881	247	Condamine River	Girder/Beam	Steel	82.3	6.7	01-JAN-1961
3	340	1	24.256	248	Wilkie Creek	Girder/Beam	Timber	32.9	5.5	01-JAN-1939
3	340	1	36.222	249	Braemar Creek	Girder/Beam	Timber	24.7	5.5	01-JAN-1939
3	340	1	47.463	250	Kogan Creek	Girder/Beam	Timber	36.6	5.5	01-JAN-1940
3	3402	1	39.702	307	Kogan Creek	Girder/Beam	Timber	15.2	5.5	01-JAN-1954
3	3403	1	6.39	308	Condamine River	Girder/Beam	Steel	57.9	7.3	01-JAN-1973
3	341	1	9.03	251	Condamine River	Girder/Beam	Steel	99.1	7.3	01-JAN-1970
3	341	1	21.635	252	Wambo Creek	Girder/Beam	Timber	27.4	5.5	01-JAN-1940
3	342	1	15.571	253	Fourteen Mile Creek	Girder/Beam	Timber	36.6	5.5	01-JAN-1941
3	342	1	20.349	254	Wambo Creek	Deck Unit	Pre-Stressed Concrete	42	8	01-JAN-1983
3	342	1	45.797	8675	Wiembilla Creek	Girder/Beam	Timber	45.7	7.4	01-JAN-1939
3	35A	1	7.847	392	Myall Creek	Girder/Beam	Steel	46	9.4	01-JAN-1955
3	35A	1	9.436	393	Loudon'S Bridge	Girder/Beam	Steel	108	9.4	01-JAN-1954
3	35A	1	25.154	366	Wilkie Creek	Girder/Beam	Timber	32.92	7.31	01-JAN-1953
3	4023	1	15.65	309	Northbrook Creek No 1	Deck Unit	Pre-Stressed Concrete	42	7.3	01-JAN-1990

DIST	Road	CWY	Tdist	ID	NAME	Construction Type	Construction Material	Design Length	Width	Construct_Date
3	4023	1	17.524	310	Northbrook Creek No 2	Deck Unit	Pre-Stressed Concrete	17.7	9.1	01-JAN-1990
3	4023	1	17.771	311	Northbrook Creek No 3	Deck Unit	Pre-Stressed Concrete	17.7	8	01-JAN-1990
3	4023	1	24.657	312	Northbrook Creek No 4	Deck Unit	Pre-Stressed Concrete	24	8	01-JAN-1990
3	405	1	4.5	255	Coal Creek	Deck Unit	Pre-Stressed Concrete	42	7.3	01-JAN-1977
3	405	1	7.603	256	Meiers Gully	Deck Unit	Pre-Stressed Concrete	33	8	01-JAN-1978
3	405	1	14.48	257	Brisbane River	Girder/Beam	Pre-Stressed Concrete	264	7.4	01-JAN-1978
3	405	1	21.88	258	Silverton Creek	Deck Unit	Pre-Stressed Concrete	39	8	01-JAN-1982
3	405	1	25.38	259	Waterfall Gully	Girder/Beam	Timber	21.3	5.5	01-JAN-1939
3	40B	1	22.991	396	Brisbane River	Girder/Beam	Pre-Stressed Concrete	238	8.6	01-JAN-1985
3	40B	1	27.485	394	Emu Creek	Girder/Beam	Steel	109	7.3	01-JAN-1964
3	40B	1	31.429	363	Wallaby Creek	Girder/Beam	Steel	45	7.3	01-JAN-1962
3	40B	1	36.038	364	Wallaby Creek	Girder/Beam	Timber	41	7.3	01-JAN-1940
3	40B	1	39.313	365	Wallaby Creek	Girder/Beam	Timber	35	7.3	01-JAN-1940
3	40B	1	44.97	368	Blackbutt Creek	Deck Unit	Pre-Stressed Concrete	68	8.6	01-JAN-1984
3	40B	1	50.19	369	Railway At Benarkin	Deck Unit	Pre-Stressed Concrete	14	8.64	01-JAN-1985
3	40B	1	54.601	367	Taromeo Creek	Girder/Beam	Timber	18	7.9	01-JAN-1942
3	40B	1	58.03	406	Nukku Railway O/Bridge	Deck Unit	Pre-Stressed Concrete	16.7	8.6	01-JAN-1980
3	40B	1	61.311	370	Railway At Gilla	Deck Unit	Pre-Stressed Concrete	18	8.64	01-JAN-1980
3	40B	1	63.164	331	Cooyar Creek	Girder/Beam	Steel	92.7	6.7	01-JAN-1958
3	40B	1	68.396	371	Yarraman Creek	Deck Unit	Pre-Stressed Concrete	48	8.6	01-JAN-1983
3	40C	1	5.59	372	Rocky Creek	Deck Unit	Pre-Stressed Concrete	28	7.3	01-JAN-1967
3	40C	1	20.342	332	Sandy Creek	Girder/Beam	Timber	15.2	7.3	01-JAN-1939
3	40C	1	27.041	373	Meandu Creek	Deck Unit	Pre-Stressed Concrete	39	8.7	01-JAN-1981
3	40C	1	27.91	374	Barkers Creek	Deck Unit	Pre-Stressed Concrete	40	8.7	01-JAN-1980
3	40C	1	28.942	375	Horse Creek	Deck Unit	Pre-Stressed Concrete	36	8.65	01-JAN-1978
3	410	1	1.176	8676	Pryde Creek	Deck Unit	Pre-Stressed Concrete	28	8	01-JAN-1977
3	410	1	2.797	8677	Pryde Creek	Deck Unit	Pre-Stressed Concrete	28	8	01-JAN-1977
3	410	1	2.948	8678	Pryde Creek	Deck Unit	Pre-Stressed Concrete	28	8	01-JAN-1977
3	410	1	3.685	8679	Pryde Creek	Deck Unit	Pre-Stressed Concrete	28	7.8	01-JAN-1977
3	410	1	8.73	8680	Branch Ck	Deck Unit	Pre-Stressed Concrete	60	8	01-JAN-1978
3	410	1	13.098	8682	Kipper Ck	Deck Unit	Pre-Stressed Concrete	64	7	01-JAN-1977
3	410	1	23.407	8681	Deep Creek	Deck Unit	Pre-Stressed Concrete	43	6.8	01-JAN-1978
3	410	1	27.469	8683	Sandy Creek	Deck Unit	Pre-Stressed Concrete	42	6.9	01-JAN-1981
3	410	1	37.542	8684	Reedy Creek	Deck Unit	Pre-Stressed Concrete	120	7.2	01-JAN-1983
3	410	1	38.786	8685	Stanley River	Deck Unit	Pre-Stressed Concrete	150	7.6	01-JAN-1983
3	4104	1	0.982	313	Rocky Creek 1st Crossing	Slab	Concrete	30.5	5.5	01-JAN-1928
3	4104	1	22.799	314	Railway Overpass At Ballard	Deck Unit	Pre-Stressed Concrete	23	8.6	01-JAN-1985
3	411	1	8.223	260	Buaraba Creek	Girder/Beam	Timber	73.1	5.5	01-JAN-1947
3	412	1	0.461	261	Laidley Creek	Deck Unit	Pre-Stressed Concrete	16.5	7.3	01-JAN-1973
3	412	1	8.523	262	Lockyer Creek	Girder/Beam	Steel	54.9	7.3	01-JAN-1969
3	412	1	18.007	263	Blind Gully	Deck Unit	Pre-Stressed Concrete	82.5	6.7	01-JAN-1967
3	412	1	25.382	264	Lockyer Creek	Girder/Beam	Timber	54.9	5.5	01-JAN-1958
3	412	1	33.231	265	Slip Gully	Girder/Beam	Timber	18.3	7.3	01-JAN-1958
3	414	1	0.601	266	Redbank Creek No 1	Deck Unit	Pre-Stressed Concrete	36.6	7.3	01-JAN-1963
3	414	1	3.329	267	Redbank Creek No 2	Deck Unit	Pre-Stressed Concrete	42	8.6	01-JAN-1986
3	414	1	10.55	268	Redbank Creek No 3	Girder/Beam	Timber	36.6	5.5	01-JAN-1943

