DEMEZA
CIVIL CONSULTING

Civil Technical Specification

Turner Road Upgrade, Denmark

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Project Preliminaries

Project Context & Scope

Design Scope

This Specification has been prepared by the Civil Consultant to define the performance and construction standards for the civil works only. The Civil Consultant is not responsible for contract administration, construction supervision, or assessment of Contractor performance, unless separately engaged by the Client for those services.

Location of Works

The site is located at Turner Road, Denmark, WA 6333. Access to the site is via Mount Shadforth Road.

Description of Works

The work includes but is not limited to:

- Location and protection of existing services
- Construction survey set-out
- Vegetation clearing and removal of roots and debris
- Demolition and disposal of existing civil infrastructure, such as pavements, furniture, stormwater drainage structures and as noted on the drawings
- Stripping of topsoil, stockpiling, respreading and removal of excess from site
- Earthworks to the underside of pavements (ie: to subgrade level)
- Stormwater drainage works including pit, pipes and end of line detention/retention infrastructure
- Pavement construction, including subbase and basecourse
- Concrete kerbing
- Sealed surfaces
- Pavement signage
- Adjustment to existing services as required
- As-constructed survey and associated documentation, suitable to be supplied to the Shire of Denmark digital data specifications

Drawings

The following drawings form part of the Contract Documentation:

DRAWING NO.	DRAWING TITLE	REV.
DEM-25-035-C400	Roadworks Key Plan	0
DEM-25-035-C401	Roadworks Plan – Sheet 1 of 6	0
DEM-25-035-C402	Roadworks Plan – Sheet 2 of 6	0
DEM-25-035-C403	Roadworks Plan – Sheet 3 of 6	0
DEM-25-035-C404	Roadworks Plan – Sheet 4 of 6	0
DEM-25-035-C405	Roadworks Plan – Sheet 5 of 6	0
DEM-25-035-C406	Roadworks Plan – Sheet 6 of 6	0
DEM-25-035-C420	Cross Sections – Sheet 1	0
DEM-25-035-C421	Cross Sections – Sheet 2	0
DEM-25-035-C422	Cross Sections – Sheet 3	0
DEM-25-035-C423	Cross Sections – Sheet 4	0
DEM-25-035-C424	Cross Sections – Sheet 5	0
DEM-25-035-C425	Cross Sections – Sheet 6	0
DEM-25-035-C426	Cross Sections – Sheet 7	0
DEM-25-035-C427	Cross Sections – Sheet 8	0
DEM-25-035-C428	Cross Sections – Sheet 9	0
DEM-25-035-C429	Cross Sections – Sheet 10	0
DEM-25-035-C430	Cross Sections – Sheet 11	0
DEM-25-035-C431	Cross Sections – Sheet 12	0
DEM-25-035-C432	Cross Sections – Sheet 13	0
DEM-25-035-C440	Intersection Detail	0
DEM-25-035-C900	Civil Notes	0
DEM-25-035-C950	Civil Details	0

Contractual & Procedural Framework

Definitions

For the purposes of this Specification, unless stated otherwise:

Client means the party engaging the Contractor to perform the Works.

Nominated Representative mean the individual or consultant authorised by the Client to clarify scope or respond to queries (if applicable).

Contractor means the party engaged by the Client to execute the Works described in the Contract Documents.

The Works means the scope of construction and associated activities described in this Specification and on the Drawings.

Working Days means Monday to Friday, excluding weekends and public holidays in Western Australia unless otherwise approved in writing by the Client.

Practical Completion means the stage in the execution of the Works when the Works are complete except for minor defects and omissions that do not prevent the Works from being reasonably capable of being used for their intended purpose.

Defects Liability Period means the 12-month period commencing from the date of Practical Completion, during which the Contractor is responsible for remedying defects at no cost to the Client.

Hold Point means a nominated stage in the Works where further progress is not permitted until the activity is inspected and written approval is granted by the Client.

Substitutions

The Contractor shall not substitute any materials, products, plant, or construction methods specified in the Drawings or this Specification without prior written approval from the Client or their representative.

Requests for substitution shall be made in writing and shall include:

- The reason for substitution (e.g., availability, cost, improved performance)
- Full technical specifications and product data sheets of the proposed alternative
- Details of how the alternative is equal or superior in performance, durability, aesthetics, and compliance with relevant Australian Standards
- Evidence of prior use on comparable projects (if available)

Approval of a substitution shall not relieve the Contractor of responsibility for compliance with the Specification or the satisfactory performance of the substituted item.

Any delays, redesign costs, or additional coordination associated with proposed substitutions shall be at the Contractor's cost.

Client's Directions

The Contractor shall comply with all written instructions issued by the Client or their representative. Any ambiguity or discrepancy shall be referred to the Client or their representative prior to commencing affected work.

Programme

The Contractor shall submit a Construction Programme to the Client or their representative within one week of acceptance of tender.

The Construction Programme shall advise the start and completion dates for each main activity and the critical path.

The Contractor shall review and update the programme fortnightly for monitoring by the Client or their representative.

Site Meetings

No work shall commence on site until pre-start requirements have been met by the Contractor and a start-up meeting has been held with the relevant Authority or Service Provider.

The Contractor's Representative shall be present at site meetings at an agreed fortnightly interval to discuss the progress of the Works. The Contractor shall provide a suitable location on site to conduct all site meetings.

The Client or their representative will arrange, chair and minute all meetings.

Site Possession / Access

The Contractor shall not access the site until written confirmation of site possession has been provided by the Client or their representative. Any unauthorised access or early commencement is at the Contractor's own risk.

