SHIRE OF MERREDIN
CULVERT WORKS

CULVERT TECHNICAL SPECIFICATION

AUGUST 2026

SHIRE OF
MERREDIN
INNOVATING THE WHEATBELT

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Revisions

ISSUE	REV	DATE	CHECKED BY	APPROVED BY	DESCRIPTION OF REVISION CHANGES
1	A	August 2026	GY	GY	Technical Specification

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1 GENERAL REQUIREMENTS

1.1 General

This Specification is for the drainage works to be constructed as part of the Merredin Drainage Replacement at King Street Bridge and Giles Road. This Specification should be read in conjunction with the relevant drawings, regulations, Codes and Standards.

1.2 Local Authority

The Local Authority is the Shire of Merredin.

All works will be subject to inspections of and constructed to the standards and approval of the Local Authority. Any instructions from either body pertaining to the works must be issued by that body to the Superintendent.

1.3 Site Location

The area of works consists of:

- King Street Bridge
- Giles Road

1.4 Australian Standards

All workmanship and materials used in the Works shall conform to the current edition of the appropriate Australian

Standard. Where the regulatory Authority's requirement differs from the Australian Standard, the regulatory Authority's requirement shall prevail.

1.5 Precedence and Dimensions of Drawings

1.5.1 Documentation

The order of precedence of the contract documents shall be:

1. Conditions of Tendering
2. Contract Drawings
3. This Technical Specification
4. The General Conditions of Contract and Amendments

1.5.2 Discrepancies

All discrepancies shall be immediately notified in writing to the Superintendent.

1.6 Traffic Management

The Contractor shall undertake all necessary traffic management requirements including:

- Submit a TMP in accordance with the Shire's traffic management requirements for review and approval prior to mobilisation.
- The intent is that public access to work site will be restricted during the Works, but where this may not be possible, the TMP is to provide a safe working environment for both construction workers and the public.
- Provide traffic management as per the approved TMP.

All signs and method of traffic control shall be generally in accordance with AS 1742 and to the approval of the relevant Statutory Authority.

1.7 Work Health and Safety

The Contractor is responsible for maintaining a safe site at all times in accordance with Work Health and Safety (WHS) requirements.

All site staff shall be deemed to be employed by the Contractor, and the Contactor shall arrange for all staff to meet the site safety requirements.

Possible hazards shall be addressed by the Contractor, and managed to ensure that no significant hazard is overlooked, and that all risks are properly assessed and adequately controlled.

Trenching shall be carried out in accordance with the West Australian Work Health and Safety (WHS) Act 2022. All excavation shall be fenced off with warning signs and lighting if required. The Contractor is responsible for the complete supply and maintenance of all such safety measures and costs for these works shall be deemed to have been included with the Tender.

The Contractors safety plan shall include the following;

- Have an adequate number of employees trained in first aid to meet potential hazards in the workplace, with an experienced First Aid officer available at all times when work is in progress.
- Have an adequate training program for all employees and subcontractors, which is relevant to work undertaken and includes hazard identification, assessment and reporting.
- Adequate fire prevention equipment, including portable fire extinguishers.
- Good housekeeping onsite, and an accident notification procedure
- Promotion of safety information to all employees.
- Should the Works involve any unusual activities such as trenchless technology, deep excavations, work close to existing structures or large/high pressure services, unusual ground conditions, work at height, etc then the Contractor shall submit a Method Statement to the Superintendent defining the timing, plant, labour, materials and other temporary facilities associated with the works at least 48 hours before commencing such activity.
- The Contractor shall notify the Superintendent of any and all accidents within the meaning of the Workers' Compensation Acts and/or Regulations which may happen to his employees or employees of his Sub-Contractors or nominated Sub-contractors engaged on the Contract work within 24 hours of the occurrence of each such accident.

1.8 Existing Services

It shall be the Contractor's responsibility to verify the position of underground and other services before commencing excavation and further, to arrange repair by the responsible servicing authority, at his own cost, all damage caused to these services during the works.

Sewerage rising mains, water pipes, electrical cables, gas mains, telephone cables and conduits, sewers and access chambers, drains and other public utilities may interfere with construction.

Particular care must be taken by the Contractor to avoid damage to all such utilities. The Contractor shall ensure that all utilities encountered are securely supported, strutted, and slung or otherwise protected at his own responsibility and expense. The Contractor shall allow for excavating by hand in the close vicinity of all utilities. It should be understood that the location of any utilities which may be shown on Drawings is only intended as a guide and that liaison must be maintained with relevant authorities for these utilities so that they can be located accurately.

