WSFN

WHEATBELT SECONDARY FREIGHT NETWORK

BASIS OF DESIGN

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05	May 2025	Narrative on the WSFN Limits of Responsibility	Appendix 3

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1 GENERAL

1.1 Definitions and interpretation

For the purpose of this Basis of Design:

1.1.a the term:

(i) **Clear Zone** is the roadside area of width as defined in *MRWA Supplement to Austroads Guide to Road Design – Part 6* calculated based on the design speed of the road, except that for design speeds of 80 km/h and above the width must be increased by 50%.

(ii) **Design Groundwater Level** is defined as the maximum anticipated groundwater level over the design life of the Pavement.

(iii) **Road** is a Local Government Authority owned road.

(iv) **Maintenance Zone** is the clearing zone as defined in Main Roads' Environmental Guideline *Vegetation Placement within the Road Reserve*.

(v) **Overlay** is the addition of one or more courses of Pavement material to an existing Pavement.

(vi) **Pavement** is that portion of a carriageway placed above the subgrade for the support of, and to form a running surface for, vehicular traffic and includes the shoulders.

(vii) **Resurfacing** is the addition of a new bituminous surfacing treatment to an existing Pavement. It also includes any surface correction works required to remove rutting and other surface defects.

1.1.b except where otherwise specified, the definitions given in AS 1348 Road and Traffic Engineering - Glossary of Terms apply. Definitions otherwise specified take precedence over those in AS 1348.

1.1.c unless the context otherwise requires, a reference to a clause or appendix is to a clause of or appendix to this Basis of Design.

1.1.d unless the context otherwise requires, a reference to an Australian standard or other standard, guideline or code of practice, is to that standard, guideline or code of practice current as at the date of this Basis of Design.

1.1.e except where otherwise specified, documents referred to on the Main Roads' website can be found at the following locations:

(i) Main Roads' specifications are in the "Tender Preparation" section under "Building Roads".

(ii) Main Roads' drawings are in "Main Roads Drawings" under the "Standards and Technical" section under "Building Roads";

(iii) Main Roads' survey and mapping standards are in "Survey and Geospatial Services" under the "Standards and Technical" section under "Building Roads".

(iv) Main Roads road and traffic design standards are in "Road and Traffic

Engineering" under the "Standards and Technical" section under "Building Roads";

(v) Main Roads' materials and Pavement design standards are in "Material Engineering" under the "Standards and Technical" section under "Building Roads"; and

(vi) Main Roads' Test Methods are in "Material Engineering" under the "Standards and Technical" section under "Building Roads".

1.2 Inconsistency

To the extent there is any inconsistency between any requirement of this Basis of Design and an industry standard specified, this Basis of Design takes precedence over Australian standards, and Australian standards take precedence over international standards.

2 SCOPE

2.1 General

2.1.a The Project Works include all investigation, design and construction required to deliver a consistent program of works across each of the 53 identified freight routes of the Wheatbelt Secondary Freight Network so that the freight task of each route can be completed in the most efficient and safe manner.

2.1.b The Project Works, as described in this Basis of Design, include the following:

(i) All Roads

Design and construction of the Road in accordance with the typical cross section plans at Appendix 1, including:

- The width of the pavement is to nominally be 10m (if site conditions permit);
- The seal width is to be 8m.
- Existing pavement is to be overlayed and widened where the existing pavement strength and / or surface shape is unsound (determined in consultation with the WSFN); and
- Existing pavement is to be widened, and the existing seal resurfaced where the existing pavement strength and shape is sound (determined in consultation with the WSFN).

(ii) Connecting Roads

Design and construction of all connections, modifications and improvements necessary to Connecting Roads including access roads to properties and intersections as necessary.

(iii) Road safety barriers

Design and construction of road safety barriers as necessary.

(iv) Resurfacing

Resurfacing of existing Road bituminous surfaces as necessary

(v) Accommodation works

Design and construction of accommodation works to properties affected by the Project Works including accesses as necessary.

(vi) Drainage

Design and construction and/or modification of all associated drainage including underground drainage, swales, basins, culverts and realignment of drainage channels.

(vii) Services

Relocation or modification of Services which are affected by work carried out by the LGA in order to complete the Project Works.

(viii) Modifications

Provision of all connections, modifications and improvements necessary to Connecting Roads and properties affected by the Project Works, including removal of redundant road infrastructure, modifications to drainage, traffic islands and associated new lane markings as necessary.

(ix) Design

Design and preparation of all documentation including detailed construction drawings and specifications, as required, in accordance with the design for the Project Works.

(x) Others

Any other works described elsewhere in the Basis of Design.

2.1.c The LGA must also undertake other obligations including:

(i) Environmental management

Obtaining environmental approvals, addressing all commitments through implementation and carrying out performance and compliance reporting.

3 PERFORMANCE REQUIREMENTS

3.1 General

3.1.a The Project Works must be designed to meet all reasonable standards of safety, maintenance and service to the public and must form an integral and sustainable part of the local road network.

3.1.b The Project Works must accommodate the needs of all legal road and path users including motor cyclists, pedestrians, cyclists, and people with disabilities.

3.1.c The minimum standards applicable to the design of the Project Works are as set out in this clause 3 and clause 4.

3.2 Component design life

The various components of the Project Works must have a minimum design life in accordance with Table 3.1.

Component	Minimum design life
drainage structures	100 years
asphalt fatigue	As per ERN 9
Pavements (excluding any Asphalt Wearing Course and bituminous surfacing)	40 years
dense graded asphalt (except Resurfacing)	15 years
open Graded Asphalt	10 years
Sprayed Bituminous Surfacing	10 years
protective coatings to steelwork	25 years

Table 3.1 – Component design life

3.3 Safe systems

To the extent permitted by this Basis of Design, the Project Works must be designed and constructed in accordance with the principles of safe systems so

that road user death or serious injury is unlikely to occur, regardless of the errors made by drivers.

A Road Safety Assessment (RSA) will be determined on a case-by-case basis in conjunction with WSFN and Shire. The Steering Committee will make the final decision regarding funding.

The principles are described in Appendix 2.

3.4 Authorities and emergency services

The Project Works must satisfy the requirements of all relevant Authorities and emergency services.

3.5 Soil erosion

The Project Works must be designed, constructed, and maintained so that erosion of non-paved areas of the Site is not excessive.

4 DESIGN REQUIREMENTS

4.1 General

4.1.a The Project Works, as described in this Basis of Design, include the following:

(i) The positioning of road furniture and other items (such as signs, drainage, road safety barriers etc.) must be done in a way which is compatible to the positioning of such existing road furniture and other items on or adjoining the Site.

(ii) The safety of the Project Works must be maximised by treatment of all hazards within the Clear Zone. Subject to environmental constraints treatment must comprise, in order of preference: removal, making frangible or shielding with a crashworthy barrier in accordance with clause 4.8.

(iii) All parts of the road reserve must be accessible for future maintenance purposes. Access to the road reserve from private or adjacent property will not be permitted.

4.1.b Design Groundwater Level

(i) In areas known to have a high-water table, the Design Groundwater Level (DGL) must be established using bore records and other data. The Design Groundwater Level must consider all impacts including climate change, changes to existing vegetation and other factors.

(ii) Any impacts on the groundwater level, including the provision of subsoil drains and/or drainage blankets, must be approved by the Department of Water.

4.2 Survey requirements

The LGA is responsible for any survey work necessary to design and construct the Project Works. This work must include:

(i) digital ground survey of the Project corridor for final design; and

(ii) setting out the Project Works.

4.3 Geometric road design

4.3.a General standards and application

(i) The geometric design of the Project Works must be fit for the intended purpose for which it is required. The design of the Project Works must be such that it forms an integral part of the road network in both visual and functional aspects. The design must be aesthetically pleasing to the road user and in harmony with the terrain and other features of the surrounding Environment. The design must provide a high level of coordination between the horizontal and vertical alignments.

