

Engineering Design and Construction Manual for Subdivision in Growth Areas



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wyndhamcity



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Foreword

The growth area Councils in partnership with Victorian Planning Authority (VPA), land owners, developers, service and utility providers, and key stakeholders are responsible for creating new communities in Melbourne's growth areas. Our objective is to create new suburbs that are not only affordable but are great places to live and the first choice of Victorians.

A key aim of the VPA and growth area Councils is to streamline the planning process for creating new communities to increase certainty, reduce costs and reduce regulatory burden to all stakeholders in the land development process.

Subdivision, engineering and construction approvals are vital parts of the overall development process. Local government, developers, contractors and consultants have identified a shared belief that time and cost savings and increased certainty for all stakeholders can be achieved in these parts of the planning process through agreed common processes for approvals and shared engineering infrastructure standards and specifications across Melbourne's growth areas.

This updated (2019) Engineering Design and Construction Manual (the Manual) outlines a series of shared engineering standards and specifications, prepared by the VPA, the municipalities of Casey, Cardinia, Hume, Melton, Whittlesea and Wyndham and the Office of Local Government following consultation with key stakeholders, including the Urban Development Institute, the Association of Land Development Engineers and the Civil Contractors Federation.

Definitions

Annual Exceedance Probability (AEP)	The probability of exceedance of a given stormwater discharge within a period of one year expressed as a percentage (ie: 20% AEP)
Approved Drawings	Road, Drainage, Earthworks and other drawings which are required to be approved by Council under the Subdivisions Act and have been approved. For the purpose of this definition Approval shall mean drawings having been stamped with Council's approval stamp and signed by a Council officer delegated with the authority to approve drawings.
A-Spec	Suite of specifications for the delivery of newly constructed assets as Digital data in a GIS ready format. Streamlines stakeholder processes for receiving, handling and storage of infrastructure data related to newly constructed assets.
Average Recurrence Interval (ARI)	The average or expected value of the period between exceedance of a given event or discharge expressed as number of years between events (ie: Q5)
Carriageway	The distance between the inverts of kerbs.
Consulting Engineer	A person or company employed by a developer to provide design and/or construction administration services for land subdivision.
Contractor	A company or individual appointed by the Developer to construct the infrastructure works of the subdivision development.
Council	The relevant Growth Area municipal organisation and its various associated departments within whose boundaries the infrastructure is to be constructed.
Council Supervisor	The person nominated by the Council to liaise with the Superintendent during the execution of the works. The Council Supervisor shall issue any written or verbal advice to the Superintendent in relation to the quality and execution of the works.
Days	Days refer to calendar days unless specifically noted otherwise
DDA	Disability Discrimination Act
Design Engineer or Designer	Unless approved otherwise by the Council, all road and drainage designs shall be undertaken by a qualified Civil Engineer, experienced in the field, who shall hereafter be referred to as the Design Engineer or Designer.
Dial Before You Dig	A national community service providing information to prevent damage and disruption to essential services i.e. electricity, gas, water sewer, communications, recycled water and drainage.

Definitions

D-Spec	Drainage specifications under the “A-Spec” system.
Gap Flow	The gap flow is the difference in runoff which results from a 1% AEP event less the design discharge for the underground reticulated piped drainage system.
Infrastructure	Physical works including roads, paths, public lighting, playground and recreation equipment, landscaping and drainage systems (including retardation and treatment).
Manual	The Engineering Design and Construction Manual
Paper Road	A Road reserve created on a Plan of Subdivision for the purpose of creating a residential address, emergency vehicle access or pedestrian and bicycle access. Usually located at the front of allotments overlooking public open space when vehicle access is available from a rear laneway.
Pathway Reserve	Generally a narrow open space reserve located between private property and linking reserves such as roads and open space on either side.
Referral Authority	An agency or relevant authority to whom development plans are required to be referred as a part of a development process, including application for planning permits and Certifications of Plans of Subdivision.
ResCode	ResCode is a state-wide package of provisions for residential development. ResCode is not a single document but a group of provisions incorporated as Clause 56 of the Council Planning Scheme.
Responsible Authority	The Authority responsible for the administration of the relevant Planning Scheme.
Road Reserve	The Road Reserve is a road as defined by the Road Management Act
Road Verge	The distance between the invert of kerb and the near road reserve boundary.
Superintendent	All road and drainage construction surveillance and auditing shall be undertaken by a suitably qualified and experienced person appointed by the Developer, who shall hereafter be referred to as the Superintendent and who shall liaise with and inform the Council Supervisor at all relevant stages of the work.
Water Sensitive Urban Design (WSUD)	The integration of urban water cycle management and stormwater drainage within planning and design is known as Water Sensitive Urban Design



PART A

OVERVIEW AND BACKGROUND

1. Introduction

1.1 Background

This Manual is a product of the Victorian Growth Areas Infrastructure Engineering Standardisation Project, and delivers a set of consistent standardised, best practice documents that outline approval and supporting processes for the planning, design and construction of subdivision infrastructure.

The standards, specifications and processes have been developed by collaboration between the Victorian Planning Authority and Councils in Melbourne's growth areas, in consultation with industry representatives. This updated Manual addresses numerous issues that have arisen through application of the manual, consultation with users and updates of reference material. Changes to the manual are facilitated through the EDCM Governance and technical committees, with representation from Councils, the VPA, developers, consultants and civil contractors.

Further revisions to the EDCM will be ongoing to ensure its relevance and effectiveness, generally arising from consultation with users and stakeholders, as well as changes in key legislation and references such as the Precinct Structure Planning Guidelines and associated Notes. Adopted standards will generally be applied by planning permits allowing subdivision following the approval of a Precinct Structure Plan.

A consistent approach to design standards and construction specifications will ensure growth area Councils, landowners, developers and consultants clearly understand the expectations and commitments that are outlined in this manual. Clear expectations will result in a more efficient process of approval, implementation and certification, avoiding delays that can arise from interpreting and responding to different standards across the growth areas.

1.2 Principles

In preparing the manual the following principles were considered:

- Ensuring that the guidelines, standards and specifications are achievable;
- Providing flexibility to encourage innovation and best practice, and take into account regional or localised conditions within the growth areas.
- Current Victorian Standards for residential development contained in Precinct Structure Planning Guidelines and Clause 56 of the Victorian Planning Provisions.
- The need to harmonise the procedures and timelines of the various infrastructure and service agencies with local government procedures and standards.

1.3 Objectives of the Manual

The primary objectives of the manual are:

- To clearly document Council requirements for the planning, design and development of subdivision infrastructure;
- To standardise development submissions as much as possible and thus to expedite Council engineering approvals;
- To recognise and deal with the various issues currently impacting on the land development industry, in particular sustainability, integrated water management, timeliness and affordability; and

- To ensure that minimum design criteria are met in regard to the design and construction of infrastructure within the municipalities.

Achieving these objectives requires cooperation of all relevant parties with ongoing open communication and commitment to achieving best practice.

1.4 Structure and Content of the Manual

For clarity and reproduction purposes, the manual has been structured into the following sections to separate procedures and design issues from construction requirements.

- **Parts A, B and C** outline the engineering design and approvals process. This will generally follow the completion of Precinct Structure Planning and issue of a Planning Permit for a development proposal.
- **Part D** outlines a construction framework and processes that will usually follow the planning and engineering approvals stages. Preliminary specification clauses are based on Section 160 of the standard VicRoads specifications.

The manual contains the following elements:

- **Charts, forms and tables** provided to assist in clarity and understanding of the written clauses.
- **Functional Layout Plan** process preceding the detail design process. While being mandatory if it is a requirement of a planning permit, this process is highly recommended in other cases to facilitate faster documentation and approvals of engineering designs.
- **Planning permit** submission documentation requirements in Part B are included for context.
- Land subdivision flowchart in **Appendix A** is included for context.
- Road pavement design charts in **Appendix B** provide consistency in the interpretation and application of design codes in determining road pavement composition.
- The design submission form in **Appendix C** will prompt both the designer and the council regarding the required contents of design submissions.
- **Standard Drawings** in **Appendix D** cover the majority of infrastructure types required in most growth area scenarios. Each Council will have additional standard drawings that may need to be referred to where the standard drawings in this manual do not cover particular proposals.
- **Appendix E** contains a list of relevant agencies and references that are recommended for use during the approval and construction process.
- Detailed construction specifications in **Appendix F** are specific to the EDCM Document and are based on relevant VicRoads specifications. These will not generally need to be reproduced in hard copy form.
- **Road elements** within Section 10 indicate the basic components of road cross sections. Generally, road cross sections will be specified in the PSP for particular road types. Guidance on the determination of road cross sections is provided in the **Precinct Structure Planning Guidelines** and associated **Road Note**.

1.5 Implementation

The implementation of the manual is supported by:

- A communication plan that targets key stakeholders in the process;
- Periodic updates to the standards to ensure best practice; and
- Periodic review of the procedures to achieve continuous improvement.

The Manual has been developed specifically to address Melbourne's growth areas. A longer term goal of the State Government is to establish state wide standards and procedures. The manual may be revised and updated to achieve this goal.

The Manual is a living document, formatted to allow for revision and amendment from time to time.

1.6 Exceptions

The Manual establishes a consistent approach to the design and approval of engineering infrastructure for subdivision in Melbourne's growth areas, however realistically there will be occasional situations where they do not apply. Deviation from the criteria listed in this Manual may be considered in exceptional circumstances, provided that proponents can demonstrate that:

- The objectives and requirements of the relevant PSP and planning permit are achieved.
- The objectives and intent of the manual will be achieved through the application of sound engineering judgement.
- A **net community benefit** is derived.

Approval of exceptions within the above framework is at the discretion of the relevant Council.

1.7 Context and Challenges

Key drivers in the preparation of this manual are the consideration and adoption of current best practice where applicable, and a philosophy where best practice is the norm rather than the exception.

There are many challenges which need to be considered in the planning, design and delivery of our newest suburbs. Some of these challenges are outlined below to provide context to the design and construction processes which are outlined further in this manual.

1.7.1 Innovation and Continuous Improvement

Standards and processes outlined in this manual have been developed based on reviewing current approaches and modifying these where necessary to address new and emerging needs and challenges.

Innovation will need to be considered and encouraged where necessary to address changing needs over time.

A continuous improvement approach will be adopted through an ongoing consultation process and modification of the standards prescribed in this manual based on experience gained through its' implementation. Nevertheless, the above conditions in Section 1.6 are relevant to the consideration of innovation proposals.

1.7.1.1 Provisional Approval

Provisional Approval allows for the use and trialling of new processes and products while minimising the risk to councils. It establishes a process to evaluate new processes and products for incorporation into the Manual.

Any member Council may issue Provisional Approval of a process or products within its municipality provided it:

- Prepares a detailed specification for the use of the process or product,
- Prepares Key Performance Indicators for the evaluation of the process or product,
- Advises the other member councils of its intention to issue the Provisional Approval and seeks the input of the member councils.

This provides the opportunity for other councils to:

- o comment on their experience with the process or products,
- o provide details of any concerns that should be considered in evaluating the process or product,
- o issue a similar Provisional Approval.
- Provides a letter of Provisional Approval setting out any conditions on the use of the process or product within its municipality,
- Has the letter of Provisional Approval placed on the EDCM web page,
- Evaluates and provides a report to the EDCM Technical Committee every six months on the process or product with a recommendation.

The Provisional Approval will initially be valid for a period of six months and may be extended by the relevant Council if the evaluation is considered inconclusive by either the Council or EDCM Technical Committee.

The Council may withdraw its Provisional Approval at any time.

Companies wanting to incorporate new processes or products into the Manual should seek the support of a member council to issue the Provisional Approval for the trialling of the new process or product within its municipality.

The Australian Road Research Board – Transport Infrastructure Product Evaluation Scheme, State Road Authorities (VicRoads) or similar bodies can assist in evaluating the performance of products.



1.7.2 Integration and Collaboration

Sustainability and liveability objectives of the community can be achieved through the planning and delivery of infrastructure for our newest suburbs in an integrated and collaborative way, adopting a partnership approach between planners, engineers, government, non-government agencies, service authorities and land developers.

Our collective goals are:

- Understand our impacts.
- Favour Improvements
- Share what is learnt.

This leads to continuous improvement, spreading awareness and advancing our understanding of critical issues while focussing on transforming short-term trade-offs into longer term benefits.

1.7.3 Sustainability

Increasing urbanisation and economic growth provide significant community benefit but they can also present a range of challenges.

There is a growing aspiration to ensure cities reduce their ecological footprint in order to become more sustainable and to improve their structure and function to make them more liveable.

We need to recognise and act on the connections between climate, environmental quality, security, energy use, equity and prosperity.

To build sustainable communities our collective aims are:

- Improve environmental quality
- Build prosperous economies
- Improve prospects for our children.

Design and construction of our newest suburbs is a critical element and, if undertaken correctly, can be a key influence in achieving sustainability and improving liveability.

1.7.4 Quality Assurance

Organisations using this Manual should have a Quality Assurance system which ensures the quality of their work, address any failures in their works and support continuous improvement of their operation.

1.7.5 Certification

Development and implementation of a certification system for subdivision detailed design and construction approvals is outside the scope of this version of the manual, however it is supported in principle provided this results in higher quality outcomes and a streamlining of processes to reduce time requirements.

Any certification scheme would require a prequalification scheme for consultants and contractors, longer defect liability periods for both the design and construction and bonds and insurance schemes to rectify defects in the works and protect the community.

Certification maybe considered for inclusion in future reviews of this manual.

1.7.6 Occupational Health and Safety

The requirements of the Occupational Health and Safety Act (the Act) and Regulations must be adhered to in all construction activities related to subdivision development, including the supervision and execution of the works.

A third party accredited integrated management system (CCF or similar) incorporating quality, safety and environmental aspects is a minimum requirement for all contractors.

All people who undertake construction work (including supervision) must hold the relevant qualification (construction induction card or similar) in accordance with the regulations.

In regard to occupational health and safety:

- Contractors have a direct contractual relationship with the land developer and are bound by the relevant acts and regulations to implement appropriate occupational health and safety systems during the execution and delivery of the works.
- Council staff have a role in assessing and approving engineering documentation including works specifications, and also in monitoring the quality of the infrastructure to be ultimately handed over to the Council. While having no direct contractual relationship with the contractor, Council staff are bound by the relevant acts and regulations and need to ensure an appropriate level of safety is implemented at all times during the construction of works.
- Consultants are bound by the relevant acts and regulations and need to ensure an appropriate level of safety is implemented at all times during the construction of the works.


1.7.7 Environmental Management

Best practice approaches are necessary in order to help protect environmental quality from degradation resulting through subdivision development.

A best practice environmental management approach can be defined as:

“the best combination of techniques, methods, processes or technology used in an industry sector or activity that demonstrably minimizes the environmental impact of that industry sector or activity”.

Knowledge of environmental management, implementation of effective management practices and modern advanced technology enables us to manage our activities to minimize our impact on the environment.



All practitioners should strive to improve their knowledge of best practice environmental management and implement this knowledge through their activities relating to subdivision development.

1.7.8 Practicability

Innovative or improvement measures should be assessed against measures used by others within the same industry or social sector, and the expected environmental financial and social impacts resulting from implementing these measures.

The practicability of each action needs to be assessed on a case by case basis to ensure that the unique environmental, social and financial aspects of each action are fully considered. Practicable actions are not necessarily the lowest financial cost options, but are generally considered to be what is affordable in the context of relevant industry or social sector. Implementation in a practicable manner will ensure that social and financial values are considered and sustained and environment protection maximized.

The many values and needs of our community need to be considered from a variety of contexts including the ability of communities and businesses to pay both financially and socially.

1.7.9 Weed Management

Management measures to prevent the spread of weeds should form an integral part of any environmental management plan prepared for a subdivision proposal. Site assessments are recommended to determine the presence of noxious weeds including those declared under the **Catchment and Land Protection Act 1994** and, if applicable, appropriate measures considered to ensure compliance with sections 70A (“Removing particular vehicles or other things onto or from a road”) and 71 (“Spread of Noxious weeds”) of that Act.

1.7.10 Protection of Waterways

Victoria’s water environments are diverse and are among the state’s most valuable assets. Victoria’s water environments:

- Support diverse range of native plants and animals.
- Sustain a way of life by providing drinking water, water for agriculture and other essential activities that support our wellbeing and economy.
- Are of great environmental, cultural and spiritual value to all Victorians, especially Victorian Traditional Owners.
- Are of great value to rural communities which often see our water environments as their lifeblood.

Healthy waterways and catchments make our cities and towns liveable and provide significant environmental, social, cultural and economic benefits. The health of these environments is often adversely affected by the impact of a growing population and the increasing effect of urbanisation, which can threaten the very features that make them so attractive and valuable.

Land development can adversely impact the health of waterways through increased runoff of polluted stormwater into waterways. The increased pollutant loads (e.g. litter, sediments, nitrogen, phosphorus, hydrocarbons and heavy metals) combined with the increased frequency and magnitude of stormwater flows or the discharge of untreated stormwater can degrade waterway condition and the associated values of the waterways. Adverse effects include increased salinity, sediments and nutrients, algal blooms and aquatic pest plants and animals.

Protection of waterways largely depends upon improved management of pollution carried by stormwater. In response to this, better management of stormwater within urban catchments has now become an essential component of land development through increased stormwater retention or reuse and improved stormwater infiltration to catchment soils.

1.7.11 Integrated Water Management

An integrated approach to the management of our water resources (i.e. potable supply, sewage, stormwater, rainwater, ground water) is a critical element to the creation of better suburbs and it needs to be considered when planning and designing for our newest suburbs.

Integrated water management forms a key consideration during the Framework Planning and Precinct Structure Planning processes, and each PSP will contain an integrated water management plan which outlines the IWM requirements for the particular precinct. An integrated approach to the management of water involves a broad range of stakeholders at a regional, precinct, development and domestic scale. This approach seeks opportunities beyond “business as usual” to foster innovation and provide better environmental, health and liveability outcomes in all aspects of water management, supply and disposal.

Guidance on Integrated Water Management is provided in the ***Precinct Structure Planning Guidelines*** and associated ***Integrated Water Management Note***.

