

Fit for purpose specifications for managing community assets

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ABSTRACT:

AUS-SPEC is the national technical specification system for minor infrastructure. Developed by the Institute of Public Works Engineering Australasia (IPWEA) and updated by NATSPEC, the AUS-SPEC specification system provides specification Templates and supporting information for the life cycle management of community assets including buildings, roadworks, urban and open spaces and public utilities. National master specification systems such as AUS-SPEC represents the collective experience of local government and other industry contributors.

AUS-SPEC documentation system further supports in improving and providing better infrastructure asset services to their communities. It is an essential technical resource, which is relevant, responsive, and well researched. AUS-SPEC establishes a common language between governments, organisations and consultants, which improves communication between the different parties involved in a project. A common language significantly reduces the risk of delays, rework, and extra costs by minimising misinterpretation.

This paper will provide an overview of the AUS-SPEC information, tools, technical specification templates, specification framework that are fit for purpose and processes to document requirements for various asset life cycle activities. It will also demonstrate the use of the system to create contract documentation for the design, construction, and maintenance of local government infrastructure assets to meet the growing needs of the communities. Specifications for managing sealed and unsealed roads, road related assets and specifying the use of recycled materials by embedding this information in the design, construction and maintenance specifications will also be discussed. The paper will also assist the practitioners particularly local government in achieving their sustainability targets by providing an overview of the updated AUS-SPEC documents permitting the use of recycled material based on the latest research.

KEYWORDS: assets, construction, contracts, design, infrastructure, local government, maintenance, quality, risk, specification, recycled materials.

1 Introduction

AUS-SPEC is the Local Government specification system for the life cycle management of assets. Developed by IPWEA and updated by NATSPEC, a not-for-profit organisation owned by Government and industry bodies. NATSPEC's major service is providing a national master specification to the construction industry. The specification packages include design, construction, and maintenance worksections (specification templates) for buildings, roadworks, urban and open spaces, and public utilities.

AUS-SPEC's main aim is to provide a specification system for local government and improve the quality of construction and maintenance of their built environment in Australia. The system supports technical and contractual consistency between Councils yet

allows flexibility to edit and add project specific requirements where necessary.

2 Necessity of specification

The specification is an essential contract document, and its primary function is to define precisely and succinctly the quality required and the processes necessary for achieving it. Specifications are a multipurpose tool with many users' such as designers, estimators, tenderers, contractors, subcontractors, project managers, contract administrators, Superintendent, legal representatives, and other authorities. Specifiers must have the ability to make informed decisions and communicate those decisions effectively. Preparing a specification is a core process in tendering and contracting. Specifications may include functional requirements which define performance requirements which define the

physical performance expected which can be reliably measured and evaluated and technical requirements which define the technical and physical characteristics.

Specifications are key in determining the project cost, duration and ensure that project outcomes match objectives. Where the specification is incomplete, unclear, inconsistent, or not updated to the current standards claims can potentially be made against:

- Designers and consultants who prepared the specification.
- Contractors and suppliers who warrant the Specifications are satisfactory.
- Superintendents, project managers and certifiers who apply the specification.
- Principals who provide the Specifications to contractors and suppliers.

To address all these issues, the national local government specification system assists the Councils in providing a framework of technical specifications for managing their various assets. Key areas of focus include:

- Record of design decisions, materials used, and standards sets,
- To show statutory compliance,
- To be used in pre-tender estimates,
- For tendering, by the principal subcontractor and contractor.
- To be part of a contract – contract document.
- An onsite document for the contractor and contract administrator.
- Evidence to resolve disputes and information for facility management.

3 National Specifications for local government

3.1 History of local government specifications

National **Australian Specifications** AUS-SPEC were developed in 1997 as an answer to the Federal Government's call for microeconomic reform, the Institute of Municipal Engineering Australia (IMEA) now IPWEA (Institute of Public Works Engineering Australasia) sought to identify means of assisting Councils as they began integrating Competitive Provision of services procedures. Statewide Roads, through its Technical Management consultancy (SWRTM), part of the Sinclair Knight Merz Group, now Jacobs, had

concurrently co-ordinated several Councils in successfully co-authoring the substantial Development Specification Set called DEVSPEC. A joint venture between IMEA now IPWEA and SWRTM, with support from the Local Government Association of Australia (ALGA), was formed to publish a series of documentation sets named AUS-SPEC that assist Councils in providing competitive services via internal and external contracts.

3.2 Local government suite of specifications

Local Councils use AUS-SPEC suite of national specification system to provide quality and consistency for the life cycle management of various assets. AUS-SPEC provides a uniform approach to design decisions, construction, and maintenance practices across Australia.

AUS-SPEC standard contract documents have been prepared for local government works and reflect the terminology and particular requirements of local government in Australia. AUS-SPEC provides a range of specifications for buildings, roadworks, urban and open spaces, and public utilities. A full list of specifications for minor infrastructure works is provided in Appendix – NATSPEC National Classification System.

Basis of technical specifications

Every project is different and may require a unique set of associated drawings, technical and contractual documentation that describe the requirements and outcomes, the contractor is expected to deliver for the projects. Most of the technical specifications are based on:

1. Legislative requirements including Acts, National Construction Code etc.
2. Standards generally provide the minimum standard of a material, quality requirements, design method, test method, construction procedures, and implementation. It is preferable to cite the Australian Standard, but if an AS Standard is not available the international standards e.g., ASTM, BSI etc are referenced in the specifications.
3. Other technical publications include guides from Austroads, Australian flexible Pavement Association (AfPA), Australian Road Research Board (ARRB), Cement and Concrete Aggregates Australia (CCAA), IPWEA publications, State Road Authority specifications and Water services

Association of Australia (WSAA). These are best practice guides and inform the local government suite of specifications to support the specifier.

4. Specifications are a framework of worksections, that are customised to the project specific needs to develop a complete set of technical specifications which is then included in the contract documents.