(ii) The requirements of clause 4.3 must apply to the Project Works and the relationships of new construction with adjoining existing road sections.

(iii) To the extent it is not inconsistent with the other requirements in the Basis of Design, the design of the Project Works must comply with

the following:

(A) Main Roads' Drawings which are available from the Main Roads' website.

(B) Main Roads' Supplements to Austroads' Guide to Road Design Guidelines which are available from the Main Roads' website.

(C) Main Roads' Traffic Management Guidelines which are available from the Main Roads' website.

(D) Main Roads WA Horizontal Curve Tables.

(E) Austroads' Guide to Road Design – Parts 1 – 8.

(F) Austroads' Guide to Traffic Management – Parts 1 – 13.

(G) Austroads' Guide to Road Safety – Parts 1 – 9.

(iv) In the event of any inconsistency between these documents, the inconsistency must be resolved by giving precedence to the documents in the order they are listed under clause 4.3(a)(iii).

(v) Where a document listed in clause 4.3(a)(iii) includes both desirable and absolute minimum or maximum standards, the desirable standard must apply unless otherwise permitted by this Basis of Design.

(vi) With reference to Austroads publications, Extended Design Domain will not be permitted.

(vii) All works to Connecting Roads not owned by the LGA, including associated drainage, road lighting, footpaths and shared paths must be approved by the relevant Road Authority.

4.3.b Design speeds

The minimum design speed must be posted speed plus 10km/hr.

4.3.c Traffic

(i) The minimum lengths of merging/diverging areas (excluding tapers) must be in accordance with the relevant standards specified in clause 4.3(a).

4.3.d Design vehicles

(ii) Intersections must be designed to accommodate the following turning vehicles:

(A) 27.5 m B-Double or 36.5 m road train or 19 m semi-trailer.

4.3.e Intersections

(i) Turn lane lengths (excluding tapers) must:

(A) be sufficient to contain queue lengths for the design traffic volumes.

(B) be not less than 80 m; and

(C) satisfy the relevant standards specified in clause 4.3(a).

(ii) Unless otherwise specified in this Basis of Design:

(A) where one lane approaching an intersection diverges to two lanes, at least 100 m length of two lanes must be provided before the intersection; and

(B) where two lanes merge to one after an intersection the merge must begin at least 100 m after the intersection.

(iii) The turning lanes must be a minimum of 3.5 m wide.

(iv) Deceleration distances must be based on a deceleration rate not exceeding 2.5 m/s.

(v) The minimum widths between kerbs must be as follows:

(A) for single unit or semi-trailer design vehicle 5.5 m

(B) for design vehicles longer than semi-trailer 6.0 m

A concept design (to determine if a RAV 7 intersection is appropriate) must be undertaken if any of the following occur or will be required:

- Land resumption
- Service relocation
- Vegetation clearing
- Excessive grade separation involved (eg steep ascent or descent into the intersection)
- Other asset owners will be involved (eg MRWA, ARC Infrastructure etc)

If a concept design is required, the matter MUST be referred to the Technical Committee for assessment. To assist with this determination simultaneous traffic counts for each leg of the intersection will be required.

(Steering Committee Meeting 16 May 2025 - Resolution SC2025 / 05-127).

4.3.f Horizontal alignment

(i) General

In general, the existing road alignment centreline should not change in terms of both position and bearing.

(ii) Horizontal curves

(A) Minimum lengths of horizontal curves must be in accordance with the *MRWA Supplement to Austroads Guide to Road Design – Part 3: Geometric Design* which is available from the Main Roads' website.

(B) Horizontal curves must be provided at all deflection angles greater than 0.50 degrees.

(C) Contiguous reverse horizontal curves are only allowed when both curves have plan transitions. Curves turning in the same direction must be directly compounded or well separated. If a curve does not have a plan transition, an

equivalent tangent must be provided which is equal in length to the superelevation transition.

(D) Compound curves and broken back curves must not be used on the Highway carriageways and must be avoided wherever possible on other roads. When compound curves are used:

(I) the radius of the flatter curve must not be more than 50% greater than that of the sharper curve.

(II) the design speed of the flatter curve must not be more than 10 km/h greater than the design speed of the sharper curve; and

(III) the length of the smaller radius curve must be at least two thirds the length of the larger radius curve.

(iii) Transition curves and superelevation

(A) Plan and superelevation transitions must be in accordance with the MRWA Supplement to Austroads Guide to Road Design – Part 3: Geometric Design which is available from the Main Roads' website.

(B) Plan transitions must be provided when the radial shift is 0.2 m or greater.

(C) Superelevation rates must be in accordance with Main Roads WA Horizontal Curve Tables. Side friction factors exceeding the Austroads desirable maximum are acceptable only on low-speed urban roads and where permitted by the Horizontal Curve Tables.

(D) In the application of relative grade criteria to superelevation development, sealed shoulders 2.5 m or more wide must be counted as a lane.

(E) Existing Pavements that are being resurfaced must have superelevation rates on curves which are:

(I) not more than 1% higher than the rates specified in Main Roads WA Horizontal Curve Tables.

(II) no less than the rates required to maintain side friction demand within the desirable maximum limits specified in Austroads' Guide to Road Design – Part 3: Geometric Design; and

(III) transitioned at the curve ends in accordance with Austroads' Guide to Road Design – Part 3: Geometric Design.

(F) Development of superelevation must be in accordance with section 7.7.13 of the MRWA Supplement to Austroads Guide to Road Design – Part 3: Geometric Design which is available from the Main Roads' website.

4.3.g Cross section

The design of roads should comply with the following typical cross section dimensions and should be as shown at Appendix 1. Lane widths must be increased on horizontal curves where required by section 7.9 of Austroads' *Guide to Road*

Design – Part 3: Geometric Design.

(i) All roads should include a single carriageway with:

(A) 2 x 3.5 m traffic lanes.

(B) 0.5 m outside sealed shoulders; and

(C) 1.0 m outside unsealed shoulders.

(ii) Other Connecting Roads

All other Connecting Road dimensions must match the existing.

(iii) Extent of Pavement and bituminous surfacing

All road Pavements must be constructed using Pavement batters.

(iv) Surfacing joints

All joins between existing and new surfaces must be either perpendicular to the direction of travel or along new lane lines. At longitudinal joins, changes in crossfall between existing and new Pavements must be no greater than 1% at any cross-section except where the join is on a crown.

(v) Pavement crossfall and superelevation

(A) All carriageways on must have a normal crossfall of 3%. The crossfall may be reduced to 2% at intersections to ensure that the cross over crown has a maximum change of grade of 4%.

(B) Superelevation at curves must be applied in accordance with clause 4.3(g), with a minimum equal to the normal crossfall and a maximum in accordance with the MRWA Supplement to Austroads Guide to Road Design – Part 3: Geometric Design.

(vi) Earthwork batters

(A) All new or modified earth batter slopes must comply with the desirable slopes specified in *MRWA Supplement to Austroads Guide to Road Design – Part 3: Geometric Design.* Fill batter slopes steeper than 4 (horizontal) to 1 (vertical) may be used for fill heights greater than 2.5 m if protected by suitable road safety barriers, but no earth batter slopes can be steeper than 3 (horizontal) to 1 (vertical).

(B) Table drains must comply with the preferred cross sections described in section 4.6 of Austroads' *Guide to Road Design – Part 3: Geometric Design.*

(C) Rock cut batter slopes may be steepened subject to the findings of the geotechnical investigations and the aesthetic requirements of clause 4.11.

(D) Retaining walls or mortared laterite stone pitching may be used to restrict the width of batters. Batters must also comply with clause 4.12(m).