DIST	Road	CWY	Tdist	ID	NAME	Construction Type	Construction Material	Design Length	Width	Construct_Date
3	414	1	12.066	269	Redbank Creek No 4	Girder/Beam	Timber	45.7	6.1	01-JAN-1942
3	414	1	12.258	270	Redbank Creek No 5	Girder/Beam	Timber	45.7	6.1	01-JAN-1942
3	414	1	38.501	8686	Ballard Creek	Girder/Beam	Timber	36.6	6.1	01-JAN-1942
3	4144	1	0.71	315	Lockyer Creek	Deck Unit	Pre-Stressed Concrete	61	7.3	01-JAN-1971
3	4144	1	15.837	316	Yellow Gully	Girder/Beam	Pre-Stressed Concrete	26	8	01-JAN-1982
3	4144	1	20.06	317	Buaraba Creek	Deck Unit	Pre-Stressed Concrete	90	8.6	01-JAN-1991
3	418	1	44.26	337	Myall Creek	Deck Unit	Pre-Stressed Concrete	25	6.7	01-JAN-1965
3	419	1	20.831	271	Barker Creek	Girder/Beam	Timber	36.6	5.5	01-JAN-1934
3	419	1	23.776	272	Middle Creek	Girder/Beam	Timber	27.4	5.5	01-JAN-1954
3	419	1	38.629	274	Tanduringie Creek	Deck Unit	Pre-Stressed Concrete	42.7	7.3	01-JAN-1971
3	419	1	46.208	273	Tanduringie Creek	Girder/Beam	Timber	22.9	5.5	01-JAN-1939
3	4196	1	3.286	318	Middle Creek	Girder/Beam	Timber	9.1	3.9	01-JAN-1967
3	41A	1	0.815	20641	Sandy Creek	Deck Unit	Pre-Stressed Concrete	30	9.22	20-OCT-1998
3	41A	1	25.182	376	Mudering Hut Creek	Deck Unit	Pre-Stressed Concrete	12	7.35	01-JAN-1972
3	41A	1	27.118	377	Wyalla Creek	Deck Unit	Pre-Stressed Concrete	19	7.35	01-JAN-1972
3	41A	1	27.276	378	Wyalla Creek Overflow	Deck Unit	Pre-Stressed Concrete	23	7.35	01-JAN-1972
3	41A	1	42.46	398	Barambah Creek	Girder/Beam	Timber	56	7	01-JAN-1942
3	4202	1	20.476	319	Barker'S Creek	Girder/Beam	Timber	24	6.1	01-JAN-1967
3	4206	1	4.64	320	Stuart River	Deck Unit	Pre-Stressed Concrete	72	7.4	01-JAN-1975
3	4206	1	11.55	321	Deep Creek	Girder/Beam	Timber	30.5	3.6	01-JAN-1925
3	4206	1	15.35	322	Reedy Creek	Deck Unit	Pre-Stressed Concrete	80	7.36	01-JAN-1997
3	421	1	21.94	276	Jimbour Creek	Deck Unit	Pre-Stressed Concrete	36.6	7.3	01-JAN-1966
3	423	1	0.038	32634	Jandowae Creek	Deck Unit	Pre-Stressed Concrete	26	8.6	24-SEP-2003
3	424	1	18.8	24943	Downfall Creek	Special	Timber	7	5.1	01-JAN-1967
3	426	1	94.813	279	G. S. Bond Bridge	Girder/Beam	Timber	61	5.5	01-JAN-1931
3	426	1	98.564	280	Spring Creek	Deck Unit	Pre-Stressed Concrete	32	7.3	01-JAN-1973
3	426	1	108.33	281	Duff'S Gully	Girder/Beam	Timber	18.3	5.5	01-JAN-1956
3	426	1	121.59	282	Coverty Creek	Girder/Beam	Timber	36.6	5.5	01-JAN-1952
3	426	1	123.762	283	Lambing Creek	Girder/Beam	Timber	15.2	5.5	01-JAN-1950
3	426	1	133.506	284	L. G. Smith Bridge	Girder/Beam	Steel	68.6	6.7	01-JAN-1961
3	428	1	3.431	285	Stuart River	Girder/Beam	Timber	36.6	5.5	01-JAN-1933
3	428	1	19.664	286	Gordon Brook Creek	Deck Unit	Pre-Stressed Concrete	32	6.7	01-JAN-1965
3	428	1	33.16	287	Boyne River	Girder/Beam	Timber	45.72	3.7	01-JAN-1925
3	428	1	33.308	289	Sandy Creek	Girder/Beam	Timber	22.86	7	01-JAN-1925
3	428	1	35.525	290	Unnamed Creek	Girder/Beam	Timber	9	8	01-JAN-1923
3	428	1	47.865	291	Ironpot Creek	Girder/Beam	Timber	31.08	7	01-JAN-1937
3	428	1	55.601	288	Boyne River	Girder/Beam	Timber	36.6	7	01-JAN-1957
3	429	1	9.45	292	Meandu Creek	Deck Unit	Pre-Stressed Concrete	30.5	6.7	01-JAN-1964
3	42A	1	5.2	333	Sandy Creek (South Branch)	Deck Unit	Pre-Stressed Concrete	32	8.7	01-JAN-1975
3	42A	1	6.538	334	Sandy Creek (North Branch)	Deck Unit	Pre-Stressed Concrete	24.08	8.5	01-JAN-1975
3	42A	1	11.122	401	Fairney Brook	Deck Unit	Pre-Stressed Concrete	36	8.6	01-JAN-1978
3	42A	1	18.09	397	Brisbane River	Girder/Beam	Pre-Stressed Concrete	217	8.6	01-JAN-1994
3	42A	1	23.4	388	Wivenhoe Dam Spillway	Deck Unit	Pre-Stressed Concrete	74	8.6	01-JAN-1984
3	42A	1	36.93	387	Logan Creek	Deck Unit	Pre-Stressed Concrete	48	8.5	01-JAN-1976
3	42A	1	38.648	385	Ti-Tree Gully	Deck Unit	Pre-Stressed Concrete	24	8.5	01-JAN-1977
3	42A	1	41.46	384	Five Mile Creek	Deck Unit	Pre-Stressed Concrete	36	8.5	01-JAN-1977

DIST	Road	CWY	Tdist	ID	NAME	Construction Type	Construction Material	Design Length	Width	Construct_Date
3	42A	1	43.796	386	Ti-Tree Gully	Deck Unit	Pre-Stressed Concrete	27	7.3	01-JAN-1964
3	42A	1	46.67	383	Paddy Creek	Deck Unit	Pre-Stressed Concrete	33	7.3	01-JAN-1976
3	42A	1	53.753	382	Esk Creek	Deck Unit	Pre-Stressed Concrete	73	8.6	01-JAN-1988
3	42A	1	63.16	381	Railway At Ottaba	Deck Unit	Pre-Stressed Concrete	24	8.6	01-JAN-1986
3	42A	1	70.485	380	Camp Creek	Deck Unit	Pre-Stressed Concrete	50	8.6	01-JAN-1982
3	42A	1	70.956	379	Cressbrook Creek	Deck Unit	Pre-Stressed Concrete	48	8.6	01-JAN-1982
3	42A	1	81.1	402	Railway At Timbun	Girder/Beam	Steel	13	7.3	01-JAN-1957
3	42A	1	85.308	400	Ivory Creek	Girder/Beam	Steel	123	6.7	01-JAN-1961
3	42A	1	87.48	328	Jimmy Gully	Deck Unit	Pre-Stressed Concrete	56	8.6	23-AUG-1995
3	435	1	66.79	293	Di Di Creek	Deck Unit	Pre-Stressed Concrete	33	7.4	01-JAN-1975
3	435	1	80.74	294	Boondooma Creek	Girder/Beam	Timber	36.6	5.5	01-JAN-1940
3	4356	1	5.52	324	Stuart River	Girder/Beam	Timber	68.6	4.9	01-JAN-1927
3	4356	1	34.937	325	Boyne River	Girder/Beam	Timber	74.7	5.5	01-JAN-1936
3	436	1	16.198	295	Hansen'S Gully	Girder/Beam	Timber	22.86	8	01-JAN-1960
3	4365	1	7.311	405	Barambah Creek	Girder/Beam	Timber	36.6	3.7	01-JAN-1939
3	437	1	1.542	296	Barambah Creek	Deck Unit	Pre-Stressed Concrete	56	8	01-JAN-1980
3	439	1	4.067	297	Oaky Creek	Deck Unit	Pre-Stressed Concrete	32	8	01-JAN-1984
3	439	1	21.502	298	Unnamed Creek	Girder/Beam	Timber	15.2	5.5	01-JAN-1954
3	439	1	22.752	299	Windera Creek	Deck Unit	Pre-Stressed Concrete	54.9	7.3	01-JAN-1975
3	439	1	24.591	300	Kratzman'S Gully	Girder/Beam	Timber	36.6	6.1	01-JAN-1958
3	45A	1	65.414	27777	Spring Ck	Deck Unit	Pre-Stressed Concrete	48	9	18-OCT-2002
3	45A	1	69.992	329	Boyne River	Girder/Beam	Timber	15.24	6.7	01-JAN-1959
3	45A	1	72.63	330	Mannuem Creek	Girder/Beam	Timber	20.41	7	01-JAN-1930
3	45A	1	99.225	389	Stuart River	Deck Unit	Pre-Stressed Concrete	71	7.3	01-JAN-1977
3	45B	1	30.403	404	Dingo Creek	Slab	Concrete	16	7.3	01-JAN-1957
3	45B	1	39.388	403	Barambah Creek	Girder/Beam	Steel	84	8.5	01-JAN-1971
3	45B	1	47.46	390	Sawpit Creek	Deck Unit	Pre-Stressed Concrete	40	8.65	01-JAN-1978

Appendix C Site Inspections

Site Inspection Checklist

Site Name: 369 Railway at Benarkin

External Factors

Width of Bridge: 8.7m

End Treatment

Type: Modified fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): Yes

Clear Zone: Drop off behind guardrail

Parabolic Flare: No, straight flare

Comments: Fish tail has curved section welded to it.

Guardrail

Height: 650mm to top

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Good

Delineation (Y/N): Yes

Comments: Guardrail not to standard for height

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected but no reduced post spacing for transitioning

Photo #: 31-34

Site Inspection Checklist

Site Name: 406 Nukku Railway Overbridge

External Factors

Width of Bridge: 8.7m

End Treatment

Type: Fishtail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: Yes

Parabolic Flare: No 2m straight offset

Comments: Fish tail end treatment

Guardrail

Height: 600mm to top

Length: 12m

Posts: Timber

Spacing: 2m

Structural Adequacy: Timber posts rotting

Delineation (Y/N): Yes

Comments: Structurally unsound and not to standard for height and length.

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected but no reduced post spacing for transitioning

Photo #: 35-39

Site Inspection Checklist

Site Name: 372 Rocky Creek

External Factors

Width of Bridge: 7.3m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: Tree in clear zone, drop off behind guardrail

Parabolic Flare: Yes

Comments: Previous standard with breakaway terminals and cable anchor

Guardrail

Height: 650mm to top

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Good

Delineation (Y/N): Yes

Comments: Guardrail no to standard for height

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes 8@1m

Comments: Connected and reduced post spacing for transitioning but not quite to standard

Photo #: 40-43

Site Inspection Checklist

Site Name: 375 Horse Creek

External Factors

Width of Bridge: 8.6m

End Treatment

Type: Modified fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Fish tail has curved section welded to it.

Guardrail

Height: 700mm to top

Length: 17m on approach, 8m on departure side

Posts: Timber

Spacing: 4m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail has timber posts and is not to standard for length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected but no reduced post spacing for transitioning

Photo #: 54-58

Site Inspection Checklist

Site Name: 373 Meandu Creek

External Factors

Width of Bridge: 8.6m

End Treatment

Type: Modified fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Fish tail has curved section welded to it and is not in good condition

Guardrail

Height: 650mm to top

Length: 20m

Posts: Timber

Spacing: 4m

Structural Adequacy: Yes

Delineation (Y/N): Yes but some broken and missing

Comments: Guardrail has timber posts and is not to standard for height and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected but no reduced post spacing for transitioning

Photo #: 44-48

Site Inspection Checklist

Site Name: 374 Barkers Creek

External Factors

Width of Bridge: 8.7m

End Treatment

Type: Modified fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Fish tail has curved section welded to it

Guardrail

Height: 580mm to top

Length: 20m

Posts: Timber

Spacing: 4m

Structural Adequacy: Timber posts rotten

Delineation (Y/N): Yes

Comments: Structurally unsound due to rotting of timber posts. Not to standard for height and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected but no reduced post spacing for transitioning

Photo #: 49-53

Site Inspection Checklist

Site Name: 271 Barkers Creek

External Factors

Width of Bridge: 7.0m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: No, cutting directly behind guardrail

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminal and cable anchor.

Guardrail

Height: 720mm to top

Length: 12m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes, good condition

Delineation (Y/N): Yes

Comments: Guardrail not to standard for length however cutting stops vehicle from going behind guardrail.

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected as guardrail is continuous across bridge but no reduced post spacing for transitioning

Photo #: 27-30

Site Inspection Checklist

Site Name: 273 Tanduringie Creek

External Factors

Width of Bridge: 5.5m

End Treatment

Type: Fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: Insufficient due to very short length of guardrail

Parabolic Flare: No

Comments: Fish tail end treatment

Guardrail

Height: 520mm to top

Length: 4m

Posts: Timber

Spacing: 4m

Structural Adequacy: Timber posts rotting

Delineation (Y/N): Yes

Comments: Structurally unsound due to rotting timber posts. Not to standard for height, length and post spacing.