Incorporation of IWM into subdivision designs will be influenced by what is contained in the relevant PSP and planning permit.

In general, the management and integration of stormwater will be the primary IWM element influenced by this manual, however other elements will have an indirect relationship and need to be considered. Typically, the following IWM elements relate to the design and construction of subdivision developments:

- Water Sensitive Urban Design treatments within roads and open space.
- Stormwater harvesting systems
- Integration with Melbourne Water Drainage Schemes including reticulated drainage, retarding basins, wetlands and similar treatments.
- Integration with water authority or catchment authority projects i.e. water recycling schemes, sewer mining, aquifer recharge and regional stormwater harvesting schemes.



1.7.12 Stormwater and Water Sensitive Urban Design

Clause 56 of the **Victoria** Planning Provisions (urban runoff management objectives and Standard C25) requires that stormwater run-off from certain subdivisions and development in an urban area comply with the ***Urban Stormwater – Best Practice Environmental Management Guideline (BPEMG)***.

Management of stormwater is an important and essential component of an overall integrated water management approach for residential subdivision development.

Key principles of Water Sensitive Urban Design (WSUD) outlined in the BPEMG are:

- Protect Natural Systems
- Integrate stormwater treatment into the landscape
- Protect water quality
- Reduce runoff and peak flows
- Add value while minimizing development costs

Current water quality **objectives** are:

- 80% retention of typical urban annual suspended solids load (TSS)
- 45% retention of typical urban annual total phosphorous load (TP)
- 45% retention of typical urban annual total nitrogen load (TN)
- 70% retention of typical urban annual litter load (Litter)

Various WSUD treatments are outlined in the BPEMG to achieve the above objectives; including swales, rain gardens, bio-retention swales, buffer strips and wetlands.

Provision of treatments in sequence (treatment train) is recommended by the BPEMG to effectively deal with different types of pollutants.

Physical characteristics of a particular site can limit options for the location of WSUD treatments. There may also be social constraints which impact on the location of treatments including amenity, health and safety, aesthetics and impacts on recreational facilities.

Design and construction of WSUD treatments, therefore, needs to accommodate a **balance of various needs** including legislation, sustainability and environmental impacts, engineering best practice, physical and social impacts, and affordability and practicability. For further particulars regarding detailed WSUD applications, each Growth Area Council has produced guidelines which can be obtained from the relevant Council.

1.7.13 Co-ordination of Street Works

Code of Practice Management of Infrastructure in Road Reserves

Placement of underground services and assets within road reserves by service and utility agencies is often difficult to coordinate due to trends to limit road reserve widths while needing to accommodate additional services such as recycled water third pipes and also fibre optic communication conduits. In addition, utility agencies have over time, modified minimum clearance requirements to their assets.

It is therefore becoming increasingly difficult to provide cost effective road reserve widths appropriate to particular locations, both in new developments within growth areas and also in the wider metropolitan area.

The Code of Practice ***Co-ordination of Street Works*** documents agreed requirements for the placement of services within road reserves. This code of practice has not been updated since 1995.

The Code of Practice – Management of Infrastructure in Road Reserves (CoP-MIRR) has been developed under the Road Management Act to replace the Code of Practice Co-ordination of Street Works. The CoP-MIRR was developed by all the service agencies, VicRoads and local government. The CoP-MIRR recognises the importance of trees and landscaping in roads reserves and incorporates tree zone to accommodate trees. The CoP-MIRR received Ministerial approval on 6 April 2016 and was gazetted on 28 April 2016.

The Manual has adopted the tree zones and offsets and depths for services as set out in the CoP-MIRR as well as the process for locating services when the standard offsets cannot be accommodated.


Dial Before You Dig

Any person or organisation that owns underground assets including pipes and cables has a responsibility or **duty of care** to ensure that information about the location of these services is easily available for people intending to undertake excavation activities.

People who represent a company responsible for any excavation work also have a **duty of care** to locate underground services or assets that are in the vicinity of the dig site, and then find and expose them before excavating near or around them.

Designer and Contractors responsible for any excavation work also have a **duty of care** to locate underground services or assets that are in the vicinity of the work site, and then find and expose them before excavating near or around them.

The preferred method of obtaining **information** about the location of underground assets is the **Dial Before You Dig** service. The Dial Before You Dig service is referred to in publications from **WorkSafe Victoria** and **Energy Safe Victoria** as best practice. The service aims to provide designers and contractors with the best possible access to plans and information direct from asset owners of underground services using a national enquiry service.



Dial Before You Dig's **Service Guidelines for Victoria** outlines the responsibilities of all underground asset owners to register assets and provide information when requested, and also the responsibilities of people intending to undertake excavation work to obtain information about underground assets in the area and follow safe work practices. The guidelines can be obtained from:

(<http://www.1100.com.au/Aboutus/ServiceGuidelinesforVictoria.aspx>)

In the growth areas it is especially important that new infrastructure is registered with the Dial Before You Dig service not just when it has been commissioned, but also at the construction stage to ensure that information about the underground infrastructure is available to protect these assets before commissioning.

1.7.14 Recording of Asset Information

Recording of all newly constructed asset data is a key task undertaken by councils.

Over time, individual councils have developed particular requirements in regard to the provision of asset data by developers following completion of subdivision development works. These requirements are typically included as conditions in planning permits.

Provision of digital drainage asset data under the “**D-Spec**” system has been adopted as the minimum requirement on the following basis:

- All growth area Councils currently use this system for the recording of their drainage data;
- Data is provided in a GIS ready format;
- Data can be readily transferred to Asset Information systems;
- This is a best practice approach which streamlines the provision, handling and storing of asset data;
- Many Consultants are familiar with this system;
- This system is now widely accepted across Australian local government agencies.

Where a planning permit requires additional digital asset information such as for roads and open space, this is mandatory and shall be provided in accordance with the requirements of the Responsible Authority.

Further information can be obtained from website www.aspecstandard.com.au.

1.7.15 Staging of Development

Where development is to be staged, design and documentation should consider:

- Implementing the current stage in a safe and appropriate manner;
- Facilitating subsequent sequencing;
- Specific provisions if there is to be out-of-sequence staging (refer also to section 5.8);
- Minimising redundant works;



PART B
FRAMEWORK AND PROCEDURES

2. Planning Framework

2.1 Planning Hierarchy

Subdivision and development of land within growth areas sits within a planning hierarchy comprising a framework of State, regional and local policies including:

- The State Planning Policy Framework
- State Standard Provisions
- Local Planning Policy Frameworks
- Growth Corridor Plans
- Precinct Structure Plans

Decision on planning permit applications, plans and other actions and documents requiring approval under a planning scheme or planning permit (i.e. subdivision permits and plans).

2.2 State and Local Framework

The **State Planning Policy Framework (SPPF)** within the Victoria Planning Provisions provides overarching policy to guide land use, subdivision and development in Victoria.

State Standard Provisions are included in all planning schemes in Victoria. Of particular relevance are the requirements for the layout and design of residential subdivision set out at **Clause 56** of planning schemes.

The **Local Planning Policy Framework (LPPF)** provides local policy context. Decision-makers must take into account local policies as relevant to the decision at hand.

Growth Corridor Plans comprise the government's specific policy framework for Melbourne's outward metropolitan growth. They describe broad land use patterns, committed and proposed transport networks, regional open space, significant waterways and areas of potential environmental sensitivity. They inform the preparation of precinct structure plans and determination of permit applications prior to the preparation of a precinct structure plan.

Precinct Structure Plans set the future structure for specific neighbourhoods. They provide more detail on how the land uses described in the Growth Corridor Plans will be developed. The Precinct Structure Plan shows how the objectives of Clause 56 will be achieved within the precinct. A permit application under a Precinct Structure Plan must meet particular Objectives set out in Clause 56 and should meet the Standards set out in Clause 56, as appropriate. The Precinct Structure Plan is incorporated into the local planning scheme to guide the use and development of land in the precinct over the long term.

Planning Permits can be issued in response to an application for a planning permit to subdivide, develop or use land. A planning permit must be generally in accordance with the Precinct Structure Plan and meet the requirements set out in the Precinct Structure Plan and the Schedule to the Urban Growth Zone.

Figure 1 below illustrates the planning hierarchy.



Figure 1 – Planning Hierarchy

2.3 Land Development Objectives and Goals in Growth Areas

Based on the planning framework and current government policies and strategies, overall goals for land development in Victoria’s growth areas are:

- To ensure a sufficient supply of land is available for residential, commercial, retail, industrial, recreational, institutional and other community uses.
- To facilitate the orderly development of urban areas.
- To manage the sequence of development in growth areas so that services are available from early in the life of new communities.

Objectives for growth area planning are:

- To establish a sense of place and community
- To create greater housing choice, diversity and affordable places to live
- To create highly accessible neighbourhoods and vibrant activity centres
- To provide for local employment and business activity
- To provide better transport choices
- To respond to climate change and increase environmental sustainability
- To deliver accessible, integrated and adaptable community infrastructure
- To establish safe communities.

2.4 Land Subdivision Process

The land subdivision process is generally depicted in **Appendix A**.

3. Planning Permits

3.1 Planning Permit Application for Subdivisions

All subdivision in Victoria, with a few minor procedural exceptions, must be approved by the responsible authority under the relevant planning scheme.

The information that should be lodged with a planning permit application for subdivision is set out in Clause 56 of the planning scheme and the relevant zone, overlay or other particular provision. A schedule to the Urban Growth Zone will usually contain precinct-specific information requirements. Generally the information is required to demonstrate how the permit application implements the Precinct Structure Plan.

3.2 Documentation Requirements for Planning Permit Applications

The following documentation requirements for Planning Permit Applications are presented to provide a broad context to the engineering design and construction matters included in this manual. These issues should be addressed with the relevant Council or referral authority prior to progressing with subdivision design.

- a) A copy of the title;
- b) A written report including information on:
 - i. The subdivision's compliance with strategic plans and the precinct structure plan for the area;
 - ii. The number of lots with reference to existing supply and the demand for lots;
 - iii. Tabulated lot size details including the range of lot sizes and average lot size details;
 - iv. Existing and approved road and drainage infrastructure;
 - v. The utility services to be provided and, where applicable, a strategy for staging trunk distribution;
 - vi. The adequacy of community services and facilities such as schools, health facilities and shopping centres; and
 - vii. How the subdivision complies with the objectives of Clause 56 and other relevant sections of the municipal planning scheme.
- c) An appropriate permit application plan or plan set showing:
 - i. The location of the proposed lots and table of approximate lot areas;
 - ii. The proposed internal road, path and trail network (including traffic control devices);
 - iii. Public open space and reserves for other purposes;
 - iv. Land for community facilities
 - v. How the subdivision connects with surrounding streets, regional path network, upstream drainage and open spaces proposed for adjoining estates;
 - vi. The physical attributes of the land and affected adjacent land;
 - vii. The Gross Development Area;

- viii. The Net Development Area;
- ix. Any existing and proposed easements;
- x. Approximate road reserve widths as per the Traffic Report at Clause 3.2(e) below;
- xi. Adjoining roads, including interim and ultimate intersection types at arterial roads;
- xii. Details of vegetation protection zones for trees to be retained and designation of trees proposed for removal;
- xiii. The major drainage system, including large pipes, silt ponds, wetlands and waterways;
- xiv. Overland flow paths for the 100 year ARI (1% AEP) – (plus compliance with ANCOLD requirements);
- xv. Drainage outfall system, interim and ultimate, from the land to defined outlets;
- xvi. Location of works required external to the subdivision, including any access and trunk services identified.

d) An overall drainage management strategy including any proposed staging of the works and the methodology for satisfying Clause 56.07 of the municipal planning scheme.

e) A traffic engineering report designating street hierarchy, maximum predicted traffic volumes, traffic management methods, pedestrian paths, public transport routes, bicycle lanes/trails/paths, typical cross section elements and other relevant information.

f) A traffic plan showing sufficient notional (unmarked) on street parking spaces, traffic control devices and large vehicle turning overlays to show that such vehicles can negotiate bends, laneways, nonstandard intersections and temporary 'dead ends' with clearance from parked cars.

g) Environmental assessment reports (where appropriate) including Native Flora and Fauna (which may also include an existing vegetation survey), Aboriginal and Cultural Heritage studies, and any other investigations required to be undertaken on the site.

h) An overall utility servicing strategy identifying works relevant and required external to the subdivision and the indicative alignment of major/trunk mains within the proposed street network.

Dependent on the proposed development, additional information may be required as deemed necessary by responsible authority.

A standard of Clause 56 should normally be met. However, if the responsible authority is satisfied that an application for an alternative design solution meets the objective in Clause 56, the alternative design solution may be considered.

If a development proposal is not generally consistent with a Precinct Structure Plan it is prohibited.



3.3 Preliminary Consultation

Prior to preparing a Planning Permit Application, the applicant should consider the Precinct Structure Plan, the zone, overlay and particular provisions controls and to confirm that the subdivision is permitted. It is also necessary to become familiar with any restrictions or requirements of the municipal planning scheme and Council policy. For these reasons, it is recommended that preliminary consultation is held with relevant Council officers. It is also recommended at least a conceptual subdivision permit plan be prepared at this stage for discussion purposes.

3.4 Native vegetation and protected habitat

A PSP will identify native vegetation that should be retained and native vegetation that can be removed subject to conditions or requirements. Native vegetation identified for removal in a PSP may be removed under strict conditions. The permit exemption and conditions are located in the Schedule to Clause 52.17 of the planning scheme. Essentially the conditions are those contained with the applicable Commonwealth approval under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). Older PSPs included a Native Vegetation Precinct Plan operated under Clause 52.16 of the planning scheme. These plans operated in a similar manner but set out in more detail the condition and requirements for removal within the plan.

If there is no exemption in the Schedule to Clause 52.17 or an NVPP does not apply to the land a planning permit is generally required to remove, lop or destroy any native vegetation.

3.5 Heritage Assessment

The *Aboriginal Heritage Act 2006* may prescribe that a Cultural Heritage Management Plan (CHMP) is required before the development of land commences. If this is the case a responsible authority is prevented from issuing a planning permit for the relevant development until such a plan is approved. The applicant must provide a copy to the responsible authority who in turn must ensure that the permit application complies with the CHMP.

The presence or relocation of aboriginal artefacts on land may impact on the layout of a subdivision including. It may necessitate the setting aside of land for such a purpose including finding an appropriate public and manager.

3.6 Plan of Subdivision

Following design and approval of the subdivision plan, a licensed land surveyor should be contacted to prepare plans of subdivision for certification under the *Subdivision Act 1988*.

The plan of subdivision shall be in accordance with any approved Functional Layout Plan(s) prepared in accordance with this Manual.

3.7 Developer Contributions

In most cases, the process of subdivision will trigger a requirement to pay development contributions as provided for under a Section 173 Agreement, Development Contributions Plan or Infrastructure Contributions Plan incorporated in the planning scheme.

If a Section 173 Agreement applies to the land it will be registered on the title of the property. If a development contributions plan applies to the land the land will be in the Development Contributions Plan or Infrastructure Contributions Plan Overlay on the planning scheme maps and will show up on a property report or Section 32 report.

3.8 Public Transport

The Public Transport Guidelines for Land Use and Development (DOT, 2008) should be considered when planning for land use developments. These guidelines set out a range of design principles that will better integrate public transport options in urban development. A copy of these guidelines is available at www.transport.vic.gov.au, or can be requested from the Department of Transport.

It is recommended that consultation is held with the Public Transport Victoria for large scale developments, prior to submitting a planning permit application.

The Public Transport Guidelines for Land Use and Development should be considered in the preparation of a Precinct Structure Plan. Consultation should be undertaken with the Public Transport Victoria in preparing the PSP. If the PSP sets out alternatives or guidelines, the alternative or guideline should be used.

3.9 Strategic and Arterial Roads

The Precinct Structure Plan will identify the relationship between proposed development and roads that are VicRoads controlled arterial roads or likely future strategic arterial or major roads.

It is recommended that early consultation is held with both VicRoads and Council regarding road development requirements to the extent that these matters are not addressed in the PSP, prior to submitting a planning permit application.

3.10 Waterways and Main Drainage

Water catchments in Melbourne's growth corridors are managed by the regional catchment management authority, usually Melbourne Water, with jurisdiction over waterways and main drainage systems. Details of requirements, including the existence of prepared Drainage Schemes, can be found at <http://ldm.melbournewater.com.au/>.

Prior to submitting a planning permit application, it is recommended that early consultation is held with the relevant regional catchment management authority and Council to determine the extent of drainage and water quality requirements to the extent that these matters are not addressed in the PSP.



3.11 Sewer, Water and Recycled Water

It is recommended that early consultation is held with the relevant water retailing authorities regarding their supply and treatment requirements to the extent that these matters are not addressed in the PSP, prior to submitting a planning permit application.

3.12 Utility Services

In new Growth Areas the planning and provision of all utility services can require considerable lead times to reach proposed levels of service.

It is recommended that early consultation is held with the relevant supply authorities regarding supply requirements to the extent that these requirements are not addressed in the PSP, prior to submitting a planning permit application.

3.13 Traffic Assessment

Council may request submission of a detailed report on the traffic impact, both internal and external, to a proposed subdivision as part of the Planning Permit Application.

Where a Traffic Assessment report is required, it should be prepared in accordance with the requirements of **Section 4.4** of this manual.



4. Engineering Framework

A robust engineering process can only be achieved by considering the context within which this needs to occur.

There are a variety of issues which need to be considered in developing engineering design plans and implementing these through a construction process.


Engineering proposals need to consider, but should not be limited to, the following matters.