(E) Where batter slopes of intersecting embankments meet (e.g. at intersections) the interface must be rounded.

(F) The extent of earthworks must be kept to the minimum where existing native vegetation is present. In these locations it will not be permitted to:

(I) dispose of excess or unsuitable material by widening fill embankments; or

(II) enlarge excavations to win fill material.

(vii) Kerbing

Full kerbing should be provided where long-term scour problems may otherwise occur.

Kerbing design and profiles must be in accordance with the *Roadside Items – Design of Kerbing guidelines* which are available from the Main Roads' website, Document No. 67-08-81.

(viii) Kerb and Pavement backfill

(A) Kerb and Pavement backfill widths must be a minimum of 2.5 m from the edge of the shoulder where there is no lighting and 3.0 m otherwise.

(B) Kerb faces must be no closer than 5.0 m from a property boundary. Paved kerb backfill, including paths, must be sloped towards the road.

4.3.h Sight distance

(i) Stopping sight distances calculations must be based on a reaction time of not less than 2.0 seconds.

(ii) Stopping sight distances for cars must be based on a 1.1 m eye height and a coefficient of deceleration not greater than 0.36.

(iii) Unless it can be demonstrated to be impractical, safe intersection sight distance must be provided at all driveways.

(iv) Horizontal curve perception sight distance must be provided in accordance with section 5.10 of Austroads' Guide to Road Design – Part 3: Geometric Design.

(v) Decision sight distance must be provided at all critical locations in accordance with AASHTO's Policy on Geometric Design of Highways and Streets.

4.3.i Vertical alignment

(i) General

(A) Vertical curves should be provided at all changes of grade.

(B) The existing profile should be maintained in terms of both position and grade.

(C) Successive mainline Vertical Points of Intersections (VPI's) must be separated by at least a distance (in metres) calculated as:

(I) three times the vertical design speed (in km/h) on tangent sections of other roads.

(D) In areas susceptible to seasonal waterlogging (generally sumpland, dampland, palusplain and where water has been designed to pond beside the road) the subgrade level must be above the zone of potential capillary rise. For sand embankment material the subgrade must be at least 0.75 m above natural ground at the edge of the shoulder and at least 0.5 m above

standing water. For silty embankment material the clearance must be greater and must be determined in accordance with clause 4.5(f).

(ii) Vertical curves

(A) Lengths of vertical curves must comply with the values for satisfactory appearance given in Table 8.6 of Austroads' *Guide to Road Design – Part 3: Geometric Design.*

(B) Crest curve minimum K-values must achieve the stopping sight distance appropriate to the design speed, reaction time and object height specified in this Basis of Design and Austroads publications.

(C) K-values of sag curves on unlit roads must be in accordance with the headlight criteria minimum requirements given in Austroads' *Guide to Road Design – Part 3: Geometric Design*.

(D) The *MRWA Supplement to Austroads Guide to Road Design – Part 3: Geometric Design* guideline which is available from the Main Roads' website, must be used to co-ordinate main profile vertical curves with the rounding vertical curves used in the development of superelevation.

(iii) Grades

(A) Permissible maximum grade is 5.0%.

(B) The permissible minimum grade for kerbed Pavements is 0.3%.

(C) Grades of table drains must meet the requirements of clause 4.7(a)(xiv).

4.4 Pavement design

4.4.a Pavement type

(i) The Pavement type should be granular Pavements with surfacing treatments.

(ii) The surfacing treatments and asphalt courses must also comply with clause 4.6.

4.4.b Pavement design standards

(i) Flexible Pavements

The design of all flexible Pavements must comply with Main Roads Western Australia Engineering Road Note No. 9 Procedure for the Design of Flexible Pavements available from the Main Roads' website.

(ii) Subgrade conditions

Subgrade conditions assumed for design purposes must be confirmed during construction. Where actual subgrade conditions are worse than those assumed for design purposes, the LGA must carry out any redesign necessary to reflect those actual conditions.

(iii) Embankment foundation conditions

Embankment foundation conditions assumed for design purposes must be confirmed during construction. Where actual embankment foundation conditions are worse than those assumed for design purposes, the LGA must carry out any redesign necessary to reflect those actual conditions.

4.4.c Minimum Pavement thickness

(i) Total pavement thicknesses (including base course and subbase) must not be less than 300 mm, which includes the increase for construction tolerances.

(ii) There must be at least 150 mm of granular material with a 4-day-soaked California Bearing Ratio (CBR) of not less than 6% below the subgrade surface (i.e., either insitu material, modified insitu material or imported material).

(iii) For all Connecting Roads not owned by the LGA, the design of the Pavement must be approved by the relevant road owner.

4.4.d Pavement joints

Longitudinal joints must be constructed parallel to the direction of the traffic either on a lane edge or at the midpoint of a lane and must start and terminate at a transverse joint.

4.4.e Design traffic

Pavement components must be designed for lane traffic of not less than the Equivalent Standard Axles (ESA's) and the Heavy Vehicle Axle Groups (HVAG's) specified in Table 4.1.

Location	Design Traffic ESA
	(85th percentile of Wheatbelt Region)
All Roads	2.73 x 10^5

Table 4.1 – Minimum Pavement design traffic loading

4.4.f Materials

(iii) Embankment

(A) Embankment material must be free of roots, clay, rubble, organic material (including peat) or any other foreign substances.

(B) The full width of embankments must be compacted to the same standard as that for embankments beneath Pavements.

(iv) Embankment foundation

If the embankment foundation material is less permeable than the embankment material, the embankment foundation must be compacted and shaped to provide a transverse crossfall towards the edge of the embankment of at least 0.5%.

(v) Bunds

Bunds must not contain clay, peat or other materials with low permeability below the level of the adjacent shoulder edge.

(vi) Medians

Except for that portion of the median above the level of the adjacent Pavement subgrade, material placed in medians must have a California Bearing Ratio (CBR) value not less than the material underlying the adjacent Pavement at the same level.

(vii) Subgrade strength

For Pavement design purposes, the subgrade CBR must be determined in accordance with Main Roads Western Australia *Engineering Road Note No. 9 Procedure for the Design of Flexible Pavements*.

(viii) Subgrade layer in cuttings

The layer located within 150 mm of the subgrade surface in cuttings must be free of any oversize particles having a maximum dimension greater than 100 mm measured in any direction.

(ix) Pavement

(A) For granular pavements the base course material must be either crushed rock base (CRB) or naturally occurring gravel. If CRB is used, then it must have a resilient modulus of at least 600 MPa. The resilient modulus must be determined by laboratory repeated load tri-axial testing at not more than 99% Maximum Modified Dry Density at a moisture condition not less than 70% of optimum moisture content. The base course material must have a CBR greater than 80.

(B) Sub-base should be either:

(I) crushed limestone;

(II) naturally occurring gravels;

(III) crushed ferricrete; or

(IV) crushed rock base.

The subbase material must have a CBR of greater than 30.

(C) Sands and clayey sands must not be used as a Pavement material.

(D) As a minimum, granular Pavement materials must satisfy the requirements set out in Main Roads' Specification 501 Pavements (including guidance notes) available from the Main Roads' website.

(E) As a minimum, the density specification for granular materials must be in accordance with Main Roads' Specification 201 Quality Systems, Specification 302 Earthworks and

Specification 501 Pavements (including guidance notes), all available from the Main Roads' website. The Characteristic Dry Density Ratio must not be less than:

(I) 88% for embankment foundation;

(II) 90% embankment;

(III) 92% for subgrade;

(IV) 94% for subbase; and

(V) 96% for basecourse.

(F) For all materials other than crushed rock base, as a minimum sub-base layer must be dried back so that the Characteristic Moisture Content, as a proportion of optimum moisture content (modified compaction), does not exceed 85%. For crushed rock base material, the layer must be dried back to a least 60%.