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): No

Comments: Not connected as there is no bridge rail. No reduced post spacing for transitioning

Photo #: 1-9

Site Inspection Checklist

Site Name: 272 Middle Creek

External Factors

Width of Bridge: 7.0m

End Treatment

Type: Melt

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Current standard end treatment

Guardrail

Height: 720mm to top

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard and in very good condition

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 4 @ 0.5m and 6 @ 1m

Comments: Connected as guardrail is continuous across bridge with reduced post spacing to standard for transitioning

Photo #: 22-26

Site Inspection Checklist

Site Name: 274 Tanduringie Creek

External Factors

Width of Bridge: 7.6m

End Treatment

Type: Fish Tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: No, tree stump in clear zone

Parabolic Flare: No

Comments: Fish tail end treatment

Guardrail

Height: 570mm to top

Length: 8m

Posts: Timber

Spacing: 4m

Structural Adequacy: Timber posts rotting

Delineation (Y/N): No

Comments: Structurally unsound due to rotting timber posts. Not to standard for height, length or post spacing

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): No

Comments: Not connected and no reduced spacing for transitioning to concrete bridge end

Photo #: 10-15

Site Inspection Checklist

Site Name: 377 Wyalla Creek

External Factors

Width of Bridge: 7.4m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: No, drop off behind guardrail

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 720mm to top

Length: 20.5m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: To standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 9 @ 1m

Comments: Connected to bridge with reduced post spacing of 1m for transitioning but not quite to standard

Photo #: 67-70

Site Inspection Checklist

Site Name: 378 Wyalla Creek Overflow

External Factors

Width of Bridge: 7.4m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: No, drop off behind guardrail

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 710mm to top

Length: 21m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: To standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 9 @ 1m

Comments: Connected to bridge with reduced post spacing of 1m for transitioning but not quite to standard

Photo #: 71-74

Site Inspection Checklist

Site Name: 376 Murdering Hut Creek

External Factors

Width of Bridge: 7.3m

End Treatment

Type: Fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: No, drop off one side

Parabolic Flare: No

Comments: Fish tail end treatment

Guardrail

Height: 560mm to top

Length: 8m

Posts: Timber

Spacing: 4m

Structural Adequacy: Timber posts rotting and rusty guardrail

Delineation (Y/N): No

Comments: Structurally unsound due to timber posts rotting. Not to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): No

Comments: Not connected and no reduced post spacing for transitioning

Photo #: 63-66

Site Inspection Checklist

Site Name: 20641 Sandy Creek

External Factors

Width of Bridge: 9.2m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Precious standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 715mm to top

Length: 20.5m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail in good condition and to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 8 @ 1m

Comments: Connected with reduced post spacing to 1m for transitioning but not quite to standard

Photo #: 59-62

Site Inspection Checklist

Site Name: 292 Meandu Creek

External Factors

Width of Bridge: 7.0m

End Treatment

Type: Modified fish tail

Breakaway Terminal (Y/N): No, timber posts

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Fish tail has curved section welded to it

Guardrail

Height: 630mm to top

Length: 23m

Posts: Timber

Spacing: 2m

Structural Adequacy: Timber posts rotting

Delineation (Y/N): No

Comments: Structurally unsound due to rotting timber posts. Not to standard for height.

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): No

Comments: Not connected with no reduced post spacing for transitioning to concrete end post

Photo #: 16-22

Site Inspection Checklist

Site Name: 398 Barambah Creek

External Factors

Width of Bridge: 7.0m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: No, slight drop off and post in clear zone

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 700mm to top

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: To standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 8 @ 1m

Comments: Connected as guardrail is continuous across bridge with reduced post spacing to 1m for transitioning but not quite to standard

Photo #: 75-78

Site Inspection Checklist

Site Name: 296 Barambah Creek

External Factors

Width of Bridge: 8.0m

End Treatment

Type: Modified fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): Yes

Clear Zone: Clear but drop off concrete wall

Parabolic Flare: Yes

Comments: Fish tail has curved section welded to it

Guardrail

Height: 720mm to top

Length: Approach 20.5m, departure 12m

Posts: Timber

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): No

Comments: Guardrail to standard for height, post spacing and approach for length but not on departure side for length

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 8 @ 1m

Comments: Connected with reduced post spacing to 1m for transitioning but not quite to standard

Photo #: 79-83

Site Inspection Checklist

Site Name: 298 Unnamed Creek

External Factors

Width of Bridge: 7.7m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 700mm to top

Length: 20.5m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 8 @ 1m

Comments: Connected with reduced post spacing to 1m for transitioning but not quite to standard

Photo #: 94-97

Site Inspection Checklist

Site Name: 297 Oaky Creek

External Factors

Width of Bridge: 8.0m

End Treatment

Type: Modified fish tail

Breakaway Terminal (Y/N): No, timber posts

Cable Anchor (Y/N): Yes

Clear Zone: No, trees in clear zone

Parabolic Flare: Yes

Comments: Fish tail has curved section welded to it

Guardrail

Height: 640mm to top

Length: 20.5m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): No

Comments: Guardrail in good condition and to standard for length and post spacing but not for height

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 8 @ 1m

Comments: Connected with reduced post spacing to 1m for transitioning but not quite to standard

Photo #: 88-93

Site Inspection Checklist

Site Name: 299 Windera Creek

External Factors

Width of Bridge: 7.3m

End Treatment

Type: Fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: No, drop off behind guardrail

Parabolic Flare: No

Comments: Fish tail end treatment

Guardrail

Height: 650mm to top

Length: 8m

Posts: Timber

Spacing: 4m

Structural Adequacy: Timber posts rotting

Delineation (Y/N): Yes

Comments: Structurally unsound due to timber posts rotting. Guardrail not to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): No

Comments: Not connected and no reduced post spacing for transitioning

Photo #: 98-102

Site Inspection Checklist

Site Name: 300 Kratzmans Gully

External Factors

Width of Bridge: 6.1m

End Treatment

Type: Melt

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Current standard end treatment

Guardrail

Height: 730mm to top

Length: 20.5m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 5 @ 0.5m and 6 @ 1m

Comments: Connected as guardrail is continuous across bridge with reduced post spacing for transitioning to standard

Photo #: 103-108

Site Inspection Checklist

Site Name: 390 Sawpit Creek

External Factors

Width of Bridge: 8.6m

End Treatment

Type: Fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: No, drop off

Parabolic Flare: No

Comments: Fish tail end treatment

Guardrail

Height: 630mm

Length: 8m

Posts: Timber

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): No

Comments: Guardrail not to standard for height and length

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected but no reduced post spacing for transitioning. Last post 4m from end of bridge

Photo #: 84-87

Site Inspection Checklist

Site Name: 320 Stuart River

External Factors

Width of Bridge: 7.4m

End Treatment

Type: Fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: No, drop off and trees in clear zone

Parabolic Flare: Yes

Comments: Fish tail end treatment

Guardrail

Height: 630mm to top

Length: 16m approach and 8m departure

Posts: Timber

Spacing: 4m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail not to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected but no reduced post spacing for transitioning

Photo #: 28-32

Site Inspection Checklist

Site Name: 321 Deep Creek

External Factors

Width of Bridge: 3.6m one-lane

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: No, tree in clear zone

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 700mm to top

Length: 20.5m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): Yes, 9 @ 1m

Comments: Not connected as there is no bridge rail but has reduced post spacing to 1m for strengthening

Photo #: 33-37

Site Inspection Checklist

Site Name: 322 Reedy Creek

External Factors

Width of Bridge: 7.2m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 690mm to top

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for length and post spacing but not for height

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 8 @ 1m

Comments: Connected with reduced post spacing to 1m for transitioning but not quite to standard

Photo #: 38-42

Site Inspection Checklist

Site Name: 280 Spring Creek

External Factors

Width of Bridge: 7.3m

End Treatment

Type: Fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: No, drop off

Parabolic Flare: No

Comments: Fish tail end treatment

Guardrail

Height: 470mm to top

Length: 8m

Posts: Timber

Spacing: 4m

Structural Adequacy: Timber posts rotting

Delineation (Y/N): Yes

Comments: Structurally unsound due to timber posts rotting. Guardrail not to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): No

Comments: Not connected and no reduced post spacing for transitioning

Photo #: 18-22

Site Inspection Checklist

Site Name: 285 Stuart River

External Factors

Width of Bridge: 7.2m

End Treatment

Type: Melt

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: No, tree in clear zone

Parabolic Flare: Yes

Comments: Current standard end treatment but with tree in clear zone

Guardrail

Height: 720mm to top

Length: 25m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected as guardrail is continuous across bridge but without reduced post spacing for transitioning

Photo #: 43-45

Site Inspection Checklist

Site Name: 287 Boyne River

External Factors

Width of Bridge: 3.6m one-lane

End Treatment

Type: BCT

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 570mm to top

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for length and post spacing but not height

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): Yes, 8 @ 1m

Comments: Not connected as there is no bridge rail but has reduced post spacing to 1m for strengthening

Photo #: 46-49

Site Inspection Checklist

Site Name: 289 Sandy Creek

External Factors

Width of Bridge: 3.6m one-lane

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 650mm

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for length and post spacing but not height

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): Yes, 8 @ 1m

Comments: Not connected as there is no bridge rail but has reduced post spacing to 1m for strengthening

Photo #: 50-53

Site Inspection Checklist

Site Name: 291 Ironpot Creek

External Factors

Width of Bridge: 3.7m one-lane

End Treatment

Type: Fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: No, tree in clear zone

Parabolic Flare: No

Comments: Fish tail end treatment

Guardrail

Height: 740mm to top

Length: 8m approach and 4m departure

Posts: Timber

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail not to standard for length with timber posts

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): No

Comments: Not connected as there is no bridge rail and no reduced post spacing for transitioning

Photo #: 54-59

Site Inspection Checklist

Site Name: 330 Mannuem Creek

External Factors

Width of Bridge: 7.0m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 630mm to top

Length: 12m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail not to standard for height and length

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): No

Comments: Connected as guardrail is continuous across bridge but no reduced post spacing for transitioning

Photo #: 65-68

Site Inspection Checklist

Site Name: 329 Boyne River

External Factors

Width of Bridge: 6.7m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: No, drop off

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 720mm to top

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): Yes, 8 @ 1m

Comments: Not connected as there is no bridge rail but has reduced post spacing to 1m for strengthening

Photo #: 69-72

Site Inspection Checklist

Site Name: 389 Stuart River

External Factors

Width of Bridge: 7.4m

End Treatment

Type: Modified fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): Yes

Clear Zone: No, tree in clear zone

Parabolic Flare: Yes

Comments: Fish tail has curved section welded to it

Guardrail

Height: 650mm to top

Length: 16m

Posts: Timber

Spacing: 4m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail not to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): No

Comments: Not connected and no reduced post spacing for transitioning

Photo #: 60-64

Site Inspection Checklist

Site Name: 27777 Spring Creek

External Factors

Width of Bridge: 9.2m

End Treatment

Type: Melt

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Current standard end treatment

Guardrail

Height: 740mm to top

Length: 20.5m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 4 @ 0.5m and 6 @ 1m

Comments: Connected with reduced post spacing for transitioning to standard

Photo #: 73-79

Site Inspection Checklist

Site Name: 284 L.G.Smith Bridge

External Factors

Width of Bridge: 6.7m

End Treatment

Type: BCT

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: Yes

Parabolic Flare: Yes

Comments: Previous standard end treatment with breakaway terminals and cable anchor