Design Documentation

AUS-SPEC design worksections form a basis for the creation of uniform design processes for civil infrastructure works. These worksections can be used for Council capital works as well as developmental works. The *0010 Quality requirements for design* worksection outlines the quality assurance requirements of design and a comprehensive checklist system to:

- Inform designers of the design criteria.
- Provide a record of the design processes.
- Allow flexibility of additional design criteria to be integrated into the process, as necessary.

Proper design is the basis of the entire local government infrastructure system. Infrastructure connects communities. Roads being the largest asset under the local government portfolio, we will focus on how road assets should be designed effectively so that they are fit for purpose through the life of this asset. Roads are affected by environmental and demographic changes. During the planning and design phase of local roads proper assessment is undertaken such that the design of the pavement structure meets the following:

- Required design life and traffic loading.
- Maximum economic value, safety, and serviceability requirements over the pavement design life.
- Adequate for its load carrying capacity.
- Appropriate to subgrade strength, climatic conditions, and environmental factors.
- Materials for the subgrade, subbase, base and wearing surface.
- Have minimal deterioration over pavement design life.
- Have minimal disruption to the adjoining land use.

- Fit into the built environment visually.
- Develop design options to repair existing pavement distress and prevent future problems.
- Integrate control measures in the development design.

However, for light traffic roads or minor roads are more susceptible to the effects of the environment, have higher variation in subgrade and moisture conditions, have lower traffic speeds in urban locations and are more susceptible to significant pavement damage resulting from a small number of passages of heavily overloaded vehicles.

Construction documentation

AUS-SPEC Construction worksections provide specifications for both Quality control and Integrated management systems associated with most Councils' engineering activities. These worksections have been developed for Councils in controlling the quality of works performed by contractors and developers.

Overarching documents are required and should be included for every project. It covers Quality control, Quality assurance, quality system requirements. These are listed under General worksections in the Appendix.

All construction worksections include the following main headings:

1. General: Includes clauses relating to the general responsibilities, cross references, main standards applicable to the entire worksection, definitions, tolerances, submissions, and inspections.
2. Pre-construction planning
3. Materials: Includes clauses relating to materials, material properties and testing. The sub-clause headings may vary depending on the construction activity.
4. Execution: Includes installation, transportation, cleaning, testing, completion, and maintenance. The sub-clause headings may vary depending on the construction activity.
5. Annexures: Includes schedules, summary of hold points and witness points, maximum lot sizes and minimum test frequencies, pay items and reference documents.

Maintenance Documentation

Maintenance and operations are an on-going process, once constructed assets start

deteriorating due to different factors, for example roads are affected the by the traffic levels, environmental conditions etc. Maintenance aims to preserve an asset and includes regular checking, repairs, and minor improvements to remove the cause of any defects and avoid excessive repetition of maintenance effort. Each organisation is required to adopt a maintenance policy and strategy to effectively manage and maintain their assets at an appropriate level of service and structural integrity at the lowest possible cost to the asset owner and users. Delayed or neglected maintenance may incur additional direct and indirect costs.

The AUS-SPEC maintenance system is based on quality management, competitive principles, and programmed maintenance. It reflects the move from predominantly direct control, responsive maintenance and operations to the proactive approach outlined in the National Sustainability Frameworks for Asset Management for Local Government and developed in the International Infrastructure Management Manual (IIMM) and the Australian Infrastructure Financial Management Manual (AIFMM). The system allows asset owners to balance the level of service provided with the maintenance and operations budget available and prepare documentation for in- house and/or private maintenance contracts. It includes records of asset inspections, defects registers, programmed and prioritised works and periodic reports of completed works. These records and reports improve the maintenance history and asset inventory and provide a defence against possible litigation.

AUS-SPEC maintenance worksections cover routine, periodic and urgent maintenance for local government infrastructure assets. Each asset is managed against an Asset maintenance plan that defines the activities required by that asset, includes maintenance, refurbishments, and ultimately replacement. When the pavement exhibits major deterioration that affects the structural support layers it may require reconstruction and the design and construction documents available assist the councils and can be incorporated into the documentation for projects requiring reconstruction and rehabilitation.

The benefits of road asset maintenance plans include:

- Improved regulatory compliance.
- More meaningful financial reporting.

- Increased system reliability.
- Long-term system integrity.
- Potentially, eligibility for federal infrastructure funding.
- Significant cost savings.

Quality requirements/management

Quality considerations are embedded in the local government specifications throughout the entire process of design, procurement, construction, maintenance and operations for the assets to provide best value of assets to the community. A well maintained fit for purpose technical specification system is a key component in producing quality documentation. The benefits of quality documentation include reduced project ambiguities, variations, re-work, and a reduced likelihood of legal action due to contractual disputes. It is only through quality documentation that clients can be assured of a quality result. Quality is reliant on good documentation and good documentation is incomplete without a good specification.

The main aim of local government is to deliver infrastructure that is fit for purpose and provides quality assets to their communities. The following documents assist local government to embed the level of quality required at each stage of the life cycle:

Design – 0010 *Quality requirements for design.*

Construction – 0161 *Quality management*, 0162 *Quality (Supply)*, 0163 *Quality (Delivery)*, 0167 *Integrated management.* In addition to these quality worksections, each AUS-SPEC construction worksection includes a submission and an inspection clause, provides a summary of activities that require testing including lot sizes, minimum test frequencies and test methods. Provides a summary of Hold points and witness points for each construction activity.

Maintenance: The AUS-SPEC maintenance system covered in *Workgroups 14 Maintenance and operations – Urban and open spaces*, *15 Maintenance and operations – Buildings*, *16 Maintenance and operations – Road reserve* conforms to a quality management model with the following characteristics:

- A systematic approach: Each project is broken into several defined activities.