(G) Completed sub-base and basecourse layers must be maintained to the specified standard of dry back up to the time of application of the bituminous surfacing.

(H) Prior to the application of bituminous surfacing the basecourse must be dried back such that the characteristic moisture content of both the upper half and the lower half of the basecourse layer (tested separately) is less than that specified in Table 4.2.

Basecourse material type	Characteristic Moisture Content as a proportion of optimum moisture content (modified compaction)
Crushed rock base (CRB)	60%
Basecourse, other than CRB (spray seal surface)	85%
Basecourse, other than CRB (asphalt surface)	70%

Table 4.2 – Basecourse dry back requirements

4.4.g Pavement drainage

(i) The design must ensure that the Pavement does not wet up or become saturated through capillary rise, infiltration, or any other means of moisture ingress to the extent that design assumptions or performance requirements are not met. Assumed groundwater levels (whether or not altered by subsoil drainage) and capillary rise must be the maximum expected during the life of the Pavement.

(ii) If porous base course material is utilised as a base course layer, the LGA must implement measures to ensure that the underlying layer is adequately

protected against the impacts of moisture ingress during and after construction so that the underlying layer is maintained in its conforming dry back condition.

(iii) The capillary rise allowance must be above the Design Groundwater Level.

(iv) Pavements must be constructed above the Design Groundwater Level and the capillary rise allowance.

(v) The capillary rise allowance must be established from laboratory tests on the material proposed, but must not be less than 300 mm.

(vi) The permeability of any layer must be less than the underlying layer to prevent perching of moisture in the Pavement.

(vii) Where rock is present in cuttings, moisture control systems such as drainage blankets, permeable sub-grade layers and/or impermeable membranes must be provided to remove any possibility of moisture related Pavement defects, whether or not groundwater is evident at the time of construction. The design must be appropriate to the geology of the site and incorporates geotechnical investigations.

4.4.h Materials testing

Unless stated otherwise, materials testing must be in accordance with Main Roads' standard test methods available from the Main Roads' website. Where a suitable test method is not listed, then testing must be in accordance with AS 1289 *Methods of Testing Soils for Engineering Purposes.*

4.5 Bituminous surfacing

4.5.a Minimum standard surfacing requirements

(i) Bituminous surfacing treatments must waterproof the Pavement and provide a durable, smooth, safe, abrasion and skid resistant surface which reduces noise, splash and spray and minimises aquaplaning. Each component must be well bonded to the underlying treatment and the whole surface must be well bonded to the Pavement.

(ii) Surfacing treatments must be in accordance with Table 4.3.

Location	Surfacing treatments
For intersections where asphalt is used	• 2 coat bitumen emulsion seal using 10 mm and 5 mm aggregate. • tack coat using bitumen emulsion; and • 14 mm dense graded granite intersection mix asphalt with A15E polymer modified binder, 40 mm thickness.

For intersections where a spray seal is used	• Prime coat. • First hot sprayed seal coat with S35E polymer modified binder and 14 mm aggregate • Second hot sprayed seal coat with S35E polymer modified binder and 10mm aggregate. Or • First Hot sprayed primer seal coat with 14mm aggregate • 7mm aggregate dry rack.

All other roads	• Two coat spray seals
	• Either
	  • First coat hot sprayed primer seal with 7mm aggregate followed by a final coat hot sprayed seal with 14mm aggregate; or
	  • Hot sprayed prime coat with 14mm aggregate hot sprayed first seal coat followed by a 10mm aggregate hot spayed second seal coat.
	  • WSFN recommends that at least the final seal binder be S45R(S15R)

Table 4.3 – Surfacing treatments

4.5.b Specific surfacing requirements

(i) Line marking modifications

(A) Areas of existing Pavement on which the new lane marking differs from the existing lane marking must be resurfaced. Resurfacing must comply with clause 4.5(a)(ii).

(ii) Intersection surface treatment types and triggers

(A) Seal

- All Intersections to have a chip seal as a minimum as per item 4.5a

(B) Asphalt

- Assessment for asphalt triggered during development or scope

review by Local Government request

- Pre and/or post upgrade review undertaken with consideration to the following.
    - Traffic Counts predominantly RAV/AMMS
    - Horizontal and Vertical Alignments
    - Swept Path of RAV's
    - Existing surface damage
    - Current maintenance impost

(C) Deep Lift Asphalt

- No Intersection in the Wheatbelt would be considered for this treatment option.

4.5.c Minimum surfacing design standards

(i) Prime, primerseal and seal coats

(A) The prime must generally conform to the practices and procedures described in the Austroads' *Guide to Pavement Technology – Part 4K: Seals*.

(B) The design of single and double/double seals must generally be in accordance with Austroads Publication No. AP-T09/01 *Provisional Sprayed Seal Design Method Revision 2000*.

(C) For the purposes of seal design the Average Least Dimension (ALD) of aggregate must be determined in accordance with Australian Standard method AS 1141.20.1.

(ii) Asphalt mixes

(A) Asphalt mixes must comply with the mix design criteria in Table 4.3, the grading and bitumen content production tolerances in Table 4.4 and must satisfy the performance criteria specified in clause 3.8.

(B) Asphalt mix design and materials used must be chosen to satisfy the minimum design life specified in clause 3.3.

(C) The asphalt test properties given in the design standards must be determined in accordance with the following Main Roads' test methods:

Description	Test Method
Sampling procedures for asphalt	WA 701.1
Stability and flow of asphalt: Marshall Method	WA 731.1
Maximum density of asphalt: Rice Method	WA 732.2
Bulk density and void content of Asphalt	WA 733.1
Bulk density and void content of asphalt – Vacuum sealing method	WA 733.2
Bitumen content and particle size distribution of asphalt and stabilised soil: Centrifugal Method	WA 730.1
Sample preparation – compaction of asphalt test specimens using a gyratory compactor	AS 2891.2.2

(D) All asphalt mixes must contain 1.5% by mass of aggregate of hydrated lime as an adhesion agent.

(E) The 10 mm dense graded laterite asphalt must satisfy the requirements set out in Main Roads' Specification 504 *Asphalt Wearing Course*.

(F) The *Bulk Density and Void Content of Asphalt* must be determined in accordance with Main Roads Test Method WA 733.1 except that open graded asphalt must be tested in accordance with Main Roads Test Method WA 733.2.

Marshall and other mix properties (75 blow compactive effort for all mixes except asphalt for shared paths (shared path mix) which must be designed on 50 blow compactive effort)	**Mix design minimum**	**Mix design maximum**
Stability kN - Dense graded mixes (all aggregate types) - Open graded mixes - Shared path mix	 8.0 kN 4.0 kN 5.0 kN	 - - -
Flow	2.0 mm	4.0 mm

Air Voids - 10 mm dense graded mix (all aggregate types) - 10 mm open graded granite mix - 14 mm dense graded granite intersection mix - 14 mm dense graded Asphalt Intermediate Course mix - 20 mm dense graded Asphalt Intermediate Course mix - 5/7 mm shared path mix	 4.0 % 16.0 % 4.0 % 4.0 % 3.5 % 3.0 %	 6.0 % 21.0 % 7.0 % 6.0 % 5.5 % 6.0 %
Voids in mineral aggregate - 10 mm dense graded mix - 14 mm dense graded mix - 20 mm dense graded mix - 5/7 mm shared path mix	 15.0 % 14.0 % 14.0 % 17.0 %	 - - -
Bitumen content - open graded asphalt only - 10 mm open graded granite mix (% by mass of mix)	4.2	4.8
Gyratory Compactor Mix properties All dense graded mixes (except shared path mix) (At mid-point grading and binder content only)	**Design minimum**	**Design maximum**
Air Voids after 350 cycles	2.5%	

Table 4.3 – Asphalt mix design standards

Property	AS sieve size (mm)	Tolerance on percentage by mass passing	Tolerance on percentage by mass of total
Particle Size Distribution	4.75 and larger 2.36 and 1.18 0.6 and 0.3 0.150 0.075	± 7 ± 5 ± 4 ± 2.5 ± 1.5	- - - - -
Bitumen Content	-	-	± 0.3

Table 4.4 – Asphalt production tolerance limits

4.5.d Standard material specifications

(i) Bitumen

(A) Bitumen must conform to the requirements of Main Roads' Specification 511 *Materials for Bituminous Treatments*.