Guardrail

Height: 670mm to top

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for length and post spacing but not height

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 8 @ 1m

Comments: Connected with reduced post spacing to 1m for transitioning but not quite to standard

Photo #: 23-27

Site Inspection Checklist

Site Name: 294 Boondooma Creek

External Factors

Width of Bridge: 5.4m one-lane

End Treatment

Type: Fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: Yes

Parabolic Flare: No

Comments: Fish tail end treatment

Guardrail

Height: 500mm to top

Length: 4m

Posts: Timber

Spacing: 2m

Structural Adequacy: Timber posts rotting

Delineation (Y/N): Yes

Comments: Structurally unsound due to timber posts rotting. Guardrail not to standard for height and length

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): No

Comments: Not connected as there is no bridge rail and no reduced post spacing for transitioning

Photo #: 7-13

Site Inspection Checklist

Site Name: 293 Di Di Creek

External Factors

Width of Bridge: 7.5m

End Treatment

Type: Fish tail

Breakaway Terminal (Y/N): No

Cable Anchor (Y/N): No

Clear Zone: No

Parabolic Flare: No

Comments: Fish tail end treatment

Guardrail

Height: 660mm to top

Length: 8m

Posts: timber

Spacing: 4m

Structural Adequacy: Yes

Delineation (Y/N): No

Comments: Guardrail not to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): No

Strengthening (reduced spacing): No

Comments: Not connected and no reduced post spacing for transitioning

Photo #: 14-17

Site Inspection Checklist

Site Name: 295 Hansens Gully

External Factors

Width of Bridge: 7.0m

End Treatment

Type: Melt

Breakaway Terminal (Y/N): Yes

Cable Anchor (Y/N): Yes

Clear Zone: No, tree in clear zone

Parabolic Flare: Yes

Comments: Current standard end treatment but with tree in clear zone

Guardrail

Height: 740mm to top

Length: 20m

Posts: Steel

Spacing: 2m

Structural Adequacy: Yes

Delineation (Y/N): Yes

Comments: Guardrail to standard for height, length and post spacing

Transition:

Connected to bridge (Y/N): Yes

Strengthening (reduced spacing): Yes, 5 @ 0.5m and 6 @ 1m

Comments: Connected with reduced post spacing for transitioning to standard

Photo #: 1-6

Appendix D Distance from Traffic Counters to Bridge Sites

Road	Shire	CWY	Tdist	ID	NAME	Tdist of Traffic Counter Site	Counter Site ID	Distance from Bridge to Counter
40B	89	1	50.19	369	Railway At Benarkin	48	30090	2.19
40B	89	1	58.03	406	Nukku Railway O/Bridge	63	30091	4.97
40C	89	1	5.59	372	Rocky Creek	8	30032	2.41
40C	89	1	28.942	375	Horse Creek	39	20536	10.058
40C	89	1	27.041	373	Meandu Creek	39	20536	11.959
40C	89	1	27.91	374	Barkers Creek	39	20536	11.09
419	89	1	20.831	271	Barker Creek	16.6	20210	4.231
419	89	1	46.208	273	Tanduringie Creek	42.08	20490	4.128
419	89	1	23.776	272	Middle Creek	16.6	20210	7.176
419	89	1	38.629	274	Tanduringie Creek	42.08	20490	3.451
41A	89	1	27.118	377	Wyalla Creek	25	20537	2.118
41A	89	1	27.276	378	Wyalla Creek Overflow	25	20537	2.276
41A	89	1	25.182	376	Mudering Hut Creek	25	20537	0.182
41A	89	1	0.815	20641	Sandy Creek	8.2	30098	7.385
429	89	1	9.45	292	Meandu Creek	9.49	20494	0.04
41A	86	1	42.46	398	Barambah Creek	25	20537	17.46
437	86	1	1.542	296	Barambah Creek	6.9	32130	5.358
439	86	1	21.502	298	Unnamed Creek	22	20500	0.498
439	86	1	4.067	297	Oaky Creek	7.7	20498	3.633
439	86	1	22.752	299	Windera Creek	22	20500	0.752
439	86	1	24.591	300	Kratzman'S Gully	22	20500	2.591
45B	86	1	47.46	390	Sawpit Creek	52	32008	4.54
4206	73	1	4.64	320	Stuart River	6.3	20209	1.66
4206	73	1	11.55	321	Deep Creek	6.3	20209	5.25
4206	73	1	15.35	322	Reedy Creek	6.3	20209	9.05
426	73	1	98.564	280	Spring Creek	108.2	32124	9.636
428	73	1	3.431	285	Stuart River	7.2	32125	3.769
428	73	1	33.16	287	Boyne River	7.2	32125	25.96
428	73	1	33.308	289	Sandy Creek	7.2	32125	26.108
428	73	1	47.865	291	Ironpot Creek	7.2	32125	40.665
45A	73	1	72.63	330	Mannuem Creek	90.71	20542	18.08
45A	73	1	69.992	329	Boyne River	90.71	20542	20.718
45A	73	1	99.225	389	Stuart River	90.71	20542	8.515
45A	73	1	65.414	27777	Spring Ck	90.71	20542	25.296
426	130	1	133.506	284	L. G. Smith Bridge	147.3	30033	13.794

Appendix E Traffic Counter Checks Data

373 Meandu Creek

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-24 -- English (ENA)

Datasets:

Site: **[44444] 44444 on 40C**
Direction: 1 - North bound, A hit first., **Lane:** 0
Survey Duration: 14:51 Tuesday, 3 July 2007 => 8:00 Wednesday, 25 July 2007
File: G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\4444425Jul2007.EC0 (Plus)
Identifier: S819W2SK MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: **14:51 Tuesday, 3 July 2007 => 8:00 Wednesday, 25 July 2007**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Factory default profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 72738 / 72798 (99.92%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-24
Site: 44444.0N
Description: **44444 on 40C**
Filter time: **14:51 Tuesday, 3 July 2007 => 8:00 Wednesday, 25 July 2007**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
0000-0100	5.3	7.3	5.0	11.0	10.0	21.0	10.0	7.6	9.7
0100-0200	10.0	4.7	3.3	8.3	6.3	13.0	8.3	6.3	7.5
0200-0300	9.0	4.0	5.8	10.0	8.7	13.3	6.0	7.4	8.0
0300-0400	10.3	11.3	11.5	10.3	10.7	10.0	5.0	10.9	10.0
0400-0500	31.3	28.7	19.3	29.3	26.3	15.0	4.7	26.5	22.0
0500-0600	81.0	73.3	58.8	74.3	79.3	47.0	21.0	72.4	62.0
0600-0700	119.3	120.3	99.8	126.3	115.3	80.0	34.3	115.2	99.4
0700-0800	226.0	**217.7<**	176.3	259.7	235.0	190.3	64.7	220.0	194.8
0800-0900	283.3	200.0	223.3	317.0	297.3	310.7	114.7	261.6	248.3
0900-1000	**295.0<**	191.7	**292.3<**	**319.0<**	287.7	**390.3<**	162.0	**277.1<**	**276.9<**
1000-1100	274.3	173.7	269.7	313.7	**308.7<**	376.7	178.7	268.0	270.8
1100-1200	265.0	195.7	267.3	307.7	306.7	355.7	**200.0<**	268.5	271.1
1200-1300	276.3	172.3	275.7	297.7	322.7	**309.0<**	216.0	268.9	267.1
1300-1400	260.7	190.0	276.3	307.7	326.0	228.0	220.0	272.1	258.4
1400-1500	**306.3<**	154.5	290.7	333.3	344.7	235.3	229.7	277.7	265.4
1500-1600	295.3	**231.3<**	**309.7<**	**350.7<**	**382.0<**	205.0	**233.0<**	**308.6<**	**284.2<**
1600-1700	269.0	215.3	273.0	296.0	337.0	169.3	195.3	274.1	249.1
1700-1800	232.3	190.0	269.0	294.0	278.0	139.7	181.0	248.8	224.6
1800-1900	111.0	92.0	124.3	161.3	181.7	97.7	106.7	131.4	123.5
1900-2000	57.0	55.8	77.0	106.7	106.0	69.7	77.0	78.9	77.4
2000-2100	45.3	35.5	45.7	71.3	76.0	50.0	55.3	53.6	53.3
2100-2200	31.3	28.5	33.7	45.0	49.7	46.3	27.0	37.1	37.0
2200-2300	32.7	27.0	32.7	34.0	41.7	28.3	18.7	33.2	30.5
2300-2400	11.0	11.3	13.7	21.3	25.7	25.0	10.7	16.3	16.7
Totals									
0700-1900	3094.7	2224.0	3047.5	3557.7	3607.3	3007.7	2101.7	3076.9	2934.0
0600-2200	3347.7	2464.1	3303.6	3907.0	3954.3	3253.7	2295.3	3361.7	3201.1
0600-0000	3391.3	2502.3	3349.9	3962.3	4021.7	3307.0	2324.7	3411.1	3248.3
0000-0000	3538.3	2631.7	3453.4	4105.7	4163.0	3426.3	2379.7	3542.2	3367.4
AM Peak	0900	0700	0900	0900	1000	0900	1100		
	295.0	217.7	292.3	319.0	308.7	390.3	200.0		
PM Peak	1400	1500	1500	1500	1500	1200	1500		
	306.3	231.3	309.7	350.7	382.0	309.0	233.0		

MetroCount Traffic Executive
Class Bin Chart

ClassBin-36 -- English (ENA)

Datasets:

Site:	**[44444] 44444 on 40C**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	14:51 Tuesday, 3 July 2007 => 8:00 Wednesday, 25 July 2007
File:	G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\4444425Jul2007.EC0 (Plus)
Identifier:	S819W2SK MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**14:51 Tuesday, 3 July 2007 => 8:00 Wednesday, 25 July 2007**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 72738 / 72798 (99.92%)

Class Bins

Class 1 - 64934 (89.27%)
Class 2 - 2177 (2.99%)
Class 3 - 2845 (3.91%)
Class 4 - 703 (0.97%)
Class 5 - 90 (0.12%)
Class 6 - 106 (0.15%)
Class 7 - 185 (0.25%)
Class 8 - 163 (0.22%)
Class 9 - 1136 (1.56%)
Class 10 - 376 (0.52%)
Class 11 - 21 (0.03%)
Class 12 - 2 (0.00%)

MetroCount Traffic Executive
Speed Histogram

SpeedHist-29 -- English (ENA)

Datasets:

Site:	**[44444] 44444 on 40C**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	14:51 Tuesday, 3 July 2007 => 8:00 Wednesday, 25 July 2007
File:	G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\4444425Jul2007.EC0 (Plus)
Identifier:	S819W2SK MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**14:51 Tuesday, 3 July 2007 => 8:00 Wednesday, 25 July 2007**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 72738 / 72798 (99.92%)