- Inspection and test plans: Provided for each activity to allow systematic and progressive verification of conformance with requirements.
- Simple clear checklists: For in-the-field recording, as evidence of conformance with requirements. - Hold points: Assigned to critical aspects of the work.
- Conformance: Designed to encourage the service provider to identify and correct process faults and thereby assure the asset owner of good quality and productivity. If some aspect of the work does not conform and cannot be corrected, a non-conformance report is required.

Reference documents

There are many reference documents listed in the Annexures of each worksection, but in addition more guidance on specific topics is available in the following documents:

- TECHguides - provide roadmaps and examples for compiling the documentation required for local government projects. They include information on contracts, technical specifications and tender submission requirements and should be read before commencing a project.
- TECHnotes - are short guidance notes for consideration for your design and specification choices. They are divided into three groups – Design, General and Product. TECHnotes help you to keep up to date with industry changes. Relevant Technotes for AUS-SPEC are attached in Appendix.
- TECHreports: are in-depth reference documents on topics of interest to the design and construction industry including specifying ESD, refurbishment.
- Design Reference: Local government personnel and engineering consultants will find the *Design reference* useful for all types of roads and associated infrastructure. It provides essential quality requirements for the design of sealed and unsealed roads, pathways and cycleways, subsurface drainage and stormwater drainage. The document helps councils to bridge the gap where there is lack of in-house engineering capability to deliver

efficient design of rural and regional roads. The design reference is available in a PDF format and can be used both for in-house design or as part of a brief for external consultants.

- Design checklists are a companion document to the *Design reference* and are available in an editable format. The checklists can be used to verify that all the design requirements have been addressed, provide a record of the design process, and allow the flexibility of integrating additional design criteria as necessary.
- The *Construction reference* and *Schedules* provide an alternative approach to specify road construction requirements. This two-part specification includes a non-editable construction reference specification and *Schedules* which can be customised with project specific information. This reference document provides essential quality management requirements for the construction of sealed and unsealed road reserves. The document has been developed to help rural and regional councils with the engineering capability to deliver efficient roads, drainage, and related assets. The *Construction reference specification* is available in PDF format and can be used as a reference specification for a road construction contract. Construction Schedules are available in an editable format and need to be completed with project specific requirements. Schedules include material selection schedules, *Summary of hold points and witness points*, *Maximum lot sizes and test frequencies* and *Pay items* for every construction worksection.
- Maintenance Reference: *NATSPEC Maintenance reference* is a reference specification that defines the minimum level of acceptable materials and workmanship for the maintenance works for all classes of buildings. It also covers corrective and preventative maintenance works for mechanical, hydraulic, electrical and fire services, and lifts.

Contract management

The AUS-SPEC Contract management system includes activities that follow on from the establishment of the contract, including administration throughout the contract period, which helps to make sure that the terms of a contract are met and that the expected value is achieved.

In addition to the legislative and policy framework, there are several factors that are important at all stages of the contracting process. These are:

- Managing risks
- Managing relationships
- Managing resources
- Specifying responsibilities
- Behaving ethically
- Keeping records.

Contract administration is the last stage of the tendering and contract cycle, and includes all administrative duties associated with a contract after formation. These include contract review, contract variation, and contract transition. The AUS-SPEC contract document system assists users to manage each stage of the contract cycle from project initiation, project delivery, compilation of contract documents, contract management and contract administration through to operation, maintenance and asset management.

Specifications made easy with SPECbuilder

AUS-SPEC specifications can be accessed and easily compiled using SPECbuilder, NATSPEC's online specification compiler. It permits the relevant documents to be compiled for a project specification, or a master specification for council projects. The worksections are collated from a menu in SPECbuilder and edited in Microsoft Word to the detail required for the work situation, either simple or complex. Council's design, construction and maintenance teams can all use SPECbuilder while working on specific projects in their road networks.

AUS-SPEC case studies and papers, are available at www.natspec.com.au provide more information and examples of how different councils have used the AUS-SPEC specification system for their own council projects.

AUS-SPEC case studies in IIMM

The following case studies demonstrating the implementation of the AUS-SPEC documentation for different types of local government works have been published in the

6th Edition of IIMM:

- Developing effective performance measures, Defining technical levels of service for buildings, roads, open spaces, and utilities – Penrith City Council
- Developing a maintenance plan – City of Parramatta
- Identifying service delivery and contracting options – Liverpool City Council
- Developing national documents for implementing BIM on construction and infrastructure projects.

Specifying the use of recycled Materials

Most recently it can be seen Councils are improving their sustainability targets by applying the principles of waste hierarchy and by reducing the waste going to landfill. Councils as Road authorities are responsible for improving the sustainability of road asset management, they require a continuous supply of materials for road construction and maintenance of their large network. With depleting natural resources and virgin materials, the road authorities are looking for other alternatives and are utilising recycled materials which would otherwise end up in the landfill. Councils are also investigating to integrate circular economy principles and waste minimisation to their day-to-day operations in general.

The need for recycling is becoming an increasing issue due to rapid growth of population and industry. Closed loop recycling is the best sustainable method to re-use waste streams back into new production, as it creates energy savings, reduces the demand on primary mineral resources and diverts materials away from landfill. Road network being the largest asset under the Council portfolio, can use a large amount of waste and recycle it for various purposes. Crushed concrete has been used for many decades as road base, subbase, aggregate, pipes bedding etc. There is a need for the use of recycled glass in a way which promotes sustainability with economic, environmental and construction benefits.

AUS-SPEC has been involved with other industry organisations to assist Local Government in an initiative to review engineering standards to increase the use of recycled materials in the construction and maintenance of our local roads and reduce the amount of reusable materials being diverted to landfill. TECHnote NTN GEN 028 provides further details on specifying recycled materials for roadworks using AUS-SPEC. Relevant AUS-SPEC information is updated incrementally. More information is available at www.natspec.com.au.