Hold Points

The Contractor shall request hold point inspections at the following stages:

- Stormwater drainage pipe installation prior to backfilling
- Pavement subgrade prior to importing pavement material
- Pavement basecourse prior to sealing
- Practical Completion
- Any specific issues where the Contractor wishes to carry out works that differ from the Drawings and / or Specification

Works shall not proceed past the hold points until written approval is given by the Client or their representative to specifically do so. Failure to do so may result in abortive rework by the Contractor at their own expense.

The Contractor shall provide a minimum of 24 hours' notice to the Client or their representative of when an inspection to release a hold point is required.

The Client or their representative shall inspect the works within 24 hours of receiving written notice from the Contractor.

Materials and workmanship not complying with the Drawings and Specification will be rejected unless made good to the satisfaction of the Client or their representative.

No claims for delay will be accepted for hold point inspections where the Contractor has failed to provide required notice or documentation.

Request for Additional Information

The Contractor shall notify the Client or their representative in writing immediately upon becoming aware of any matter that may delay, disrupt, or affect the performance of the Works.

Survey

The Contractor shall engage a suitably qualified practising Surveyor who is available for the entire Contract Period to ensure accurate and proper setting out of the Works as necessary for the satisfactory execution of the work to the specified tolerances.

The Client's Surveyor is responsible for the provision of control marks. The Contractor is responsible for ensuring that control marks provided are maintained, with any damage or rectification if disturbed to be rectified by the Client's Surveyor at the Contractor's cost.

Set-out information will be provided electronically in .dwg file format.

The Contractor shall provide as-constructed information (.dwg and .pdf file format) at the completion of subgrade and basecourse works. No work is to be carried out on the next stage until this as-constructed information has been verified.

Site Management Obligations

Safety Management

The Contractor shall prepare and submit to the Client or their representative a project specific Safety Management Plan (SMP) for approval prior to commencing any works on site.

The SMP shall be prepared in accordance with AS ISO 45001 Occupational Health and Safety Management Systems.

All works shall be carried out with due regard for the safety of employees and the general public and in compliance with all relevant Acts and Regulations.

Work Health and Safety (WHS) Obligations

The Contractor shall comply with the Work Health and Safety Act 2020 (WA), Work Health and Safety (General) Regulations 2022 (WA), relevant Codes of Practice, and all other applicable statutory WHS requirements. The Contractor is the designated 'person conducting a business or undertaking' (PCBU) under WHS legislation and assumes responsibility for safe systems of work on site.

Traffic Control and Pedestrian Management

The Contractor is responsible for the design, relevant approvals and supply of all traffic management measures in relation to the Works for the duration of the Works, inclusive of, but not limited to, lane closures, signage, diversions and all public advisory and consultation. All works shall be undertaken by a MRWA accredited Traffic Controller.

All works shall abide by Local Authority regulations as required.

The Contractor shall not block pedestrian access to and from adjacent buildings and, if necessary, the work shall be staged to always maintain pedestrian access.

The Contractor shall supply, install and maintain all necessary temporary paths, detours and transitions suitable for pedestrians thoroughfare. All temporary paths shall be firm and even under foot, free of trip hazards, loose material, drainage ponding and steep gradients (greater than 1 in 14) or sudden change in direction or elevation.

Temporary works shall be removed at the completion of works and reinstated.

Working Days and Hours

Normal working days are Monday to Friday, excluding public holidays, unless otherwise approved in writing by the Client or their representative. Normal working hours are 7.00am to 6.00pm. Works outside of normal working days and hours shall be requested in writing prior to undertaking, seeking approval by the Client or their representative and Local Authority.

With respect to Liquidated Damages, a day will mean any 24 consecutive hour day inclusive of Saturday's, Sunday's and statutory holidays.

Utilities

The Contractor shall ascertain and verify the exact location of existing services, by whatever means necessary to the satisfaction of relevant Service Provider's working in proximity

documentation, prior to commencing works. All existing services shown on design documents are indicative only.

The Contractor shall make all due allowance in their program for all necessary liaison, relocation (if required) and programming with service authorities as required for the provision of installation by service authorities during the Works. The Contractor shall backfill and compact service trenches as required by the relevant service authority and satisfactorily reinstate.

No utility, private or public, may be moved to accommodate the Contractor's equipment or its method of operation when the utility does not interfere with the Works, unless such removal is at the expense of the Contractor, and in each case subject to the approval of the utility authority concerned.

The Contractor must take all precautions necessary to prevent damage to existing fencing, drainage structures, telephone and power lines, water mains and services and other facilities and features whilst undertaking the Works. The Client or their representative may arrange for the repair of damage not made good by the Contractor and the cost of such repair will be deducted from payments due to the Contractor.

The Contractor shall be liable for all direct and consequential costs associated with service damage resulting from failure to accurately locate or protect underground utilities.

Adjacent Residences

The Contractor shall avoid causing a nuisance to adjacent residences due to the Works. The Contractor shall be fully responsible for any damage caused, particularly damage that may be caused by vibratory compaction equipment.

The Contractor shall provide notice to residents who may be affected by the Works via a letter drop fourteen (14) prior to the commencement of works. The notice shall contain the name of Client and Contractor, a concise summary of the nature, timing, and likely impacts of the Works, date for commencement, anticipated date for completion and Contractor’s Representative contact details.

Temporary Works and Access

The Contractor shall design, provide, maintain, and remove all temporary works, haul roads, access tracks, laydown areas, and site offices necessary for the execution of the Works.

The layout and installation of temporary works shall:

- Not obstruct access for adjacent users
- Comply with all safety, environmental and traffic regulations
- Be approved by the Client or their representative prior to installation, where requested

The Contractor shall restore all disturbed areas associated with temporary works to original or better condition upon completion of the Works. All costs associated with temporary works shall be deemed included in the lump sum contract, unless otherwise stated.