Speed Statistics

Vehicles = 72738
Posted speed limit = 100 km/h, Exceeding = 20522 (28.21%), Mean Exceeding = 105.57 km/h
Maximum = 159.8 km/h, **Minimum** = 20.3 km/h, **Mean** = 96.2 km/h
85% Speed = 103.3 km/h, **95% Speed** = 109.1 km/h, **Median** = 96.1 km/h
15 km/h Pace = 89 - 104, **Number in Pace** = 51808 (71.23%)
Variance = 69.94, **Standard Deviation** = 8.36 km/h

398 Barambah Creek

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-23 -- English (ENA)

Datasets:

Site: **[33333] 33333 on 41A**
Direction: 1 - North bound, A hit first., **Lane:** 0
Survey Duration: 14:00 Tuesday, 3 July 2007 => 7:52 Wednesday, 25 July 2007
File: G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\3333325Jul2007.EC0 (Plus)
Identifier: N923MSGR MC56-L4 [MC55] (c)Microcom 19Sep03
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: **14:00 Tuesday, 3 July 2007 => 7:52 Wednesday, 25 July 2007**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Factory default profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 17904 / 17935 (99.83%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-23
Site: 33333.0N
Description: **33333 on 41A**
Filter time: **14:00 Tuesday, 3 July 2007 => 7:52 Wednesday, 25 July 2007**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	3.3	4.3	1.8	2.7	2.7	5.3	1.3	2.9	3.0
0100-0200	2.0	1.7	1.5	2.3	3.3	4.0	2.7	2.1	2.5
0200-0300	3.7	3.3	1.0	3.0	3.0	2.7	2.7	2.7	2.7
0300-0400	3.0	1.7	1.8	3.7	2.3	6.7	0.7	2.4	2.8
0400-0500	6.0	3.3	5.0	6.0	6.3	10.0	2.7	5.3	5.6
0500-0600	16.3	12.3	7.8	7.3	10.7	15.0	4.0	10.7	10.4
0600-0700	27.0	24.0	17.0	19.7	21.3	22.0	16.3	21.5	20.9
0700-0800	39.7	17.3	24.3	40.0	35.3	43.0	25.3	30.9	31.8
0800-0900	47.7	34.0	40.3	51.7	49.3	65.3	36.7	44.6	46.4
0900-1000	65.0	40.0	57.0	58.0	65.0	81.3	53.3	57.0	60.0
1000-1100	**79.7<**	44.0	58.3	67.0	95.3	90.7	86.0	68.9	74.4
1100-1200	71.3	**47.3<**	**68.7<**	**79.7<**	**100.0<**	**96.3<**	**91.3<**	**73.4<**	**79.2<**
1200-1300	69.0	43.3	71.0	**69.7<**	83.3	85.7	103.3	67.3	75.0
1300-1400	**88.7<**	43.3	**85.3<**	64.7	**105.0<**	**92.3<**	98.3	**77.4<**	**82.5<**
1400-1500	78.7	**45.5<**	59.3	66.0	97.7	74.3	**134.7<**	67.9	77.9
1500-1600	63.3	44.0	56.7	63.0	90.7	63.7	112.3	62.3	69.3
1600-1700	44.0	31.8	53.3	56.0	85.7	52.7	108.3	52.8	60.3
1700-1800	37.3	27.8	37.3	38.3	70.3	38.3	61.0	41.3	43.6
1800-1900	30.7	17.0	22.7	28.3	55.7	22.7	43.0	30.0	30.8
1900-2000	13.0	11.3	18.0	19.3	40.0	16.0	27.7	19.8	20.3
2000-2100	15.7	10.8	9.0	13.0	31.3	9.3	17.7	15.6	15.0
2100-2200	7.3	6.3	8.3	6.3	18.7	9.3	5.3	9.2	8.7
2200-2300	6.3	1.8	4.3	10.3	3.3	7.3	4.7	5.0	5.3
2300-2400	4.0	4.0	4.0	7.0	6.3	2.0	4.0	5.0	4.5
Totals									
0700-1900	715.0	435.3	634.3	682.3	933.3	806.3	953.7	673.7	731.3
0600-2200	778.0	487.6	686.6	740.7	1044.7	863.0	1020.7	739.8	796.2
0600-0000	788.3	493.3	694.9	758.0	1054.3	872.3	1029.3	749.8	805.9
0000-0000	822.7	520.0	713.7	783.0	1082.7	916.0	1043.3	775.9	832.8
AM Peak	1000	1100	1100	1100	1100	1100	1100		
	79.7	47.3	68.7	79.7	100.0	96.3	91.3		
PM Peak	1300	1400	1300	1200	1300	1300	1400		
	88.7	45.5	85.3	69.7	105.0	92.3	134.7		

MetroCount Traffic Executive
Class Bin Chart

ClassBin-35 -- English (ENA)

Datasets:

Site:	**[33333] 33333 on 41A**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	14:00 Tuesday, 3 July 2007 => 7:52 Wednesday, 25 July 2007
File:	G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\3333325Jul2007.EC0 (Plus)
Identifier:	N923MSGR MC56-L4 [MC55] (c)Microcom 19Sep03
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**14:00 Tuesday, 3 July 2007 => 7:52 Wednesday, 25 July 2007**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 17904 / 17935 (99.83%)

Class Bins

Class 1 - 12808 (71.54%)
Class 2 - 1674 (9.35%)
Class 3 - 867 (4.84%)
Class 4 - 688 (3.84%)
Class 5 - 57 (0.32%)
Class 6 - 81 (0.45%)
Class 7 - 239 (1.33%)
Class 8 - 119 (0.66%)
Class 9 - 845 (4.72%)
Class 10 - 504 (2.82%)
Class 11 - 22 (0.12%)
Class 12 - 0 (0.00%)

MetroCount Traffic Executive
Speed Histogram

SpeedHist-28 -- English (ENA)

Datasets:

Site:	**[33333] 33333 on 41A**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	14:00 Tuesday, 3 July 2007 => 7:52 Wednesday, 25 July 2007
File:	G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\3333325Jul2007.EC0 (Plus)
Identifier:	N923MSGR MC56-L4 [MC55] (c)Microcom 19Sep03
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**14:00 Tuesday, 3 July 2007 => 7:52 Wednesday, 25 July 2007**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 17904 / 17935 (99.83%)

Speed Statistics

Vehicles = 17904
Posted speed limit = 100 km/h, Exceeding = 11064 (61.80%), Mean Exceeding = 107.87 km/h
Maximum = 153.8 km/h, **Minimum** = 11.2 km/h, **Mean** = 102.4 km/h
85% Speed = 110.9 km/h, **95% Speed** = 117.7 km/h, **Median** = 102.2 km/h
15 km/h Pace = 94 - 109, **Number in Pace** = 11630 (64.96%)
Variance = 94.22, **Standard Deviation** = 9.71 km/h

291 Ironpot Creek

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-21 -- English (ENA)

Datasets:

Site: **[11111] 11111 on 428**
Direction: 1 - North bound, A hit first., **Lane:** 0
Survey Duration: 12:00 Tuesday, 3 July 2007 => 15:11 Monday, 23 July 2007
File: G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\1111123Jul2007.EC0 (Plus)
Identifier: 1434YFVA MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: **12:00 Tuesday, 3 July 2007 => 15:11 Monday, 23 July 2007**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Factory default profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 881 / 883 (99.77%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-21

Site: 11111.0N
Description: **11111 on 428**
Filter time: **12:00 Tuesday, 3 July 2007 => 15:11 Monday, 23 July 2007**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0100-0200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0200-0300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0300-0400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0400-0500	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.1	0.1
0500-0600	0.0	0.0	0.0	0.7	0.0	0.0	0.3	0.1	0.1
0600-0700	0.7	0.0	0.7	0.0	0.0	1.7	0.3	0.3	0.5
0700-0800	3.3	2.5	3.3	4.3	3.3	**3.7<**	1.0	3.4	3.1
0800-0900	7.0	0.5	2.0	5.0	**5.3<**	2.7	1.7	4.2	3.6
0900-1000	4.3	3.0	3.7	4.3	4.3	2.3	2.7	4.0	3.5
1000-1100	**7.3<**	1.5	**6.3<**	**6.3<**	5.0	2.3	2.7	**5.6<**	**4.7<**
1100-1200	6.0	**3.0<**	5.0	6.0	2.3	2.3	**3.7<**	4.6	4.1
1200-1300	3.0	1.7	3.3	3.3	4.0	2.3	3.3	3.1	3.0
1300-1400	**5.0<**	3.0	**7.0<**	5.7	**6.3<**	2.7	6.3	5.4	5.1
1400-1500	4.3	4.7	5.7	**7.3<**	5.3	2.0	**7.0<**	**5.5<**	**5.2<**
1500-1600	2.7	1.7	2.0	0.3	4.3	2.0	2.3	2.2	2.2
1600-1700	1.0	**4.7<**	1.0	1.3	5.3	4.0	2.0	2.8	2.9
1700-1800	1.0	1.3	2.3	1.7	3.7	**4.7<**	2.0	2.1	2.5
1800-1900	0.0	0.3	1.7	0.3	2.3	2.7	0.0	1.0	1.1
1900-2000	0.0	0.7	0.7	0.7	0.0	1.0	0.0	0.4	0.5
2000-2100	1.0	0.3	0.0	0.0	1.0	0.3	0.0	0.4	0.3
2100-2200	0.0	0.3	0.0	0.3	1.7	1.7	0.0	0.5	0.6
2200-2300	0.0	0.0	0.0	0.0	0.3	0.7	0.0	0.1	0.1
2300-2400	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.1
Totals									
0700-1900	45.0	27.8	43.3	46.0	51.7	33.7	34.7	43.8	40.9
0600-2200	46.7	29.2	44.7	47.0	54.3	38.3	35.0	45.4	42.8
0600-0000	46.7	29.2	44.7	47.0	54.7	39.3	35.0	45.5	43.0
0000-0000	47.0	29.2	44.7	47.7	55.0	39.3	35.3	45.8	43.3
AM Peak	1000	1100	1000	1000	0800	0700	1100		
	7.3	3.0	6.3	6.3	5.3	3.7	3.7		
PM Peak	1300	1600	1300	1400	1300	1700	1400		
	5.0	4.7	7.0	7.3	6.3	4.7	7.0		

MetroCount Traffic Executive
Class Bin Chart

ClassBin-34 -- English (ENA)

Datasets:

Site:	**[11111] 11111 on 428**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	12:00 Tuesday, 3 July 2007 => 15:11 Monday, 23 July 2007
File:	G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\1111123Jul2007.EC0 (Plus)
Identifier:	1434YFVA MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**12:00 Tuesday, 3 July 2007 => 15:11 Monday, 23 July 2007**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 881 / 883 (99.77%)

Class Bins

Class 1 - 395 (44.84%)
Class 2 - 64 (7.26%)
Class 3 - 168 (19.07%)
Class 4 - 46 (5.22%)
Class 5 - 0 (0.00%)
Class 6 - 0 (0.00%)
Class 7 - 38 (4.31%)
Class 8 - 14 (1.59%)
Class 9 - 155 (17.59%)
Class 10 - 1 (0.11%)
Class 11 - 0 (0.00%)
Class 12 - 0 (0.00%)