(B) Unless specified otherwise, bitumen used in primes, primer seals, seals and 10 mm dense graded asphalt must be Class 170. Unless specified otherwise, bitumen used in dense graded intersection mix must be class 320. Unless specified otherwise binder used in open graded asphalt must be A20E.

(ii) Polymer modified binder

Where specified, polymer modified binder must be used. Polymer modified binders may also be used elsewhere to enhance the performance of the asphalt or sprayed sealing works. Polymer modified binders must conform to the requirements of Main Roads' Specification 511 *Materials for Bituminous Treatments*.

(iii) Bitumen emulsion

Bitumen emulsions used in seals, primer seals, primes and tack coats must conform to the requirements of AS 1160 *Bituminous Emulsions for the Construction and Maintenance of Pavements*.

(iv) Aggregate

All aggregates used for sprayed sealing or asphalt must conform to the requirements of Main Roads' Specification 511 *Materials for Bituminous Treatments.* This includes laterite aggregates for coloured asphalt.

(v) Hydrated lime

Hydrated lime must conform to the requirements of Main Roads Specification 511, *Materials for Bituminous Treatments*.

4.5.e Process standards

(i) Sprayed treatments

The processes and equipment used in the supply of sprayed treatments must generally conform with the practices described in the Austroads' *Guide to Pavement Technology – Part 4K: Seals*.

(ii) Asphalt

(A) The processes and equipment used in the production, transport, laying and compaction of asphalt must generally conform with the practices described in AS 2150 *Asphalt (Hot-Mixed)*.

(B) Tanks used to store and heat polymer modified binders must have the capability to keep the binder continuously stirred or circulated and use electrical or oil heating systems. Heating using gas burners is not permitted.

(C) The Characteristic Percent Marshall Density (Compaction) for any lot of Asphalt Wearing Course must be at least 93% for any Asphalt Wearing Course.

(D) Asphalt must only be placed on a surface that is clean and dry.

4.6 Drainage

4.6.a General

(i) The drainage system must deal with runoff from all Pavement areas and adjacent verges and earthworks, and all runoff affected by the Project Works. Drainage and protection work must be designed:

(A) to minimise interruption to existing drainage systems or

modification of surface-flow patterns;

(B) to avoid ponding on the road surface and paths and adjacent to the road formation;

(C) to prevent scour, erosion and sediment transportation;

(D) to avoid adverse impacts on the environment;

(E) with particular attention to minimising the need for maintenance such as scour repair and the removal of sediment deposits;

(F) to allow for the effects of any existing drainage features on or adjacent to the Site; and

(G) to maintain the existing flow regimes and water balance of the Site as much as possible.

(ii) The drainage design and protection works must conform with sound hydrological and hydraulic practices and must, to the extent it is not inconsistent with the other requirements in the deed, conform with the following documents:

(A) Main Roads' Drawings which are available from the Main Roads' website;

(B) Main Roads' Supplements to Austroads' Guide to Road Design Parts 5, 5A and 5B Drainage/Waterways Design Guidelines which are available from the Road and Traffic Engineering Standards section of Main Roads' website.

(C) Department of Water (DoW), Stormwater Management Manual for Western Australia (2007);

(D) Department of Water (DoW), Decision Process for Stormwater Management in WA (2009);

(E) Austroads' *Guide to Road Design – Parts 5, 5A and 5B*;

(F) Institution of Engineers Australia, Australian Rainfall and Runoff: A Guide to Flood Estimation. Volumes 1 and 2. (1998);

(G) Austroads Waterway Design – A Guide to the Hydraulic Design of Bridges, Culverts and Floodways (1994);

(H) *Subsurface Drainage of Road Structures.* RJ Gerke, Australian Road Research Board Special Report SR35 (1987); and

(I) NAASRA Guide to the Design of Road Surface Drainage (1986).

(iii) In the event of any inconsistency between these documents, the inconsistency must be resolved by giving precedence to the documents in the order they are listed under clause 4.6(a)(ii).

(iv) Drainage must make allowance for a sea level rise of up to 300 mm.

(v) Stormwater management must comply with the environmental management requirements and be in accordance with the principles of water sensitive urban design as described in the DoW *Stormwater Management Manual for Western Australia*. The system must comply with the following:

(A) surface flow must be used in preference to piped flow where practicable;

(B) flow along existing vegetated surfaces must be used in preference to constructed drains; and

(C) export of water from the Site during common rainfall events must be prevented or at least slowed to mimic the pre-development catchment behaviour. A common rainfall event is considered 16 mm falling over one hour or more.

(vi) Drainage system components must be located where possible, to avoid clashes with road safety barriers and other road infrastructure items.

(vii) Drainage manholes must not be located within Pavements.

(viii) The LGA must obtain the approval of the drainage design from the relevant Authorities including the DoW and all other Service authorities where potential for clashes with the proposed drainage may exist.

(ix) All low points on the Pavement must be completely drained.

(x) The minimum grade of table drains must be 0.3%.

(xi) Modifications to existing drainage systems must not adversely affect the performance of drainage within or outside of the Site.

4.6.b Average recurrence intervals

(i) The following minimum average recurrence intervals (ARIs) must apply to the road serviceability and flood protection components of the design:

Design component	ARIs
rivers, Water Corporation drains	100 years or as specified by owner
other culverts	50 years
kerb overtopping	5 years
swales and streamlines	5 years
gutter flow spread limits	5 years
piped system	5 years
major system check	100 years
drainage system overflows which might cause erosion or scour	5 years
drainage basin backwater onto Pavement	20 years

(ii) For the common rainfall event, runoff from the Site to the existing catchment

drainage system must be maintained at predevelopment flow rates and volumes.

(iii) The major system check must ensure that there is no property or structural damage and no inundation of property floor levels with a 300 mm freeboard.

(iv) The maximum gutter flow across intersections for a 5-year average recurrence interval (ARI) must be 30 litres per second.

(v) The maximum concentration of sheet flow across carriageways, from noses, islands or superelevation changes must not exceed 5.0 litres per second for:

(A) the one-year ARI five-minute duration rainfall event; or

(B) 50 mm/h intensity.

whichever is the lesser.

(vi) The capacity of any drainage treatment incorporated in the Project Works must not be less than the capacity of any nearby existing drainage treatment of the same waterway.

4.6.c Gutter flow spread limits

The gutter flow spread limits for all roads must be in accordance with Table 5.1 in Main Roads' document *Main Roads' Supplement to Austroads Guide to Road Design Part 5A,* which is available from the Main Roads' website. The rainfall intensity for calculating gutter flow spread limits can be limited to a maximum of 100 mm per hour.

4.6.d Scour protection

The drainage system must be designed to minimise future maintenance and provide new or additional scour protection to all areas susceptible to scouring such as drains and batters.

4.6.e Open channel flow

Flow paths, other than table drains and median swales, must meet the following requirements:

(i) The use of existing vegetation to control scour must be maximized.

(ii) Riffle zones constructed from loose rock must be used in preference to concrete drop structures where energy dissipation is required.

(iii) For all flow paths, flow velocities must be minimised and flow compensation and infiltration must be maximized.