Temporary Site Facilities / Amenities

The Contractor shall provide all temporary facilities and site amenities required for their workforce including but not limited to site sheds, toilets, lunchrooms, secure storage, and first aid stations.

Power and Water Supply

The Contractor shall make all necessary arrangements and pay all costs associated with the supply of power and suitable water for construction purposes.

No potable water shall be used for general construction purposes.

Site Conditions

The Contractor shall inspect the site and familiarise themselves with all physical and environmental conditions prior to tender. No claims shall be made for site conditions that were reasonably foreseeable at the time of tender.

Environmental Controls

Dust and Erosion and Sediment Control

The Contractor is responsible for controlling and minimising the generation of dust on the site.

The Contractor shall comply with the provisions included in "Land Development Sites and Impacts on Air Quality – A guideline for the prevention of dust and smoke pollution from land development sites in Western Australia", published by the Department of Environmental Protection.

The Contactor shall make all due allowance for the watering of the site via a water cart to suppress dust throughout the construction contract. An additional water cart shall be mobilised to site if instructed to do so by the Client or their representative if it is deemed necessary. Additional water cart(s) shall be a provisional sum.

The Contractor must implement erosion and sediment control measures throughout the construction process, ensuring that sediment-laden water is managed and filtered before being discharged into the environment. This may include silt fences, sediment ponds, and stabilised access points.

Construction works shall comply with WA Environmental Protection (Noise) Regulations 1997.

Burning of Vegetation

The burning of vegetation or other materials on site is not permitted.

Waste Management

The Contractor is responsible for proper disposal of all construction waste, including excess material, debris, and waste products. Waste should be sorted for recycling where possible and disposed of at an approved waste management facility.

Security and Emergencies

Site Fencing

Not applicable.

Stand Down

The Client or their representative may direct the Contractor to cease operations and stand-down all resources for events including, but not limited to; excessive dust due to wind, total fire bans imposed by Local Authority, Department of Conservation & Land Management and Bush Fires Board, or directions by Authorities. Extensions of time will be granted for such stand-downs.

The Contractor shall continue to operate dust suppression measures specified and endeavour to suppress dust as much as possible during all periods of stand down. During the period of cessation of work the Contractor shall keep all machinery and supplies on site and maintain his capability to restart work at the first opportunity.

Inclement Weather

Inclement weather means rainfall, wind, extreme heat, or other adverse conditions that prevent or significantly hinder the safe or practical execution of the Works.

The Contractor must monitor local conditions and adjust programming accordingly. Extensions of time for inclement weather shall only be granted where:

- Weather records are submitted from a recognised Bureau of Meteorology station located within reasonable proximity to the site; and
- The weather event is of such magnitude that the work could not reasonably continue, and the delay exceeds the standard allowances for adverse weather (if applicable).

Stand-downs during inclement weather do not automatically entitle the Contractor to delay costs or variations unless agreed in writing by the Client or their representative.

Force Majeure

The Contractor shall not be liable for failure to carry out the Works or any part thereof due to an event of Force Majeure.

Force Majeure includes, but is not limited to:

- Acts of God (e.g., cyclone, earthquake, flood, bushfire)
- War, civil unrest or terrorism
- Government restrictions or orders
- Pandemic or epidemic events
- Industrial disputes beyond the Contractor’s reasonable control

The Contractor must notify the Client or their representative in writing within 48 hours of becoming aware of any Force Majeure event, detailing:

- The nature of the event
- Its expected duration
- The anticipated effect on the Works

The Contractor shall take reasonable steps to mitigate delays or disruptions. The Client or their representative may grant an extension of time if the Works are delayed due to a genuine Force Majeure event.

Compliance and Coordination

Standard of Work

The work shall be carried out in strict accordance with the Drawings, the requirements of the Specification and to the approval of the Client or their representative with all materials, plant and workmanship used to execute the Works complying with nominated standards current at the date of execution.

The Contractor shall supply all labour, equipment, materials, temporary works and testing necessary to complete the Works in accordance with the Specification and the Drawings. All machinery shall arrive to site in clean condition and shall be free from all foreign matter, vegetation, soil, mud and dust.

Compliance with Standards

All works must comply with the relevant Australian Standards, codes, and local council regulations, including but not limited to:

AS 1141: Methods for sampling and testing aggregates
AS 1160: Bituminous emulsions for the construction and maintenance of pavements
AS 1254: PVC-U pipes and fittings for stormwater and surface water applications
AS 1289: Methods of testing soils for engineering purposes
AS 1379: Specification and supply of concrete
AS 1450: Steel tubes for mechanical purposes
AS 1734: Aluminium and aluminium allows – Flat sheet, coiled sheet and plate
AS 1742.1: Manual of uniform traffic control devices, Part 1: General introduction and index of signs
AS 1742.2: Manual of uniform traffic control devices, Part 2: Traffic control devices for general use
AS 1743: Road signs - Specifications
AS 2008: Bitumen for pavements
AS 2150: Asphalt – A guide to good practice
AS 2157: Cutback bitumen
AS 2566.2: Buried flexible pipelines, Part 2: Installation
AS 2700: Colour Standards for general purposes
AS 2701: Methods of sampling and testing mortar for masonry construction
AS 2870: Residential slabs and footings
AS 2890.1: Off-street parking – Car parking facilities
AS 3500.3: Plumbing and Drainage – Stormwater Drainage
AS 3600: Concrete structures
AS 3700: Masonry Structures
AS 3725: Design for Installation of Buried Concrete Pipes
AS 3798: Guidelines on earthworks for commercial and residential developments
AS 3972: General purpose and blended cements
AS 3996: Access covers and grates
AS 4049: Paints and related materials – Pavement marking materials
AS 4058: Precast concrete pipes
AS 4430: Geosynthetics – Guide to geotextiles and geogrids

AS 4455: Masonry units, pavers, flags and segmental retaining wall units
AS 4456: Masonry units and segmental pavers – methods of test
AS 4671: Steel for the reinforcement of concrete
AS 4680: Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS 4970: Protection of Trees on Development Sites
AS ISO 45001: Occupational health and safety management systems
AS 5065: Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
Local council, Main Roads Western Australia (MRWA) and regulatory requirements specific to Western Australia.
Manufacturer's installation manuals and technical data sheets

Project Documentation

The Contractor shall adhere to the approved design documentation, including any plans, drawings, and specifications provided by the project designer. Any discrepancies or ambiguities in the documentation must be clarified with the designer prior to commencement.