4.1 Planning Requirements

- Contents of the **Precinct Structure Plan** for the area will include:
 - Metropolitan, regional and local **contexts** including transport, open space, heritage, biodiversity, topography, landform and drainage;
 - **Transport and movement** options and objectives including road hierarchy and layouts for connector and arterial roads, intersections, public transport, and the provision for pedestrians and cyclists;
 - Standard **road cross sections** for each category of street including features and dimensions;
 - **Open Space** and natural systems options and objectives including connectivity via network trails and the relationship of open space to water courses and the constructed network;
 - **Biodiversity** objectives for street trees, open space, drainage, ecological and fauna habitats;
 - **Image and Character** Objectives including street tree planting requirements;
 - **Native vegetation protection** objectives and requirements, including vegetation which may be removed, destroyed or lopped, and conditions which need to be included in a planning permit for the development of the land;
 - **Utility** guidelines including co-ordination of installation;
 - Guidelines for the appropriate **staging** of development within the Precinct;
 - A **bushfire risk management plan** where necessary to prescribe any potential wildfire risk both when the precinct is fully built out and during development, and setting out how these risks have been mitigated and how the Country Fire Authority has been involved;
 - **Integrated Water Management Plan** for the provision and integration of sewer, water and storm water facilities.
 - **Precinct infrastructure plan** which sets out the infrastructure and services required to support the development of the precinct.

Individual proposals shall conform to the relevant Precinct Structure Plan for the area.

Applicants should contact the relevant Council where there is no PSP or where elements in the PSP require clarification, to determine the most suitable response.

- 
- The **Planning Permit** for the development area will usually include conditions relating to:
 - PSP requirements;
 - Bushfire management requirements where relevant;
 - Engineering plans;
 - Landscape plans;
 - Construction activities;
 - Storm water drainage;
 - Subdivision layout;
 - Vegetation protection requirements including measures to prevent the spread of noxious weeds, and vegetation which may be removed, destroyed or lopped;
 - Service and referral authority requirements;

4.2 Subdivision Layout

Subdivision layout is determined by combining elements such as roads, streets and reserves, following consideration of the following factors:

- Character of the neighbourhood;
- Type of residential development;
- Location and inter-relationship of schools, shops and public open space;
- Bushfire management requirements to mitigate the impact of bushfire in accordance with any relevant bushfire management plan including buffer zones, landscaping and perimeter treatments;
- Hierarchy of roads;
- Ingress and egress from the subdivision;
- Road safety;
- Permeability;
- Public transport system and routing;
- Conveyance of flood flows;
- Flood Prone land;
- Treatment of stormwater flows including Water Sensitive Urban Design (WSUD);
- Nature and contours of the terrain;
- Environmental factors, specifically flora and fauna;
- Special infrastructure requirements; and
- Costs of works.

Awareness of the above engineering requirements is critical to avoid undue delays in the approvals process and the need to make major alterations to the subdivision layout at the Functional Layout Plan stage and/or the detailed engineering design stage.

Topographical and environmental information should be available to enable an accurate assessment of the suitability of the proposed road locations and the manner in which major drainage and utilities will be accommodated within the road reserve.

4.3 Bushfire Management

4.3.1 Management of Bushfire Risk

Management of bushfire risk is a consideration during the preparation of the **Precinct Structure Plans**, usually in cases where there is a relevant planning control (i.e. wildfire management overlay). Where bushfire management is a requirement, conditions will be included in **planning permits** to prepare a bushfire management plan.

Management of bushfire risk requires appropriate design and layout of the subdivision, and implementation of works to mitigate the impact of bushfire. Measures include landscaping, tree planting, estate entrance and exit treatment, static or reticulated water supplies, perimeter fencing and where applicable Township Protection Plans (TPP's).

4.3.2 Bushfire Management Plans

Where a bushfire management plan is required to be prepared, it must be prepared in accordance with CFA requirements and will generally contain the following items:

- All identified bushfire risks, with **ratings** consistent with the Victorian Fire risk register;
- The location, construction and performance details for any proposed **fire separation solutions** engineered to mitigate the impact of radiant heat and ember attack on properties (fencing, roadways, open space and fuel management zones);
- The proposed **lot sizes and lot densities** on land adjacent to any open space or public land;
- The defendable space requirements for any lots within a **Wildfire Management Overlay**;
- The botanical name, height, width at maturity, and location of all existing and proposed **plants**, including trees;
- The proposed **ongoing fuel management plan**, calculated against future vegetation full maturity, with estimated annual fuel management costs;
- The location of any **static water features** (dams, lakes and wetlands) and the provision for emergency vehicle access to the water features;
- The reticulated **fire hydrant service plan**, with calculated pressure and flows available during peak demand;
- Where a **Township Protection Plan (TPP)** is required, a copy of the endorsed plans shall be included.

4.3.3 Approval of Bushfire Management Plans

Approval of bushfire management plans is the responsibility of the **Country Fire Authority**, which should be contacted regarding format and requirements for submissions (usually three sets of the final plans and one electronic copy in Adobe PDF format).

4.3.4 Approval of Engineering Plans

Where a bushfire management plan is required to be prepared, this must be approved by the CFA **prior to the approval** of the engineering design plans

4.3.5 Reference Documents

Policies, standards and guidelines to assist in the development of a BMP are available on the CFA website – www.cfa.vic.gov.au/publications/policy.htm.

Key references are included in **Appendix E**.

4.4 Traffic Assessment

A traffic assessment is required to be prepared and submitted to council for approval where traffic has not been sufficiently detailed in permit application documentation.

Traffic assessments are application specific and reports should sufficiently detail the traffic impact, both internal and external, to a proposed subdivision.

Traffic Assessment Reports should include:

- An assessment of **vehicle movements** into, out of and through the subdivision;
- A **plan** showing proposed traffic devices such as roundabouts, islands, raised intersections etc. *(The use of speed humps is generally not supported and other traffic management devices should be used. If speed humps are the only suitable traffic management device available, consideration should be given to redesigning the road layout)*. Unless otherwise approved, all cross intersections are generally to be controlled by traffic management devices such as a roundabout, raised intersections, signs or traffic signals;
- **Bus** routes;
- **Bicycle** routes;
- **Pedestrian** links;
- **Traffic** Generation and Distribution; and
- Provision for **parking**.

Traffic assessments should not revise decisions made by the **Precinct Structure Plan** relevant to the development.

Further information may be requested depending on the traffic assessment, including:

- Loading and unloading information;
- Intersection assessment information (SIDRA).

4.5 Road Safety Design Audits

A road safety design audit is required in the following circumstances:

- Where proposed or existing road features involve elements identified as **potential safety hazards** for road users;
- Where road features involve elements that are potential safety hazards for persons with a **disability**.

These Audits may be requested at the time of submitting a Functional Layout Plan for approval, or at a later date, as considered necessary.

Design audits must be prepared and certified by an **independent VicRoads pre-qualified road safety auditor** and must comply with “**Austrroads Guide to Road Safety – Part 6: Road Safety Audit**”.

4.6 Classification of Road and Neighbourhood Streets

The classification, function and general composition of roads and streets within any new subdivision development should be in accordance with the PSP and Clause 56 of the Planning Scheme.

The various categories of roads referenced in this Manual are defined as follows. Further specifications for these roads are included in the engineering design sections.

Access Lane

A side or rear lane principally providing access to parking on lots with another street frontage. Lanes will generally serve up to 8 allotments.

Access Place

A minor street providing local residential access with shared traffic, pedestrian and recreation use, but with pedestrian priority.

Access Street – Level 1

A street providing local residential access where traffic is subservient, speed and volume are low and pedestrian movements facilitated.

Access Street – Level 2

A street providing local residential access where traffic is subservient, speed and volume are low and pedestrian movements facilitated.

Connector Street

A street that carries higher volumes of traffic. It connects Access Places and Access Streets through and between neighbourhoods.



The general location of Connector Streets should provide traffic routes as direct as possible between each “pocket” of a subdivision and nearby arterial roads, neighbourhood shopping centres, neighbourhood sporting facilities etc.

Trunk Connector

A street carrying higher volumes of traffic than a Connector Street however it still provides a similar function to a Connector in that it connects Access Places and Access Streets through and between neighbourhoods.

The general location of Trunk Connector Streets should provide traffic routes as direct as possible between each “pocket” of a subdivision and nearby arterial roads.

Secondary Arterial

A street carrying higher volumes of traffic than a Trunk Connector Street and carrying through traffic between neighbourhoods. Typically, Secondary Arterial Roads appear on a traditional 1.6km (1 mile) grid.

Primary Arterial

An Arterial Road is one that provides direct access from one district to another. Generally speaking, Arterial Roads have restricted frontage development and have dual carriageway pavements. In general, the location of Arterial Roads will be determined by regional development plans, including Precinct Structure Plans.

An Arterial Road need not necessarily become a VicRoads ‘declared arterial road’ however, existing declared arterial roads and roads identified as Arterial Roads on a Growth Area Framework Plan must be designed and constructed to standards acceptable to VicRoads.

Service Road

A service road is one located at the side of a through carriageway, usually on an arterial road, to provide frontage access to the adjacent properties.

Pathway Reserves – Pedestrian and Bicycle

A pathway reserve is generally a narrow open space reserve located between private property and linking reserves such as roads and open space on either side. Provision of pathway reserves shall be to the satisfaction of Council, and should address the objectives of Council’s Open Space and Bicycle Strategies.

Pathway Reserve width shall provide for both infrastructure and landscape amenity.

Where provision is required for pedestrian access or utility service provision to allotments which front open space, a suitable easement or right of way shall be created for this purpose – referred to elsewhere in this manual as a “paper road”.

4.7 Road Reserves

Residential road reserves in growth areas will usually need to accommodate the following elements:

- Road carriageway with appropriate kerbing
- Services with approved clearances in accordance with the Code of Practice for Street Works Coordination (but also including provision for services not contemplated in the Code of Practice, such as recycled water and data cables)
- Pedestrian and bicycle access
- Parking
- Landscaping
- Drainage
- Bus routes.

4.7.1 Road Reserve Widths

Typical road reserve widths will usually be specified in the PSP.

Actual widths shall be based on all of the required elements such as lanes, pedestrian and bicycle movement, landscaping and the orderly spacing of utilities in accordance with the standard elements of **Section 10** and **Appendix D** of this Manual.

Where additional or **non-standard elements** are to be incorporated for specific landscaping, utilities or urban design purposes these proposals should be discussed with the relevant Council during pre-application meetings to encourage the development of innovative cross sections and ensure these are well understood.

4.7.2 Intersection Splays

Splays of the property line at intersections of streets must be provided to ensure safety by maintaining sufficient sight lines. This will be achieved by complying with the **Austroads Guidelines**.

In residential areas, minimum splays at the intersection of streets without traffic islands shall be 3 metres by 3 metres. Intersections at the ends of access lanes may have splays reduced provided conditions satisfying **AS/NZS 2890.1 – Parking Facilities (Figure 3.3)** can be demonstrated.

Intersections of all other roads requiring local widening or traffic control devices shall be designed to preserve the 'mid-block' verge width.

4.7.3 Cul de Sac and T-head Courts.

Where circular and T head courts are permitted in residential subdivisions they must accommodate continuous and / or three point turning movements using the Austroads Standard truck templates within a 10.5 m radius. Refer **Section 10.16**.



4.8 Public Open Space Requirements

In most subdivisions, the creation of public open space will be provided for in the relevant PSP.

Opportunities for multiple usage of open space should be investigated and built into designs where appropriate, i.e. drainage management with walking trails or other recreation uses.

4.9 Drainage Provision

Council is the responsible authority for all drainage works outside the authority of the relevant regional catchment management authority. Design for drainage is outlined in **Section 13** of this manual.

As part of the engineering documentation, the developer shall submit an overall **catchment plan and stormwater management strategy** showing:

- Contour lines;
- Total catchment;
- Zoning;
- Identification of existing drainage schemes and any scheme requirements;
- Proposed property boundaries and construction stages;
- Drainage layout, including any major drainage structures (e.g. retarding basins, floodways);
- Overland flow paths;
- Preliminary sizes of major lines, supported by computations (where appropriate); or Regional Water Authority Drainage Scheme details;
- Calculations confirming gap flows are either contained within road reserves or floodways;
- Proposed drainage works upstream and downstream of the proposed development, including provision for the outside catchment and provision for a legal point of discharge;
- Proposed arrangements for conveyance over other property to a legal point of discharge;
- Water quality treatment measures, including MUSIC models where appropriate; and
- Post development and pre-development flows and levels.

The drainage strategy plan shall include **quality modelling results** to demonstrate sufficient provision for the proposed treatment elements.

4.9.1 Drainage Available to All Lots

The low point of every lot, including reserves and balance lots shall be drained to the legal point of discharge nominated by the relevant Council in either the adjoining street drainage or a drainage easement.

4.9.2 Provision for Gap Flows

Provision shall be made to ensure gap flows are able to pass through the subdivision along streets and drainage reserves to reduce the risk of inundation of dwellings. It is desirable that a road or a drainage reserve is located along each natural drainage line, to provide a pathway for gap flows.

Gap flows that result in overland flow through allotments shall not be permitted.

4.9.3 Provision for Freeboard

The road reserve shall have sufficient gap flow capacity to ensure that the available freeboard complies with the requirements for drainage (**Section 13 – Drainage Design**).

4.10 Easements

4.10.1 Easement Provision

Where it is necessary for drains, sewers, electricity cables, telecom cables etc., to be located within a lot or Council Reserve, an easement in favour of the relevant authority is to be provided.

4.10.2 Easement Width

Except where the minimum width of the easement is specified in the PSP, minimum widths shall be as indicated in Table 1.

Table 1 General Minimum Easement Widths

Type	Width
Drainage	2.00 metres
Combined Drainage and Sewerage	3.00 metres

In all cases, easement widths greater than the minimum shall be determined by the relevant utility authority subject to the size and type of infrastructure to be installed within the easement.

4.10.3 Easement Location

Where practicable, easements shall be matched and aligned with those existing on adjacent properties to provide continuity for utility services and ensure the proposed use for which the easement is created can be achieved.

5. Functional Layout Plans

5.1 Role and Purpose of Functional Layout Plan

The Function Layout Plan (FLP) is required to confirm the layout of the Planning Permit Plan and any other incorporated document to ensure that spatially the infrastructure can be provided and the works constructed.

The FLP informs the Plan of Subdivision so that it can be finalised as per the Engineering Submission Process outlined in Section 6.6 and Figure 2.

5.2 Requirement for Functional Layout Plans

Where preparation of a FLP is required as a planning permit condition, the preparation of the FLP is mandatory and shall form part of the planning process. Alternatively, an FLP may be prepared by agreement between the Council and the developer/consultant, as a pre-cursor to the detailed engineering design process.

5.3 Principles

The FLP process is aimed at improving outcomes and reducing timelines for approvals. It may require more work upfront to ensure that time is saved in the later stages of approvals. While the FLP should be consistent with the Precinct Structure Plan (PSP), it will also ensure that both designers and Council have confidence in proceeding to the development of detailed engineering and landscape designs and plans.

The preparation of functional layout plans is therefore considered to be part of a best practice approach to the documentation of subdivision developments, and as such it is highly recommended in cases where there is no specific requirement on a planning permit. Functional Layout Plan(s) should show all engineering elements which may influence either the dimensions of the plan of subdivision, the functionality of civil infrastructure, the achievement of an acceptable landscaped area or the preservation of prescribed features on the site.

Once the FLP is approved, the subdivision layout and the infrastructure shown must be delivered in accordance with the approved plan. However, the approved FLP is not a definitive statement of all construction requirements. Detailed engineering plans provide this information. Approval does not provide consent to the omission of infrastructure that is not shown on the FLP nor can it be final acceptance of items that are incidental to fixing dimensions on the Plan of Subdivision or drawn only for the purpose of clarity.

5.4 FLP Process

When a planning permit requires the endorsement of a FLP for any stage of a subdivision the submitted layout shall have no force or effect until it is endorsed as part of the permit.

The Responsible Authority shall where necessary refer the FLP to any relevant authority, and will:

- **approve** the FLP; or
- specify the **alterations** it requires; or
- **refuse** to approve the FLP,

If the Responsible Authority requires alterations or refuses to approve the FLP, it will at the same time give written reasons to the applicant.

5.5 FLP Response Timeline


Response timeline for Responsible Authorities to FLP submissions shall be:

- within **15 working days** of receipt of a submission.
If the Responsible Authority requires additional information or an alteration to the FLP, the time for consideration and response is suspended until the amended FLP is submitted.

5.6 FLP Submission Content

The FLP(s) should be consistent with the relevant PSP and Council specific supplementary information and shall show:

- A fully dimensioned subdivision layout, including proposed street names (if known), lot numbers and street reservation widths;
- Topography and existing features, including contours for the subject land and any affected adjacent land, water bodies, vegetation (including significant ground cover) and structures of historic or cultural significance;
- The location of lot boundaries to allow vehicle crossings and street tree zones to be shown to ensure infrastructure is fully contained within an existing road reserve, the owner's land or both;
- Identification by survey of all trees (or groups of trees) existing on the site, including dead trees and those that overhang the site from adjoining land or that may be affected by the proposed work;
- Details of tree protection zones (where appropriate) for all trees to be retained, designed in accordance with any Council tree protection zone guidelines;
- Typical cross-sections for each street type, dimensioning individual elements such as carriageway and pavement widths, services offsets and any other spatial requirements identified in the Precinct Structure Plan (e.g. medians, future bus lanes, on-road bicycle lanes, shared paths, large drains, WSUD elements, distribution/trunk service mains, etc.);
- Location and alignment of kerbs, parking spaces, footpaths, shared paths, vehicle crossings, bus stops (where they are able to be identified) and traffic controls (signals, roundabouts, splitter islands, slow points, etc.) including critical vehicle swept paths;
- The minor drainage network and any special features requiring access (e.g. structures, gross pollutant traps, swales and rain gardens) which will have a significant spatial impact on the plan of subdivision;
- The major drainage system, including water courses, lakes, wetlands, sedimentation ponds and/or piped elements showing preliminary sizing (from the Regional Water Authority Drainage Scheme details, etc.);
- Overland flow paths (100 year ARI (1% AEP)), supported with sufficient preliminary data to indicate how excess runoff will be safely conveyed to its destination;
- Drainage outfall system (both interim and ultimate), indicating legal point of discharge and any access requirements for construction and maintenance;

- 
- A table of offsets for all utility services (sewer, water, recycled water system, gas, electricity, lighting poles and telecommunication optical fibre conduits) and street trees;
 - Preliminary forecast locations of the reserves for electrical kiosks.
 - Location of proposed reserves and proposed vesting body or authority.