Transport for NSW (TfNSW) released the *Recycled crushed glass (RCG) in asphalt guide* and is available at [Recycled-crushed-glass-in-asphalt](#) this document also cites the relevant AUS-SPEC documents for local government works.

AUS-SPEC continues to be involved in the Southern Sydney Regional Organisation of Councils (SSROC) *Paving the way* initiative using recycled crushed glass for roadworks. This project won the [2021 Greater Sydney Planning Awards](#) under the Great sustainability initiative. Details of the awards are available at The Overview of *Paving the way* program is available at ssroc.nsw.gov.au.

LGNSW and University of Sydney released the [Recycled materials in roads and pavements – A guide for local councils](#) and the [Recycled materials in roads and pavements – A Technical review](#), this is a summary document of the guide. Relevant AUS-SPEC documents have been cited in these documents for the benefit of local government.

Expectation

The 2018 National Waste Policy reflects new ways of thinking about waste and the use of resources.

Australia's local roads can be key players in recycling. One of the best ways to prevent valuable waste going to landfill is to recycle materials for use in road construction. Regular asphalt roads use tonnes of raw materials, but recycled roads use crumb rubber, crushed concrete, recycled asphalt, plastic bags, waste toner from used printer cartridges, glass and more. Recycled materials are changing the way local governments approach road construction. Refer to Figure 1 showing the different applications of crushed concrete and crushed glass.

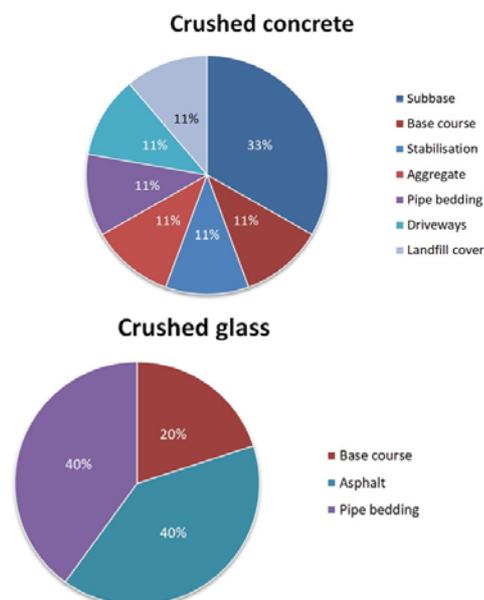


Figure 1: Different applications of crushed concrete and crushed glass

Reality

Currently AUS-SPEC includes the use of various recycled materials in design, construction, and maintenance worksections for the benefit of the designers and specifiers. To make all recycled roads safe and durable, designers, engineers, building professionals and governments need specifications. To understand where the Councils as road authorities are in their journey of using recycled materials, to gather information regarding their current policies, specifications and documentation for utilising recycled material for new roads, road maintenance and replacement. We conducted a few surveys and further information is available here www.natspec.com.au/resources.

Some councils are leaders in using recycled materials for in-situ stabilisation, road base and subbase, crushed concrete and are more proactive than others while some do not have any policies of using recycled materials and depend only on the availability of natural resources. The proactive councils have included the use of recycled materials and sustainable construction methods in their policies, procurement strategies and tender processes.

Adaptation

AUS-SPEC specifies different classes of crushed rock, crushed concrete and recycled materials for base and subbase construction. These recycled materials are manufactured from crushed concrete, bricks, terracotta tiles, glass or reclaimed, asphalt profiling.

AUS-SPEC includes properties of recycled materials and specifies limits for iron and steel slag, crushed concrete, bricks, recycled asphalt, fly ash and crushed glass fines. It also includes percentage of undesirable material e.g., metal, glass, stone and slag, plaster, clay lumps, rubber, plastic, paper, cloth, paint, wood, and other vegetable matter.

Typical Case study from City of Sydney



In the City of Sydney's first of its kind green road trial, they have taken industrial waste from coal-fired power stations and steel manufacturing to create a new roadway.

Working with researchers from the University of NSW, they have replaced a section of roadway on Wyndham Street in Alexandria to test the green concrete's durability. Made from fly ash and blast furnace slag, geopolymer concrete is a sustainable blend of concrete and recycled materials. Geopolymer generates just 300kgs of CO₂ per tonne of cement, compared to 900kgs of CO₂ from traditional cement production. The carbon emissions savings is equivalent to the electricity used by an average household every 2 weeks.

With 70% of the concrete produced today going into pavements and footpaths, using products like geopolymer concrete for our roads and footpaths has great potential to

further lower emissions from our operations. As a major road leading to Sydney Airport, Wyndham Street's high traffic volume provides the perfect conditions for the trial. Nine sensors have been positioned under the concrete to monitor and compare how the geopolymer concrete performs. The low CO₂ concrete has the potential to put the 400 million cubic tonnes of globally documented waste from the coal and steel industries to good use. While a small amount is currently used in construction, much of it is currently stored on site. UNSW researchers will monitor the road performance for up to 5 years. This example clearly shows the opportunities of using recycled materials for local roads which will be of great benefit to other Councils. More information on this trial is available at news.cityofsydney.nsw.gov.au

CONCLUSION

AUS-SPEC systems support technical and contractual consistency between Councils nationally. AUS-SPEC is accepted by the industry and provides fit-for purpose specifications for different applications and allows flexibility to edit and add project specific requirements. It provides a professional and best practice approach to responsibly design, construct and maintain community assets within budgetary constraints.

AUS-SPEC provides tools, templates, and other reference documents to provide better service to the communities and better manage their capital, maintenance, and operation of infrastructure works. The specifications are easy to use and compile through NATSPEC's online specifications' compiler SPECbuilder.

Benefits of the local government specification system

The AUS-SPEC local government specification system provides the following benefits:

Local government focus: Planning, design, construction, and maintenance contract documentation requirements for local government assets. Simple and easy to use.