Completion Framework

Final Inspection and Handover

A final inspection will be conducted to ensure that all works have been completed in accordance with the specification and the design. Any items identified during the inspection shall be rectified by the Contractor before the handover.

Documentation

The Contractor must submit all necessary documentation for the completed work, including as-constructed drawings (in digital .PDF and .DWG file format) in accordance with Local Authority requirements, test reports, and any other relevant information required for handover as required by the Client or their representative.

Defects Liability

A defects liability period of 12 months will apply from PC. The Contractor shall be responsible for rectifying any defects identified during this period at no additional cost.

Technical Requirements

Use of Generic Specification

This Specification has been prepared as a general civil engineering reference to suit a wide range of project types and conditions. While care has been taken to tailor it to this project, some items may not be applicable.

The inclusion of any item in this Specification does not necessarily indicate that it applies to this project unless shown on the Drawings or specifically instructed by the Client or Client or their representative. In the event of any discrepancy, the Drawings shall take precedence.

If anything in this Specification appears unclear or not relevant, the Contractor is encouraged to seek clarification from the Client or their representative before proceeding with the relevant works.

General Technical Requirements

Compliance

All materials, workmanship, and construction methods shall comply with the latest editions of applicable Australian Standards, relevant authority requirements, and this Specification. In the case of conflict, the most stringent requirement shall apply unless directed otherwise by the Client or their representative.

Responsibility for Dimensions and Levels

The Contractor shall verify all dimensions, levels, and set-out points on site prior to construction. Any discrepancies with the Drawings or site conditions shall be immediately referred to the Client or their representative for resolution.

Quality Assurance and Control

The Contractor shall implement a quality system appropriate to the scale of the project, and provide test results, conformance records, and inspection checklists as required under each work section of this Specification. All testing shall be undertaken by a NATA-accredited laboratory unless otherwise approved.

Testing and Sampling

Materials and works shall be tested in accordance with relevant Australian Standards. The Contractor shall allow for all necessary testing, including retesting of failed work or materials. Sampling shall be performed progressively during construction to verify conformance.

Workmanship

All work shall be executed in a neat, professional, and tradesman like manner. Works not meeting the required standard shall be rectified at the Contractor’s cost to the satisfaction of the Client or their representative.

Tolerances

Unless otherwise specified in a particular section of this Specification or on the Drawings, construction tolerances shall meet the applicable tolerances in the relevant Australian

Standards. Any deviations outside these tolerances shall be rectified to the satisfaction of the Client or their representative.

Material Approvals

Where specific products or manufacturers are not nominated, the Contractor shall submit proposed materials for approval by the Client or their representative prior to procurement. All materials shall be new and fit for purpose.

Coordination with Other Trades

The Contractor shall coordinate civil works with other trades and disciplines on site to avoid conflict, duplication, or delay. This includes coordination with landscape, building, electrical, and structural works where applicable.

Temporary Protection of Works

The Contractor shall provide adequate protection to completed works until Practical Completion is achieved. Damage caused by subsequent operations or weather shall be made good at the Contractor's expense.

Site Preparation and Clearing

Clearing and Grubbing

The site shall be cleared of any vegetation, debris, or other obstructions such as demolition and removal of fences, stormwater infrastructure, kerbing, redundant pavements and rubbish. All surplus or unsuitable materials shall be removed from site and disposed of at a licensed waste facility in accordance with statutory regulations.

Vegetation clearing shall be limited to designated areas and approved by the Client or their representative.

Tree roots and stumps shall be completely removed, and resulting voids backfilled with structural fill and compacted to the density of the surrounding undisturbed in-situ soils or 95% MMDD, whichever is the greater.

Protective fencing shall be installed around vegetation to be retained as per **AS 4970**. Vehicles and equipment shall not be parked or driven over roots of vegetation marked as retained.

Any damage outside defined work areas shall be rehabilitated as per environmental regulations at Contractor's expense.

No clearing shall be undertaken for construction of temporary works, access tracks, spoil areas or site office locations.

No burning shall be permitted.

Cut Lines

Prior to any cutting the Contractor shall mark out the position of all cut lines by painting spots on the existing surface, not exceeding 30mm in width at intervals of not greater than 2m.

The cut line of existing asphalt shall be in a smooth straight line with no undercutting to the material to be retained. The sides of the cut shall be vertical and there shall be no separation of existing seal to base material.

The cut line of existing concrete shall be along the nearest expansion or control joint, where possible, and shall be in a smooth straight line, vertical and full depth to existing concrete.

Demolition

All demolished materials shall be removed from site at the Contractor's expense.

Care shall be taken during demolition. The Contractor shall protect all existing infrastructure to remain throughout demolition activities, with any damage to be rectified by the Contractor at their expense.

Topsoil Stripping and Stockpiling

Topsoil shall be stripped to a depth of 150mm, or as stated within a site-specific geotechnical report, and stockpiled for reuse. Stockpile location shall be approved by the Client or their representative.

