



AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline
Engineering Specification

Category
Track & Civil

General Appendix to ARTC Track & Civil Code of Practice

Specification Clauses

Grade Crossings

ETG-16-01

Applicability

ARTC Network wide	
New South Wales	
Western Jurisdiction	✓
Victoria	✓

Primary Source

(ARTC A1 Specifications At Grade Crossings – Inspection & Assessment and Work on Asset /TCS-28)

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16.5. Grade Crossings

16.5.1 Construction and Maintenance

16.5.1.1. General Requirements for Rectification

Full depth reconditioning of road crossings shall include:

- The use of concrete sleepers, where they do not currently exist, unless otherwise directed by ARTC.
- Removal of ballast back to formation and crossing base (eg. Cement Treated Crushed Rock CTCR)
- Removal and replacement of formation and crossing base where it does not meet the requirements of Clause 16.5.1.3.

Where directed by ARTC replacement rail and concrete sleepers shall be installed, this material may be supplied by ARTC.

Drainage shall be provided in accordance with Clause 16.5.1.3.

Existing drainage systems may be used, however, where they are fouled, blocked, clogged or damaged such that they will not perform their intended function they shall be rectified and reinstated.

Where rail defects only are being repaired the road surface only shall be removed to allow access to work on the required section of rail (dependant on the type of defect, refer to Section 1.4).

The road surface shall be reinstated to the requirements detailed in Clause 16.5.1.3.

Road surface defects may be repaired in accordance with the relevant Clauses in this section.

This work shall be scheduled in accordance with assessment detailed in Clause 16.5.2.3.

16.5.1.2. At Grade Crossing Signs

Sign type and location at level crossings shall be in accordance with Australian Standard 1742 – Part 7 and the relevant level crossing specification.

Signs shall be purchased and physically installed in accordance with ARTC requirements. Signs shall be transported such that damage does not occur.

16.5.1.3. New Level Crossings Installation

(a) General

The type and width of crossing to be constructed shall be directed by ARTC.

The Contractor shall provide ARTC with details of the procedures and materials to be used in the installation and full depth reconditioning of

grade crossings to meet the requirements below for agreement prior to work.

(b) Road Level Crossings

Cross-sectional configuration and typical requirements for bituminised road level crossings are shown in the relevant design drawings.

(b.1) Drainage

Drainage systems for new installation sites shall be specified by the Contractor and agreed with ARTC.

The surface runoff shall be directed away from the track structure.

Free drainage of the ballast shall be achieved. Where this can not be achieved (for example through geometric restrictions, the drainage shall be assisted through the use of slotted pipe drains (or equivalent) installed in accordance with the manufacturers specifications.

(b.2) Formation

The formation shall be constructed or overhauled to ensure it is in accordance with the ARTC Earthworks Specification.

(b.3) Crossing Base

A 3% Cement Treated Crushed Rock (CTCR) base of minimum depth 200mm shall be constructed as detailed in the relevant design drawings.

The base shall extend 5m past the edge of the road pavement. Where the road crossing has an adjacent pedestrian crossing the base shall extend 5 m past the pedestrian crossing.

The base shall be compacted in two (2) layers and provide a minimum lateral crossfall of 1 in 50 to provide for drainage of the overlying ballast layer. Where longitudinal drainage of 1 in 100 cannot be achieved the drainage shall be assisted by the use of slotted pipe drains (or equivalent) installed in accordance with the manufacturers specifications.

(b.4) Ballast

Ballast used for this activity shall comply with the specification in Clause 4.7.1.

The ballast depth beneath the base of concrete sleepers shall be as specified in the relevant design drawings.

The width of excavation shall be 3.5 - 4m, or 500mm - 750mm past the outside rails where multiple tracks are crossed.

Ballast profiles for the adjacent track 10m either side of the crossing shall be in accordance with Clause 4.1 and variations.