Minor civil works focus: Address minimum best practice requirements.

A national document: Apply across all Australian jurisdictions. Accommodate variations for metro/regional location, climate zone or locally available materials.

A reference type specification: Minimise the customisation required. Addresses the shortage of in-house technical expertise and

reduces need for outsourcing. Performance and technical requirements separated from contract management requirements. Consistency for contractors specialising in local government work.

An industry standard: Improve productivity and quality and good quality outcomes at project level.

Sustainability requirements: AUS-SPEC maintenance system and the sustainability aspects embedded in the design, construction and asset maintenance *Templates* assist the councils in extending the life of their current as well as future infrastructure assets.

These benefits will assist Councils in delivering fit for purpose documentation for their design, construction and maintenance works and provide quality infrastructure assets to their communities.

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1. [AUS-SPEC Technical references and resources](#)
2. [AUS-SPEC Complete Package](#)
3. Institute of Public Works Engineering Australasia, Sixth Edition, *International Infrastructure Management Manual (IIMM)*, 2020
4. Transport for NSW (TfNSW), 2020 [Recycled crushed glass \(RCG\) in asphalt guide](#)
5. LGNSW and USYD, 2020 [Recycled materials in roads and pavements – A guide for local councils](#) and [Recycled materials in roads and pavements – A Technical review](#),
6. Southern Sydney Regional Organisation of Councils (SSROC) *Paving the Way*, ssroc.nsw.gov.au.

7. City of Sydney case study on green road trial news.cityofsydney.nsw.gov.au/articles/sydney-drives-world-first-green-roads-trial

NATIONAL CLASSIFICATION SYSTEM - APRIL 2022

Refer to the National Worksection Matrix for the worksections included in each NATSPEC/AUS-SPEC package: full, basic/rural cut-down version and branded worksections. See www.natspec.com.au. [Square brackets] indicate that no generic worksection is available. A NATSPEC branded worksection may be available.

00 PLANNING AND DESIGN (AUS-SPEC)

001 General

- 0001 Design reference and checklist
- 0010 Quality requirements for design
- 0012 Waterfront development
- 0013 Bushfire protection (Design)

002 Open space

- 0021 Site regrading
- 0022 Control of erosion and sedimentation (Design)

004 Road reserve

- 0041 Geometric road design
- 0042 Pavement design
- 0043 Subsurface drainage (Design)
- 0044 Pathways and cycleways (Design)

005 Road reserve - rural

- 0051 Geometric rural road design - sealed
- 0052 Geometric rural road design - unsealed
- 0053 Rural pavement design - sealed
- 0054 Rural pavement design - unsealed

006 Bridges

- 0061 Bridges and related structures

007 Public utilities

- 0071 Water supply - reticulation (Design)
- 0072 Water supply - pump stations (Design)
- 0074 Stormwater drainage (Design)
- 0076 Sewerage systems - reticulation (Design)
- 0077 Sewerage systems - pump stations (Design)

01 GENERAL

011 Documentation

012 Tendering

- 0120 Pre-tendering contract preparation (AUS-SPEC)
- 0121 Tendering
- 0122 Information for tenderers (AUS-SPEC)
- 0123 Conditions of tendering (AUS-SPEC)
- 0124 Tender submission documents (AUS-SPEC)
- 0125 Standard contract checklists (AUS-SPEC)
- 0126 Period supply and service checklists (AUS-SPEC)
- 013 Generic preliminaries
- 0131 Preliminaries (Generic)
- 0133 Preliminaries (Interior and alterations)
- 0134 General requirements (Supply) (AUS-SPEC)
- 0135 General requirements (Services) (AUS-SPEC)
- 0136 General requirements (Construction) (AUS-SPEC)
- 0138 Multiple contracts

014 Contract preliminaries

- 0140 Preliminaries - ABIC BW-2018C
- 0141 Preliminaries - ABIC MW-2018
- 0142 Preliminaries - ABIC SW-2018
- 0143 Preliminaries - AS 2124
- 0144 Preliminaries - AS 4000
- 0145 Preliminaries - AS 4905
- 0146 Preliminaries - AS 4902
- 0147 Conditions of contract (AUS-SPEC)
- 0148 Preliminaries - ABIC EW-1
- 0149 Preliminaries - NCW4

015 Schedule of rates (AUS-SPEC)

- 0152 Schedule of rates (Construction)
- 0153 Schedules - period supply and service

016 Quality assurance

- 0160 Quality
- 0161 Quality management (Construction) (AUS-SPEC)
- 0162 Quality (Supply) (AUS-SPEC)
- 0163 Quality (Delivery) (AUS-SPEC)
- 0164 Commissioning
- 0167 Integrated management (AUS-SPEC)

017 General requirements

- 0171 General requirements
- 0172 Environmental management
- 0173 Environmental management (AUS-SPEC)

018 Common requirements

- 0181 Adhesives, sealants and fasteners
- 0182 Fire-stopping
- 0183 Metals and prefinishes
- 0184 Termite management
- 0185 Timber products, finishes and treatment

019 Sundry installations

- 0191 Sundry items
- 0192 [Structural components]
- 0193 Building access safety systems
- 0194 [Door seals and window seals]
- 0195 [Tactile indicators and stair edgings]

02 SITE, URBAN AND OPEN SPACES

020 Demolition

- 0201 Demolition
- 0202 Demolition (Interior and alterations)

022 Preparation and groundwork

- 0221 Site preparation
- 0222 Earthwork
- 0223 Service trenching
- 0224 Stormwater - site

024 Landscape structures

- 0241 Landscape - walling and edging
- 0242 Landscape - fences and barriers
- 0243 Landscape - water features

025 Landscape cultivation

- 0250 Landscape - combined
- 0251 Landscape - soils
- 0252 Landscape - natural grass surfaces
- 0253 Landscape - planting
- 0254 Irrigation
- 0255 Landscape - plant procurement
- 0256 Landscape - establishment
- 0257 Landscape - road reserve and street trees (AUS-SPEC)