Stockpiles shall not exceed 1.5m in height and shall be stabilised to prevent erosion.

Hydromulching with sterile rye grass shall be conducted to minimize dust and weed growth.

Earthworks

Site Specific Geotechnical Reference

Where a geotechnical investigation report has been provided as part of the Contract Documentation, the Contractor shall carry out all earthworks in accordance with the recommendations and requirements of that report, including but not limited to:

- Site preparation and stripping depths
- Dewatering or groundwater considerations
- Subgrade treatment
- Compaction control
- Material suitability and placement

In the event of conflict between the geotechnical report and this Specification, the geotechnical report shall take precedence unless otherwise directed in writing by the Client or their representative.

If no site-specific geotechnical report has been issued, or if the report does not cover a particular aspect of the Works, then the Contractor shall adhere to the requirements of this Earthworks section in full.

Any uncertainties regarding the interpretation or application of geotechnical recommendations shall be referred to the Client or their representative prior to commencement of the associated works.

Excavation

Excavation shall be carried out to the required levels as shown in the drawings.

Unsuitable material shall be removed of off-site and replaced with compacted fill.

Materials to be reused as fill shall be stockpiled. Stockpile location shall be approved by the Client or their representative. Excess material, after filling as appropriate, shall be removed from site.

All excavations shall be kept free from water until work below ground level is sufficiently set or protected.

The Contractor shall ensure that all excavations always remain stable. The Contractor shall utilise measures such as shoring, piling, trench boxes, suitable battering (angles) and overburden management (do not load top of excavation) to ensure excavation stability.

Filling

All fill material shall comply with the requirements of **AS 3798** and be clean and free from the following:

- Clay material
- Peat, vegetation, timber, organic, soluble or perishable material
- Dangerous or toxic materials
- Metal, rubber, plastic or synthetic materials
- Dieback containing materials

All fill materials shall conform to the following material properties:

- 100% passing 2.36mm sieve
- Less than 5% by weight passing 75um sieve
- 5m/day permeability
- Be non-plastic

Fill materials shall be placed in layers not exceeding 300mm thickness and compacted.

Compaction Requirements

Compaction shall meet a minimum of 95% Modified Maximum Dry Density (MMDD) as per **AS 1289**.

Moisture content shall be maintained within -2% to +3% of the optimum.

Proof rolling shall be conducted before pavement or structural elements are placed.

Topsoil Replacement

Topsoil shall be evenly placed, as designated on the drawings, to a minimum thickness of 50mm, maximum thickness 100mm. The finished surface shall be free from lumps and foreign material and blend gradually to adjoining undisturbed ground.

Excess topsoil shall be removed from the site at the Contractor's expense, unless otherwise instructed by the Client or their representative.

Quality Assurance and Testing – Earthworks

Prior to the commencement of pavement construction, soil compaction tests should be conducted to confirm the subgrade meets the required specifications.

Earthworks layers shall be tested for compaction, grading, and moisture content.

Test frequency shall be 1 per 250m2 for road subgrade.

Compaction test results shall be submitted to the Client or their representative within 24 hours of testing. Non-conforming test results shall be immediately followed by rectification methodology and proposed re-test schedule.

Tolerance for bulk lot earthworks shall be within minus 50mm or plus 0mm of design levels shown on the drawings.

The Contractor shall provide as-constructed survey in digital file format (.dxf or .dwg and .pdf) of the completed subgrade prior to proceeding further.

Finish

Earthworks shall be considered as finished when:

- All earthworks are evenly graded to satisfy the design drawings
- All wheel tracks and other surface disturbances are levelled out
- Removal of all debris and / or rock greater than 100mm in any one direction from the surface
- Removal and clean-up of all stockpile heaps

- Rolling of final layer has occurred.

Stormwater Drainage

General

The Contractor shall supply, install / construct and commission stormwater drainage infrastructure as shown on the approved drawings and as per the specifications herein.

All workmanship and materials shall conform to the relevant Australian Standards.

The Contractor shall take appropriate measures to ensure temporary drainage during works to prevent flooding, erosion, or any damage to structures.

Materials

Pipes

Reinforced concrete pipes shall conform to **AS 4058** and be of spigot and socket rubber ring joint type unless otherwise specified.

HDPE pipes shall conform to **AS 5065** and be installed per **AS 2566.2**.

PVC-U pipes, where specified, shall conform to **AS 1254**.

Pipe strength class shall be Class 2 unless otherwise noted on drawings.

All pipes supplied shall be new and free from cracks, chips, dents and other deformities. Handling, transport and storage shall be in accordance with the Manufacturer's requirements.

Precast Components

Precast concrete pit liners for access chambers, side entry pits and gully pits shall be of equivalent strength to Class 2 pipes and have interlocking joints.

All precast elements shall be free from cracks, chips, or defects.

Concrete

Concrete shall conform to **AS 3600** and **AS 1379**, with a minimum strength of 20 MPa at 28 days and a slump between 30-70 mm.

Cement shall comply with **AS 3972** and be stored in weatherproof conditions.

Aggregate shall meet **AS 1141** standards, and sand shall conform to **AS 2701**.

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

Sand for mortar shall be crushed stone or natural sand free from all deleterious substances with a uniform grading.

Steel Reinforcement

Reinforcement shall comply with **AS 4671**, free from rust and impurities.

Masonry Bricks

Bricks shall be hard, well-burnt, pressed or wire-cut clay brick in accordance with **AS 4455** and **AS 3700**.

Bricks shall have a minimum ultimate strength of 30 MPa and absorb not more than 10% of their own weight of water when saturated.

Bricks shall be of uniform shape and size. Damaged (chipped or broken) bricks shall not be used.