Prior to installation of concrete sleepers the ballast shall be distributed over the installation site (i.e. over the length of the base layer) and compacted with a vibrating roller . The ballast depth shall be sufficient to allow for a 50 mm (maximum) lift to achieve design level and alignment.

(b.5) Sleepers and Fastenings

Level crossings shall be constructed using concrete sleepers (excluding fastening assemblies) and rail supplied by ARTC, or otherwise agreed with ARTC.

Sleepers and fastenings shall be installed in accordance with Clause 3.2.

Sleeper spacing shall be a maximum of 500mm between the road verges.

(b.6) Tamping

Full support of sleepers shall be achieved during the tamping of level crossings by tamping the full width of the sleepers with a switch tamper.

For level crossings where deviations can be provided, a period of 7 days shall be allowed between the initial tamp and application of the road surfacing materials. During this 7 day period the alignment and level shall be manually adjusted and ballast cribs and shoulders compacted twice, once within the day prior to sealing.

For level crossings where detours or deviations are not possible for 7 days following installation, the ballast shall be suitably compacted by use of whacker packers or other suitable equipment on the ballast in the cribs and shoulders after tamping and prior to application of road surfacing materials.

All compaction shall be carried out over the full length of the crossing base layer.

(b.7) Approach Road Surface

The approaches shall be constructed in accordance with the specification of the adjoining road authority for the type and class of road crossing the track.

(b.8) Crossing Road Surface

b.8.1 Asphaltic concrete Road Surface

Asphaltic concrete road surface levels shall be constructed to the full rail height in a two stage laying. Wheel flangeways shall be formed with timber 65mm wide and 40mm deep.

Surface shall be installed with a uniform surface providing;

- Deviations of not greater than 5mm from a 3.0m straight edge
- Drainage away from the road and track

All surfaces in contact with the AC to be spayed with bitumen emulsion.

Where asphaltic concrete surface crossings are specified by ARTC for unsealed roads the road surface shall extend a minimum of 2.5m either side of both rails (or the outside rails at multi-track crossings) to the specification of the local road authority.

b.8.2 Unsealed Road Surface

Unsealed road surface levels shall be constructed to the full rail height. The surface shall be constructed to specifications equivalent to the requirements of the adjoining road authority for the type and class of road crossing the track.

Where road base containing any material that may contaminate the ballast is used it shall be separated from the ballast by a suitable geotextile (BIDIM A44 or equivalent)

All steel surfaces (eg. rail and fastenings) in contact with the road material shall be sprayed with bitumen emulsion.

b.8.3 Modular Road Surface

The modular units used shall be specified by the Contractor and agreed with ARTC.

(c) Private Crossings and Road-Rail Vehicle Takeoffs

(c.1) General

Generally, private crossings shall have unsealed (ballast where agreed) or modular units traffic surfaces and constructed using a track structure equivalent to plain track.

Road-rail takeoffs shall have ballasted surfaces unless otherwise specified by ARTC.

(c.2) Drainage

The surface runoff shall be directed away from the track structure.

Free drainage of the ballast shall be achieved. Where this can not be achieved (for example through geometric restrictions, the drainage shall be assisted through the use of slotted pipe drains (or equivalent) installed in accordance with the manufacturers specifications.

The approach road construction shall not interfere with the existing track-side drainage. Where this cannot be achieved appropriated under road drainage shall be installed to ensure continuity of the longitudinal track drainage.

(c.3) Ballast

The track ballast shall be separated from all finer material (including the base). This may be achieved by the use of a suitable geotextile as detailed in the relevant design drawings.

(c.4) Approach Road Surface

The approaches shall be constructed in accordance with the specification of the licensee for the type and class of road crossing the track.

(c.5) Crossing Road Surface

c.5.1 Unsealed Road Surface

Unsealed road surface levels shall be constructed to the full rail height. The surface shall be constructed to specifications equivalent to the requirements of the licensee for the type and class of road crossing the track or from ballast if appropriate for the site and as agreed with ARTC.

Where road base containing any material that may contaminate the ballast is used it shall be separated from the ballast by a suitable geotextile.