(iv) Kerb openings with associated rock pitched spoon drains are acceptable as an alternative to pit and pipe systems provided, they are not within 25 m of an intersection, the horizontal kerb radius is not less than 30 m and the level difference from top to bottom does not exceed 3.0 m.

4.6.f Culverts and pipe drainage networks

(i) General

(A) Drainage pipe networks must be self-cleaning and must be designed for 5-year ARI maximum water levels in runoff storage areas.

(B) Disused pipes and pits must be removed or entirely filled in-situ with a concrete slurry.

(C) Culverts with units greater than 3050 mm width will be allocated bridge numbers by Main Roads on request.

(ii) Minimum requirements

(A) A new system must as a minimum match the existing drainage system;

(B) For pipe networks, the maximum length of pipe without an intermediate pit must be 100 m to facilitate maintenance rodding;

(C) The maximum water depth in pits must be at least 0.2 m below the adjacent road level;

(D) Side entry pits must not be used with mountable kerbing in front of a road safety barrier;

(E) The maximum water level upstream of culverts for the design storm must be at least 300 mm below the Pavement surface at the shoulder.

(F) Culvert ends must be located on the existing drainage channel and realignment of existing waterways will not be permitted unless:

(I) a skew of more than 45 degrees will result;

(II) the existing waterway is less than 0.5 m depth; or

(III) otherwise specified in this Basis of Design.

(G) Pipe lengths, apron lengths and headwall heights must be designed to suit the embankment batter and non-trafficable headwalls must be outside the Clear Zone unless protected by a barrier or in a low-speed environment. Headwall faces must generally be parallel to the road shoulder.

(H) For culverts in natural water courses, invert levels must generally be located at natural streambed levels to ensure that excessive lengths of outlet drains are avoided.

(I) Culvert sections, including link slabs, must not protrude into the Pavement layer.

(iii) Materials

(A) Drainage conduits and structures must be of adequate quality, size and strength to meet the design life and standards specified. The existing ground conditions at drainage locations must be assessed as “Aggressive” or “Non-Aggressive” for the purpose of selection of the appropriate cover to the reinforcement in precast concrete culvert and pipe units.

(B) Culverts may consist of reinforced concrete boxes with cast-in-

situ base slabs; spigot and socket reinforced concrete pipes with rubber ring gaskets; or HDPE pipes.

(C) All culverts and piped systems must have concrete end treatments which comply with the overall dimensions shown on Main Roads drawings 200131-061 or 200531-0010.

(D) Installation and backfill of culverts and pipes must be in accordance with Main Roads' drawings 0130-2875, 9530-1290, 9530-1291, 200131-061, 200131-062 and 200131-063 which are available from the Main Roads' website.

(E) Concrete drainage pipes must be commercially available pipe sections, manufactured in accordance with Main Roads' Specification 404 Annexure 404B *Precast Reinforced Concrete Drainage Pipes*.

(F) All box culverts must have cast in-situ concrete base slabs.

(G) Box culverts and link slabs must be manufactured in accordance with Main Roads' Specification 404 Annexure 404C *Precast Reinforced Concrete Box Culverts*.

4.6.g Subsoil drainage

Subsoil drainage will only be permitted in accordance with clause 4.1(b).

4.6.h Management of surface runoff

(i) General

(A) Discharges into existing drains must be compensated to reduce peak flows to limits acceptable to the controlling Authorities.

(B) Existing patterns of surface water flows on surrounding properties must be maintained by re-direction of flows without loss of capacity or backwater effects.

(C) Infiltration rates used in hydrologic modelling must be calculated from the results of field investigations at actual or geologically comparable locations.

(ii) Stormwater discharge

Stormwater runoff from the Road must be managed in one of the following ways, listed in order of decreasing preference:

(A) Infiltration into natural surface

If the soil permeability is adequate, Pavement integrity is assured and no adverse environmental or community effects will result from standing water, the runoff must be allowed to spread over the Road reserve to infiltrate. Excess runoff must be treated in accordance with clause 4.6(i)(ii)(B).

(B) Infiltration areas

Runoff may be directed, via pipes or swales, to an infiltration area.

Regardless of the management method removal of water must be augmented as much as possible by infiltration, evaporation and

absorption by plants to achieve the outcome described in clause 4.6(a)(v)(C).

Stormwater runoff from roads controlled by other road authorities must be in accordance with their requirements. Discharge into other road authority drainage must only originate from roads under the control of the other road authority and is subject to the approval of the other road authority.

(iii) Kerbing

Kerbing should be provided at locations specified in clause 4.3(g)(vii).

4.7 Signage and Pavement marking

4.7.a General

(i) The Project Works may include the design and installation of all road signs (including directional signs), sign supports and Pavement markings (where approved by Main Roads). Signs on the road network must be modified, removed, replaced or relocated as necessary to reflect all changes in the road layout arising from the Project Works.

(ii) Signage and Pavement marking design and construction must be compatible with the existing road network.

4.7.b Design standards

(i) The design, drawing and installation of signs and Pavement markings must be in accordance with the following Main Roads' standards and guidelines:

(A) Main Roads' *Traffic Management Guidelines* (available from the Main Roads' website), including *Signs Index*, *Sign Structural Design Guidelines* and *Directional Sign Guidelines*;

(B) Main Roads Specification 601, *Signs,* except for warranty period which must be in accordance with clause 4.7(c)(iii)(A);

(C) Main Roads Specification 604, *Pavement Marking* except for the type of glass bead which must be in accordance with clause 4.7(c)(ii)(D);

(D) Main Roads document *Direction Signs – Determination of Sight Distances*;

(E) Main Roads' drawings (available from the Main Roads' website), including Drawing 9931-198 *Pavement Marking Line Types* and Drawing 9120-0158 *Raised Pavement Markers General Applications*; and

(F) Document 67-08-88 *Design and Drawing Presentation* (available from the Main Roads' website).

(ii) In addition, the following specifications and Australian Standards must be applied:

(A) GPC-P-41/5 Water borne road marking paints;

(B) AS 4049.2 *Paints and related materials - Road marking material Part 2: Thermoplastic road marking materials*;

(C) AS 3554 *Adhesives - Epoxy - For raised pavement marker installation*;

(D) AS 1742 *Manual of uniform traffic devices* (All parts);

(E) AS 1743 *Road Signs – Specifications*;

(F) AS 1744 *Forms of Letters and Numerals for Road Signs*; and

(G) AS 2342 *Design and Use of Graphic Symbols and Public Information Symbol Signs*.

(iii) In the event of any inconsistency between the documents listed in clauses 4.7(b)(i) and 4.7(b)(ii), the documents in clause 4.7(b)(i) take precedence.

4.7.c Specific design requirements

(i) General

(A) All proposed new regulatory signs, guide signs and Pavement markings must be approved by Main Roads;

(B) Regulatory speed signs must be size C when setting the speed zone, except for repeater signs which must be size B.

(ii) Pavement markings

(A) Pavement markings which are not required as part of the permanent works must be permanently removed by Resurfacing in accordance with clause 4.5(b). Painting over obsolete markings will not be permitted;

(B) At intersections where width has been provided to accommodate the swept path of a design vehicle larger than a 19 m semi-trailer, Pavement markings must be installed in accordance with Main Roads' Drawing 200031-0015 *Typical Corner Treatments on Heavy Combination Vehicle Routes*.

(C) Glass beads must comply with the properties of Type B AS 2009 drop-on glass beads, with an additional high performance retroreflectivity requirement, requiring the delivery of a minimum 450 mcd/lux.m^2, when tested in accordance with a modified Appendix M of AS 2009 as detailed below:

(I) AS 2009 Appendix M4 Apparatus clause a) Dry film thickness of paint must be 200-250 µm;

(II) AS 2009 Appendix M5 Procedure clause b) Weight 24 grams ± 0.5 grams of glass beads; and

(III) AS 2009 Appendix M5 Procedure clause e) Wet film thickness of paint must be 375 µm ± 25 µm.