Where existing services must be interrupted to enable carrying out of the works such interruption shall be at a time agreed by the Superintendent. The Contractor shall organise with the responsible servicing Authority so that the interruption shall be for the minimum practical time. All costs shall be considered to be included in the Contractors price to complete the works.

1.9 Diverting Water and Dewatering

The Contractor shall do all work necessary to drain and/or divert any water interfering with the progress of the works, keep the excavations free from water while the works are in progress and

prevent any injury to the works by water due to floods or other causes. The cost of such work shall be deemed as having been included in the Contractor's Tender Price.

1.10 Protection from Weather

The Contractor shall, at his own expense, provide all plant, materials and labour necessary to protect the works from damage by inclement weather. Low points or excavations where water may collect shall be kept thoroughly drained by mechanical or gravitational means. Drains or water courses utilised for this purpose shall be maintained to the satisfaction of the Superintendent.

The Contractor shall prevent, insofar as is reasonably possible any materials entering any gully, manhole or pipe, and shall remove from the drainage system any materials from any source which may be deposited in the drainage system by any agency up to the date of Practical Completion.

1.11 Restoration and Cleaning Up

Excavation is to be kept to a minimum in all established areas such as roadways, footpaths and other paved areas. Unless otherwise specified or shown, all damage to existing improvements as a result of construction works, shall be made good by the Contractor, to pre-existing conditions. No existing trees, shrubs, sheds or other permanent structures shall be removed without the prior approval in writing of the Superintendent.

The Contractor shall liaise with the relevant local authority where such works are located on public land. Construction and reinstatement works shall conform to the local authorities' requirements. The cost for reinstatement work shall be deemed to have been included in the tender.

Existing pavements and kerbs shall be saw cut to provide a neat edge for reinstatement works.

Excavation material shall be deposited in an area causing the least interference to vehicular and pedestrian traffic.

During the period of the Contract, the Contractor shall clean up the construction site and remove all surplus construction material and debris from the site. At the completion of the Contract the site shall be left clean and tidy, all excavation filled flush with the natural ground level, and all excess material removed to the satisfaction of the Superintendent.

1.12 Practical Completion

The intended purpose of the Works is to achieve the relevant Authority acceptance and takeover of the Works.

Practical Completion shall therefore be awarded when;

- All Authority inspections have been successfully completed and works have been accepted by the
- Principal;
- All testing has been successfully completed;
- All as-constructed details and drawings have been accepted by the Principal.

2 DRAINAGE

2.1 General

This specification sets out the requirements for the construction of drainage culverts, pipelines and related structures.

All the Works must be constructed in accordance with the Drawings and this Specification. All pipes must be laid and trenches backfilled prior to construction of basecourse of new roads.

The work under this specification consists of the supply and installation of reinforced concrete pipes (RCPs) and reinforced concrete boxes (RCBs) culverts, corrugated steel pipe (CSP) and corrugated aluminium pipes (CAP) culverts, polyethylene (PE) and polypropylene (PP) pipes and fittings, reinforced concrete end treatments for culverts and the supply and installation of RCP stormwater drains.

Pile and keel or bearers will be required in soft ground and where drains cross existing services.

Drain construction shall take place in dry conditions and where necessary the Contractor shall provide dewatering equipment to ensure such suitable conditions exist.

2.2 Materials

2.2.1 Pipes and Precast Components

All pipes and precast components incorporated in the works shall be in first class condition and free of cracks, chips and deformities. Any damaged items shall be rejected and shall be removed from the site.

2.2.2 Concrete Pipes and Culverts

All concrete pipes shall conform to AS 4058 and shall be rubber ring joint type, unless otherwise specified or authorised by the Superintendent. Strength class shall be "2" unless otherwise noted on the Drawings.

Culverts and bases shall be precast reinforced concrete culverts manufactured to AS1597 unless otherwise specified on the Drawings.

2.2.3 Polyethylene & Polypropylene Pipes and Fittings

Polyethylene & Polypropylene pipes and fittings shall comply with AS 5065. Polyethylene pipes and fittings shall also comply with AS 4130 and AS 2566.1 where relevant to the application. Mechanical, electrofusion or butt-welded joints installed in accordance with the manufacturer's requirements many be used.