Geotextile

All geotextile shall be non-woven fabric (≥ 150 gsm) and UV-stabilised. All overlaps and joints shall be joined as per manufacturer's recommendations.

Installation

Setting Out

Drainage works shall be set out per approved drawings, with tolerances of ±50mm horizontally and +0mm/-20mm vertically.

An engineering surveyor shall provide set-out data, and records shall be kept for inspection.

Excavation

Trenches shall be cut to the required line, depth, and gradient.

Where trenches exceed the required depth, additional excavation shall be backfilled with approved material.

Dewatering shall be the Contractor's responsibility.

Excavation in roadways shall be minimized, and approval obtained before commencement.

Pipe Laying and Bedding

Pipes shall be laid in a straight line with socket ends facing upstream. Pipe laying shall commence from the downstream end.

Bedding shall consist of clean sand or crushed rock, free from roots, clay or any deleterious material, compacted per **AS 1289**. Bedding depth shall be as shown on the drawings.

Bedding material shall conform to the grading envelope defined in AS 3725 (if using RCP), or the manufacturer's installation manual for plastic pipes.

Pipes shall be fully supported along their length and tested before backfilling.

Backfilling

Backfill and side support material shall be free from debris and compacted in 150mm layers.

Vibrating plate compactors and mechanical tampers shall not be used until there is at least 300mm of material over the crown of the pipe.

Cement-stabilized backfill shall consist of base course material with 100kg of GP Portland cement per cubic meter.

Under pavements, the final 150mm of backfilling below the subgrade shall be 2% cement-stabilized material.

Concrete Encasement

The minimum thickness of concrete encasement surrounding a pipe shall be 150mm with 32 MPa concrete.

Structures

Access Chambers, Side Entry Pits and Gully Pits

Pits shall be constructed using precast concrete sections with a minimum internal diameter of 1050mm.

Covers shall be trafficable to Class D per **AS 3996** and fitted with approved lifting points.

Headwalls

Headwalls shall be constructed using reinforced concrete or mortared stonework. Stonework shall consist of stones with minimum dimension of 300mm and largest dimension being less than 1.5 times the least dimension.

Erosion protection such as aprons and edge beams shall be included for pipes exceeding 300mm diameter.

Quality Assurance and Testing – Stormwater Drainage

The Contractor shall submit verified records weekly to confirm compliance.

Compaction testing shall be per **AS 1289**, with trench backfill achieving at least 95% of the maximum dry density.

All completed drainage lines shall be surveyed, and "As Constructed" drawings submitted.

After installation, the stormwater drainage system shall be subjected to visual inspection, or CCTV inspection (as directed), and tested for functionality, including checking the correct gradient, no blockage, and no water ingress. Any leaks in the pipework or joints shall be rectified.

Cleaning and Final Works

The site shall be restored to pre-construction conditions, with debris removed and surfaces reinstated.

Any subsidence or settlement during the maintenance period shall be rectified at the Contractor's expense.

Roadworks

General

The work consists of the supply of materials, preparation, and construction of sub-grade, sub-base, and basecourse pavement layers, including bituminous and asphalt surfacing and trafficable brick paving, in accordance with approved drawings and specifications.

All workmanship and materials shall conform to the current Australian Standards. Where no standard exists, industry best practices and guidelines shall be followed.

The Contractor shall ensure compliance with all environmental, safety, and quality control requirements, including traffic management where applicable.

Regular inspections shall be conducted by the Client or their representative to ensure compliance with the drawings and specifications.

Subgrade Preparation

Site-specific Geotechnical Reference – Pavement Subgrades

Where a geotechnical report has been provided, the Contractor shall prepare and compact pavement subgrades in accordance with the CBR values, moisture control limits, and site preparation measures recommended in that report.

The geotechnical recommendations shall take precedence over this Specification unless otherwise directed in writing by the Client or their representative.

Where no CBR values or pavement guidance has been provided, the Contractor shall comply with the compaction and material requirements set out in this Specification.

Any discrepancies or uncertainties in the geotechnical advice shall be referred to the Client or their representative for resolution prior to commencement of pavement construction.

Where no site-specific Geotechnical information is available

Subgrade materials shall be inspected and approved by the Client or their representative before commencement of any pavement construction.

Prior to laying of base materials, all drainage and utility service crossings beneath road pavements shall be installed.

The subgrade shall be compacted to not less than 95% of the Maximum Dry Density (MDD) as per **AS 1289**.

All unsuitable material shall be excavated and replaced with approved fill.

Adequate drainage shall be ensured to prevent water accumulation and damage.

The finished surface shall be checked using a 3m straight edge, with a maximum deviation of 10mm.

The finished subgrade shall be free of loose or soft areas and shall conform to the design levels with a tolerance of +0mm to -20mm.

Proof rolling shall be conducted to identify weak areas, with remediation performed as required.

Moisture content shall be maintained at optimum levels to ensure uniform compaction.

Materials

Natural Laterite Gravel Basecourse

Shall consist of a clean, durable aggregate in a soil matrix free from organic matter, lumps of clay, and large rocks (>37.5mm).

Compliance with WA 115.1 for Particle Size Distribution (PSD):

- 37.5mm sieve: 100% passing
- 19.0mm sieve: 80% passing (min 71, max 100)
- 9.5mm sieve: 57% passing (min 50, max 81)
- 2.36mm sieve: 31% passing (min 25, max 53)
- 0.075mm sieve: 7% passing (min 4, max 19)

Liquid limit: ≤25%

Plastic limit: ≤20%

Plasticity index: ≤6%

Linear shrinkage: ≤3%

Dust ratio: 0.3 – 0.70

Maximum Dry Compressive Strength: ≥1.7 MPa

Minimum 4-day soaked CBR: ≥80%

Crushed Rock Basecourse

Shall be a uniformly blended mixture of coarse and fine aggregates, produced by crushing sound, unweathered rock.