(iii) Signs

(A) Directional signings must be provided in accordance with Document 67-08-4B *Directional Sign Guidelines* (available from the Main Roads' website).

Background Sheeting Class	Used in combination with	Warranted Outdoor Exposure	Warranted Retain CIL/m² Percentile [1]
Class 1X	Class 1X Class 1W Class 1 Electronic Cuttable Films Screen printed colours	10 years	50% [2]
Class 1W	Class 1X Class 1W Class 1 Electronic Cuttable Films Screen printed colours	10 years	50% [2]
Class 1	Class 1 Electronic Cuttable Films	12 years	80% [2]
Class 1	Screen printed colours	10 years	80% [2]
Class 2	Class 1X Class 1W Class 1 Electronic Cuttable Films Screen printed colours	7 years	50% [2]

[1] Warranted retained brightness levels apply to reflective sheetings used for sign backgrounds, borders and legends.

[2] Retained CIL percentile is based on minimum CIL values for new reflective sheetings by Class for all of the combinations of Observation and Entrance Angles defined in relevant tables included in AS/NZS 1906.1 and Table 601.1 of Main Roads Specification 601 for Class 1X material.

Table 4.5 – Sign warranty requirements

(B) The face of all signs must be treated with an anti-graffiti coating.

(C) The footings for all signs must be designed to suit the ground conditions in which they are placed.

(D) Existing signs and posts which are no longer required must be removed and disposed of.

(E) The sign drawing number on the identification plate fixed to the back of the sign in accordance with Main Roads' Specification 601 must be the Main Roads drawing number.

4.8 Road safety barriers

4.8.a Road safety barriers must be provided in accordance with:

(i) *MRWA Supplement to Austroads Guide to Road Design – Part 6* (available from the Main Roads' website);

(ii) Main Roads' *Guide to the Design of Work Zone Barriers* (available from the Main Roads' website);

(iii) Main Roads' *List of Approved Road Safety Barrier Systems* (available from

the Main Roads' website);

(iv) Austroads' Guide to Road Design – Part 6: Roadside Design, Safety and Barriers;

(v) AS/NZS 3845 *Road Safety Barrier Systems*; and

(vi) AASHTO Roadside Design Guide.

4.8.b In the event of any inconsistency between these documents, the inconsistency must be resolved by giving precedence to the documents in the order they are listed under clause 4.8(a).

4.8.c Road safety barriers must be provided where non-crashworthy objects (including those outside the Site) are located within the Clear Zone of any traffic lane. Barrier terminations must be crashworthy.

4.8.d Where road safety barriers are required in accordance with clause 4.9(d) and the design speed is greater than 70 km/h, the road safety barrier must be a minimum of TL4.

4.8.e Only crash attenuators tested for the design speed (or higher) of the road are permitted. Only TAU II, TRACC, QuadGuard and QuadGuard HS are permitted.

5 SERVICES

5.1 Relocation or modification of Services

5.1.a The LGA must relocate or modify any Services which are affected by work carried out in order to complete the Project Works.

5.1.b The relocation or modification of Services includes the following:

(i) reconstruction of existing Services;

(ii) relocation of existing Services;

(iii) modification to existing Services.

(iv) provision of appropriate permanent protection to existing Services.

(v) treatment of redundant or disused Services; and

(vi) any upgrade of an existing Service to comply with Law or meet the relevant Authority's or private owner's current minimum standards.

5.2 Service-related obligations

5.2.a Where existing Services become redundant as a result of the Project Works, then all associated pipes, cables, conduits or structures must be removed and backfilled, or if under road formations the Services must be removed or alternatively be entirely filled in-situ with a concrete slurry. The open ends of any remaining conduits, and apertures left in remaining structures must be permanently sealed off to exclude water, sand or other material. Unknown disused Services must be treated as required.

5.2.b The LGA must arrange and coordinate the relocation or modification of all Services and must ensure that the requirements of each Authority or private owner are met.

The LGA must obtain written approval and acceptance of all works to and around Services from the relevant Authority or private owner.

5.2.c In general, all Services must be maintained at all times. During construction it must be ensured that disruption in reconnecting existing Services to individual owners/occupiers is minimised. The LGA must identify and satisfy any special requirements by the owner/occupier and the Authority or private owner regarding continuity of supply.

5.2.d Except for Services crossing the Road, existing, new, relocated or modified Services must not be located under Pavements.

5.2.e To the greatest extent possible the alignment of any new or relocated Service crossing the Road must be perpendicular to the alignment of the main carriageway, except for drainage works specified in clause 4.6(f)(ii)(F).

5.2.f Records of the location of all Services must be maintained throughout the duration of the Project Works. Permanent location markers must be provided as required by the relevant Authority or private owner.

5.2.g Any work in the vicinity of any Service or within any Service easement must be carried out in accordance with the Authority's or private owner's requirements.

5.2.h Pavements must not be cut to install Services of any type.

6 CONSTRUCTION REQUIREMENTS

6.1 General

6.1.a The LGA must obtain the other road authorities agreement prior to commencement of work on any Connecting Road.

6.1.b The technical specifications for the Project Works should, as a minimum, be in accordance with Main Roads' specifications.

6.1.c As a minimum, construction tolerances, surface requirements and finishes must meet Main Roads and industry standards, as specified in Main Roads' specifications, and Best Practice.

6.2 Property access

6.2.a The LGA must ensure that access to residential properties is not unreasonably denied.

6.2.b The LGA must ensure that access to all commercial, industrial and Service Authority properties and infrastructure is provided at all times, including for permit vehicles.

6.3 Accommodation works

6.3.a General

(i) Accommodation works are the works necessary to ensure the use and amenity of the land adjoining the Site is not adversely affected by the Project Works. Accommodation works are generally carried out on or at the boundary of other road authorities and private properties abutting the road reserve.

(ii) Accommodation works includes provision of and modification to;

(A) access roads/driveways;

(B) buildings, including demolition of existing buildings;

(C) fencing and gates;

(D) retaining walls;

(E) reticulation and bores;

(F) drainage facilities;

(G) private services; and

(H) public amenities.

(iii) The owners' and occupiers' consent must be obtained prior to any work commencing on private property, and for acceptance of the work at completion.

6.3.b Access roads/driveways

Notwithstanding any specified standards, reinstated driveways must be not less than the standard of the existing driveway.

6.3.c Fencing and gates

(i) The reinstatement of affected fences must be new and of a similar type, form and height to that existing. All fencing on a boundary must be agreed by the adjoining property owner.

(ii) The integrity of existing fences and gates must be maintained at all times during construction.

6.4 Operation of vehicles with excessive mass within the Site

When the LGA is operating vehicles on public roads within the Site, the LGA must comply with all relevant legislation including:

(i) Road Traffic Act (1974)

(ii) Road Traffic Code (2000)

(iii) Road Traffic (Vehicle Standards) Rules (2002)

(iv) Road Traffic (Vehicle Standards) Regulations (2002)

(v) *Australian Design Rules* (2nd and 3rd editions); and

(vi) other Law as required.