5.7 Information NOT required in FLP Submission

The following items are not required as part of the FLP submission;

- Landscaping plans showing new plantings in the road reserves;
- Electrical layout plan;
- Various road pavement compositions;
- Road linemarkings and signage details.

5.8 Specific Sites – Out of Sequence

For sites that are out of sequence and/or not adjacent to existing or approved infrastructure the following information is required in the FLP in addition to the above standard requirements:

- Locality Plan or Permit Application Plan indicating the relationship between the subject subdivision stage and surrounding land and relevant PSP;
- Proposed linkages to future streets, open space, regional path network and upstream drainage;
- Works external to the subdivision, including both interim and ultimate access requirements;
- Intersections with VicRoads Main Roads showing interim and ultimate treatments; and
- Drainage and sewerage outfalls, including any easements required over other property.

5.9 Applicable Standards

In the absence of specific information in this Manual and associated checklists or standard specifications, the relevant standard or authority requirements shall apply.

5.10 Presentation

The FLP plan(s) should be:

- clear and legible
- drawn at a scale of **1:500**
- drawn to acceptable drafting standards.

5.11 Format for FLP Submission

Submissions of FLP plan(s) to the Responsible Authority for approval should be in the following formats:

- one electronic copy (PDF) provided to Council.

6. Engineering Design Plans

6.1 Detailed Engineering Design

Detailed engineering design shall be prepared in accordance with:

- The requirements of the **PSP**;
- The conditions specified in the **Planning Permit**;
- The requirements of this **Manual**;
- The approved **Functional Layout Plan**.

6.2 Design Submission Content

The detailed engineering submission shall include:

- One complete set of A1 engineering drawings, including:
 - Detail Engineering Plans;
 - Reproduction of the applicable Plan of Subdivision;
 - Typical Details, including pavement details;
 - Signage and Line marking Plan;
 - Road Longitudinal Sections;
 - Road Cross Sections;
 - Intersection Details;
 - Principal Bicycle Network and bicycle priority intersections;
 - Drainage Longitudinal Sections and Pit Schedules;
 - Plans showing existing vegetation to be protected or removed; and
 - Telecommunications pits and conduits.
- Public Lighting Plans submission for Council approval.
- Overall drainage concept for the entire development (if not provided in the planning permit or FLP submission).
- A coloured catchment plan showing Q100 (1% AEP) for the entire development.
- A coloured catchment plan showing Q5 (20% AEP) sub-catchments.
- Drainage computations for Q5 (20% AEP) and Q100 (1% AEP).
- Melbourne Water Scheme drainage plans (where applicable), including water quality treatment systems
- A Traffic Assessment Report including a road hierarchy plan (if not provided in the planning permit or FLP submission).
- Geotechnical report and pavement design.
- Water main reticulation plans including the location and capacity of fire hydrants and hydrant mains.
- Sewer main reticulation plans.
- Recycled water reticulation plans (where applicable).



- Tree removal/retention plans (where applicable).
- Weed Management Plan (where applicable) identifying the presence of any noxious weeds and the proposed measures to prevent their spread.
- Copy of current approved Permit Plan.
- Road Safety Design Audit Report (refer **Clause 4.5**).

6.3 Submission Presentation

Sheet Size

All engineering drawings submitted for approval must be provided in A1 standard sheets sizes unless otherwise agreed.

Drawing Scales

Standard engineering scales for layout plans are:

1:50, 1:100, 1:200, 1:250, 1:500, 1:1000

Selection of scale/s should ensure that all details are clear and legible at the presentation sheet size/s.

Longitudinal sections

For all long section plots (including drainage), a ratio of 10:1 shall be applied (i.e. the vertical scale is 10 times the horizontal scale applied in plan view).

For example:	Horizontal Scale	1:500
	Vertical Scale	1:50

Cross Sections

For all cross section plots, a ratio of 2:1 shall be applied, (i.e. the vertical scale is two (2) times the horizontal scale).

For example:	Horizontal Scale	1:100
	Vertical Scale	1:50

6.4 Co-ordinates and Levels

Co-ordinates

Map Grid of Australia (MGA) shall be used as the co-ordinate system. All co-ordinates shall be expressed in metres to three (3) decimal places.

All CAD data provided to Council is to be georeferenced to GDA2020. Transformation grids to support transformation between GDA94 and GDA2020 (as well as between AGD66/84 and GDA94) are freely available from https://github.com/icsm-au/transformation_grids.



Reduced Levels

Australian Height Datum (AHD) shall be used as the reference system. All reduced levels and invert levels shall be expressed in metres to three (3) decimal places. Allotment levels in detail plan shall be expressed to two (2) decimal places.

The origin (Permanent Bench Mark) of level datum for the subdivision shall be identified on the plans.

6.5 Approved Design Plans

For purposes of endorsing approved plans, the following shall be provided to Council:

- A1 size plans one set
- A3 size plans two sets
- Electronic copy in Adobe PDF format one copy

A schedule of works and costs must be provided prior to endorsement of the approved design plans by the Responsible Authority.

Payment of the Plan Checking Fee in accordance with Clause 6 of the **Subdivision (Permit and Certification Fees) Regulations** (currently to the value of 0.75% of the total estimated cost of constructing the works proposed on the engineering plan) is required at the time of endorsing the approved engineering plans.

6.6 Engineering Submission Process

Engineering submissions should generally follow the process outlined below in Figure 2.

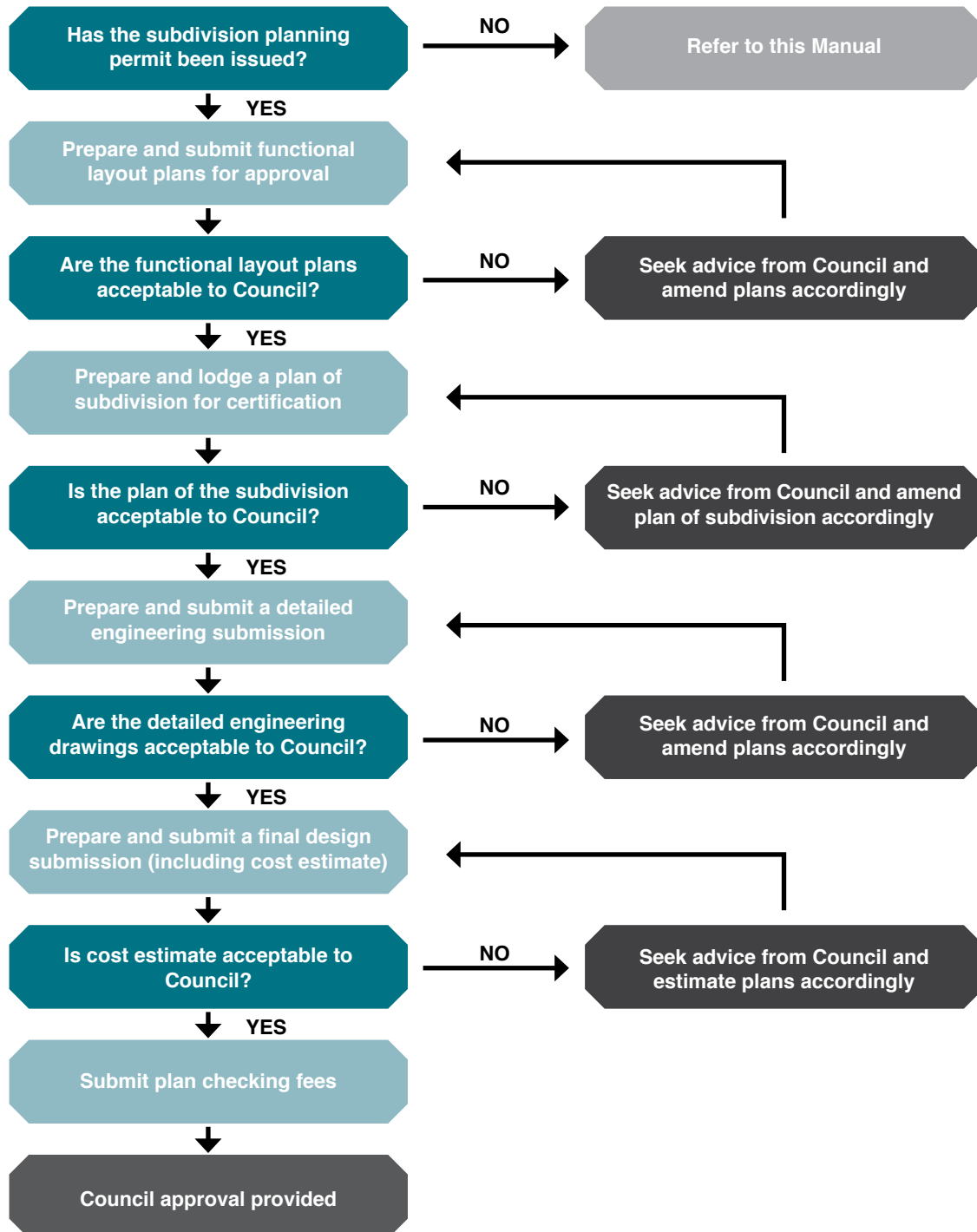


Figure 2 – Engineering Submission Process

6.7 Timeline for Responses to Design Plans

Timeline for responding to a design submission is prescribed in the ***Subdivision (Procedures) Regulations*** and is currently **30 days** from the date on which the engineering plan is received by the Council or referral authority.

If the Council or referral authority requires additional information or an alteration to the design plans, the consulting engineer should endeavour to make these changes as soon as practicable. In accordance with Clause 15 of the **Subdivision Act 1988**, the time for consideration and response to revised design plans is **suspended until the altered engineering plan is submitted**.

6.8 Revisions

6.8.1 Design Revisions

Should it be necessary to revise the detailed engineering drawings following approval of the design, amended drawings must be re-submitted to Council for its approval. All revisions shall be documented, including (where appropriate) the use of revision clouds and labelling within the title block, provided clarity is maintained on the drawings. Where drawing clarity would be compromised, separate documentation of revisions will be considered.

6.8.2 Plan of Subdivision Revision

Should the Plan of Subdivision be altered after the Detailed Engineering Design approval, it shall be the responsibility of the designer to resubmit a copy of the Certified Plan (as amended) together with amended engineering drawings to Council for approval.

6.8.3 Limitation of Approval Life

Except with the written agreement of the Council, approval of engineering plans shall lapse if construction of works shown on the approved engineering plans is not commenced within **12 months** of approval.

7. Landscaping Plans

7.1 General

All landscape works including streetscapes, landscaping of open space areas, tree planting and estate entrance treatments shall be documented and provided in accordance with this Manual, the planning permit conditions, and relevant documentation including Council Standards.

Landscape designs shall be developed in conjunction with the engineering design to ensure there are no conflicts between landscape and engineering elements.

7.2 Contents of Landscape Plans

Landscaping plans shall be prepared and submitted to Council for approval, showing:

- All surface treatments.
- The location, height and construction details for any proposed fencing (including fencing treatments abutting native grassland reserves consistent with the approved Environmental Management Plan).
- Any entrance features or estate feature retaining walls.
- The botanical name, height and width at maturity, and location of all existing and proposed plants, including trees.
- The location of all proposed garden beds or feature plantings, including construction details.
- Any park or street furniture including lighting, BBQ facilities, seating, shade shelters and play equipment.
- A works specification, including the method of preparing, draining, watering and maintenance of all planting and landscape elements.

7.3 Format of Landscape Submissions

Submissions of final landscaping plans to council for approval shall be in the following formats:

- 3 sets of paper versions
- An electronic copy in Adobe PDF format.

8. Construction Requirements

8.1 Approvals Prior to Commencement

The **Subdivision Act 1988** (Clause 17) requires that works shall not be commenced until:

- The plan of subdivision has been certified;
- The engineering plans and specifications have been approved;
- All applicable planning permit conditions have been satisfied; and
- All agreements required by other authorities have been made.

8.2 Construction Process Following Approvals

Construction process and requirements following the approval to commence are outlined in “**Part D - Construction**” of this manual.

9. Certification and Compliance

9.1 Certification of Plan of Subdivisions

Certification of a Plan of Subdivision must only occur if the plan of subdivision is in accordance with the requirements of the planning permit and any approved Functional Layout Plan.

9.2 Certification of Structures

A Building Permit and Certificate of Compliance for Design and a Certificate of Compliance for Construction is required for the following infrastructure items constructed as a part of a subdivision development:

- Retaining walls;
- Entrance structures;
- Gazebo's;
- Boardwalks/elevated walkways/jetties; and
- Other structures as applicable.

Structures in the road reserve, including bridge and structures not included in the Standard Drawings, must be designed, proof engineered and construction supervised and certified by a consultant holding VicRoads prequalification for the type of structure.

9.3 Provision of As Constructed Data

Upon completion of the works “as constructed” measurements of all newly constructed drainage assets shall be provided to Council as digital data in the “**D-Spec**” format. Refer to website www.aspecstandard.com.au for specifications.

Where a planning permit specifically requires additional data, i.e. for roads or open space, the provision of this additional data shall be mandatory and shall be provided as digital data in accordance with the relevant Council requirements.

9.4 Engineering Infrastructure Compliance

9.4.1 Practical Completion of Engineering Works

“Practical Completion” is that stage in the execution of the work when :

- The Works are complete except for minor outstanding works and minor defects —
 - which do not prevent the Works from being reasonably capable of being used for their intended purpose; and
 - where there are reasonable grounds for the outstanding works and minor defects not being promptly rectified; and
 - rectification of which will not prejudice the convenient use of the Works; and
- Those tests which are required to be carried out and passed before the Works reach Practical Completion have been carried out and passed; and

- Provision of documents and other information required which are essential for the use, operation and maintenance of the Works.

Prior to Council's **consent to Practical Completion**, Council will require:

- An electronic copy of all "as constructed" engineering drawings in suitable format on agreed media;
 - Suitable formats are generally PDF together with DWG files; and
 - The preferred media is CD, DVD or USB Memory Stick.
- "As constructed" asset information for drainage in electronic format in accordance with the "**D-spec**" specification;
- Completed Inspection and Test Plans;
- Certificates of Compliance for any structural works; and
- Practical Completion inspection attended by the Council Supervisor and the Superintendent. Written advice shall be provided to the Superintendent:
 - Confirming the outcome of the Practical completion inspection; and
 - Itemising any minor outstanding works remaining and/or defects observed.

9.4.2 Uncompleted Works Bond

Where considered appropriate to facilitate the issue of a Statement of Compliance, Council may permit the developer to bond uncompleted works subject to the developer and Council entering into an agreement dealing with the uncompleted works.

Uncompleted works bonds:


- will be **150%** of the value of the uncompleted works based on an agreed estimate of the cost to deliver the future works and agreed by Council;
- may be in the form of either a cheque or a bank guarantee or other approved form (i.e. insurance bond); and
- will be returned to the developer upon satisfactory completion of the works.

Principles for bond agreements

- *Any request for bonding must be made in writing and be supported by a clear and achievable programme, acceptable to the Council, for the completion of the works.*
- *The developer is required to submit a construction programme for the unfinished works with nominated completion date.*

In considering the appropriateness of uncompleted works bonds, the following criteria should be considered:

- The development works as a whole have reached practical completion and can be safely used for its intended purpose;
- It would otherwise be unreasonable to withhold consent to statement of compliance;

- 
- Deferment of the works will assist in the staging of future works;
 - Deferment will avoid undue wear and tear or possible damage to the works taking into account other development works (i.e. housing construction) which will follow; and
 - The developer and/or contractor have a demonstrable capacity and capability to complete the outstanding works by the nominated completion date.

9.4.3 Defects Liability Bond

Prior to Council issuing a Statement of Compliance for a stage of development, the applicant is required to submit a bond in the form of a cheque or a bank guarantee or other approved form (i.e. insurance bond), to be held and used to maintain the works at the end of the defects liability period, should the applicant fail to do so.

Where the amount of bond has not otherwise been specified (i.e. in a planning permit) the amount shall be to the value of **5%** of the final cost of road and drainage works.

All defects liability bonds will be returned to the developer at the end of the defects liability period, provided that the works have been maintained to the satisfaction of Council, and all documentation has been provided as per Council's conditions of approval.

9.4.4 Commencement of Defects Liability

Defects Liability will commence on the issue to Council of the title(s) for roads created on the Plan of Subdivision when Council is then deemed the Road Manager as defined by the Road Management Act, or on 'Practical Completion' of works that have been the subject of an 'Uncompleted Works Bond', whichever is the latter.

For works on existing roads, the Defects Liability Period will commence on the Practical Completion of the works on the existing road and when the works are made available for the public to use.

Written advice shall be provided to the Superintendent:

- Confirming the "Date of Commencement" of the defects liability period; and
- Itemising any work remaining to be completed prior to the end of the defects liability period.

All works undertaken in the Road Reserve after commencement of Defects Liability will require a Consent to Work in the Road Reserve Permit.

9.4.5 End of Defects Liability Inspection

The works shall be maintained for a period of **3 months**, or other agreed period, from the date of the commencement of defects liability. At the end of this period, the Superintendent shall request Council to undertake a final inspection. All outstanding items shall be addressed and completed prior to the inspection.

After the works have been satisfactorily maintained, written advice shall be provided to the Superintendent, and Council will assume the ownership and ongoing maintenance of the works.

9.5 Landscape Works Compliance

9.5.1 Uncompleted Landscape Works Bond

Where considered appropriate to facilitate the issue of a Statement of Compliance, Council may permit the developer to bond uncompleted hard and/or soft landscaping or planting works subject to the developer and Council entering into an agreement dealing with the uncompleted works.

The bond will be based on a minimum of **150%** of the value of the uncompleted landscape works based on the Landscape Architect's or Consulting Engineer's estimate of the landscape works and agreed by Council.

The bond may be in the form of either a cheque or a bank guarantee or other approved form (i.e. insurance bond), and will be returned to the applicant upon satisfactory completion of the works.

In considering the appropriateness of uncompleted landscape works bonds, the following matters should be considered:

- Where it would otherwise be unreasonable to withhold consent to statement of compliance;
- To provide the opportunity for growth and development during appropriate planting seasons;
- Where deferment of the landscape works will assist in the staging of future works; and
- Where deferment will avoid undue wear and tear or possible damage to the landscape works taking into account other development works (i.e. housing construction) which will follow.