MetroCount Traffic Executive
Speed Histogram

SpeedHist-26 -- English (ENA)

Datasets:

Site:	**[11111] 11111 on 428**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	12:00 Tuesday, 3 July 2007 => 15:11 Monday, 23 July 2007
File:	G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\1111123Jul2007.EC0 (Plus)
Identifier:	1434YFVA MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**12:00 Tuesday, 3 July 2007 => 15:11 Monday, 23 July 2007**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 881 / 883 (99.77%)

Speed Statistics

Vehicles = 881
Posted speed limit = 100 km/h, Exceeding = 0 (0.00%), Mean Exceeding = 0.00 km/h
Maximum = 98.3 km/h, **Minimum** = 10.8 km/h, **Mean** = 59.2 km/h
85% Speed = 69.1 km/h, **95% Speed** = 73.8 km/h, **Median** = 60.8 km/h
15 km/h Pace = 54 - 69, **Number in Pace** = 521 (59.14%)
Variance = 128.36, **Standard Deviation** = 11.33 km/h

27777 Spring Creek

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-25 -- English (ENA)

Datasets:

Site: **[55555] 55555 on 45A**
Direction: 1 - North bound, A hit first., **Lane:** 0
Survey Duration: 8:00 Wednesday, 4 July 2007 => 14:56 Monday, 23 July 2007
File: G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\5555523Jul2007.EC0 (Plus)
Identifier: L419V8GX MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: **8:00 Wednesday, 4 July 2007 => 14:56 Monday, 23 July 2007**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Factory default profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 9746 / 9751 (99.95%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-25

Site: 55555.0N
Description: **55555 on 45A**
Filter time: **8:00 Wednesday, 4 July 2007 => 14:56 Monday, 23 July 2007**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
0000-0100	1.3	1.0	2.0	2.7	1.3	1.7	0.3	1.7	1.5
0100-0200	0.0	2.0	1.5	1.0	0.3	1.0	2.3	0.8	1.1
0200-0300	1.0	0.5	0.5	2.3	1.7	1.3	0.3	1.3	1.2
0300-0400	3.0	2.5	1.5	1.7	3.0	2.7	0.3	2.4	2.1
0400-0500	5.0	5.0	4.5	3.7	4.0	2.3	4.0	4.4	4.0
0500-0600	8.0	4.5	3.5	5.0	5.3	6.3	5.3	5.5	5.6
0600-0700	17.3	10.0	11.0	14.3	11.7	12.0	5.7	13.2	11.8
0700-0800	22.0	21.0	17.5	23.0	24.0	18.0	12.0	21.8	19.7
0800-0900	34.7	26.0	33.3	32.0	34.7	28.7	24.3	32.6	30.8
0900-1000	40.3	**42.5<**	43.3	40.3	49.7	51.7	32.3	**43.3<**	42.9
1000-1100	**40.3<**	37.0	39.7	34.7	**50.7<**	**54.7<**	43.0	40.7	43.1
1100-1200	39.7	40.0	**45.3<**	**41.0<**	44.3	48.7	**51.7<**	42.2	**44.6<**
1200-1300	31.0	42.0	34.7	40.3	53.3	43.3	50.0	40.1	42.1
1300-1400	25.3	**42.5<**	42.0	**43.3<**	48.3	**50.0<**	46.3	40.1	**42.5<**
1400-1500	25.0	39.0	**44.3<**	43.0	46.0	49.7	45.0	39.5	41.9
1500-1600	**39.5<**	36.0	35.3	38.7	**55.3<**	31.7	**56.0<**	**41.5<**	42.2
1600-1700	34.0	31.0	31.3	36.0	48.3	33.0	46.3	36.7	37.6
1700-1800	29.0	30.0	25.0	24.3	34.0	36.3	32.3	28.3	30.2
1800-1900	15.5	22.0	16.3	18.7	25.7	14.0	20.0	19.8	18.9
1900-2000	9.5	8.0	11.7	15.7	14.3	9.3	12.0	12.3	11.8
2000-2100	8.5	7.5	6.7	9.7	11.0	7.3	9.3	8.8	8.6
2100-2200	5.5	8.5	7.7	6.0	10.0	2.7	5.3	7.6	6.5
2200-2300	3.5	4.0	2.3	6.3	6.3	4.3	3.3	4.6	4.4
2300-2400	3.0	3.5	0.7	4.3	3.3	3.0	1.7	2.9	2.7
Totals									
0700-1900	376.3	409.0	408.2	415.3	514.3	459.7	459.3	426.6	436.5
0600-2200	417.2	443.0	445.2	461.0	561.3	491.0	491.7	468.6	475.3
0600-0000	423.7	450.5	448.2	471.7	571.0	498.3	496.7	476.1	482.4
0000-0000	442.0	466.0	461.7	488.0	586.7	513.7	509.3	492.2	497.8
AM Peak	1000	0900	1100	1100	1000	1000	1100		
	40.3	42.5	45.3	41.0	50.7	54.7	51.7		
PM Peak	1500	1300	1400	1300	1500	1300	1500		
	39.5	42.5	44.3	43.3	55.3	50.0	56.0		

MetroCount Traffic Executive
Class Bin Chart

ClassBin-37 -- English (ENA)

Datasets:

Site:	**[55555] 55555 on 45A**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	8:00 Wednesday, 4 July 2007 => 14:56 Monday, 23 July 2007
File:	G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\5555523Jul2007.EC0 (Plus)
Identifier:	L419V8GX MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**8:00 Wednesday, 4 July 2007 => 14:56 Monday, 23 July 2007**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 9746 / 9751 (99.95%)

Class Bins

Class 1 - 6195 (63.56%)
Class 2 - 1315 (13.49%)
Class 3 - 591 (6.06%)
Class 4 - 108 (1.11%)
Class 5 - 25 (0.26%)
Class 6 - 65 (0.67%)
Class 7 - 114 (1.17%)
Class 8 - 87 (0.89%)
Class 9 - 669 (6.86%)
Class 10 - 572 (5.87%)
Class 11 - 5 (0.05%)
Class 12 - 0 (0.00%)

MetroCount Traffic Executive
Speed Histogram

SpeedHist-31 -- English (ENA)

Datasets:

Site:	**[55555] 55555 on 45A**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	8:00 Wednesday, 4 July 2007 => 14:56 Monday, 23 July 2007
File:	G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\5555523Jul2007.EC0 (Plus)
Identifier:	L419V8GX MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**8:00 Wednesday, 4 July 2007 => 14:56 Monday, 23 July 2007**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 9746 / 9751 (99.95%)

Speed Statistics

Vehicles = 9746
Posted speed limit = 100 km/h, Exceeding = 5671 (58.19%), Mean Exceeding = 108.91 km/h
Maximum = 159.1 km/h, **Minimum** = 37.6 km/h, **Mean** = 101.7 km/h
85% Speed = 112.0 km/h, **95% Speed** = 119.9 km/h, **Median** = 101.5 km/h
15 km/h Pace = 95 - 110, **Number in Pace** = 5460 (56.02%)
Variance = 130.15, **Standard Deviation** = 11.41 km/h

284 L.G. Smith Bridge

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-22 -- English (ENA)

Datasets:

Site: **[22222] 22222 on 426**
Direction: 1 - North bound, A hit first., **Lane:** 0
Survey Duration: 13:00 Tuesday, 3 July 2007 => 15:09 Monday, 23 July 2007
File: G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\2222223Jul2007.EC0 (Plus)
Identifier: S705K6EF MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm: Factory default
Data type: Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time: **13:00 Tuesday, 3 July 2007 => 15:09 Monday, 23 July 2007**
Included classes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range: 10 - 160 km/h.
Direction: North, East, South, West (bound)
Separation: All - (Headway)
Name: Factory default profile
Scheme: Vehicle classification (AustRoads94)
Units: Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile: Vehicles = 8039 / 8044 (99.94%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-22
Site: 22222.0N
Description: **22222 on 426**
Filter time: **13:00 Tuesday, 3 July 2007 => 15:09 Monday, 23 July 2007**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
0000-0100	0.3	0.5	0.0	0.3	0.3	2.0	0.7	0.3	0.6
0100-0200	0.3	0.0	1.3	1.0	0.7	1.0	1.7	0.7	0.9
0200-0300	0.3	1.5	0.3	0.3	0.7	0.7	0.7	0.6	0.6
0300-0400	2.3	0.0	1.7	1.7	0.7	1.3	0.7	1.4	1.3
0400-0500	3.7	5.5	3.3	4.7	4.7	3.7	1.3	4.3	3.8
0500-0600	13.7	11.0	10.7	10.7	11.0	6.0	3.0	11.4	9.3
0600-0700	17.7	19.5	21.3	20.0	20.3	8.0	4.0	19.8	15.7
0700-0800	26.3	30.0	29.0	30.0	28.7	17.0	9.7	28.7	24.1
0800-0900	**31.7<**	27.0	26.0	34.0	30.0	28.0	15.3	29.9	27.4
0900-1000	28.3	**30.5<**	31.3	**35.0<**	35.0	29.7	25.0	32.1	30.7
1000-1100	31.0	27.5	30.7	28.3	31.3	33.3	**39.3<**	29.9	31.9
1100-1200	26.0	26.0	**35.0<**	32.7	**39.0<**	**37.7<**	25.3	**32.1<**	**31.9<**
1200-1300	29.7	26.0	33.7	26.7	36.7	**35.3<**	31.0	30.9	31.6
1300-1400	**32.7<**	25.0	33.0	28.3	41.3	29.0	**37.7<**	32.1	32.4
1400-1500	20.3	30.0	**37.3<**	34.7	43.0	26.7	31.0	33.1	31.9
1500-1600	25.3	**33.3<**	32.0	**41.3<**	**47.0<**	29.0	30.7	35.8	**34.1<**
1600-1700	32.0	33.0	35.0	40.7	38.7	22.7	30.7	**36.1<**	33.3
1700-1800	22.5	20.0	25.7	30.3	30.3	15.7	23.0	26.0	24.0
1800-1900	13.0	13.3	9.3	10.7	13.3	11.3	10.7	11.9	11.6
1900-2000	7.5	7.0	8.0	6.3	9.7	5.7	5.0	7.7	7.0
2000-2100	4.0	4.7	7.7	6.0	5.3	3.0	5.0	5.6	5.2
2100-2200	7.0	3.3	3.0	4.3	5.7	3.3	4.3	4.5	4.3
2200-2300	1.5	3.3	1.7	4.3	2.3	0.7	2.0	2.7	2.3
2300-2400	2.0	0.7	1.3	0.7	1.3	1.7	1.7	1.1	1.3
Totals									
0700-1900	318.8	321.7	358.0	372.7	414.3	315.3	309.3	358.6	344.9
0600-2200	355.0	356.2	398.0	409.3	455.3	335.3	327.7	396.3	377.0
0600-0000	358.5	360.2	401.0	414.3	459.0	337.7	331.3	400.1	380.6
0000-0000	379.2	378.7	418.3	433.0	477.0	352.3	339.3	418.8	397.0
AM Peak	0800	0900	1100	0900	1100	1100	1000		
	31.7	30.5	35.0	35.0	39.0	37.7	39.3		
PM Peak	1300	1500	1400	1500	1500	1200	1300		
	32.7	33.3	37.3	41.3	47.0	35.3	37.7		

