



mainroads
WESTERN AUSTRALIA

Tri-Drive Route Assessment Guidelines

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Document Control

Owner	Main Roads Heavy Vehicle Services
Custodian	Access Manager
Document Number	D16#374056
Issue Date	July 2016
Review Frequency	Annually

Amendments

Revision Number	Revision Date	Description of Key Changes	Section / Page No.
1	July 2017	Note added relating to private driveways.	1.2
2	February 2019	Removed Turning Template List. Removed reference to Standards and Technical web page & added RAV assessment vehicle diagrams. Removed reference to Traffic Data Formatted to updated document template.	Appendix B 2.4, 2.1 & entire Document

Definitions

Term	Definition
Main Roads website	www.mainroads.wa.gov.au

Related Documents

Document Number	Description
D16#198414	Guidelines for Approving RAV Access
D14#493277	Standard Restricted Access Vehicle Route Assessment Guidelines
NA	RAV Route Assessment Form

1 INTRODUCTION

1.1 General

These *Tri-drive Route Assessment Guidelines* are directly linked to the *Standard Restricted Access Vehicle (RAV) Route Assessment Guidelines*. A road being assessed for a Tri-drive Restricted Access Vehicle (RAV) Network is required to meet the requirements under the Standard Restricted Access Vehicle (RAV) Route Assessment Guidelines, with the exception of the structures assessments, gradient assessments and swept path assessments, which must be assessed in accordance with these *Tri-drive Route Assessment Guidelines*. Generally speaking, if a road meets the requirements for a Tri-drive RAV Network, it will meet the requirements for a Standard RAV Network (i.e. RAV Networks 1 to 10).

The quantitative limits recommended in these guidelines provide additional safety margins for Tri-drive RAVs, as the tri-drive axle group has a considerable impact on the vehicle performance characteristics and pavement impact in certain circumstances.

These guidelines have been prepared by Main Roads Western Australia to assist Local Government, Main Roads staff, transport operators and consultants in assessing the suitability of routes proposed for the operation of Tri-drive RAVs on roads within the State of Western Australia.

The Tri-drive RAV Categories have been grouped into four (4) assessment levels, as follows:

- Level 1 – Tri-drive RAV Category 1 (e.g. a vehicle that would otherwise be a general access vehicle if it was tandem drive. This category has access to the tandem drive RAV Network 2);
- Level 2 – Tri-drive RAV Category 2 (e.g. RAVs with a maximum length of 25.0 metres);
- Level 3 – Tri-drive RAV Category 3 (e.g. RAVs with a maximum length of 27.5 metres);
- Level 4 – Tri-drive RAV Category 4 (e.g. RAVs with a maximum length of 36.5 metres); and
- Level 5 – Tri-drive RAV Category 5 (e.g. RAVs with a maximum length of 53.5 metres).

The guidelines are intended to assist assessors in ensuring that the necessary factors have been considered during the route assessment process.

Where quantitative limits are recommended, they are intended as a guide only and are no substitute for common sense and judgement based on experience. In certain cases, routes which do not meet the requirements outlined in this document can be accepted as RAV routes by imposing appropriate conditions, such as speed restrictions, curfews etc.

Should an aspect of a route clearly fail to conform to these guidelines in a manner which cannot be suitably addressed, the route should be considered unsuitable for RAV access.

The information used in preparation of this document has been obtained from various internal and external sources, such as Austroads reports and years of practical experience, and incorporates the latest reference material available at this time.

1.2 Assessment Requirements

Route assessments should be undertaken by a person who has experience within the heavy transport industry and a substantial knowledge of the following:

- The principles of heavy vehicle operation, including vehicle configurations, maximum dimensions and axle load limits;
- Heavy vehicle dynamic performance characteristics, including limitations on the ability of heavy vehicles to accelerate, brake, ascend grades and negotiate corners;
- Heavy transport issues, legal requirements and permit systems; and
- Road safety concepts and principles.

When considering a potential route, the assessor is advised to initially perform a desktop assessment using all available information. In some cases this initial assessment will identify particular physical constraints, such as posted bridge load limits and road width deficiencies, which may render the route unacceptable without the need for further assessment.