6.5 Security of adjacent properties

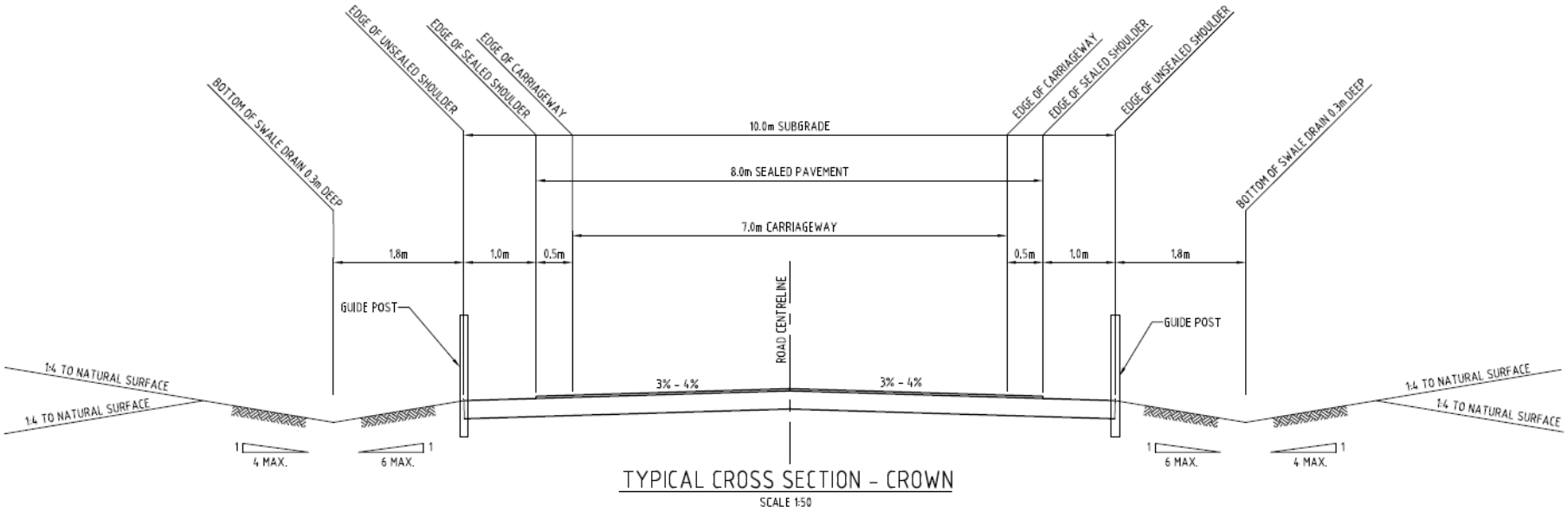
Security of all properties affected by the Project Works must be maintained at all times to a standard equivalent to that which currently exists.

6.6 Removal of disused features

Notwithstanding the requirements of clause 5.2(a), disused or abandoned pipes, cables, conduits or structures encountered during carrying out of the Project Works within the Site (above surface or sub-surface) must be removed and backfilled, or for pipes, cables and conduits deeper than 2 m below finished ground level, must be entirely filled in-situ with a concrete slurry.

APPENDIX 1 – TYPICAL CROSS SECTIONS

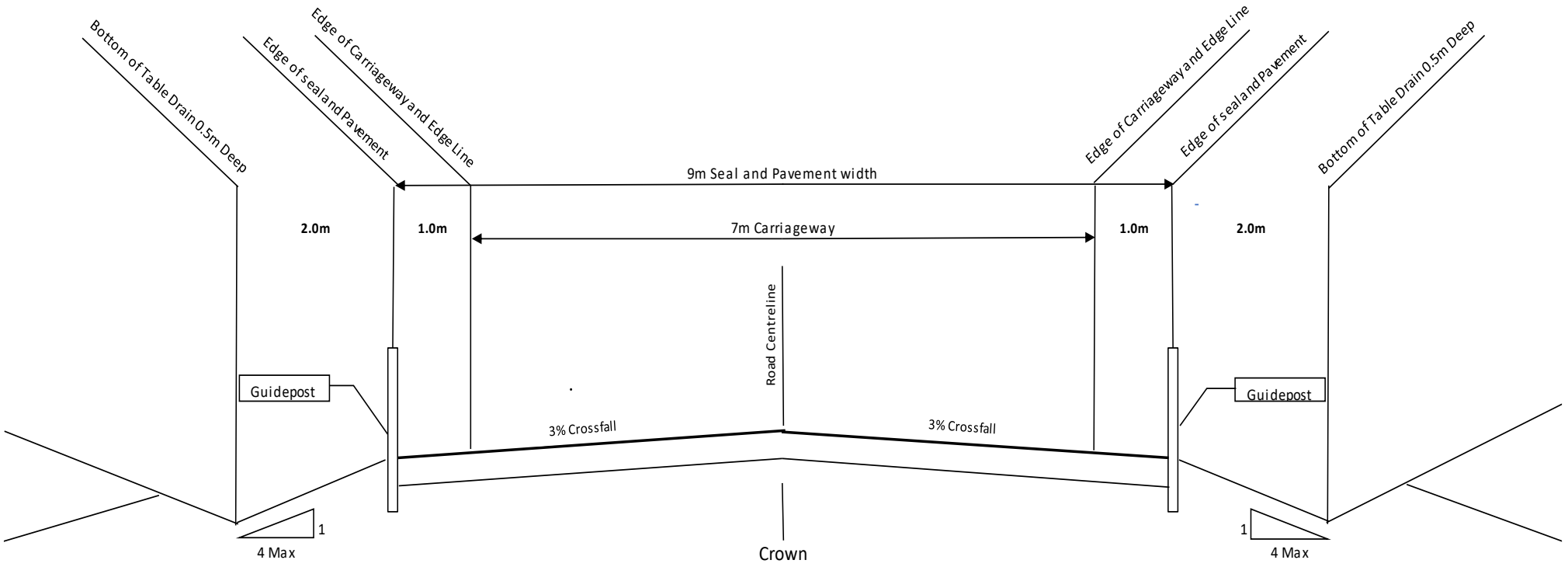
Typical Cross Section 8m seal on 10m Pavement



TYPICAL CROSS SECTION - CROWN
SCALE 1:50

APPENDIX 1 – TYPICAL CROSS SECTIONS (CONT)

Typical Cross Section 9m seal on 9m Pavement



APPENDIX 2 – SAFE SYSTEMS APPROACH TO ROAD SAFETY

Safe System Approach to Road Safety

The safe systems approach to road safety can be found on the link below to Roadwise

https://www.roadwise.asn.au/local-government/best-practice-in-road-safety/safe-system-approach-to-road-safety.aspx

APPENDIX 3 – NARRATIVE ON THE WHEATBELT SECONDARY FREIGHT NETWORK LIMITS OF RESPONSIBILITY

(Steering Committee Meeting 16 May 2025 Resolution SC2025 / 05-128)

Towns

The complexity of projects within town sites becomes exponential when considering an upgrade and allowing access to RAV vehicles. Points for consideration includes:

- Does the WSFN stop at the town boundary? If so, what would constitute exceptional circumstances?
- Widths, seal, and pavement. A lot of times, town streets are already restricted by businesses, kerbing etc.
- Drainage, culverts, and surface drains.
- Intersections - local roads and intersections turning movements for identified paths.
- Pavement Strength - A lot of town streets were not constructed with the potential traffic ESA's in mind.
- Interaction with Schools etc.
- Town Bypass – the New WSFN funding is for upgrades, no green fields construction has been funded, however some has been identified.

Local Road Intersections

Meets Australian Standards, sealed or unsealed.

- If it meets Australian standards for alignment.
    - Traffic warrants upgrade for turning movements – is a design required?
- Does not meet Australian standards i.e. poor alignment or poor sight distance, during development.
    - Is a Road Safety Audit required?
    - Does it require realignment and design? Usually involves small green fields construction.

State Intersections and Interactions with other Service providers.

- These are controlled by or have other constraints placed on access and ability to upgrade by the other providers. At all circumstances, engagement with the other stakeholder is recommended at earliest possible point of development as they will have an impact on any design etc.

Property cross overs or access

- Who owns and is responsible for culverts or drainage?
- Location – New, Hazardous, or Upgraded.

Private Enterprise

- Has the above items plus impact on business from construction works, Claim?