MetroCount Traffic Executive
Class Bin Chart

ClassBin-33 -- English (ENA)

Datasets:

Site:	**[22222] 22222 on 426**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	13:00 Tuesday, 3 July 2007 => 15:09 Monday, 23 July 2007
File:	G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\2222223Jul2007.EC0 (Plus)
Identifier:	S705K6EF MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**13:00 Tuesday, 3 July 2007 => 15:09 Monday, 23 July 2007**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 8039 / 8044 (99.94%)

Class Bins

Class 1 - 5912 (73.54%)
Class 2 - 707 (8.79%)
Class 3 - 422 (5.25%)
Class 4 - 95 (1.18%)
Class 5 - 11 (0.14%)
Class 6 - 21 (0.26%)
Class 7 - 58 (0.72%)
Class 8 - 46 (0.57%)
Class 9 - 554 (6.89%)
Class 10 - 205 (2.55%)
Class 11 - 8 (0.10%)
Class 12 - 0 (0.00%)

MetroCount Traffic Executive
Speed Histogram

SpeedHist-27 -- English (ENA)

Datasets:

Site:	**[22222] 22222 on 426**
Direction:	1 - North bound, A hit first., **Lane:** 0
Survey Duration:	13:00 Tuesday, 3 July 2007 => 15:09 Monday, 23 July 2007
File:	G:\MainRoads\NP\ARMIS\TARS\2007 Metros\Pocket\9th Pick Up\2222223Jul2007.EC0 (Plus)
Identifier:	S705K6EF MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**13:00 Tuesday, 3 July 2007 => 15:09 Monday, 23 July 2007**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 8039 / 8044 (99.94%)

Speed Statistics

Vehicles = 8039
Posted speed limit = 100 km/h, Exceeding = 2632 (32.74%), Mean Exceeding = 107.70 km/h
Maximum = 159.2 km/h, **Minimum** = 19.5 km/h, **Mean** = 94.5 km/h
85% Speed = 105.8 km/h, **95% Speed** = 114.5 km/h, **Median** = 95.8 km/h
15 km/h Pace = 90 - 105, **Number in Pace** = 4280 (53.24%)
Variance = 185.58, **Standard Deviation** = 13.62 km/h

Appendix F Prioritisation of Bridge Approach Guardrail

Bridge Name: Nukku Railway O'Bridge
Structure ID: 406
Road Number: 40B
Through Chainage: 58.03

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
2860	2	106.6	2	8.7	1	14.84%	1.5	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0
								End Treatment Score	20

Comments: Fishtail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	10

Comments: Structural adequacy of guardrail comprimised by rotting of timber posts. Guardrail incorrect height and length.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	5

Comments: Guardrail is connected but has not got reduced post spacing for transitioning.

Total Component Score	35
X Adjustment Factor	1.5

Total Component Score	35

Prioritisation Score

52.5

Bridge Name: Rocky Creek
Structure ID: 372
Road Number: 40C
Through Chainage: 5.59

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
2898	2	108	2	7.3	1.5	14.88%	1.5	9	2
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminal and cable anchor.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	3

Comments: Guardrail structurally sound but is not to standard height.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Connected to bridge with reduced spacing for transitioning but not quite to standard.

Total Component Score	16
X Adjustment Factor	2

Prioritisation Score

32

Total Component Score	16

Bridge Name: Horse Creek
Structure ID: 375
Road Number: 40C
Through Chainage: 28.942

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
3332	2	102.6	2	8.6	1	7.81%	1	4	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment modified by welding curved end.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	8

Comments: Guardrail has timber posts that are incorrectly spaced at 4m. Guardrail also not to specified height or length.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	5

Comments: Connected to bridge but no reduced spacing for transition.

Total Component Score	33
X Adjustment Factor	1.5

Total Component Score	33

Prioritisation Score

49.5

Bridge Name: Meandu Creek
Structure ID: 373
Road Number: 40C
Through Chainage: 27.041

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
3332	2	102.6	2	8.6	1	7.81%	1	4	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment modified by welding curved end.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	5

Comments: Guardrail has timber posts that are incorrectly spaced at 4m. Guardrail also not to specified height.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	5

Comments: Connected to bridge but no reduced spacing for transition.

Total Component Score	30
X Adjustment Factor	1.5

Total Component Score	30

Prioritisation Score

45

Bridge Name: Barkers Creek
Structure ID: 374
Road Number: 40C
Through Chainage: 27.91

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
3332	2	102.6	2	8.7	1	7.81%	1	4	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment modified by welding curved end.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	10

Comments: Guardrail has timber posts that are rotting so are not structurally adequate.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	5

Comments: Connected to bridge but no reduced spacing for transition, 4m spacings.

Total Component Score	35
X Adjustment Factor	1.5

Total Component Score	35

Prioritisation Score

52.5

Bridge Name: Barkers Creek
Structure ID: 271
Road Number: 419
Through Chainage: 20.831

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
818	1	110.2	2	7	1.5	11.08%	1.5	4.5	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	3

Comments: Guardrail structurally adequate but is not to standard length. Cutting behind guardrail.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Guardrail is continuous across bridge so there is no transition.

Total Component Score	16
X Adjustment Factor	1.5

Prioritisation Score

24

Total Component Score	16

Bridge Name: Tanduringie Creek
Structure ID: 273
Road Number: 419
Through Chainage: 46.208

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
600	1	100.4	2	5.5	2	11.73%	1.5	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish Tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	10

Comments: Guardrail not structurally sound, timber posts rotting and at 4m spacing. Guardrail not to length or height.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: Not connected to bridge as there is no bridge rail. No reduced post spacing for transitioning.

Total Component Score	40
X Adjustment Factor	1.5

Total Component Score	40

Prioritisation Score

60

Bridge Name: Middle Creek
Structure ID: 272
Road Number: 419
Through Chainage: 23.776

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
818	1	110.2	2	7	1.5	11.08%	1.5	4.5	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0
								End Treatment Score	0

Comments: Recently upgraded to current standard.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Recently upgraded to current standard.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	0

Comments: Recently upgraded to current standard.

Total Component Score	0
X Adjustment Factor	1.5

Prioritisation Score

0

Total Component Score	0

Bridge Name: Tanduringie Creek
Structure ID: 274
Road Number: 419
Through Chainage: 38.629

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
600	1	100.4	2	7.6	1	11.73%	1.5	3	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	10

Comments: Guardrail structurally unsound due to timber post rotting. Guardrail not to height, length or post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: Not connected and no reduced post spacing for strengthening with concrete end post.

Total Component Score	40
X Adjustment Factor	1

Prioritisation Score

40

Total Component Score	40

Bridge Name: Wyalla Creek
Structure ID: 377
Road Number: 41A
Through Chainage: 27.118

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
931	1	107.3	2	7.4	1.5	18.88%	2	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminals and cable anchor.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Guardrail meets current standards for height, length and post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Connected with reduced spacing of 1m that is not quite to current standards.

Total Component Score	13
X Adjustment Factor	1.5

Total Component Score	13

Prioritisation Score

19.5

Bridge Name: Wyalla Creek Overflow
Structure ID: 378
Road Number: 41A
Through Chainage: 27.276

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
931	1	107.3	2	7.4	1.5	18.88%	2	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminals and cable anchor.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Guardrail meets current standards for height, length and post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Connected with reduced spacing of 1m that is not quite to current standards.

Total Component Score	13
X Adjustment Factor	1.5

Prioritisation Score

19.5

Total Component Score	13

Bridge Name: Murdering Hut Creek
Structure ID: 376
Road Number: 41A
Through Chainage: 25.182

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
931	1	107.3	2	7.3	1.5	18.88%	2	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0
								End Treatment Score	20

Comments: Fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	10

Comments: Guardrail structurally unsound due to timber post rotting. Guardrail not to height, length or post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: Not connected and no reduced post spacing for strengthening with concrete end post.

Total Component Score	40
X Adjustment Factor	1.5

Total Component Score	40

Prioritisation Score

60

Bridge Name: Sandy Creek
Structure ID: 20641
Road Number: 41A
Through Chainage: 0.815

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
1087	1.5	112.3	2	9.2	0.5	18.96%	2	3	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment

Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminals and cable anchor.

Guardrail

Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Guardrail meets current standards for height, length and post spacing.

Transition

Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Connected with reduced spacing of 1m that is not quite to current standards.

Total Component Score	13
X Adjustment Factor	1

Prioritisation Score

13

Total Component Score	13

Bridge Name: Meandu Creek
Structure ID: 292
Road Number: 429
Through Chainage: 9.45

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
651	1	107.3	2	7	1.5	11.63%	1.5	4.5	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Modified fish tail end treatment with curved part welded on.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	10

Comments: Guardrail structurally unsound due to timber post rotting.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: No connection and no reduced spacing for transitioning with concrete bridge end.

Total Component Score	40
X Adjustment Factor	1.5

Prioritisation Score

60

Total Component Score	40

Bridge Name: Barambah Creek
Structure ID: 398
Road Number: 41A
Through Chainage: 42.46

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
931	1	107.3	2	7	1.5	18.88%	2	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) with breakaway terminals and cable anchor.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Guardrail meets current standards for height, length and post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Connected as guardrail is continuous across bridge. There is reduced post spacings of 1m for strengthening but this is not quite to current standards.

Total Component Score	13
X Adjustment Factor	1.5

Total Component Score	13

Prioritisation Score

19.5

Bridge Name: Barambah Creek
Structure ID: 296
Road Number: 437
Through Chainage: 1.542

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
441	0.5	99	1.5	8	1	22.53%	2	1.5	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Modified fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	3

Comments: Guardrail meets standard for height and post spacing. Length is short on departure side and timber posts.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Connected with reduced post spacings of 1m which is not quite to standard.

Total Component Score	26
X Adjustment Factor	1

Prioritisation Score

26

Total Component Score	26

Bridge Name: Unnamed Creek
Structure ID: 298
Road Number: 439
Through Chainage: 21.502

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
493	0.5	107.3	2	7.7	1	26.94%	2	2	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment

	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminals and cable anchor.

Guardrail

	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Guardrail meets current standards for height, length and post spacing.

Transition

	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	0

Comments: Connected with reduced spacing of 1m that is not quite to current standards.

Total Component Score	10
X Adjustment Factor	1

Prioritisation Score

10

Total Component Score	10

Bridge Name: Oaky Creek
Structure ID: 297
Road Number: 439
Through Chainage: 4.067

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)		% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
671	1	99	1.5	8	1	19.21%	2	3	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Modified fish tail end treatment with timber posts.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	3

Comments: Guardrail in good condition with steel posts and to standard for length and post spacing. Not to standard for height.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Connected with reduced spacing of 1m which is not quite to standard.