0259 Landscape - maintenance

026 Landscape finishes

- 0261 Landscape - furniture and fixtures
- 0262 External sports and playground surfacing

027 Pavements

- 0271 Pavement base and subbase
- 0272 Asphalt
- 0273 Sprayed bituminous surfacing
- 0274 Concrete pavement
- 0275 Paving - mortar and adhesive bed
- 0276 Paving - sand bed
- 0277 Pavement ancillaries
- 0278 Granular surfaces
- 0279 Paving - on pedestals

028 Pathways (AUS-SPEC)

- 0281 Fire access and fire trails
- 0282 Pathways and cycleways (Construction)

029 Retaining walls (AUS-SPEC)

- 0292 Masonry walls
- 0293 Crib retaining walls
- 0294 Gabion walls and rock filled mattresses

03 STRUCTURE

030 Foundations

- 0301 Piling
- 0305 [Foundation isolation systems]

031 Concrete - in situ

- 0310 Concrete - combined
- 0311 Concrete formwork
- 0312 Concrete reinforcement
- 0313 Concrete post-tensioned
- 0314 Concrete in situ
- 0315 Concrete finishes
- 0318 Shotcrete
- 0319 Auxiliary concrete works (AUS-SPEC)

032 Concrete - systems

- 0321 Precast concrete
- 0322 Tilt-up concrete
- 0325 [Concrete protection]

033 Masonry

- 0331 Brick and block construction
- 0332 Stone masonry
- 0333 Stone repair
- 0334 Block construction
- 0335 Brick construction

034 Steel

- 0341 Structural steelwork
- 0342 Light steel framing
- 0343 Tensioned membrane structures
- 0344 Steel - hot-dip galvanized coatings
- 0345 Steel - protective paint coatings
- 0346 Structural fire protection systems

036 Earth

- 0361 Monolithic stabilised earth walls
- 0362 Mud brick walls
- 0363 Straw bale walls

038 Timber

- 0381 Structural timber
- 0382 Light timber framing
- 0383 Decking, sheet and panel flooring
- 0385 Cross-laminated timber (CLT)

04 ENCLOSURE

041 Tanking and damp-proofing

- 0411 Waterproofing - external and tanking

042 Roofing

- 0421 Roofing - combined
- 0423 Roofing - profiled sheet metal
- 0424 Roofing - seamed sheet metal
- 0425 Roofing - shingles and shakes
- 0426 Roofing - slate
- 0427 Roofing - tiles
- 0428 Roofing - insulated panel systems
- 0429 Roofing - glazed

043 Cladding

- 0431 Cladding - combined
- 0432 Curtain walls
- 0433 Stone cladding
- 0434 Cladding - flat sheets and panels
- 0435 Cladding - planks and weatherboards
- 0436 Cladding - profiled and seamed sheet metal

- 0437 Cladding - insulated panel systems

- 0438 [Cladding - cement board]

- 0439 [Cladding - systems]

045 Doors and windows

- 0451 Windows and glazed doors
- 0453 Doors and access panels
- 0454 Overhead doors
- 0455 Door hardware
- 0456 Louvre windows
- 0457 External screens
- 0458 [Automatic doors]

046 Glass

- 0461 Glazing
- 0462 Structural silicone glazing
- 0463 Glass blockwork
- 0466 Structural glass assemblies
- 0467 Glass components

047 Insulation

- 0471 Thermal insulation and pliable membranes
- 0472 Acoustic insulation
- 0473 [Acoustic floor underlays]

05 INTERIOR

051 Linings

- 0511 Lining

052 Partitions

- 0520 Partitions - combined
- 0521 Partitions - demountable
- 0522 Partitions - framed and lined
- 0523 Partitions - brick and block
- 0524 Partitions - glazed
- 0525 Cubicle systems
- 0526 Terrazzo precast
- 0527 Room dividers
- 0528 [Partitions - composite systems]

053 Ceilings

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- 0531 Suspended ceilings - combined
- 0532 Suspended ceilings - flush lined
- 0533 Suspended ceilings - ceiling units

054 Access floors

- 0541 Access floors

055 Fixtures

- 0551 Joinery
- 0552 Metalwork - fabricated
- 0553 Stainless steel benching
- 0554 [Handrails, guardrails, balustrades and other barriers]

057 Furniture and furnishings

- 0571 Workstations
- 0572 Miscellaneous furniture
- 0573 Fire extinguishers and blankets
- 0574 Window coverings
- 0575 Tapestries

058 Signs and features

- 0581 Signage

06 FINISH

061 Trowelled and sprayed coatings

- 0611 Rendering and plastering
- 0612 Cementitious toppings
- 0613 Terrazzo in situ

062 Wet areas

- 0621 Waterproofing - wet areas

063 Tiling

- 0631 Ceramic tiling
- 0632 Stone and terrazzo tiling

064 Wall surfacing

- 0641 Applied wall finishes
- 0642 Wallcoverings

065 Floor surfacing

- 0651 Resilient finishes
- 0652 Carpets
- 0654 Multilayered board flooring
- 0655 Timber flooring
- 0656 Floor sanding and finishing
- 0657 Resin based seamless flooring

067 Painting

- 0671 Painting
- 0672 Textured and membrane coatings
- 0673 Powder coatings

07 MECHANICAL

070 Mechanical general

- 0700 Reference - Mechanical services
- 0701 Mechanical systems
- 0702 Mechanical design and install

071 Water plant

- 0710 [Steam boilers]
- 0711 Chillers - combined
- 0712 Water heating boilers
- 0713 Cooling towers
- 0714 Mechanical pumps
- 0715 Tanks, vessels and heat exchangers
- 0716 Chillers - centrifugal
- 0717 Chillers - water cooled screw
- 0718 Chillers - air cooled screw and scroll
- 0719 Chillers - absorption