All steel surfaces (eg. rail and fastenings) in contact with the road material shall be sprayed with bitumen emulsion.

c.5.2 Modular Road Surface

The modular units used shall be specified by the Contractor and the type agreed with ARTC.

(d) Pedestrian Crossings

(d.1) General

New pedestrian crossings shall be constructed the relevant design drawings, (including a minimum walkway width of 2m) and in accordance with Australian Standard 1742 – Part 7.

Generally, isolated pedestrian crossings shall be constructed using a track structure equivalent to plain track. Where the pedestrian crossing is adjacent to a road level crossing the track structure (excluding sleeper spacing) shall conform to the requirements of Clause 16.5.1.3(c) above.

The following requirements apply to isolated pedestrian crossings.

(d.2) Drainage

The surface runoff shall be directed away from the track structure.

Free drainage of the ballast shall be achieved. Where this can not be achieved (for example through geometric restrictions, the drainage shall be assisted through the use of slotted pipe drains (or equivalent) installed in accordance with the manufacturers specifications.

The approach path construction shall not interfere with the existing track-side drainage. Where this can not be achieved appropriated under path drainage shall be installed to ensure continuity of the longitudinal track drainage.

(d.3) Approach Path Surface

The approaches shall be constructed in accordance with the specifications of the relevant local authority or as required by ARTC.

(d.4) Crossing Surface

d.4.1 Asphaltic Concrete Surface

The path surface shall be constructed from the ballast/sleeper surface to the full rail height and extend 500-750mm either side of the rails (or the outside rails in multiple track crossings). Wheel flangeways shall be formed with timber 65mm wide and 40mm deep.

All surfaces in contact with the AC to be sprayed with bitumen emulsion.

d.4.2 Unsealed Surface

Unsealed surface levels shall be constructed to the full rail height. The surface shall be constructed using compacted quarry fines or agreed equivalent.

Where any material that may contaminate the ballast is used it shall be separated from the ballast by a suitable geotextile (BIDIM A44 or equivalent)

All steel surfaces (eg. rail and fastenings) in contact with the road material shall be sprayed with bitumen emulsion.

d.4.3 Modular Surface

The modular units used shall be specified by the Contractor and agreed with ARTC.

Prefabricated units, suitable for loadings up to 6 tonnes, shall be installed where pedestrian walkways cross the railway. These units shall be manufactured to allow easy removal from track to accommodate track maintenance requirements.

16.5.1.4. Rail Surface

Where possible, no rail joints shall be within the crossing and 3 metres from the edge of the crossing.

If the use of welded joints within the crossing is unavoidable the finished rail profile must comply with Table 1.10A.

16.5.1.5. Repairs to Existing Level Crossings

Road Surface defects shall be repaired in accordance with the following:

The requirements of Clause 16.5.1.3 with respect to surface material and finish.

All material affected by the failure shall be removed and replaced including any surface breakdown which may allow water percolation into the track structure or road base.

Alternative materials may be used with the agreement of ARTC.

16.5.1.6. Repairs to Existing Pedestrian Crossings

The Contractor shall assess the extent and severity of any defect that may be hazardous or detrimental to public safety and apply appropriate restrictions or warnings to protect users of the crossing.

The contractor shall specify the repair method for all defects.

16.5.1.7. Repairs to Existing Roadrail Vehicle Takeoffs

The surface shall be maintained by the Contractor in accordance with the following;

The requirements of Clause 16.5.1.3 with respect to surface material.

To ensure that roadrail vehicles can safely use the takeoff.

16.5.1.8. General Requirements For Temporary Closure of Level Crossings

Prior to the closure of Grade crossings for reconditioning, the Contractor shall implement all requirements of the relevant Statutory Authorities.