If agreement is provided by Council, the uncompleted landscape works bond must be lodged following the approval of landscape plans and detailed documentation and before statement of compliance.

Uncompleted landscape works bonds will be returned to the developer following the completion of all required landscape works to the satisfaction of Council.

9.5.2 Landscape Maintenance Bond

The applicant shall submit a landscape maintenance bond in the form of either a cheque or a bank guarantee or other approved form (i.e. insurance bond) for all completed landscape works.

All landscape maintenance bonds will be returned to the developer at the end of the defects liability period, provided that the works have been maintained to the satisfaction of Council, and all documentation has been provided as per Council's conditions of approval.

Landscape maintenance bonds will be utilised by Council to maintain the landscape works at the end of the defects liability period, should the applicant fail to do so.

Where the amount of bond has not otherwise been specified (i.e. in a planning permit)- refer to Council for the value of the Landscape Maintenance Bond.



9.5.3 Landscape Defects Liability Period

Where the landscape defects liability period has not otherwise been specified (i.e. in a planning permit) the maintenance period will be a minimum of **24 months**.

9.5.4 Practical Completion of Landscaping and Handover Procedures

At the completion of landscape works, the Superintendent shall contact Council to arrange an inspection for certification of practical completion of the works.

Prior to the end of the maintenance period, the landscape designer shall provide copies of the “**as constructed**” **landscape drawings** in the following formats:

- AutoCAD DWG file format; and
- Adobe PDF file format.

Prior to the end of the maintenance period, Council shall be contacted to arrange an inspection for certification of final completion of the works.

9.6 Bushfire Management Works

9.6.1 Bushfire Maintenance Management Bond

Where a Bushfire Management Plan (BMP) and works are required under a planning permit, the following requirements will apply to maintenance of the works.

- Following the approval of the BMP and before Statement of Compliance, the applicant will be required to submit to Council an outstanding maintenance bond to the value of **100%** of the estimated annual cost of ongoing fuel maintenance works for a period of **24 months**, including both hardscape (fencing) and softscape (vegetation management) works.
- This bond is held until the end of the agreed maintenance period, which will be a minimum of 24 months. The bond may be in the form of either a cheque or a bank guarantee, and is refunded to the applicant upon completion of the maintenance period.
- Bushfire Management Plan maintenance bonds will not be released until such time that all required works have been maintained to the satisfaction of the Municipal Fire Prevention Officer.

9.6.2 Practical Completion and Handover Procedures

At the completion of works relating to bushfire mitigation, the Superintendent shall contact the Country Fire Authority to arrange an inspection for certification of practical completion of the works.

9.7 Statement of Compliance

Prior to consenting to the Statement of Compliance, the following is required:

- The engineering and landscape works must have either reached **Practical Completion** or Council has accepted a **bond for uncompleted works**;
- Payment of **construction supervision fees** in accordance with Clause 5 of the *Subdivision (Permit and Certification Fees) Regulations* (currently to the value of 2.5% of the total estimated cost of constructing the works which are subject to supervision);
- Payment of any **non-standard public lighting fees** in accordance with this manual or the Planning Permit. Where non-standard public lighting fees apply, a public lighting plan approved by the current Service Provider shall also be submitted.
- **“As constructed”** survey data and asset information in electronic format in accordance with this Manual and other documentation required by the Planning Permit;
- Completed **Inspection and Test Plans**;
- **Certificates of Compliance** for any structural works;
- **Completed reports**, maintenance plans and other documentation required by the Planning Permit;
- Payment of any required **maintenance bonds** for the infrastructure or bushfire management works.



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PART C
ENGINEERING DESIGN

10. Road Design

10.1 Introduction

This section sets out the standard design criteria for road works. It is not intended to prohibit any alternative arrangements or approaches. Innovative or non-standard designs may be considered, but not necessarily accepted. Sufficient data and principles of design for any innovative or non-standard design shall be submitted for consideration.

Aspects not specifically referred to in this Manual should be generally in accordance with the following documents:

- Austroads: Guide to Road Design, incorporating AGRD01 to AGRD07 and all sub-sections.
- Standard Drawings appended.

10.2 Design Criteria

10.2.1 Operating Speed

The desired maximum operating speed, on which the geometric design of each road type is based, shall be:

Table 2 Operating Speeds

Zone	Road Type	Maximum Operating Speed
Residential	Access Lane, Place and Street (Level 1 & 2)	50 km/h
	Connector Road	60 km/h
	Trunk Connector	60 km/h
Commercial Streets		50 km/h
All	Arterial	Road Authority Specifies

*** Note that the design speed is not necessarily the posted or operating speed.**

10.2.2 Design Vehicle

The design vehicle(s) to be adopted shall be selected in accordance with the current version of the “**Austroads Design Vehicles and Turning Path Templates**”. Turning radii and vehicle speeds used in road design shall be confirmed with Council at the commencement of design development.

10.3 Sight Distance

The requirements for sight distance on all roads and intersections shall be in accordance with the current Austroads Guide to Road Design.

10.4 Horizontal Alignment

10.4.1 General

Horizontal alignment of all roads shall be designed in accordance with the requirements of **Austroads Guide to Road Design**.

10.4.2 Superelevated

Where curves are superelevated, it is necessary to ensure that any low points in the kerb and channel resulting from the application of superelevation are adequately drained.

10.5 Vertical Alignment

10.5.1 Longitudinal Grades

Maximum Grades

The desirable maximum grades, listed in the following table, are to be considered the maximum for normal design purposes.

Where the topography makes it difficult to provide a road location which will conform to desirable maximum grades, grades up to those shown as “Absolute Maximum” grades may be used.

In extreme cases, the use of grades steeper than “Absolute Maximum” values may be approved, provided that:

- all possible alternatives have been fully investigated and proven to be impracticable; and
- the grades and access arrangements resulting from steeper grades are proven to be practicable.

Table 3 Vertical Grades

Zone	Road Type	Desirable-Maximum	Absolute-Maximum
Residential	Access Lane, Place and Street	10%	20%
	Connector Street	8%	10%
	Trunk Connector	6%	10%
Commercial	Access Lane, Place and Street	6%	10%
	Trunk Connector	6%	8%
Arterial	Frontage Access	6%	8%
	No Frontage Access	5%	7%



The designer shall check and comply with the current grading requirements of the relevant **fire authority**.

Minimum Grades

The minimum grades for all roads, based on kerb and channel drainage requirements, shall be:

- Desirable Minimum 0.50%
- Absolute Minimum 0.33% (subject to Council approval)

10.5.2 Vertical Curves

General

A vertical curve, of parabolic form, shall be provided at every change of grade where the arithmetic change of grade is more than:

- Access, Collector and Trunk Collector - 1.0%
- Arterial roads - 0.6% (with an operating speed of 80kph or greater)

Every effort should be made to provide lengthy vertical curves for improved appearance.

Generally, the minimum length of a vertical curve shall be 15m.

All vertical curves shall be designed in accordance with **Austrroads Guidelines**.



10.6 Standard Cross-Section

The standard cross section for various roads in new subdivisions shall be in accordance with the relevant **PSP** for the area. Basis for the standard cross sections is outlined in the **PSP Guidelines and associated Road note/s**. Elements of the standard cross sections are outlined as follows.

10.6.1 Cross-Section Elements

Standard Cross Section elements shall be as follows:-

Table 4 Road Elements

	<i>Access Lane</i>	<i>Access Place</i>	<i>Access Street 1</i>	<i>Access Street 2</i>	<i>Connector Street</i>	<i>Trunk Connector (2 lane)</i>	<i>Secondary Arterial</i>	<i>Primary Arterial</i>
Traffic Volume (vpd)	300	300 - 1000	1000 - 2000	2000 - 3000	3000 - 7000	7000-12000	12000 - 40000	>30000
Target Operating Speed (kph)	10	15	30	40	50	60	60-70	70-80
Carriageway Width (m) ¹	7.0 ¹²	5.5 ²	7.3	6.0	7.0	3.5 lane each way	2x10.5 ⁷	2x10.5 ⁷
Parking Within Street	None	Unmarked	Unmarked	2.3 marked lanes both sides	2.3 marked lanes both sides	2.3 marked	Generally none. 2.3 indented adjacent to activity centres	None
Verge Width (m) ³	0.5 ¹² (If required)	4.35 ⁹	4.35 ⁹	4.7 min each side	5.0 min each side	5.0 min each side	6.5 min each side	6.5 min each side
Kerbing ⁵	Subject to pavement cross fall	600B2, SM2 ¹⁰	600B2, SM2 ¹⁰	600B2, SM2 ¹⁰	600B2, SM2 ¹⁰	600B2, SM2 ¹⁰	SM2	SM2
Footpath Provision ⁸	None	2x1.5 ⁴	2x1.5	2x1.5	2x1.5	2x1.5	2x1.5 min	2x1.5 min
Cycle Path/Lane Provision ⁸	None	None	None ⁶	Optional	2x1.7	2x1.7	2.0 on-road both sides. 3.0 shared paths both sides off-road. Preference for segregated Pedestrian and Cycle paths.	2.0 on-road both sides. 3.0 shared paths both sides off-road. Preference for segregated Pedestrian and Cycle paths.



1. Carriageway Width is line of kerb to line of kerb.
2. 7.3m if parking both sides.
3. Verge Width (measured from face of kerb or invert) include nature strip and footpath (where required).
4. For <300vpd, may be reduced to 1 subject to Council approval.
5. 600B2 and SM2 for standard cross fall, refer to Standard Drawings.
6. Carriageway designed as a shared zone and appropriately signed.
7. 6 lane arterial; if 4 lane arterial is adopted reduce to 2*7.0.
8. Refer Table 5 when shared path required.
9. Verge widths may vary for each side to accommodate services.
10. Use of either 600B2 or SM2 kerb and channel will be subject to Council approval.
11. Refer to the relevant PSP for individual road reserve widths.
12. Minimum Road Reserve width 7 metres. Carriageway width of 7 metres may be reduced to a minimum of 6 metres to allow for services in 0.5 metre verges.

Table 5 Additional Road Elements

Element	Criteria	Dimension
Travel Lane	Absolute min.	3.0m
	Standard	3.5m
	One-way	4.0m
Parking Lane	Minor road	2.1m
	Major road	2.6m
	Connector Street Indented parking lane	2.3m ²
Turn Lane	Minimum	3.0m
	Standard	3.5m
Bicycle lanes (on road)	Desirable lane width	1.5m on Access Street, otherwise 1.7m
Shared path	Desirable	3.0m
	Absolute minimum	2.5m

Element	Criteria	Dimension
Shoulders ¹	Access Road	1.20m
	Collector Road	1.20m
	Arterial Road	2.00m
Nature strip ³	Minimum for street trees	2.8
Footpath	Standard	1.5 m
Footpath offset	(from property line)	0.05 m
Services spacing	Standard	As per RMA code of practice
Median	Absolute min.	1.2m (paved)
	Desirable min.	2.5m (paved)
	Incorporating turn lane	5.2m
	Minimum (for minor street tree planting)	3.0m (grassed)

1. Permanent, rural or interim urban
2. 2.1m is acceptable in low volume collector streets with an on road bicycle lane.
3. The naturestrip is measured from face of kerb or invert to front of the path.



10.7 Cross fall

10.7.1 Normal Cross Section

On straight lengths of two-way road the pavement cross section will normally be graded with the high point (crown) on the pavement centreline, with a fall to each channel.

However, on steep side slopes, the crown may be offset, towards the higher side of the road to obtain better conformity of road levels with the natural side slope.

On divided roads each pavement will normally be graded to fall from the median to the outer channel.

10.7.2 Normal Cross fall

The normal cross fall of pavement and shoulders on straight alignment shall be:

- Bituminous Sealed pavements 3.33% (1 in 30)
- Concrete pavements 1.50% min (1 in 67)
- Bituminous Sealed Shoulders 3.33% (1 in 30)
- Unsealed Shoulders 5.00% (1 in 20)

10.7.3 Maximum and Minimum Cross fall

Where steeper or flatter cross falls than the normal are required, for example at the approach to intersections, or turning circles of cul-de-sacs, the maximum and minimum permissible pavement cross falls shall be:

- Maximum Cross fall 6.67% (1 in 15)
- Minimum Cross fall 2.50% (1 in 40)

Intersections shall be designed to avoid ponding and be free draining.

10.8 Kerb and Channel

10.8.1 Location

Concrete kerb and channel shall be provided on both sides of all urban residential and commercial roads.

10.8.2 Kerb and Channel Types

The standard kerb and channel profile shall be as shown on the Standard Drawings. In general SM2 or 600B2 profiles are to be used in residential developments

Exceptions to the use of these profiles may be considered in the following instances:

- Kerb only may be used with one-way cross fall pavements and reverse fall nature strip on high side;



- Medians & Traffic Islands, where semi-mountable is shown, shall be M2, M3, SM2 or SM3;
- Roundabout outer kerbs shall match the kerb in the intersecting roads. Roundabout splitter islands are to be SM3. Roundabout central island outer kerb shall be SM3;
- For small islands (with an enclosed surface area not greater than 3m²) SM1 may be used;
- Barrier kerb shall be used where the kerb abuts a Council reserve.

10.8.3 Grading

General minimum kerb and channel grade shall be 0.5% (1 in 200); in exceptional circumstances a 0.3% grade may be used subject to Council approval.

Vertical curves should be as long a length as possible. Generally a minimum length of 15m shall be used.

Where the change in grade in a vertical curve will result in excessively long flat areas, the invert grade shall be extended through to the low point to provide a minimum 0.3% grade.

Designers shall limit crest curves that have minimum grade (0.3% to 0.5%) to between 30m and 50m length.

In kerb returns the desirable minimum grade is 0.75% and absolute minimum is 0.50%.

10.8.4 Kerb Radii

Kerb radii shall allow for the nominated design vehicle to move through the swept path without impedance. Swept paths may cross over the road centreline in access lanes, places and streets.

The radius of the kerb and channel, measured to back of kerb, at an intersection shall be selected in accordance with “**Austroads Guide to Road Design Part 3 – Geometric Design**” and current versions of the “**Austroads Design Vehicles and Turning Path Templates**”.

Use of the **Austroads template for a “Standard Service Vehicle” (8.8m)** is recommended where access for domestic waste collection services is the governing criteria.

The following kerb radii are considered to be desirable minimums:

- | | |
|--|---------|
| ● Access Street or Place to any Street | 8.0m* |
| ● Connector or Trunk Connector Street to Trunk Connector or Arterial | 12.50m* |
| ● Arterial to Arterial | 15.00m* |

* Smaller radii may be considered by Council for special circumstances subject to demonstration that vehicle swept paths are acceptable. Swept paths shall be clear of on street parking spaces.



10.9 Footpaths & Nature Strips

10.9.1 Cross-section

The cross-section of footpaths and nature strips shall conform to those shown on Standard Drawings.

In high activity areas, such as schools and shops, the street verge is usually fully paved between title boundary and kerb. In these areas consideration should be given to the provision of a separation treatment between pedestrians and the adjoining roadway to improve safety.

In areas with no footpath, the nature strip shall be graded to accommodate the future addition of a footpath. In these areas, driveways shall be constructed to levels to accommodate the future footpath.

10.9.2 Cross fall

Where concrete footpath paving is to be provided within a street reserve, the footpath cross fall shall be 2.0% towards the road. Nature strip cross falls shall be within the range of 2.5% and 10.0%, towards the road.

Standard cross falls shall not be exceeded at any location where vehicular access to allotments may be required.

10.9.3 Provision of Tactile Ground Surface Indicators

Use of Tactile Ground Surface Indicators (TGSI) shall be in accordance with Council's policy and strategies for disabled access and DDA requirements. The use of TGSI will be minimised by designing for a continuous path of travel in order to avoid their need at minor access street intersections. Changes of footpath direction at crossings are therefore discouraged.

Footpath and Pram Crossings (kerb ramps) in new subdivisions shall be provided in accordance with DDA requirements. Location and alignment shall support the principle of "continuous path of travel" requirements.

TGSI are not required where:

- The geometry of a kerb ramp at an intersection is fully compliant with AS1428.1; and
- The ramp is located on the direct extension of the property line; and
- The top of the ramp is no more than 3000mm from the intersection of property lines.

TGSI are required at all kerb ramps that do not comply with the above, at all mid block crossings, and at high usage vehicle crossovers, e.g. service stations and shopping centre car parks.

Directional TGSI are to be used where a kerb ramp is not located on the direct extension of the property line in an accessible path of travel from the building / boundary line and will lead to warning indicators installed at the crossing (kerb ramp) point.



Directional and warning TGSIs will always be required at mid block pedestrian or school crossings, tram and bus stops.

Refer to the individual Council's **Standard Drawings** or particular requirements of the **Precinct Structure Plan**.

10.10 Access to Frontage Allotments

10.10.1 General

Steep side slopes on the natural surface can result in difficulty in vehicular access to allotments fronting the road.

10.10.2 Driveway Grades

The desirable maximum driveway grade is **25% (1 in 4)** for a residential allotment. In steep terrain, driveway cut or fill earthworks into the allotments are to be shown on the plans so that the driveway access is created with the subdivision works.

Driveways approaching maximum grades shall be checked for clearance using an **85th percentile standard car**.

10.11 Treatments to Minimise Driveway Excavation

Excavation of Driveways and garage sites, on lots on the high side of the road, may be considered where only a small number of lots (e.g. 4 or 5) are affected, such as in a short cutting or at the end of a cul-de-sac.

10.11.1 Offsetting of the Crown and one-way cross fall

In circumstances where the natural cross slope of the existing terrain will lead to unreasonably high cut batters, offsetting the crown or one-way cross fall may be considered.

Offsetting of the crown, on a two-way road, is permissible, provided that sufficient stormwater capacity is retained in the channel and roadway on the high side of the road. Required capacity will depend on catchment, and on the spacing of storm water entry pits. Offset crown widths shall be sufficient to ensure that the crown is able to be laid with asphalt machinery.