Pipe class shall be PN 6.3 PE 80.

2.2.4 Headwalls and Endwalls

Precast concrete components shall be manufactured in accordance with the dimensions and details shown on the Drawings by reputable supplier(s) acceptable to the Superintendent. Proprietary components where shown on the Drawings or specified shall be in accordance with that manufacturer's latest published information.

Headwalls, endwalls and aprons shall be constructed using reinforced concrete with a minimum compressive strength of 32MPa as detailed on the Drawings.

2.2.5 Concrete

Concrete used for in situ work shall conform to AS 3600 and be provided by a pre-mix concrete supplier conforming with AS 1379 or mixed on site using materials as specified and plant to the approval of the Superintendent.

Concrete for manholes, headwalls, end walls and keels shall have a minimum compressive strength of 32 MPa at 28 days. The slump shall not exceed 70mm or be less than 30mm and the maximum size of aggregate shall be 20mm.

2.2.6 Cement

All cement used shall be Portland Cement in accordance with AS 3972 and obtained from an approved manufacturer.

Cement shall be delivered to the site fresh and in sealed bags and there stored in a weatherproof shed until such time that it is to be used. Any bag showing signs of deterioration or setting shall be rejected.

2.2.7 Aggregate

Fine aggregate shall be well graded, clean, sharp and free from clay and organic impurities in accordance with AS 1141. Coarse aggregate shall be crushed granite or diorite clean and free from all impurities and dust in accordance with AS 1141. The maximum particle size shall not exceed 20mm.

2.2.8 Water

Water for use in concrete and mortar shall be of potable quality, free from any impurities harmful to concrete, mortar or steel.

Where public supply is used the Contractor shall obtain the supply Authority's approval to the use of the water for the Contract and shall pay all fees and costs.

2.2.9 Sand

Sand for mortar will be crushed stone or natural sand free from all deleterious substances and have a uniform grading.

Sand for bedding or backfilling shall be clean sand free from roots, clay or any deleterious matter.

2.2.10 Cement Stabilised Backfill

Cement stabilised backfill material shall consist of basecourse material, or other suitable material approved by the Superintendent, stabilised in the proportion of 100 kg of Type GP Cement to one cubic metre of uncompacted backfill material.

Water for cement stabilisation shall be clean and potable.

2.2.11 Select Bedding Material

Select bedding material shall be basecourse material, or other suitable material approved by the Superintendent, containing less than 20% by mass of material retained on the 37.5 mm sieve.

2.2.12 Steel

Steel reinforcing fabric and steel reinforcing bars for concrete shall comply with the requirements of AS 1302, AS 1303 and AS 1304 and be free from loose rust or matter likely to impair the bond with concrete.

Structural steel shall comply with the requirements of AS 4100.

2.2.13 Setting Out

The Drawings show centre lines, grades, lengths, diameters and invert levels at entry and exit of pits, headwalls, end walls and catch basins.

The distances shown between pits or pits and headwalls are mostly scaled measurements and are for the Tenderer's/Contractor’s guidance only. In all instances headwalls are to be constructed in the locations shown. Centre lines and invert levels are to be strictly adhered to and no alterations shall be made except on the written authority of the Superintendent.

2.3 Excavation

The installation of pipes and box culverts shall include all trench excavations, construction and backfill to the details shown on the Drawings and as described in this specification.

Tenderers must form their own opinion and take what tests on site they consider necessary to ascertain what the nature of the ground and sub-surface strata is.

2.3.1 Dewatering

The Contractor shall allow within his Tender the cost of all dewatering and any additional construction costs due to wet ground conditions. In the event of water being encountered, the Contractor shall make adequate provision to ensure that the excavation is kept free from water during the process of concrete pouring and for a period of at least 24 hours after the concrete pour. No bedding or pipes shall be laid in water and trenches are to be kept free from water until backfilling has commenced.

2.3.2 Trench Excavation

Trenches are to be cut to the line, depth and gradient required. The line of cut for each side of the trench shall be marked out on the surface before excavation commences.

The trench widths shall be kept to a minimum consistent with the bed width requirements and the requirements of adequate working space and shoring.

Tunnelling shall be only carried out where directed and to the approval of the Superintendent.