Total Component Score	26
X Adjustment Factor	1

Total Component Score	26

Prioritisation Score

26

Bridge Name: Windera Creek
Structure ID: 299
Road Number: 439
Through Chainage: 22.752

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
493	0.5	107.3	2	7.3	1.5	26.94%	2	3	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	10

Comments: Guardrail structurally unsound due to rotting timber posts. Guardrail not to standard for height, length or post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: Not connected and no reduced post spacing for transitioning.

Total Component Score	40
X Adjustment Factor	1

Prioritisation Score

40

Total Component Score	40

Bridge Name: Kratzmans Gully
Structure ID: 300
Road Number: 439
Through Chainage: 24.591

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
493	0.5	107.3	2	6.1	2	26.94%	2	4	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0
								End Treatment Score	0

Comments: Recently upgraded to current standard.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Recently upgraded to current standard.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	0

Comments: Recently upgraded to current standard.

Total Component Score	0
X Adjustment Factor	1.5

Prioritisation Score

0

Total Component Score	0

Bridge Name: Sawpit Creek
Structure ID: 390
Road Number: 45B
Through Chainage: 47.46

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
1424	1.5	108.7	2	8.6	1	15.38%	2	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	8

Comments: Guardrail has timber posts and does not meet current standards for height and length.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	5

Comments: Connected to bridge rail but does not have reduced spacing for transitioning. 4m between end of bridge and first timber post.

Total Component Score	33
X Adjustment Factor	1.5

Total Component Score	33

Prioritisation Score

49.5

Bridge Name: Stuart River
Structure ID: 320
Road Number: 4206
Through Chainage: 4.64

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
232	0.5	104	2	7.4	1.5	13.78%	1.5	2.25	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	8

Comments: Guardrail has timber posts and does not meet current standards for height and length.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	5

Comments: Connected to bridge rail but does not have reduced spacing for transitioning.

Total Component Score	33
X Adjustment Factor	1

Total Component Score	33

Prioritisation Score

33

Bridge Name: Deep Creek
Structure ID: 321
Road Number: 4206
Through Chainage: 11.55

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
232	0.5	104	2	3.6 (one-lane)	2	13.78%	1.5	3	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Guardrail to standard for length, height and post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	8

Comments: Not connected as there is no bridge rail but has reduced post spacing of 1m for strengthening.

Total Component Score	18
X Adjustment Factor	1

Total Component Score	18

Prioritisation Score

18

Bridge Name: Reedy Creek
Structure ID: 322
Road Number: 4206
Through Chainage: 15.35

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
232	0.5	104	2	7.2	1.5	13.78%	1.5	2.25	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	3

Comments: Guardrail height not to standard but length and post spacings are.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Connected with reduced post spacing to 1m for transitioning but is not quite to standard.

Total Component Score	16
X Adjustment Factor	1

Total Component Score	16

Prioritisation Score

16

Bridge Name: Spring Creek
Structure ID: 280
Road Number: 426
Through Chainage: 98.564

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
198	0.5	110.9	2	7.3	1.5	27.39%	2	3	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	10

Comments: Guardrail structurally unsound due to rotting of timber posts. Guardrail also not standard for height, length or post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: Not connected with no reduced post spacing for transitioning.

Total Component Score	40
X Adjustment Factor	1

Prioritisation Score

40

Total Component Score	40

Bridge Name: Stuart River
Structure ID: 285
Road Number: 428
Through Chainage: 3.431

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
120	0.5	92.9	1.5	7.2	1.5	13.25%	1.5	1.6875	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment

Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	5

Comments: Properly installed current standard (MELT) end treatment but with a tree in the clear zone.

Guardrail

Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Guardrail meets current standards for length, height and post spacing.

Transition

Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	5

Comments: Connected as guardrail is continuous across bridge but without reduced post spacings for transitioning.

Total Component Score	10
X Adjustment Factor	1

Total Component Score	10

Prioritisation Score

10

Bridge Name: Boyne River
Structure ID: 287
Road Number: 428
Through Chainage: 33.16

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
120	0.5	92.9	1.5	3.6 (one-lane)	2	13.25%	1.5	2.25	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment

Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminals and cable anchor.

Guardrail

Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	3

Comments: Guardrail to standard for length and post spacing but not for height.

Transition

Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	8

Comments: Not connected as there is no bridge rail but there is reduced post spacing to 1m for transitioning.

Total Component Score	21
X Adjustment Factor	1

Total Component Score	21

Prioritisation Score

21

Bridge Name: Sandy Creek
Structure ID: 289
Road Number: 428
Through Chainage: 26.108

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
120	0.5	92.9	1.5	3.6 (one-lane)	2	13.25%	1.5	2.25	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment

Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminals and cable anchor.

Guardrail

Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	3

Comments: Guardrail to standard for length and post spacing but not for height.

Transition

Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	8

Comments: Not connected as there is no bridge rail but there is reduced post spacing to 1m for transitioning.

Total Component Score	21
X Adjustment Factor	1

Total Component Score	21

Prioritisation Score

21

Bridge Name: Ironpot Creek
Structure ID: 291
Road Number: 428
Through Chainage: 47.865

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
120	0.5	92.9	1.5	3.7 (one-lane)	2	13.25%	1.5	2.25	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	5

Comments: Guardrail not to standard for length with timber posts

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: No connection as there is no bridge rail and no reduced post spacings for transitioning

Total Component Score	35
X Adjustment Factor	1

Total Component Score	35

Prioritisation Score

35

Bridge Name: Mannuem Creek
Structure ID: 330
Road Number: 45A
Through Chainage: 72.63

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
905	1	108.7	2	7	1.5	17.71%	2	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminals and cable anchor.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	5

Comments: Guardrail not to standard for height or length but in good condition with correctly spaced steel posts.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	5

Comments: Connected as guardrail is continuous across bridge but no reduced post spacing for transitioning.

Total Component Score	20
X Adjustment Factor	1.5

Total Component Score	20

Prioritisation Score

30

Bridge Name: Boyne River
Structure ID: 329
Road Number: 45A
Through Chainage: 69.992

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
905	1	108.7	2	6.7	1.5	17.71%	2	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0
								End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminals and cable anchor.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0
					Guardrail Score 0

Comments: Guardrail in good condition and to standard for height, length and post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0
					Transition Score 8

Comments: Not connected as there is no bridge rail but is reduced post spacing to 1m for transitioning.

Total Component Score	18
X Adjustment Factor	1.5

Prioritisation Score

27

Total Component Score 18

Bridge Name: Stuart River
Structure ID: 389
Road Number: 45A
Through Chainage: 99.225

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
905	1	108.7	2	7.4	1.5	17.71%	2	6	1.5
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Modified fish tail end treatment with cable anchor.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	8

Comments: Guardrail not to standard for height, length or post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: Not connected and no reduction in post spacing for transitioning to concrete end.

Total Component Score	38
X Adjustment Factor	1.5

Total Component Score	38

Prioritisation Score

57

Bridge Name: Spring Creek
Structure ID: 27777
Road Number: 45A
Through Chainage: 65.414

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
905	1	108.7	2	9.2	0.5	17.71%	2	2	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0
								End Treatment Score	0

Comments: Recently upgraded to current standard.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Recently upgraded to current standard.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	0

Comments: Recently upgraded to current standard.

Total Component Score	0
X Adjustment Factor	1

Prioritisation Score

0

Total Component Score	0

Bridge Name: L.G.Smith Bridge
Structure ID: 284
Road Number: 426
Through Chainage: 133.506

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
475	0.5	110.9	2	6.7	1.5	14.74%	1.5	2.25	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	10

Comments: Previous standard (BCT) end treatment with breakaway terminals and cable anchor.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	3

Comments: Guardrail in good condition to standard for length and post spacing but not for height.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	3

Comments: Connected with reduced post spacing to 1m for transitioning which is not quite to current standards.

Total Component Score	16
X Adjustment Factor	1

Total Component Score	16

Prioritisation Score

16

Bridge Name: Boondooma Creek
Structure ID: 294
Road Number: 435
Through Chainage: 80.74

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	A*B*C*D	Adjustment Factor
139	0.5	109.1	2	5.4 (one-lane)	1	20.34%	2	2	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	10

Comments: Guardrail structurally unsound due to rotting timber posts. Guardrail not to standard for height, length or post spacing

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: Not connected as there is no bridge rail and no reduced post spacing for transitioning.

Total Component Score	40
X Adjustment Factor	1

Total Component Score	40

Prioritisation Score

40

Bridge Name: Di Di Creek
Structure ID: 293
Road Number: 435
Through Chainage: 66.79

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
139	0.5	109.1	2	7.5	1	20.34%	2	2	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0

End Treatment Score	20

Comments: Fish tail end treatment.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	8

Comments: Guardrail has timber posts that appear structurally ok. Guardrail is not to standard for height, length or post spacing.

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	10

Comments: Not connected and no reduced post spacing for transitioning.

Total Component Score	38
X Adjustment Factor	1

Prioritisation Score

38

Total Component Score	38

Bridge Name: Hansens Gully
Structure ID: 295
Road Number: 436
Through Chainage: 16.198

External Factors

AADT (A)	Score (A)	85th % Speed (B)	Score (B)	Width of Bridge (C)	Score (C)	% Heavy Vehicles (D)	Score (D)	**A*B*C*D**	**Adjustment Factor**
355	0.5	107.6	2	7	1.5	12.98%	1.5	2.25	1
< 500 = 0.5 500-1000 = 1.0 1000-2500 = 1.5 2500-5000 = 2.0 > 5000 = 2.5		< 60 km/hr = 0.5 60-80 km/hr = 1.0 80-100 km/hr = 1.5 >100 km/hr = 2.0		Two-lane/one-lane > 9.0 / 5.5 m = 0.5 7.5-9.0 / 4.5-5.5 m = 1.0 6.5-7.5 / 4-4.5 m = 1.5 < 6.5 / 4 m = 2.0		< 5% = 0.5 5-10 % = 1.0 10-15% = 1.5 > 15% = 2.0		< 4 = 1.0 4 - 8 = 1.5 8 - 12 = 2 > 12 = 2.5	

Guardrail Components

End Treatment	Score		Ave Score		Ave Score		Ave Score		Min Score
Splayed ends (Fish Tail) or no end treatment	20	Previous standard end treatment without breakaway terminals or cable anchor	15	End treatment meets previous standard	10	Current standard end treatment without sufficient clearzone or parabolic flare	5	Properly installed current standard end treatment	0
								End Treatment Score	5

Comments: Recently upgraded to current standard but there is a tree in the clear zone behind one side of the guardrail.

Guardrail	Score		Ave Score		Min Score
Structurally unsound (timber posts damaged or rotten, accident damage or rusted through)	10	Does not meet current standards (incorrect height, length or post spacing)	5	Guardrail meets all current standards	0

Guardrail Score	0

Comments: Recently upgraded to current standard

Transition	Score		Ave Score		Min Score
Not connected to the bridge	10	Connected but does not meet current standards for strengthening	5	Properly connected to the bridge	0

Transition Score	0

Comments: Recently upgraded to current standard

Total Component Score	5
X Adjustment Factor	1

Prioritisation Score

5

Total Component Score	5