A pavement with one-way cross fall may be approved only where drainage requirements can be adequately met.

10.11.2 Reverse Cross fall – Divided Roads

In extreme cases, reverse cross fall, on the uphill lane of divided roads, is permissible provided that adequate drainage capacity is provided in the uphill median channel, and precautions taken to intercept flow at median openings.

10.11.3 Median Cross fall

Median Cross fall, on divided roads, should desirably not exceed a maximum of 16%, with 33% as an absolute maximum, unless a retaining wall is provided and there are no proposed median breaks in the median.

At median openings however, the pavement cross fall shall not exceed 5%.

10.11.4 Modification of the Footpath Cross fall

Modification of the footpath fall will only be considered by Council in extreme circumstance; as this approach may increase the catchment area discharging stormwater into the downhill lots, it shall be avoided where possible.

Reverse fall (away from kerb) nature strips with footpath 'spoon drain' will only be considered by Council in extreme circumstances as this approach requires higher maintenance for drainage without significant access benefits.

10.11.5 A Split-Level Road

Modification of the road section to accommodate a split level road will only be considered by Council in extreme circumstance.

10.12 Vehicular Crossings

Vehicle crossings shall be constructed during road construction unless otherwise required as a condition of the Planning Permit. Residential crossings are to be in accordance with the **Standard Drawings**.


The following variations to the **Standard Drawings** may be considered where:

- There is to be a minimum of 7 metres between crossovers at the kerb. Any variation to this will be at the discretion of the appropriate Council officer.
- The maximum grade of 1 in 10 may be increased where the naturestrip grade is set at a maximum of 1 in 10 in accordance with Section 10.9.2.

10.13 Utility Allocations

Utility Services are an important component of infrastructure provided for new suburbs. If not properly planned the provisions of the services can have a significant detrimental impact on the urban environment, landscape and the affordability of the development.

The location of trunk and larger feeder services should be planned as early as possible and consider future growth and development. Trunk and larger feeder services should be located along arterial roads and collector roads. They should not be placed in Access Streets, Access Places or Access Lanes.



Services should be located in accordance with the “Code of Practice for Management of Infrastructure in Road Reserves”. No portion of the reticulation mains are to be situated within the road pavement or, where provided, the capping layer.

The location of the local reticulation services in Access Streets and Access Places is shown in Appendix H.

For trunk and large feeder services and for the depth to services - refer to the “Code of Practice for Management of Infrastructure in Road Reserves”.

Where larger services are required and there is insufficient space, services authorities should negotiate reduced clearances between services or alternate locations. Service should avoid being placed under road pavements owing to the cost of the additional depth of excavation and structural backfill below pavement subgrade, the additional cost of constructing the pavement and community disruption, damage to the pavement and additional costs when accessing the service.

Where there is insufficient space within the naturestrip to accommodate the services, the provision of a wider road reserves or rerouting the service should be considered. As wider road reserves can impact on housing affordability, proper and timely planning is critical

The “Code of Practice for Management of Infrastructure in Road Reserves” allows trees to be placed over services. The location of property service tapplings (and under pavement service conduits) should not be placed within 2.5 metres of a proposed tree. In establishing service tapping and service conduits locations the Street Planting / Landscaping Plan must be considered.

10.14 Roundabouts

Roundabouts shall be designed according to **Austrroads Guide to Road Design Part 4B: Roundabouts. (AGRD04B/09)**.

10.15 Intersection Threshold Treatments

Where required by the PSP or Planning Permit, threshold treatments shall be provided on the minor road of an intersection; the materials and surfaces of the threshold treatment are subject to Council approval.

10.16 Cul De Sacs and Turning Areas

Where a residential street includes a Cul de Sac or a court, provision must be made for a standard 8.8 metre service vehicle (garbage truck) to turn in a “three point move” (drive in - reverse – drive out) on the pavement area. The vehicle may overhang the kerb provided the area behind the kerb is clear of obstructions. Vehicle crossings must not form part of the paved turn area.

At the temporary end of a street, which will be extended in a later stage of the development, provision must be made for a standard 8.8 metre service vehicle to turn in a “three point move” (drive forward – reverse – drive out) on a paved area. The turning area may comprise either a temporary pavement or residential vehicle crossing. If a vehicle crossing forms part of the temporary turning area it must be constructed as a Heavy Duty Crossing as per EDCM 503.

Refer Figure 10.16.1 for the minimum dimensions of the turning areas.

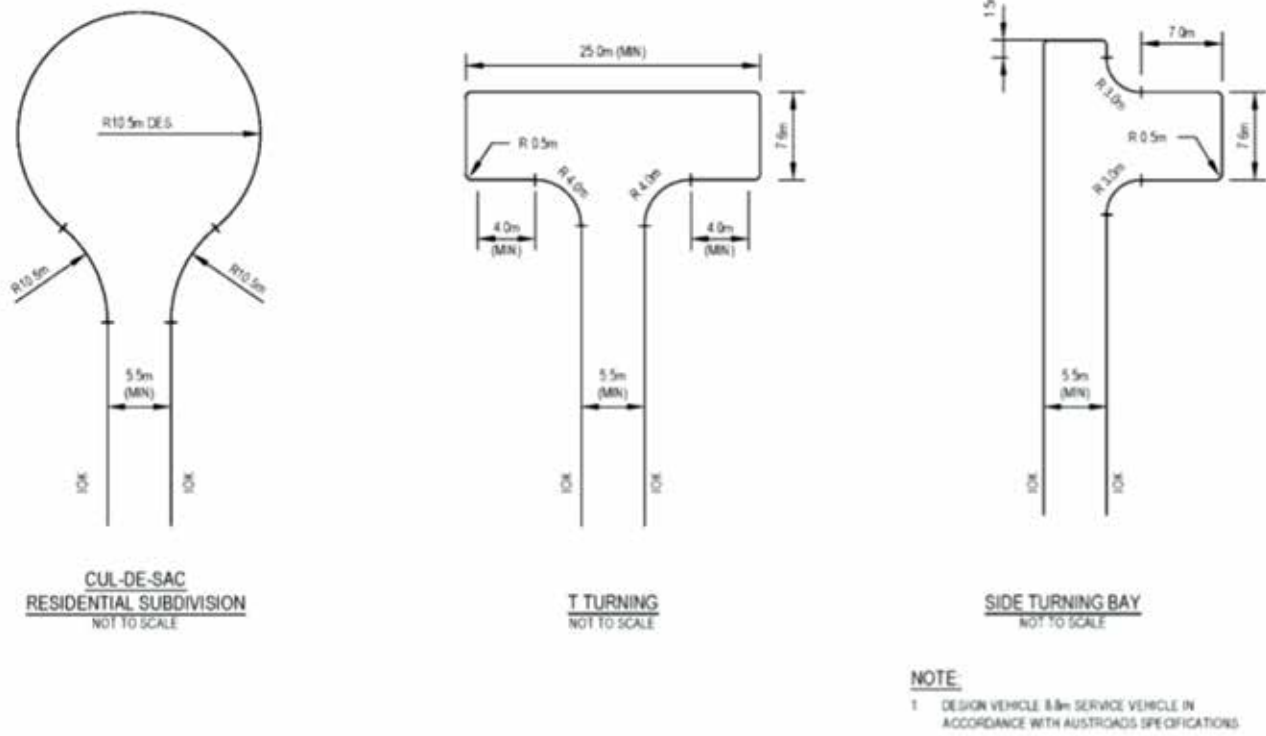


Figure 10.16.1 Minimum Dimensions of Turning Areas

11. Pavement Design

11.1 Scope

The scope of this Section covers the design of pavements for residential subdivisions, including commercial precincts. A variety of pavement types, including flexible granular pavements, full depth or deep strength asphalt pavements and rigid concrete pavements are considered.

For asphalt pavement design, requirements are restricted to the design and construction of road pavements in new urban streets surfaced with not less than **two layers of asphalt and flanked by kerb and channel**. Under special circumstances, Council officers may approve the provision of a single layer of asphalt. Approval will be at the Council officer's discretion and subject to the submission of a suitable pavement design prepared by a Specialist Pavement Engineer.

A minimum of two layers of asphalt has been adopted as the standard. An option to defer the placement of the final wearing course will be at Council's discretion, however the placement of the wearing course must not be deferred for more than 18 months.

11.2 Design References

The design of the pavements shall be carried out by qualified engineering consultants in accordance with this Manual and the principles, practices and procedures detailed in the following design references:

- VicRoads Technical Bulletin No 32 'Drainage of Subsurface Water from Roads';
- Roads and Traffic Authority NSW 'Concrete Roundabout Pavements – A Guide to their Design and Construction';
- Cement and Concrete Association of Australia Publication T51 'Guide to Residential Streets and Paths';
- VicRoads (October 2013). Code of Practice RC 500.22 : Code of Practice for Selection & Design of Pavements & Surfacing. (RC 500.22);
- VicRoads (March 2014). Code of Practice RC 500.20 : Assignment of CBR (Strength) and Percent Swell to Earthworks and Pavement Materials. (RC 500.20);
- VicRoads (Current). Standard Specifications for Roadworks & Bridgeworks. (VicRoads Standard Specifications);
- Austroads (February 2012). Guide To Pavement Technology - Part 2 : Pavement *Structural Design*. Publication No. AGPT02/08. (AGPT02);
- Austroads (May 2013). 'Guide to the Selection & Use of Polymer Modified Binders & Multigrade Bitumens'. (AP-T235-13).

11.3 Qualified Consultants

Pavement design and associated geotechnical field and laboratory investigation testing shall be undertaken by qualified consultants who have relevant experience in the required field of practice. To ensure that this requirement is met, only those consultants who are currently registered on the VicRoads “Register of Pre-Qualified Contractors & Consultants” are eligible to provide services within the categories outlined in Table 6 below.

Table 6 Minimum VicRoads Pre-Qualification Levels

	<i>Description of Service</i>	<i>VicRoads</i>	<i>Prequalification Level</i>
Group	Categories	Levels	Abbreviation
Pavement and Geotechnical Engineering	Pavement Design	Basic Pavement Design	ND1
		Intermediate Pavement Design	ND2
		Advanced Pavement Design	ND3
	Pavement Rehabilitation and Maintenance	Basic Rehab Design - Granular	RM1
		Basic Rehab Design - Flexible	RM2
		Intermediate Rehab Design	RM3
		Advanced Rehab Design	RM4
	Pavement Investigation	Field Investigation	PT1
		Field and Laboratory Testing	PT2
	Geotechnical Services	Investigations	GT-INV
		Design	GT-DES
		Groundwater and Hydrology	GT-GWH
		Pile Testing	GT-PST
		Geotechnical Proof Engineering	GT-PRE



11.4 Pavement Design Parameters

11.4.1 General

The general aim of pavement design is to select the most economical pavement thickness and composition which will provide a satisfactory level of service over the adopted design life taking into account the prevailing subgrade conditions, the characteristics of the materials in the pavement and the anticipated level of traffic.

The pavement design process accordingly requires that a number of input variables be selected and assigned to any particular design. These design parameters are listed below, together with their associated reference in this guide:

- Project Reliability Level (Section 11.4.2)
 - Assignment of a Project Reliability Level for mechanistic pavement design purposes and for design of rigid pavements.
- Subgrade (Section 11.5)
 - Assignment of subgrade strength, its associated classification as expansive or otherwise, capping and construction layer fills, and subgrade improvement measures where required.
- Pavement Materials (Section 11.6)
 - Selection and specification of appropriate pavement materials, their properties, and assignment of associated characteristics to be used in the design process.
- Design Traffic (Section 11.7)
 - Assessment of forecast future traffic for the required design period, including future growth, the proportion of heavy vehicles and their associated loading characteristics.

11.4.2 Project Reliability Levels

The Project Reliability for a particular project is defined as the probability that the pavement, when constructed in accordance with the chosen design, will outlast its design traffic before major rehabilitation is required.

The Project Reliability Level shall be selected by the designer in accordance with Table 7 right for each category of road as appropriate. A designer may choose to select a higher Project Reliability Level if the circumstances for any particular project are warranted.

Table 7 Project Reliability Levels

Road Type	Project Reliability
Access Lane	90 %
Access Place	90 %
Access Street	90 %
Connector Street	90 %
Trunk Connector	90 %
Arterial Road	95 %

The granular pavement design chart in **Appendix B**, applicable for unbound granular pavements surfaced with two layers of asphalt, has been prepared for a Project Reliability Level of 90%.

11.5 Subgrade & Earthworks


11.5.1 Subgrade Evaluation

Subgrade investigation testing, including both field and laboratory testing and associated evaluation and determination of subgrade strength, shall be undertaken in accordance with all relevant Australian Standards and relevant requirements of the following references:

- VicRoads Manual of Codes of Practice, test methods and design guides;
- Standards Australia test methods; and
- Austroads Design Guides.

The scope, extent and location of investigation testing should be commensurate with the location and magnitude of the proposed works. Notwithstanding the requirements outlined in the above guides, the following minimum testing shall be undertaken for each project for the purpose of characterising the nature and condition of the subgrade:

- excavation of test bores or pits to a depth of at least 1.0 m or more than 0.5m below the proposed subgrade (whichever is the greater), at intervals not exceeding 120 m, with a minimum of 3 test sites on any one project;
- dynamic cone penetrometer testing and measurement of field moisture content at each test site;
- grading and Atterberg limit testing on at least 2 representative samples of subgrade material; and
- laboratory soaked (4 day) CBR tests on at least 2 representative laboratory remoulded samples of subgrade material.



If rock is encountered during the field investigation, the requirement to excavate bores or pits to a depth of 1.0 m may be waived.

11.5.2 Maximum Subgrade Design CBR

To ensure that uniform minimum pavement design standards are met, the subgrade design CBR assigned for pavement design purposes **shall not exceed 10%**.

11.5.3 Expansive Subgrades

Subgrade Classification

Subgrade materials with an assigned swell $\geq 2.5\%$ as determined in accordance with RC 500.20 shall be classified as expansive for the purpose of this guide. These materials are categorised by AGPT02 to be at least very highly expansive.

Treatment of Expansive Subgrades

Since expansive subgrades exhibit seasonal volume changes with resulting shape loss and environmentally induced cracking, appropriate measures shall be incorporated into the design of the pavement as outlined in RC 500.22 Section 5.2 and AGPT02 Section 5.3.5.

These shall include, without being limited to, incorporation of the following features into the design in accordance with the referenced sections of this guide :

- minimum total pavement thickness as specified herein;
- provision of a capping layer as specified herein; and
- attention to the placement of subsurface drainage as specified herein.

11.5.4 Weak Subgrade

In addition to the pavement composition requirements outlined in this guide, an appropriate working platform may be incorporated into the pavement structure.

11.5.5 Construction Layer

Where an expansive subgrade material is experienced a construction layer and capping layer must be incorporated into the pavement structure at the time of construction to facilitate placement and compaction of subsequent pavement layers.

Where a construction layer is incorporated into the pavement structure, the usual requirements for compaction shall apply. Capping layer material must be used in the construction layer. This has the advantage of allowing for the placement of a thicker construction layer, within the range of 200-250mm, where subgrade conditions warrant the additional improvement. In the case of test rolling however, only the construction layer will be required to be test rolled so as to withstand visible deformation and springing. The requirement to test roll the natural subgrade or any additional improvement layers, may be waived.

Additional subgrade improvement is most often required because of the presence of unsuitable materials or the presence of high moisture contents at the time of construction. In determining the need for additional subgrade improvement, it is important to take into account the potential for the subgrade to be weakened if drainage of the formation is inadequate during construction.

Any isolated small areas of subgrade which are weaker than the subgrade CBR assigned for design of the pavement, or which are weak at the time of construction, shall be treated by excavation to a sound base and backfilled to subgrade level with capping layer material or a material approved by Council.

11.5.6 Capping Layer

To ensure that long term environmental effects are minimised, a construction layer shall be placed immediately above subgrades classified as being expansive. A capping layer shall be placed over the construction layer comprising imported capping layer material, with the following additional properties:

- assigned swell $\leq 1.5\%$; and
- permeability $\leq 5 \times 10^{-9}$ m/sec.

In addition to the material properties outlined above, the capping layer shall have the following minimum physical characteristics:

- thickness ≥ 150 mm, or 2.5 times the maximum particle size of the capping layer material, whichever is the greater; and
- extend for a distance ≥ 0.6 m behind the back of kerb and channel, or the edge of the pavement if there is no kerb and channel, except for arterial roads where the distance shall be ≥ 1.2 m.

When selecting the final thickness of the capping layer, designers are to take account of the prevailing subgrade conditions and the geometric constraints of containing the subsurface drain wholly within the capping layer.

11.6 Pavement Materials

11.6.1 General

Pavement materials shall be designed to be supplied, placed and compacted in accordance with the version of the VicRoads Standard Specifications current at the time of commencing the pavement design. The principal requirements relating to the following materials selected for pavements designed in accordance with this guide are outlined in the sections below.

11.6.2 Asphalt

Wearing Course Asphalt

Designers are required to pay particular attention to the selection of wearing course asphalt at roundabouts and at signalised intersections on Connector Streets and Arterial Roads where the computed HVs/lane > 500 hvpd in accordance with RC 500.22 **Appendix D**.

Bitumen Crumb Rubber Asphalt

Bitumen crumb rubber asphalt is a special standard VicRoads mix incorporating a crumb rubber modified bitumen binder to the aggregate or mixing aggregate and rubber granules with the bitumen. It requires higher ambient temperatures for placing than conventional asphalt. Asphalt containing crumb rubber binder shall not be placed when the majority of the area to be paved has a surface temperature $< 15^{\circ}\text{C}$.

SAMI Treatment (Strain Alleviating Membrane Interlayer)

SAMI Treatment consists of a Size 10 sprayed seal using Class S45R, S25E and S18RF bitumen crumb rubber binder placed at an application rate $\geq 1.8 \text{ l/m}^2$ and covered with a light application of pre-coated Size 10 aggregate. The Class S18RF Binder shall be produced using not less than 20 parts of crumb rubber (18%) by mass of binder. The volume of carrier oil used before any cutting oil is added shall not exceed 4 parts by volume of binder. It is important that there is no loose aggregate remaining on the SAMI surface when the base course asphalt is placed so as to ensure a strong bond between the SAMI treatment and the subsequent asphalt layer. The SAMI treatment shall be preceded by placement of a bituminous prime and not a primerseal, applied to the underlying unbound base material.