Should the bed of the trench be over-excavated, then the over-excavated volume shall be replaced with a 1 part cement to 3 parts fine aggregate to 6 parts coarse aggregate by volume concrete mix at the Contractor's expense, unless an alternative method is approved by the Superintendent.

The excavation of trenches with irregular shaped sides shall be avoided and, where this occurs or there is any danger of sides collapsing, then adequate timbering and strutting will be placed to the approval of the Superintendent, at the Contractor's expense. Trenches shall be kept free from water, debris and falling earth.

The final trimming of the bottom 150mm of trench excavation must not be carried out until immediately prior to concreting or placing of pipe bedding. Excavation must be completed for a minimum of 10m length ahead of pipe laying.

Adequate shoring to the approval of the Superintendent shall be used where the drain is within 2.0m plus the depth of the drain of a building, or load bearing structure, or where requested by the Superintendent. Details of the proposed method of shoring shall be submitted to the Superintendent prior to commencing excavation of this section of drain. It shall be the Contractor’s responsibility to ensure that any shoring is structurally adequate and prevents movement of the surrounding structures.

The Superintendent shall at any time during the Contract stop any works he considers necessary, if in his opinion, any part of the work is in an unsafe condition. The Contractor shall immediately rectify the unsafe condition as directed by the Superintendent.

All surplus or unsuitable materials resulting from trench excavation, pipe laying and backfill shall be removed from site at Contractor’s cost.

2.3.3 Pit Excavation

Excavation for junction pits and gullies shall be made to the correct depth and of sufficient dimensions allowing for the use of adequate shoring or battered sides. Where a firm foundation cannot be obtained, the Contractor shall place timber piles and raft to the satisfaction of the Local Authority. The depth of piles shall be as directed by the Superintendent.

The Contractor shall be responsible for safety at all times.

2.3.4 Obstruction to Traffic

Excavation material shall be deposited in an area causing the least interference to vehicular and pedestrian traffic.

At all times when the works are left unattended, all excavation in public areas shall be fenced off with warning signs and lighting and the Contractor shall ensure that they remain in a safe condition. These safety precautions shall be subject to the approval of the Superintendent.

2.4 Installation

Pipes and culverts shall be laid in accordance with the manufacturer recommendation on the prepared bedding to the line level and grade shown on the approved Drawings. No pipes or culverts shall be laid on filled ground until such ground has been compacted to a minimum dry density ratio of 95% when tested in accordance with AS1289 E2.1.

2.4.1 Pipe Setting

All pipes shall be set in a straight line between pits or between pits and headwalls. On inspection by the Superintendent, any pipe not placed in a straight line shall be replaced at the cost of the Contractor.

The acceptable tolerance of pipe setting shall be as specified in "Inspection and Tolerances" clause of this Specification.

Pipes shall be set in an upstream direction unless otherwise approved by the Superintendent.

Pipes shall be set using boning rods and profiles, or similar practices as approved by the Superintendent.

2.4.2 Concrete Pipe Jointing

Spigot and socket pipes shall be rubber ring jointed. Pipes shall be laid such that the sockets face upstream.

Externally flush interlocking pipe shall be jointed with the ends fully butting on the inside face of the pipe and caulked with a 3 part sand to 1 part cement mortar on the outer face of the joint. The mortar shall be neatly struck off flush with the outer surface of the pipe.

While waiting for backfilling, all mortar joints shall be covered with damp clean sand to prevent the mortar cracking.

2.4.3 Pipe and Culvert Bedding

Bedding for pipes and culverts shall be strictly in accordance with the details on the Drawings. In the event that soft or unstable material is encountered in the trench base, the Superintendent may direct that this be removed and replaced with approved, well compacted material.

Where socket pipes are to be used small recesses shall be left under pipe joints to allow the barrels to bear evenly on foundations for their full length.

Pipes and culverts laid in wet conditions shall be laid on coarse aggregate bedding for the full width of the bottom of the trench.

Culverts shall be laid on a reinforced concrete base.

2.5 Headwalls

Headwalls are to be constructed using either concrete with 32MPa compressive strength, mortared stonework or brickwork as detailed on the Drawings. For mortared stonework the size and quality of the stone shall be as specified for Stone Pitching.

2.6 Stone Pitching

Where indicated on the Drawings, surfaces shall be protected by hand placed pitching stones. Stones shall generally weigh in excess of 10 kg each and the greatest dimension of any stone shall not exceed 1.5 times its least dimension. Stones shall be hard, sound and durable, shall be set on a sand bed in a close fitting pattern and watered and rammed into position.