16.5.1.9. Private Crossings – Additional Requirements

(a) General

New private crossings shall conform to the following requirements:

- Constructed as specified in Clause 16.5.1.3. Note that surface can vary from ballast to fully sealed according to usage.
- The width of the crossing shall be as agreed between the licensee and ARTC.
- The approach grades to the crossing within the railway reserve shall not exceed 1 in 8.
- The road surface at the interface points (3m from each rail) between the crossing and the roadway shall be specified by ARTC.

(b) Signage

Signage consistent with the requirements of AS 1742 - Part 7 shall be erected as directed by ARTC.

(c) Maintenance of Private Crossings

(c.1) Surface

ARTC is responsible for the maintenance of the road surface 3m from the running faces of each rail each side of the crossing.

Road Surface defects shall be repaired in accordance with the following:

The requirements of Clause 16.5.1.3 with respect to surface material.

To ensure that vehicles and traffic can safely traverse the crossing.

(c.2) Signage

ARTC is responsible for the maintenance of signage at private level crossings.

(c.3) Cattle Grids and Rabbit Stops

Cattle grids and rabbit stops shall be maintained by the licensee, unless otherwise agreed with ARTC.

16.5.2 Inspection and Assessment

16.5.2.1. Active Level Crossing Integrity Checks

Inspection of the integrity of warning devices for active level crossings shall be carried out at intervals as directed by ARTC.

Inspection and testing shall include the following:

- Inspect all equipment for damage or vandalism
- Open test switch enclosure and check that “ POWER ON “ indication is illuminated and operate test switch.
- Observe function of lights, audible warning device and, if applicable, auto gates. Ensure lights are flashing and clearly visible from a vehicle driver’s position on the roadway and the audible warning device emits a clear loud note.
- Restore test switch to normal position and ensure all crossing warning devices restore normal.
- Record test in “ on-site “record book

16.5.2.2. Assessment of Active Level Crossing Integrity

Where the operation of an active level crossing is found to be defective the contractor shall:

- Inform Train Control of the fault;

And in addition where the fault presents a hazardous situation to road traffic the contractor shall:

- Arrange for the provision of a Crossing Keeper for all train movements, in accordance with the Level Crossing Procedures contained in the Operations Code of Practice, Network Interface Rules and Procedures until the defect has been rectified.

16.5.2.3. Assessment of at Grade Crossing Condition and Defects

Grade crossings shall be maintained to the tolerances and condition defined in this section. The Contractor shall be responsible for maintaining the road surface of Grade crossings for a distance of 1 metre, measured from the nearest rail,

throughout the length of the crossing, or in line with agreements with the relevant road authority.

Where the condition of Grade crossings does not comply with the following, actions shall be taken to repair or remove defects as directed.

(a) Road Surface Defects

A road surface defect occurs where any deformation of the road surface level exceeds 20mm when measured with a 1.2 metre straight edge.

Road surface defects in sealed road surfaces shall be assessed in accordance with Table 16.1:

Table 16.1

DEFECT SIZE	RESPONSE TIME	ACTION
20 mm to 40 mm	90 days	Monitor condition or repair
40 mm to 60 mm	28 days	Repair
Greater than 60 mm	7 days	Take action as determined by site conditions and repair.

Road surface details in unsealed roads shall be assessed generally in accordance with Table 16.1, having regard to the average condition of the adjacent road surface.

(b) Pedestrian Crossings

Where the condition of pedestrian crossings is found to be hazardous or detrimental to public safety:

- Immediate action shall be implemented to maintain safety
- Restoration action of the pedestrian crossing shall be carried out to an acceptable standard within 28 days
- Public access shall be restricted appropriately until such action can be taken.

This action applies to all integral components of pedestrian crossings including, fencing, signage and line of sight.

16.5.2.4. Assessment of Line of Sight at Passive Crossings

The calculation of the approach sight distances for level crossings shall be the joint responsibility of ARTC and the relevant road authority.

This matter is currently under review.

Note that the maintenance of sight lines outside the railway corridor is the responsibility of the relevant road authority.

The relevant road authority shall be advised of locations where it is suspected that growth and other obstructions prevent road users having adequate sighting of trains.