072 Air plant

- 0721 Packaged air conditioning
- 0722 Room air conditioners
- 0723 Evaporative air coolers
- 0724 Air handling plant - combined
- 0725 Air handling plant - built up
- 0726 Air handling plant - minor
- 0727 Air handling plant - packaged

073 Air handling components

- 0731 Fans
- 0732 Air filters
- 0733 Air coils
- 0734 Humidifiers
- 0735 [Natural ventilation and smoke management]

- 0736 Space heating
- 0737 [Fireplaces]

074 Ductwork and components

- 0741 Ductwork
- 0744 Ductwork insulation
- 0745 Attenuators and acoustic louvres

- 0746 Air grilles
- 0747 Variable air volume terminals
- 0748 Chilled beams

075 Piping

- 0751 Mechanical piping
- 0752 Mechanical piping insulation
- 0753 Water treatment
- 0754 Liquid fuels
- 0755 Medical gas systems
- 0756 [Industrial gas systems]
- 0757 [Compressed air]

076 Refrigeration

- 0761 Refrigeration
- 0762 Cool rooms

077 Control

- 0771 Automatic controls
- 0772 Automatic controls - minor
- 0773 Building management systems

078 Mechanical electrical

- 0781 Mechanical electrical
- 0782 Mechanical electrical - minor
- 0784 Motors and starters

079 Mechanical commissioning and maintenance

- 0791 Mechanical commissioning
- 0792 Mechanical maintenance

08 HYDRAULIC

080 Hydraulic general

- 0800 Reference - Hydraulic services
- 0801 Hydraulic systems
- 0802 Hydraulic design and install

081 Hydraulic components

- 0811 Sanitary fixtures
- 0812 Tapware
- 0813 Water heaters
- 0814 Hydraulic pumps
- 0815 Drinking water dispensers
- 0816 Tanks

082 Hydraulic systems

- 0821 Stormwater - buildings
- 0822 Wastewater
- 0823 Cold and heated water
- 0824 Fuel gas
- 0825 Rainwater storage systems
- 0826 Greywater systems
- 0827 [Processed water]

088 Hydraulic electrical

- 0882 Hydraulic electrical - minor

089 Hydraulic commissioning and maintenance

- 0891 Hydraulic maintenance

09 ELECTRICAL

090 Electrical general

- 0900 Reference - Electrical services
- 0901 Electrical systems
- 0902 Electrical design and install
- 091 Electrical equipment
- 0911 Cable support and duct systems

092 Power systems

- 0921 Low voltage power systems
- 093 Power supply equipment
- 0931 Power generation - engine driven
- 0933 Power generation - photovoltaic
- 0937 Uninterruptible power supply

094 Power distribution equipment

- 0941 Switchboards - proprietary
- 0942 Switchboards - custom-built
- 0943 Switchboard components
- 0947 Power factor correction

095 Lighting systems

- 0951 Lighting

096 Communication systems

- 0961 Information and communications technology (ICT) systems
- 0962 Television distribution systems
- 0963 Sound systems

097 Safety systems

- 0971 Emergency evacuation lighting
- 0979 Lightning protection

098 Security systems

- 0981 Electronic security

099 Electrical commissioning and maintenance

- 0991 Electrical maintenance

10 FIRE

100 Fire general

- 1000 Reference - Fire services
- 1001 Fire services systems
- 1002 Fire services design and install

101 Fire components

- 1014 Fire services pumps
- 1016 Fire services tanks

103 Wet fire suppression systems

- 1030 Combined wet fire suppression systems
- 1031 Hydrants
- 1032 Hose reels
- 1033 Sprinklers

104 Dry fire suppression systems

- 1041 Gaseous fire suppression systems

105 Chemical fire suppression system

- 1051 Liquid chemical fire suppression systems

107 Fire safety systems

- 1072 Fire detection and alarms
- 1073 Emergency warning and intercommunication

108 Fire electrical

- 1082 Fire services electrical - minor

109 Fire commissioning and maintenance

- 1091 Fire services maintenance

11 CONSTRUCTION - ROAD RESERVE (AUS-SPEC)

110 General

- 1100 Construction reference and schedules
- 1101 Traffic management
- 1102 Control of erosion and sedimentation (Construction)

111 Formation preparation

- 1111 Clearing and grubbing
- 1112 Earthworks (Road reserve)
- 1113 Stabilisation

112 Rainwater collection

- 1121 Open drains
- 1122 Kerbs and channels (gutters)

113 Rigid pavements

- 1130 Rural concrete base
- 1131 Roller compacted concrete subbase
- 1132 Lean mix concrete subbase
- 1133 Plain and reinforced concrete base
- 1134 Steel fibre reinforced concrete base
- 1135 Continuously reinforced concrete base
- 1136 Cold milling of asphalt and base course

114 Flexible pavements

- 1140 Wearing course, base and sub-base - unsealed
- 1141 Flexible pavement base and subbase
- 1142 Cold mix asphalt
- 1143 Sprayed bituminous surfacing
- 1144 Asphalt (Roadways)
- 1145 Segmental paving
- 1146 Microsurfacing
- 1147 Sprayed preservation surfacing

115 Road openings and restorations

- 1151 Road openings and restoration
- 1152 Road openings and restoration (Utilities)

117 Pavement moisture control

- 1171 Subsurface drainage
- 1172 Subsoil and formation drains
- 1173 Pavement drains
- 1174 Drainage blankets

119 Traffic facilities

- 1191 Pavement markings
- 1192 Signposting
- 1193 Guide posts
- 1194 Non-rigid road safety barrier systems
- 1195 Rigid concrete safety barrier systems
- 1196 Boundary fencing for road reserves
- 1197 Street and public lighting

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13 CONSTRUCTION - PUBLIC UTILITIES (AUS-SPEC)