Where specified as mortared stone pitching, the joints between stones shall be raked for their full depth and grouted with a 3 parts sand to 1 part Portland Cement mortar.

2.7 Inspection and Tolerances

No backfilling shall be commenced until the drainage lines have been approved by the Superintendent.

On completion of backfilling, the Superintendent shall again inspect the drainage lines for alignment, level and gradient and all pipes must be free from debris.

Pipelines shall be within 20mm of design line and level at all points where design grade exceeds 1% and within 10mm of the line and level for grades flatter than 1%.

Pipelines which have not been constructed within tolerance shall be excavated and relayed at the entire cost of the Contractor.

2.8 Backfilling

2.8.1 Culverts

Pipes shall not be backfilled until they have been inspected and approved by the Superintendent.

The material used for backfilling of pipe trenches and pits in pavements shall be a clean granular material free from stones over 25mm dimension, clay, organic or other deleterious matter and shall be compacted in 300mm layers to a minimum of 95% of the Modified M.D.D., up to the subgrade level. The pavement shall be reinstated to its original condition.

Initial backfill to the top of the pipeline shall be carried out by hand placing approved fill material, free from rock, soil lumps or other unsuitable material.

The fill shall be placed uniformly on both sides of the pipe and compacted as firmly as can be managed by hand tamping.

Care should be taken to avoid damaging the pipe by direct impact.

Final backfill above the pipe shall be placed in uniform layers along the total length of pipeline to prevent overload or displacement and compacted at optimum moisture content by mechanical methods to achieve a compacted density not less than that of the same material in an undisturbed state.

Surplus material from excavations shall be graded out over the Site and any unsuitable materials removed from the site.

No excavation shall be backfilled until the pipeline or structure has been inspected and approved by the Contractor’s supervisor.

Should any section of pipe be disturbed or damaged during backfill it shall be removed and re-laid by the Contractor.

2.8.2 Structures

Filling shall not be placed against structures until the structure has been inspected and approved for filling.

Fill materials shall be placed in horizontal uniform layers not exceeding 150mm thickness and shall be compacted to a minimum dry density ratio of 98% when tested in accordance with AS1289 E2.1 or E3.3.

Backfilling over and around structures shall avoid unbalanced loading or create movement.

The Contractor shall be responsible for repairs to any damage to existing structures as a result of filling and compacting operations. These repairs shall be at the Contractor’s expense.

2.8.3 Trench subsidence

If any subsidence of backfill occurs during the Contract period, including the Defects Liability Period, in any road, verge, footpath, pavement or elsewhere in the works, the Contractor shall at his own expense, make it good immediately is appears.

In the event of the Contractor's failure to make good such defects, the Superintendent may take action under the provisions of AS 2124.

2.9 Open Drains

Open drains shall be installed to the lines and levels as shown on the Drawings.

Excavated material from open drains shall be disposed of in an approved manner.

Where over-excavation occurs, this shall be corrected by filling with in situ material and compacting to a density exceeding that of the natural surrounding material.

2.10 As Constructed Information

The Contractor shall employ the services of the Licenced Surveyor for the collection of As Constructed information. Survey works associated with this information will be the responsibility of the Contractor's Licenced Surveyor. As Constructed information shall include the reduced levels of all pit lids, and all pipe inverts as well as the horizontal position of all pits and structures.

The Contractor shall ensure that no part of the work is backfilled or otherwise covered until 'As Constructed' information has been obtained.

The drainage 'As Constructed' information shall be to the Local Authority D spec requirements and must include, but need not be limited to the following:

- type of pit and cover level;
- pipe invert levels at all pits;
- grade of pipes;
- distance between pits;
- pipe size;
- cover level of all pits, including connection pits;
- invert levels of all pipes in existing pits to which connection may have to be made, including subsoil drainage;
- invert levels of open drains and dimensions of basins;
- cross-section of open drains;
- change of locations e.g. line alignments and manholes tied to properties/lot boundaries.

Such information shall be certified by the Contractor's Surveyor and forwarded to the Superintendent.

A red line/ink mark up drainage As-Constructed in PDF format is also to be provided reflective of the required drainage As Constructed information listed above.

Practical Completion will not be issued until satisfactory drainage 'As Constructed' Drawings are provided.