Bituminous Prime

In the case of all unbound granular pavements, a prime, or alternatively a primerseal, shall be selected and designed by the contractor and applied to the top of the base course crushed rock. Its role is to bind the subsequent asphalt base course to the crushed rock base and to waterproof the pavement.

Where a primerseal is selected, it shall comprise:

- o Size 5 or Size 7 bitumen emulsion primerseal (not exceeding 60% bitumen content)
- o Application of residual binder of $> 0.9 \text{ l/m}^2$.
- o Aggregate spread rate $\geq 200 \text{ m}^2/\text{m}^3$

11.6.3 Unbound Granular Pavements

Minimum requirements for materials to be selected for use in unbound granular pavements are :

- Base
 - o 20 mm Class 2 crushed rock
- Upper Subbase
 - o 20 mm Class 3 crushed rock, or better, or
 - o 20 mm Class CC3 crushed concrete, or better, or
 - o 40 mm Class 3 crushed rock (for layer thickness in the range of 150-200 mm on non expansive subgrades).
- Lower Subbase
 - o Class 4 crushed rock or better, or
 - o Class CC4 crushed concrete or better, or

- o subbase quality gravel, sand or soft and rippable rock with previous proven performance and a laboratory soaked CBR \geq 15%, or
- o imported or in-situ lime, cement, bitumen or mechanically stabilised materials or a combination of these with a laboratory soaked CBR \geq 15%.

11.6.4 Asphalt Pavements

Minimum requirements for materials to be selected for use as subbase in asphalt pavements, comprising either deep strength asphalt or full depth asphalt, are outlined in RC 500.22 Sections 7.2.2, 11.2 and 11.4.

11.7 Design Traffic

11.7.1 Design Period

Calculation of Design Traffic shall be based upon a **minimum design period of 20 years for a flexible pavement** and **40 years for a rigid pavement**. A designer may choose to select a longer design period if the circumstances for any particular project are warranted.

11.7.2 Calculation of Design Traffic

Calculation of Design Traffic shall be undertaken in accordance with RC 500.22 and AGPT02 to suit the characteristics and requirements of each particular project. In addition to the design period outlined above, the calculations will require an appropriate assessment of the following input data :

- forecast total traffic over the duration of the design period, including any necessary provision for future traffic growth;
- the proportion of heavy vehicles, including waste management vehicles, and an allowance for buses where the street will form part of a bus route;
- heavy vehicle traffic generated by construction during development of subdivisions in the case of Access Lanes, Access Places and Access Streets;
- vehicular trafficking patterns including the directional split, vehicle wander on wide pavements and lane distribution on multi-lane roads; and
- heavy vehicle load factors, incorporating the average number of HVAG per HV, and the average number of ESA per HVAG in the case of flexible pavements.

Typical Design Traffic parameters for residential subdivisions are outlined in **Appendix B** and are provided as a guide only. The data shall not be used as a substitute for the designer making an assessment of relevant parameters for each particular project, particularly in the case of industrial subdivisions where detailed heavy vehicle traffic forecasts are necessary.

Where the width of a street, or the presence of parked vehicles, results in two way traffic either partially or fully using the same travel path, consideration needs to be given to assignment of the appropriate Direction Factor, required to be within the range of 0.5 to 1.0.



11.7.3 Minimum Permissible Standards

To ensure that minimum pavement design standards are met, of the resultant computed Design Traffic Loading, DESA, shall not be less than that outlined in Appendix B for the corresponding AADT.

To take into account the heavy vehicle traffic generated by construction during development of subdivisions, the Design Traffic computed for design of flexible pavements, DESA, shall be increased by not less than the values outlined in Table 8 below.

Table 8 Minimum Increase In DESA

<i>Road Type</i>	<i>DESA Increase</i>
Access Lane	5 %
Access Place	4 %
Access Street	3 %

11.8 Flexible Pavement Design

For all pavement designs where the DESA is $>1.0 \times 10^5$, the pavement design **must** be supported by CIRCLY modeling.

11.8.1 Non-Expansive Subgrades

Unbound Granular Pavements

Where subgrades are defined as non-expansive, the use, thickness and composition of unbound granular pavements shall satisfy the following criteria :

- only permissible where $DESA \leq 3 \times 10^6$ ESA
- two layers of asphalt surfacing to allow staged construction of new subdivisions, and
- the design chart in **Appendix B**, subject to the minimum requirements outlined in Table 9 right.



Table 9 Unbound Granular Pavements on Non-Expansive Subgrades

<i>Road Type</i>		<i>Access Lane</i>	<i>Access Place</i>	<i>Access Street 1</i>	<i>Access Street 2</i>	<i>Connector Street</i>
	Pavement Type	N1	N2	N3	N4	N5
	Max Permissible DESA (ESA)	5.0×10^4	2.0×10^5	5.5×10^5	8.0×10^5	$\leq 3.0 \times 10^6$
Wearing Course	Size 7 Type L Asphalt (Class 320 binder)	20 mm *	--	--	--	
	Size 10 Type L Asphalt (Class 320 binder)	--	30 mm *	--	--	
	Size 10 Type N Asphalt (Class 320 binder)	--	--	30 mm	--	
	Size 14 Type N Asphalt (Class 320 binder)	--	--	--	40 mm	40 mm
Base Course	Size 10 Type N Asphalt (Class 320 binder)	30 mm	30 mm	30 mm	--	
	Size 14 Type N Asphalt (Class 320 binder)	--	--	--	40 mm	40 mm
Bituminous Prime	Prime or primerseal	yes	yes	yes	yes	yes
Base	Base Material refer Section 11.6.3	140 mm	130 mm	130 mm	110 mm	110 mm
Upper Subbase	Upper Subbase Material refer Section 11.6.3	100 mm min	100 mm min	100 mm min	100 mm min	100 mm min
Lower Subbase	Lower Subbase Material refer Section 11.6.3	--	--	(varies)	(varies)	(varies)

* - Class 170 binder may be used, subject to Council approval

Asphalt Pavements

Where subgrades are defined as non-expansive, the use, thickness and composition of asphalt pavements, comprising either deep strength asphalt or full depth asphalt as defined by RC 500.22, shall satisfy the following criteria :

- Section 11 and **Appendix D** of RC 500.22, subject to the minimum requirements outlined in Table 10 below.

Table 10 Asphalt Pavements on Non-Expansive Subgrades

	<i>Road Type</i>	<i>Connector Street</i>	<i>Trunk Con. & Arterial Roads</i>
	Pavement Type	N6	N7
	Max Permissible DESA (ESA)	3.5 x 10⁶	No Limit
Wearing Course	Size 14 Type N Asphalt	40mm	--
	Size 14 Type H Asphalt (or better)	--	40mm
Intermediate Course	Size 20 Type SI Asphalt (or type SS)	(varies)	(varies)
Base Course	Size 20 Type SI Asphalt (or type SF)	75mm	75mm
SubBase	Cementitious material	100mm min - 180mm max	100mm min - 180mm max
	Unbound material	100mm min	100mm min

NOTE: The minimum total asphalt thickness of the combined wearing, intermediate and base course thicknesses is to be 190mm to match the adjacent kerb profile.

11.8.2 Expansive Subgrades

Unbound Granular Pavements

Where subgrades are defined as expansive, the use, thickness and composition of unbound granular pavements shall satisfy the following criteria:

- only permissible where $DESA \leq 3 \times 10^6$ ESA
- two layers of asphalt surfacing to allow staged construction of new subdivisions;
- the design chart in **Appendix B**, subject to the minimum requirements outlined in Table 11A and 11B below; and
- minimum total thickness defined by the expansive subgrade curve in Appendix B.

Note that a Bitumen Crumb Rubber Asphalt Base Course (Table 11A) or the use of a SAMI Treatment (Table 11B) is mandatory for all pavements on expansive subgrades.

Table 11A Unbound Granular Pavements On Expansive Subgrades

	<i>Road Type</i>	<i>Access Lane</i>	<i>Access Place</i>	<i>Access Street 1</i>	<i>Access Street 2</i>	<i>Connector Street</i>
	Pavement Type Max Permissible DESA (ESA)	E1 5.0 x 10⁴	E2 2.0 x 10⁵	E3 5.5 x 10⁵	E4 8.0 x 10⁵	E5 ≤3.0 x 10⁶
Wearing Course	Size 7 Type L Asphalt (Class 320 binder)	20 mm *	--	--	--	
	Size 10 Type L Asphalt (Class 320 binder)	--	30 mm *	--	--	
	Size 10 Type N Asphalt (Class 320 binder)	--	--	30 mm	--	
	Size 14 Type N Asphalt (Class 320 binder)	--	--	--	40 mm	40 mm
Base Course	Size 10 Bitumen Crumb Rubber Asphalt	30 mm	30 mm	30 mm	--	
	Size 14 Bitumen Crumb Rubber Asphalt	--	--	--	40 mm	40 mm
Bituminous Prime	Prime or Primerseal	yes	yes	yes	yes	yes
Base	Base Material refer Section 11.6.3	140 mm	130 mm	130 mm	110 mm	110 mm
Upper Subbase	Upper Subbase Material refer Section 11.6.3	100 mm min	100 mm min	100 mm min	100 mm min	100 mm min
Lower Subbase	Lower Subbase Material refer Section 11.6.3	--	--	(varies)	(varies)	(varies)
Capping Layer	Capping Layer Material	150 mm min	150 mm min	150 mm min	150 mm min	150 mm min
Construction Layer	Capping Layer Material or in-situ Stabilised Material (refer Section 11.5.5)	150 mm min	150 mm min	150 mm min	150 mm min	150 mm min

* - Class 170 binder may be used, subject to Council approval

Table 11B Unbound Granular Pavements On Expansive Subgrades

	<i>Road Type</i>	<i>Access Lane</i>	<i>Access Place</i>	<i>Access Street 1</i>	<i>Access Street 2</i>	<i>Connector Street</i>
	Pavement Type Max Permissible DESA (ESA)	E1 5.0 x 10⁴	E2 2.0 x 10⁵	E3 5.5 x 10⁵	E4 8.0 x 10⁵	E5 ≤3.0 x 10⁶
Wearing Course	Size 7 Type L Asphalt (Class 320 binder)	20 mm *	--	--	--	
	Size 10 Type L Asphalt (Class 320 binder)	--	30 mm *	--	--	
	Size 10 Type N Asphalt (Class 320 binder)	--	--	30 mm	--	
	Size 14 Type N Asphalt (Class 320 binder)	--	--	--	40 mm	40 mm
Base Asphalt Course	Size 10 Type N Asphalt (Class 320 binder)	30 mm	30 mm	30 mm	--	
	Size 14 Type HP Asphalt (Class A10E binder)	--	--	--	40 mm	40 mm
SAMI	Size 10 S18R (Note 1)	yes	yes	yes	yes	yes
Bituminous Prime	Prime	yes	yes	yes	yes	yes
Base (Note 2)	Base Material refer Section 11.6.3	140 mm	130 mm	130 mm	110 mm	110 mm
Upper Subbase	Upper Subbase Material refer Section 11.6.3	100 mm min	100 mm min	100 mm min	100 mm min	100 mm min
Lower Subbase	Lower Subbase Material refer Section 11.6.3	--	--	(varies)	(varies)	(varies)
Capping Layer	Capping Layer Material	150 mm min	150 mm min	150 mm min	150 mm min	150 mm min
Construction Layer	Capping Layer Material or in-situ Stabilised Material (refer Section 11.5.5)	150 mm min	150 mm min	150 mm min	150 mm min	150 mm min

* - Class 170 binder may be used, subject to Council approval

Note 1: Pavement thickness derived from Figure 3 does not include the thickness of the SAMI layer. The thickness of the pavement derived from Figure 3 should be increased by 5mm to allow for the thickness of the SAMI layer.

Note 2: To accommodate the asphalt layers, SAMI and Base course shown, the dimension of the kerb and channel at the lip, as shown on the standard drawings as 190mm, must be increased to 200mm from the lip of the tray to the underside of the kerb (or top of subbase).

Asphalt Pavements

Where subgrades are defined as expansive, the use, thickness and composition of asphalt pavements, comprising either deep strength asphalt or full depth asphalt as defined by RC 500.22, shall satisfy the following criteria:

- Section 11 and **Appendix D** of RC 500.22, subject to the minimum requirements outlined in **Table 12** below; and
- minimum total thickness defined by Figure 5.1 of RC 500.22, or by the expansive subgrade curve in **Appendix B** where $DESA < 1.0 \times 10^5$ ESA.

Table 12 Asphalt Pavements on Expansive Subgrades

	<i>Road Type</i>	<i>Connector Street</i>	<i>Trunk Con. & Arterial Roads</i>
	Pavement Type	E6	E7
	Max Permissible DESA (ESA)	3.5×10^6	No Limit
Wearing Course	Size 14 Type N Asphalt	40mm	--
	Size 14 Type H Asphalt (or better)	--	40mm
Intermediate Course	Size 20 Type SI Asphalt (or type SS)	(varies)	(varies)
Base Course	Size 20 Type SI Asphalt (or type SF)	75mm	75mm
SubBase	Cementitious material	100mm min - 180mm max	100mm min - 180mm max
	Unbound material	100mm min	100mm min
Capping Layer	Capping Layer Material	150mm min	150mm min
Construction Layer	Capping Layer Material or in-situ Stabilised Material (refer Section 11.5.5)	150mm min	150mm min

NOTE: The minimum total asphalt thickness of the combined wearing, intermediate and base course thicknesses is to be 190mm to match the adjacent kerb profile.

11.8.3 Pavement Design Speeds

Unbound Granular Pavements

In view of the requirement for unbound granular pavements to be surfaced with two layers of asphalt as specified in Sections 11.8.1 and 11.8.2 above, the Granular Pavement Design Chart in **Appendix B** has been derived from mechanistic design procedures using CIRCLY on the basis of the following pavement design parameters :

- Project Reliability Level of 90%; and
- Pavement Design Speeds of both 10 km/h and 40 km/h, applicable for a designated speed limit of up to 60 km/h.

If there are circumstances for a particular project where the use of parameters other than those outlined above is warranted, designers will need to check their proposed designs in order to satisfy any necessary alternative design criteria.

This is particularly important in relation to the adoption of pavement design speeds as specified in RC 500.22 Table 11.1 for designated speed limits > 60 km/h. For the unbound granular pavements outlined in this guide, there would be a detrimental effect on the fatigue life of the asphalt surfacing because of the consequential elastic layer properties required to be used in the mechanistic design process.

Asphalt Pavements

Unlike the unbound granular pavements surfaced with two layers of asphalt discussed above, asphalt pavements, comprising either deep strength asphalt or full depth asphalt as defined by RC 500.22, will require thickening where the pavement is located in the following locations :

- at roundabouts and at signalised intersections; or
- where the designated speed limit is ≤ 40 km/h.

Designers are also required to pay particular attention to the selection of wearing course asphalt on Connector Streets and Arterial Roads in these locations where the computed HVs/lane > 500 hvpd in accordance with RC 500.22 **Appendix D**.

11.9 Rigid Pavement Design

Design of rigid pavements, including associated minimum requirements for pavement thickness and composition, and reinforcement and jointing design procedures, shall be undertaken in accordance with the design method outlined in **Table 13** below.

Table 13 Rigid Pavement Design Method

<i>Design traffic</i>	<i>Design Method</i>
< 1.0 x 10 ⁶ HVAG	AGPT02 - Section 12.9
≥ 1.0 x 10 ⁶ HVAG	RC 500.22 - Section 12

Where subgrades are defined as expansive, the following additional design criteria will also be required to be satisfied :

- minimum total pavement thickness defined by Figure 5.1 of RC 500.22, or by the expansive subgrade curve in **Appendix B** where $DESA < 1.0 \times 10^5$ ESA; and
- inclusion of a Capping Layer with a thickness ≥ 150 mm.

11.10 Subsurface Pavement Drains

11.10.1 General

Subsurface pavement drains shall be provided in association with all kerb and channel. The design and location of drains or filter blankets shall be carried out in accordance with the requirements of RC 500.22 Section 6 and Standard Drawing EDCM 202

11.10.2 Expansive Subgrades

Where the subgrade is classified as being expansive, subsurface pavement drains shall be designed to be contained wholly within the capping layer. In addition, no part of the subsurface drainage trench shall be located within 100 mm of the underlying subgrade. If necessary, the capping layer may have to be thickened to satisfy this requirement. Refer Standard Drawing EDCM 202.

12. Earthworks Design

12.1 General

Objectives which should be met for earthworks and lot filling are:

- To ensure that development does not cause or aggravate flooding of other properties by filling land or undertaking other flood diversion works;
- To ensure that buildings are located on a natural surface above the 1% AEP flood level or on approved filled ground, so as to comply with the constraints of Regulation 6.2 of the Building Regulations 1994 and the Health Act;
- To ensure that the recommendations of the Catchment Management Authorities or other relevant agencies or organisations are complied with;
- To ensure earthworks and lot filling activities do not result in the spread of noxious weeds, as per Section 70A and 71 of the Catchment Management and Land Protection Act 1994;
- To ensure that earthworks and lot filling works does not result in erosion dust, mud or debris leaving the site; and
- To maintain privacy and security of adjacent landowners.

12.2 Planning & Engineering Requirements

Typical earthworks may include lot filling or the construction of open drainage systems, levees, access tracks, flood protection devices overland flow paths and vegetation removal.

Assessment of design submissions should focus on the above objectives and achievement of suitable road and drainage systems. Engineering approval does not negate the need for planning approval of such earthworks.

For any earthworks which are separate from subdivision works a planning permit shall be obtained and engineering plans submitted for approval shall be accompanied by a construction specification. Where works are to be staged it is recommended that consideration be given to the entire site and not individual stages. This will eliminate the need for multiple planning permits. Existing depressions shall not be filled unless the consent of the Relevant Authority is given in writing, and any required permits obtained.