Heavy vehicle use on a particular route may have some negative impacts on the environment, community and traffic. Assessors must first determine if the proposed route is the most appropriate route for the particular operations and recommend variations to the initially proposed route to reduce such impacts.

Note 1: When conducting a route assessment for a Restricted Access Vehicle (RAV), HVS does not assess any access driveway adjoining a RAV network road. It remains the responsibility of the property owner to ensure safe ingress and egress to the property.

Note 2: Before using a RAV on any road, it is necessary to obtain the HVS approval. Before making a decision on an application for route access, HVS may deem it necessary to do any or all of the following:

- *Perform a further assessment of the route;*
- *Assess the stability of the vehicle and load, which may involve a PBS Assessment or similar;*
- *Assess the suitability of the road pavement;*
- *Obtain Local Government agreement for the proposed route (for all operators); and*
- *Recommend a number of road improvements as conditions of approval.*

1.3 Planning Evaluation

Assessment of a proposed route should be checked against any future planning proposals to evaluate the potential impact of RAVs. The relevant Local Government and Regions should be consulted as part of the process.

1.4 Route Assessment Form

The Restricted Access Vehicle Route Assessment Form, for use in assessing RAV routes in accordance with the requirements set out in these Guidelines, is available on Road Access page of the Main Roads website.

1.5 Further Assistance

Additional information and guidance is available from Main Roads Heavy Vehicle Services on telephone 138 486 or hvsrouteassessments@mainroads.wa.gov.au

2 ASSESSMENT CRITERIA

2.1 Structures

All bridges and load restrictive culverts on the requested route must be assessed by Main Roads Structures Engineering Branch, via Heavy Vehicle Services.

2.2 Steep Grades

The maximum grade for a road to be approved for inclusion in a Tri-drive RAV Network is determined by using the graph in Appendix A. This graph determines the maximum grade before a vehicle combination will lose traction.

For the purpose of the graph in Appendix A, the following table shows the average friction between a tyre and a typical road surface:

Typical Road Surface	Friction value (Mu)
Asphalt and Concrete (dry)	0.8
Asphalt (wet)	0.5-0.7
Concrete (wet)	0.8
Gravel	0.6
Earth road (dry)	0.68
Earth road (wet)	0.55

Average friction value between a tyre and various surfaces (Ref. Wong 1978)

2.3 Turning at Intersections

It is essential intersections can be safely negotiated, with minimal or no interference to other traffic. Due to the additional drive axle and additional mass on a tri-drive prime mover, the vehicle may experience understeer. For this reason, the low speed swept path of a tri-drive prime mover may differ from a tandem drive prime mover.

For tri-drive RAV assessments, HVS conducts the required swept path analysis to assess intersections and tight bends. The tri-drive vehicle combinations for completing swept path assessments are listed in the table below:

Tri-Drive Category	Assessment Vehicle	Maximum Length (m)
2		25.0
3		27.5
4		36.5
5		53.5

The following four (4) combinations have been assessed as having significant understeer while turning on a 15 metre radius at a 15 km/h speed at specific angles. In order to minimise the effect of understeer, the turning radius must be increased from 15 metres. The assessor must not use the turning template of 15 metre radius for the following vehicle combinations at the specified turn angle. The minimum radius specified in the following table must be used:

No.	Vehicle Configuration	Turn angle (Degree)	Required Minimum Turning Radius
1	Single steer prime mover and semi-trailer	180°	16m
2	Single steer B-Double	120°,150°,180°	16m
3	Single steer B-Triple	120°,150°,180°	17m
4	Single steer Double B-Double	120°,150°,180°	17m

3 APPENDICES

Appendix	Title
A	Maximum Grades

Appendix A Maximum Grades

Start from GCM **1**, move down vertically until you intersect the friction line (μ) of interest **2**, move right horizontally until you intersect the drive axle load (Md) of interest **3** and finally move down vertically and read the maximum % grade the vehicle can start and maintain **4** motion on.