- 134 Water supply**
 1341 Water supply - reticulation (Construction)
 1342 Water supply - pump stations (Construction)
- 135 Water cycle management**
 1351 Stormwater drainage (Construction)
 1352 Pipe drainage
 1353 Precast box culverts
 1354 Drainage structures
- 136 Sewerage systems**
 1361 Sewerage systems - reticulation (Construction)
 1362 Sewerage systems - pump stations (Construction)
- 139 Others**
 1391 Service conduits
 1392 Trenchless conduit installation

14 MAINTENANCE AND OPERATIONS - URBAN AND OPEN SPACES (AUS-SPEC)

- 140 General**
 1401 General requirements - parks and open space (Maintenance)
 1402 Maintenance schedules - parks and open space
 1403 Parks and open space maintenance plan (PMP)
 1404 Annexures to parks and open space maintenance plan (PMP)
- 141 Horticultural**
 1411 Street landscaping
 1412 Grass mowing in road reserves
 1413 Tree and vegetation control in road reserves
 1414 Weed control in road reserves
 1415 Weed control
 1416 Planting of annuals and trees
 1417 Care of trees and shrubs
 1418 Gardens
 1419 Care of grass and turf
 1420 Grass mowing
 1421 Native bushland
 1422 Dunal areas
 1423 Pest control
- 143 Pathways**
 1431 Footpath paving repairs
 1432 Gravel footpath repairs
 1433 Footpath and kerb ramp repairs
 1434 Fire access and fire trails repairs
- 144 Pavements**
 1441 Bituminous surfacing repairs
 1442 Boat ramps
- 146 Enclosures**
 1461 Swimming enclosures
 1462 Boundary fence repair
- 147 Equipment**
 1471 Barbecues
 1472 Drinking fountains
 1473 Barriers
 1474 Lighting
 1475 Playground equipment
 1476 Park furniture
 1477 Sport ground facilities
 1478 Public art
- 148 Operation - open spaces**
 1481 Accident repairs (Recoverable)
 1482 Accident repairs (Non-recoverable)
 1483 Emergency call out
 1484 Storm damage response
- 149 Operation - cleaning and waste management**
 1491 Open space litter collection
 1492 Open space graffiti removal
 1493 Beach cleaning

15 MAINTENANCE AND OPERATIONS - BUILDINGS (AUS-SPEC)

- 150 General**
 1500 NATSPEC Maintenance reference
- 1501 General requirements - building and facility (Maintenance)
 1502 Maintenance schedules - building and facility
 1503 Building and facility maintenance plan (BFMP)
 1504 Annexures to building and facility maintenance plan (BFMP)
- 153 Structure**
 1530 External works
 1531 Floors
 1532 Walls
 1533 Doorways and windows
 1534 Ceilings
 1535 Roofing
- 157 Services**
 1571 Mechanical systems - maintenance
 1572 Hydraulic systems - maintenance
 1573 Electrical systems - maintenance
- 158 Operation - buildings**
 1581 External building surveillance
 1582 Accident repairs (Recoverable)
 1583 Emergency call out
 1584 Storm damage response
 1585 External cleaning
 1586 Internal cleaning
 1587 Sanitary cleaning
 1588 Window cleaning
 1589 Cleaning - blinds and fire proofing of curtains

16 MAINTENANCE AND OPERATIONS - ROAD RESERVE (AUS-SPEC)

- 160 General**
 1601 General requirements - road reserve (Maintenance)
 1602 Maintenance schedules - road reserve
 1603 Road reserve maintenance plan (RMP)
 1604 Annexures to road reserve maintenance plan (RMP)
- 161 Pavement**
 1611 Pavement sweeping
 1612 Auxiliary work for reseals
 1613 Repairs to bituminous surfacing
 1614 Crack sealing
 1615 Local shape correction
 1616 Grading unsealed roads
 1617 Resheeting unsealed roads
 1618 Heavy patching
 1619 Minor patching
 1620 Pothole repair
 1621 Concrete pavement repairs
 1622 Concrete slab stabilisation
 1623 Emergency pavement repairs
- 163 Shoulder**
 1631 Edge break repairs
 1632 Grading unsealed shoulders
 1633 Resheeting unsealed shoulders
 1634 Local scour repairs

164 Roadside

- 1641 Kerb and channel (gutter) repairs
 1642 Traffic islands
- 165 Pavement moisture control**
 1651 Clear road reserve subsoil drains
 1652 Clear road reserve open drains
- 167 Traffic facilities**
 1671 Road reserve boundary fence repairs
 1672 Road reserve fences and handrails
 1673 Street seats and bus shelters
 1674 Carriageway delineators
 1675 Road reserve guard fence
 1676 Road reserve signs
 1677 Road reserve guide signs
- 168 Operation - road reserve**
 1681 Accident repairs (Recoverable)
 1682 Road reserve emergency call out
 1683 Storm damage response for road safety
 1684 Traffic facilities - road traffic control
- 169 Operation - cleaning and waste management**
 1691 Road reserve litter collection
 1692 Removal of graffiti visible from roads

17 MAINTENANCE AND OPERATIONS - BRIDGES (AUS-SPEC)

- 170 Structure**
 1701 Wharves and decks maintenance

18 MAINTENANCE AND OPERATIONS - PUBLIC UTILITIES (AUS-SPEC)

- 184 Water supply**
 1841 Water supply - irrigation systems
- 185 Water cycle management**
 1851 Clear open space drains
 1852 Clear open space drainage culverts
 1853 Clear road reserve culverts and pits
 1854 Minor repair of lined drains in road reserves
 1859 CCTV inspection of drainage conduits

20 CONVEYING

- 200 Conveying general**
201 Conveying equipment
 2011 Lifts design and install
 2012 [Escalators and moving walkways]
202 Other conveying equipment
 2021 [Pneumatic tube systems]

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