Comply with WA 115.1 for Particle Size Distribution (PSD):

- 26.5mm sieve: 100% passing
- 9.5mm sieve: 70% passing (min 60, max 80)
- 2.36mm sieve: 38% passing (min 30, max 45)
- 0.075mm sieve: 8% passing (min 5, max 11)

Liquid limit: ≤25%

Plasticity index: ≤5%

Linear shrinkage: ≤2%

Dust ratio: 0.35 – 0.60

Los Angeles Abrasion Value: ≤35%

Maximum Dry Compressive Strength: 1.7 MPa

CBR: ≥100%

Basecourse shall be pre-wet to 95%-110% of Optimum Moisture Content (OMC) before placement.

Limestone Subbase
Shall consist of clean, durable crushed limestone free from organic matter, clay lumps, and large rocks (>37.5mm).

Compliance with WA 115.1 for Particle Size Distribution (PSD):

- 75.0mm sieve: 100% passing
- 19.0mm sieve: 75% passing (min 55, max 85)
- 2.36mm sieve: 50% passing (min 35, max 65)

Plasticity index: ≤5%

Linear shrinkage: ≤2%

Los Angeles Abrasion Value of Crushed Limestone: 20% min to 60% max

Calcium Carbonate Content: ≥60%

Minimum 4-day soaked CBR: ≥50%

Sub-Base Construction

The subbase layer shall be constructed using suitable limestone, crushed rock or laterite gravel, with a minimum thickness as per the approved design.

Sub-base shall be compacted to ≥96% MDD.

Each sub-base layer shall be placed and compacted in thicknesses of 100mm to 150mm to ensure uniformity.

The finished surface shall be checked using a 3m straight edge, with a maximum deviation of 10mm.

The finished surface shall conform to design levels with a tolerance of +5mm to -10mm.

Basecourse Construction

The basecourse layer(s) shall be constructed using suitable crushed rock or laterite gravel, with a minimum thickness as per the approved design.

Once the sub-base had dried back sufficiently, basecourse material shall be spread uniformly over the prepared sub-base, or subgrade if no sub-base, and shaped to the required profile.

The material shall be compacted to ≥98% MDD using appropriate rolling equipment.

Moisture content shall be maintained within ±2% of OMC during compaction.

Final shaping and compaction shall be checked using a 3m straight edge, with a maximum deviation of 6mm.

The finished surface shall conform to design levels with a tolerance of +10mm to -0mm.

Bituminous Sealing

Bituminous sealing shall comply with **AS 2157**, using polymer-modified binders where required, for hot cut-back bitumen or **AS 1160**, using bitumen emulsion.

The surface shall be free of dust, debris, and loose material before sealing.

A primer seal shall be applied as necessary to improve adhesion of the seal coat.

The binder shall be uniformly sprayed using approved mechanical sprayers. Binder spraying temperature shall be in the range of 155-185°C.

Primer seal shall consist of 7mm Class 170 bitumen. The Contractor shall design seal spray and spread rates to suit local conditions on the day of application and provide to the Client or their representative.

The final surfacing shall comprise a 14 mm / 10 mm two-coat bituminous seal unless noted otherwise on the Drawings.

Seal design, binder type, aggregate size, application rates, rolling, sweeping and traffic management shall be undertaken in accordance with Main Roads WA Specification 503, Austroads sprayed sealing guidance and Shire of Denmark requirements.

Final binder application rates and aggregate spread rates shall be determined immediately prior to sealing by the sealing contractor / Shire sealing supervisor having regard to pavement texture, aggregate ALD, traffic, temperature and site conditions.

Any overspray or contamination shall be promptly cleaned. Bitumen edge deviation shall not exceed 50mm.

Crushed diorite, granite, or basalt aggregates shall meet grading and durability standards and be clean, tough, durable fragments free from an excess of thin or elongated pieces, soft or disintegrated pieces, or, dirt or other foreign material.

Aggregate shall comply with **AS 2758.2**, with a maximum Los Angeles Abrasion Value of 20% for diorite and basalt and 40% for granite and a minimum specific gravity of 2.9, 2.8 or 2.6 for diorite, basalt and granite respectively.

Aggregate shall be evenly spread within 10 minutes of binder application and rolled continuously to ensure bonding and until fully embedded.

Excess aggregate shall be removed by sweeping.

Quality Assurance and Testing - Roadworks

Contractors shall maintain verified quality assurance records for material specification, compaction, and levels in accordance with the specifications. All sampling shall be undertaken progressively to demonstrate satisfactory performance of the works.

All costs shall form part of the lump sum contract.

Additional tests may be requested by the Client or their representative. Where the results of such tests indicate satisfactory performance, then the costs of the additional tests will be paid as a provisional sum to the Contract.

Sampling and testing shall be performed by NATA-accredited laboratories in accordance with **AS 1289** and WA 133.1.

Tests shall include sieve analysis, Atterberg limits, compaction testing, and bitumen and trafficable paving quality tests.

The Contractor shall conduct compaction tests on subgrade, subbase and basecourse at a frequency of one test per 250m² of pavement.

Any non-conforming work shall be rectified at the Contractor's expense.

Records shall include material delivery certificates, daily inspection logs, and compaction test results.

The Client or their representative shall be provided with complete test reports within 48 hours of completion.

The Contractor shall provide as-constructed survey in digital file format (.dxf or .dwg and .pdf) of the completed subbase and basecourse.

"As Constructed" drawings shall be provided upon project completion.

Cleanup and Final Inspection

The Contractor shall restore disturbed areas, remove debris, and ensure site cleanliness. Any damage to adjacent infrastructure or vegetation shall be repaired. All site waste shall be disposed of in accordance with environmental regulations.

Any defects, including settlement, rutting, or surface irregularities, shall be rectified before handover.

A final inspection and approval by the Client shall be obtained before project completion and handover.

Post-construction, the Contractor shall monitor for subsidence or defects during the maintenance period with defective sections being rectified within the maintenance period at the Contractor’s cost.

Concrete and Kerbing

Concrete Works

Concrete shall conform to **AS 1379**, **AS 3600**, **AS 3610.1**, and project design documentation. Concrete shall be batched, transported, placed, compacted, finished, and cured strictly in accordance with the relevant Standards and manufacturer's recommendations to ensure durability and service performance.

Subgrade preparation, compaction, and testing shall comply with relevant earthworks specifications prior to concrete placement.

Expansion and contraction joints shall be installed in accordance with design documentation and **AS 3727.1** for concrete pavements.

Concrete for footings, slabs, and walls shall meet durability, exposure classification, and compressive strength requirements as documented in the design.

Kerbing

Kerbing shall be extruded using an approved extrusion machine equipped with an automatic levelling device. All kerbing shall be minimum 32 MPa and maximum 90mm slump.

All kerbing shall be installed to the line and level specified in the design, ensuring positive drainage. The road surface shall be thoroughly swept of all loose material prior to extruding kerb.

Kerbing to small radii, that cannot be placed using an extrusion machine, shall be cast in-situ to the same cross-section as extruded kerbing.

Extruded concrete kerbing shall be installed to a tolerance of ±5mm.

Contraction joints shall be installed at 2.0m centres, 5mm wide and cut through the kerb above the road surface level with an approved tool immediately after kerb extrusion.

Expansion joints shall be installed at 4.0m centres, 10mm wide and completely cut through the kerb with a suitable cutting wheel. Cutting to occur no less than 24 hours after kerb extrusion. Each expansion joint shall be filled with an approved butyl mastic compound filler and foam or polyurethan backing rod.

All joints shall be cut prior to laying of asphalt.

Where kerb adjoins a footpath, kerb joints shall be placed to coincide with footpath joints.

All kerbing shall be cured by covering with plastic sheeting or spraying with an approved curing compound. Curing shall occur for a period of 4 days and commence within 2 hours of kerbing.

Backfill to kerbing shall only commence once curing has completed.

Quality Assurance and Testing

Concrete tests shall be carried out on random samples to ensure it meets the required compressive strength, slump and air content as per **AS 1379**.

Upon completion of the concrete surface, testing shall be done for surface smoothness, compaction and thickness.

Pavement Marking and Signage

Pavement Marking

The car park layout, including parking bays, directional arrows, and pedestrian crossings, shall be marked in accordance with **AS 1742.2**.

Paint

Paint may be water-borne or solvent-based, in accordance with **AS 4049**. All paint shall be lead-free.

White paint shall be whiter than **AS 2700** "Y35 Off White", yellow paint shall match **AS 2700** "Y12 Wattle" or "Y15 Golden Yellow" and blue paint shall match **AS 2700** "B21 Ultramarine Blue".

Paint must be suitable for both air-assisted and airless line marking machines.

Paint shall be applicable to unpainted and previously painted surfaces, including asphalt and aggregate chip seals.

All pavement markings shall comply with MRWA standards and guidelines.

Application

Surfaces must be cleaned and dry prior to application such that pavement markings are not applied in wet weather or on wet surfaces.

Templates and stencils for markings shall be provided by the Contractor. Edges must be clean, sharp, and free from splattering.

Minimum dry film thickness: **200µm (microns)**.

The Contractor is responsible for protecting newly applied markings until they are traffic-ready. Damaged markings must be rectified at no cost to the Client.

Tolerances

Maximum deviation from straightness: 5mm in 2000mm

Maximum deviation from correct position: ±30mm

Line width tolerance: -0, +10mm

Starting and ending position: ±30mm

Traffic Signage

All necessary regulatory, warning, and informational signs must be installed in accordance with the approved design and **AS 1742.1, AS 1743**, and MRWA requirements. Signs must be visible, properly positioned, and securely installed.

Sign retro-reflectivity shall meet AS 1906.1 requirements.

Sign types, sizes, and placement shall align with MRWA guidelines.

Sign Panels

Panels shall be 2.0mm thick aluminium alloy (5052, temper H36 or H38) as per **AS 1734** and shall be free from sharp edges, cracks, and blemishes.

Aluminium shall undergo acid etching or an equivalent mechanical abrasion process before reflective sheeting application.

Tolerances:

- Length and Width: ± 5mm
- Hole Diameter: ± 1.0mm
- Hole Centre Position: ± 1.0mm

Backgrounds, Legends, Symbols, and Borders

Retro-reflective sheeting must conform to Class 1W reflective standards and shall be applied as per manufacturer's guidelines without visible joints.

Protective Overlay

Protective overlay films must be compatible with the reflective sheeting and must extend 15mm over the back of the sign for moisture protection.

Posts

Sign posts shall comply with **AS 1450** and MRWA standards be gauge 60.3 CHS 2.3, zinc-coated or galvanised as per **AS 4680**.

Posts shall be installed to a minimum embedment of 600mm below ground level or as per manufacturer's guidelines for wind loading class.

Plastic or aluminium end caps must be installed.

Drilled holes in posts shall be treated with galvanising paint.

Fixings

Fixings shall comply with Main Roads WA Drawing No. 8820-257-4 and 9020-0693-1.

Packaging, Handling, and Delivery

Signs, posts, and fixings shall be packaged to ensure damage-free delivery.

End of Specification

Specification prepared by Demeza Civil Consulting Pty Ltd.

Any queries can be directed to the below.

Regards,



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