12.3 Earthworks and Filling Requirements

The following earthworks and lot filling requirements apply to all developments:

- All allotments shall be graded from either the rear to front or front to rear, by cutting or filling, such that a desirable minimum grade of 0.67% (1:150) is achieved from the high point of the allotment toward the low side of the allotment having the drainage outlet; an absolute minimum grade of 0.5% (1 in 200) will be considered in extreme circumstances. Grades shall be calculated along the side boundary of the allotment.
- The finished floor level of all lots shall be a minimum of 150mm above the 100 year ARI (1% AEP) flood level, or as otherwise specified in the planning permit or by the responsible drainage authority;

- The extent and depth of all proposed filling shall be shown on construction plans. Where depths of fill on allotments exceeds 300 mm, those areas are to be clearly differentiated from fill of depth less than 300mm;
- Full records shall be kept of all areas filled. The areas filled, the depths of fill and the finished surface levels shall be recorded on the “as constructed’ plans. Refer to Part D of this Manual for additional details regarding construction;
- Details of the safety and integrity of any structure shall be provided to the Council where earthworks abut structures;
- Concentrated stormwater runoff must not flow onto adjoining properties;
- Natural overland flow paths in adjoining properties must be accommodated and any restriction or alteration must not cause detriment to adjoining properties; and
- All reasonable precautions must be taken to prevent the spread of noxious weeds from or to the worksite.

13. Drainage Design

13.1 Introduction

This section of the Manual outlines the relevant standards necessary to meet best practice and accommodate various needs in relation to the design and construction of stormwater systems, and more generally to ensure the management of stormwater fits within an overall integrated water management approach for residential subdivision development.

Innovative or non-standard approaches to design may be considered subject to sufficient data and supporting details being provided on the philosophy and principles that are proposed.

The drainage design shall:

- Incorporate water quality and water quantity treatment measures to enhance quality of the drainage runoff before discharging it to a creek or other main drainage network; and
- Maintain pre-development flows at the outlet from the subdivision, unless otherwise approved by the responsible drainage authority.

Council is the responsible authority for all drainage works outside the authority of the relevant regional catchment management authority. All cross drainage works on creeks and waterways shall be to the approval of the regional catchment management authority. For other minor and major drainage, Council is the responsible drainage authority.

13.1.1 Stormwater and Water Sensitive Urban Design

Relevant Victorian Planning Provisions (ie: urban runoff management objectives, Standard C25, etc) requires that stormwater run-off from residential subdivisions in an urban area comply with the **Urban Stormwater – Best Practice Environmental Management Guideline (BPEMG)**.

In particular cases, there may be specific Water Sensitive Urban Design Guidelines that are agreed between Melbourne Water and the relevant Council. Where these exist, there may be variations between particular Council areas.

Designers will therefore need to refer to any such specific guidelines.

13.1.2 Drainage Design References

Design and construction of stormwater management systems for residential development needs to be in accordance with the current edition/version of the following documents :

- “Urban Stormwater – Best Practice Environmental Management Guideline”, EPA, CSIRO, Melbourne Water et al;
- “Australian Runoff Quality Guidelines”, Engineers Australia;
- “Australian Rainfall and Runoff”, Institution of Engineers Australia, (AR&R);
- “Land Development Manual”, Melbourne Water;
- “Drainage Design Guidelines”, VicRoads;
- “Fibre Reinforced Concrete Pipes” AS 4139; and
- “Design for Installation of buried concrete pipes” AS 3725.

13.2 Planning & Layout

Where required in proposed developments, the drainage system shall accommodate runoff from the upstream catchment, and provide for downstream drainage works.

Council and regional catchment management authority schemes shall be shown on plans. Main drains should follow the valleys in reasonably straight alignments, with a minimum of deviation. Natural drainage paths shall be preserved, in the form of roadways, parkland, walkways, etc., and shall have a discharge capacity at least equal to that of the pipe drain.

Private allotments will not be permitted downstream of low points in roadways, downhill court bowls, or any other locations where drainage flows may concentrate.

Gap flows shall be confined to roadways and reserves and under no circumstances encroach onto private allotments. Freeboard is permitted to extend a limited distance into allotments in accordance with the provisions of **Section 13.22.3 – Freeboard.**

13.3 Computation of Runoff

Computation of runoff shall be determined using the **Rational Method**:

$$Q = CIA/360$$

Where Q = design discharge (m³/s)

C = runoff coefficient

I = rainfall intensity (mm/h)

A = catchment area (ha)

For large catchments the designer shall be responsible for ensuring that possible 'Partial Area Effects' are taken into account when calculating peak flows using the Rational Method.

Hydraulic programs using other than the Rational Formula may be permitted by Council.

13.4 Rainfall Intensity

Australian Rainfall and Runoff shall be used to calculate rainfall intensities for the relevant location.

13.5 Average Exceedance Probability

The following values shall be used for drainage design; they do not apply for Water Sensitive Urban Design schemes.

Table 14 Average Exceedance Probabilities

Urban Residential Areas	20% (Q5)
Industrial and Commercial Areas	10% (Q10)
Floodways	Gap Flow or 1% (Q100) if no pipe is provided

13.6 Time of Concentration

Table 15 Times of Concentration

Development Category	Maximum Time of Concentration (t_c) For flow to enter system (minutes)	Average Recurrence Interval (Years)
MINOR SYSTEM	-	-
Road Reserves:		
Access Lane	5	5
Access Place	5	5
Access Street	6	5
Connector Street	6	5
Trunk Connector Street	6	5
Secondary Arterial Road	6	5
Primary Arterial Road	6	5
Parklands	Calculated	5
Residential:		
Block Area (m^2) < 300	5	5
300 – 450	5	5
450 – 600	7	5
600-1000	7	5
1000 – 2000	7	5
2000 – 4000	7	5
> 4000	Calculated	5
Unit Development:		
Dual Occupancy Block (m^2)	5	5
MAJOR SYSTEM	Calculated	MWC criteria

$$t_c = t_1 + t_2 + t_3$$

where

t_c = time of concentration

t_1 = time to reach the pipe or kerb and channel

t_2 = kerb and channel travel time

From Australian Rainfall and Runoff.

t_3^* = pipe travel time

From Australian Rainfall and Runoff

or $t_3 = L/V$

where L= pipe length

V= flow velocity

t_3 shall be determined up to but not including the pipe reach being designed

13.7 Runoff Coefficient C

Due to the variability of rainfall across Metropolitan Melbourne, runoff coefficients have not been standardised across all municipalities but have been calculated in accordance with the **Australian Rainfall and Runoff (AR&R) Volume 1 (May 2003), Book VIII, Section 1.5.5 (iii) Runoff Coefficients**.

The following formulas have been applied in calculating runoff coefficients for the growth areas:

$$C'_{10} = 0.1 + 0.0133(10I_1 - 25)$$

Where C'_{10} is the pervious runoff coefficient

$10I_1$ is the 10 year ARI, 1 hour duration rainfall intensity

And;

$$C_{10} = 0.9f + C'_{10}(1 - f)$$

Where

C_{10} is the 10 year ARI runoff coefficient

f is the fraction impervious (0.0 to 1.0)

And;

$$C_Y = F_Y \cdot C_{10}$$

Where

C_Y is an average recurrence interval

F_Y is a frequency factor

ARI (years)	FREQUENCY FACTOR, F_y
1	0.80
2	0.85
5	0.95
10	1.00
20	1.05
50	1.15
100	1.20

Intensity Frequency Duration Data has been obtained from the Bureau of Meteorology website <http://www.bom.gov.au/hydro/has/cdirswebx/index.shtml>, using coordinates that are central to the area for which the runoff coefficient has been calculated.

To simplify the application of runoff coefficients, values have been limited to the 3 regions listed in Table 17.

Fraction impervious values for discrete sub-catchments of uniform use shall be taken from the 'Typical Values' column in Table 16 below. Averaging values across multiple use zones or allotment density as listed is not permitted.



Table 16 Land use fraction impervious

Zone	Zone Code	Brief Description / Examples	Normal Range	Typical Value
Residential Zones :				
Residential 1 & 2 Zone	R1Z	Normal range of densities. (Allotment size 600m ² – 4000m ²)	0.40 - 0.60	0.50
	R2Z	Medium densities. (Allotment size 450m ² – 600m ²)	0.50 – 0.70	0.60
		High densities. (Allotment size <450m ²)	0.70 – 0.90	0.80
Low Density Residential Zone	LDRZ	Low densities (Allotment size 1000m ² -4000m ² .)	0.15 - 0.45	0.30
Mixed Use Zone	MUZ	Mix of residential, commercial, industrial & hospitals.	0.60 - 0.90	0.70
Township Zone	TZ	Small townships with no specific zoning structures.	0.40 - 0.70	0.55
Industrial Zones :				
Industrial 1 Zone	IN1Z	Main zone to be applied in most industrial areas.	0.70 - 0.95	0.90
Industrial 2 Zone	IN2Z	Large industrial zones away from residential areas.	0.70 - 0.95	0.90
Industrial 3 Zone	IN3Z	Buffer between Zone 1 and Zone 3. - for garden supplies/nurseries. - for quarries.	0.70 - 0.95 0.30 - 0.60 0.10 - 0.40	0.90 0.50 0.30
Business Zones :				
Business 1 Zone	B1Z	Main zone to be applied in most commercial areas.	0.70 - 0.95	0.90
Business 2 Zone	B2Z	Offices and associated commercial uses.	0.70 - 0.95	0.90
Business 3 Zone	B3Z	Offices, manufacturing industries & associated uses.	0.70 - 0.95	0.90
Business 4 Zone	B4Z	Mix of bulky goods retailing & manufacturing industries.	0.70 - 0.95	0.90
Business 5 Zone	B5Z	Mix of offices & multi-dwelling units.	0.70 - 0.95	0.90



Zone	Zone Code	Brief Description / Examples	Normal Range	Typical Value
Rural Zones :				
Rural Zone	RUZ	Main zone to be applied in most rural areas.	0.05 - 0.20	0.10
Environmental Rural Zone	ERZ	Rural areas with specific environmental considerations.	0.05 - 0.20	0.10
Rural Living Zone	RLZ	Predominantly residential use in rural environment.	0.10 - 0.30	0.20
Public Land Zones :				
Public Use Zone		Use of land for public purposes		
- Service and Utility	PU1Z	- power lines, pipe tracks and retarding basins.	0.20 - 0.30	0.25
		- reservoirs.	0.40 - 0.60	0.50
- Education	PU2Z	- schools and universities.	0.60 - 0.80	0.70
- Health and Community	PU3Z	- hospitals.	0.90 - 0.80	0.70
- Transport	PU4Z	- railways and tramways.	0.60 - 0.80	0.70
- Cemetery / Crematorium	PU5Z	- cemeteries and crematoriums.	0.50 - 0.70	0.60
- Local Government	PU6Z	- libraries, sports complexes and offices / depots.	0.70 - 0.90	0.80
- Other Public Use	PU7Z	- museums.	0.50 - 0.80	0.60
Public Park and Recreation Zone	PPRZ	Main zone for public open space, incl golf courses.	0.20 - 0.30	0.25
Public Conservation and Resource Zone	PCRZ	Protection of natural environment or resources.	0.05 - 0.25	0.25
Road Zone – Category 1	RDZ1	Major roads and freeways.	0.60 - 0.90	0.75
Road Zone – Category 2	RDZ1	Secondary and local roads.	0.50 - 0.80	0.60



Zone	Zone Code	Brief Description / Examples	Normal Range	Typical Value
Special Purpose Zones :				
Special Use Zone	SUZn	Development for specific purposes.	0.50 - 0.80	0.60
Comprehensive Development Zone	CDZn	Large and complex developments – residential.	0.40 - 0.80	0.50
Urban Floodway Zone	UFZ	Land identified as part of an active floodway.	0.05 - 0.25	0.25
Capital City Zone	CCZn	Special Use Zone for land in Melbourne’s central city.	0.70 - 0.90	0.80
Docklands Zone	DZn	Special Use Zone for land in Docklands area.	0.70 - 0.90	0.80
Commonwealth Land :				
Commonwealth Land	CA	Army barracks, CSIRO.	0.50 - 0.80	0.60

To simplify the number of coefficients applied, runoff coefficients have been limited to the 3 regions listed in Table 17.

Table 17 “C” Values

South-East Region – Cardinia & Casey					
C’₁₀	0.11508008				
		<i>f</i>	C5	C10	C100
		0.2	0.258	0.272	0.326
		0.5	0.482	0.508	0.609
		0.6	0.557	0.586	0.703
		0.7	0.631	0.665	0.797
		0.8	0.706	0.743	0.892
		0.9	0.780	0.822	0.986
		1.0	0.855	0.900	1.000



South-West / West Region – Wyndham & Melton

C'_{10} **0.15445632**

	f	C5	C10	C100
	0.2	0.288	0.304	0.364
	0.5	0.501	0.527	0.633
	0.6	0.572	0.602	0.722
	0.7	0.643	0.676	0.812
	0.8	0.713	0.751	0.901
	0.9	0.784	0.825	0.991
	1.0	0.855	0.900	1.000

North-West Region – Hume, Whittlesea & Mitchell

C'_{10} **0.16031382**

	f	C5	C10	C100
	0.2	0.293	0.308	0.370
	0.5	0.504	0.530	0.636
	0.6	0.574	0.604	0.725
	0.7	0.644	0.678	0.814
	0.8	0.714	0.752	0.902
	0.9	0.785	0.826	0.991
	1.0	0.855	0.900	1.000

13.8 Hydraulics

Drainage design shall be based on hydraulic grade line analysis, using appropriate pipe friction and drainage structure head loss coefficients. All pipe sizes are to be computed using a velocity and discharge diagram based upon Manning's equation. HGL's shall be shown on drainage plans.



13.9 Hydraulic Grade Line

Drainage design shall be based on hydraulic grade line analysis, using appropriate pipe friction and drainage structure head loss coefficients. All pipe sizes are to be computed using a velocity and discharge diagram based upon Manning’s equation. HGL’s shall be shown on drainage plans.

The hydraulic grade line shall be at least 300mm below the surface or kerb or channel invert, and not more than 2m above the pipe obvert.

13.10 Pipe Grade and Alignment

Pipes shall be uniformly graded and generally designed in a straight line between pits. Curved pipelines are permitted only where approved by Council and are of constant radius and in accordance with the pipe manufacturer’s specifications.

13.11 Minimum Cover (to top of pipe)

Under road pavements for concrete pipes, the greater of 750mm below design surface level or 150mm below pavement depth (including any capping layer).

NOTE: Pipe Class may need to be increased if cover is not sufficient under subgrade due to construction traffic loading

Elsewhere 450mm for concrete pipes subject to pipe class requirements

The design of pipe cover shall consider the effects of all utility services and conduits and provide the necessary clearances required by the relevant utility authority. The design shall also consider the control of sub surface drains (refer **Clause 13.24**)

13.12 Pipe Friction

Table 18 Friction Factors

	Manning	Colebrook - White
	N	k (mm)
Concrete	0.013	0.6
Other Materials	To Manufacturer’s specification	To Manufacturer’s specification



13.13 Minimum Pipe Size

Easement: 225mm.
Within road reservation: 225mm but 300mm where road runoff is being collected or the pipe crosses the road

A reduction in the size of pipes may be permitted for 450mm pipes and above.

13.14 Pipe Joints

All pipes up to and including 750mm in diameter shall be rubber ring jointed. Pipes above this size may be flush jointed with external sealing bands.

For pipes greater than 900mm and changes in direction between 2 connecting pipes exceeding 10o construct segmented curves using splayed pipes with bandage joints, having deflections within the manufacturer's specification.

13.15 Pipe Flow Velocity and Grade

The following is based on pipes running full but not under pressure.

Table 19 Acceptable Velocities

	Desirable	General	Flat Terrain	Steep Terrain
Minimum	1.0 m/s	0.9 m/s	0.6 m/s	NA
Maximum	4.0 m/s	5.0 m/s	NA	6.0 m/s

13.16 Anchor Blocks

Anchor blocks shall be provided where the pipe slope is steeper than 1 in 10 and the pipe length is greater than 15m. Refer to Melbourne Water's standard drawings for details of anchor block construction.



13.17 Alignment at Pits

Where possible, drops and deflections shall be kept to the minimum requirements to maintain the flow through pits as a jet and minimise head loss created by turbulence.

Required **drops** (at invert):

- Generally 50mm to 100mm for same size pipes.
- Match springing lines for change in diameter, but a drop shall not be less than 50mm.
- Drops in the range 100mm to $1.5D_o$ are not permitted except:
 - where springing lines are matched.
 - for minor branches - ($D_b < 1/2D_o$) (D_b = branch diameter) (D_o = outlet diameter)
 - to dissipate head in steep terrain.
- Drops greater than $1.5D_o$ are acceptable on long pipe reaches (where there are considerable savings in excavation) for pipe sizes up to 450mm.

The maximum permitted **deflections** in pits are:

$D_o \leq 600\text{mm}$	$0^\circ - 50^\circ$: align as in standard detail
	$50^\circ - 90^\circ$: provide deflector in pit floor
	$>90^\circ$: not permitted
$D_o \ 675\text{mm} - 900\text{mm}$	Maximum deflection - 45°
$D_o \geq 1050\text{mm}$	Maximum deflection - 10°

13.18 Pit Locations

Pits should, preferably, be located at or about the mid-point of the frontage of allotments, to reduce the likelihood of conflict with future driveway locations.

Pits shall be located a minimum clearance of 0.75m from a vehicle crossing.

13.19 Kerb Inlets

Pits shall be spaced to capture all surface flow resulting from the design minor rainfall event with a maximum spacing of 90m.

Kerb inlets are required at the following locations:

- Adjacent to tangent points at intersections where the channel falls towards the intersection;
- At low points; and
- At construction boundaries, unless existing drainage inlets downstream are adequate.



Additional kerb inlets shall be provided at;

- Double entry pits at low points of streets where one or both channel grades are greater than 7%.
- Flat vertical curves approximately 10m either side of the low point, except where saw tooth grading of the kerb is employed.

A 50% blockage factor shall be allowed when designing the inlet capacity of grated entry pits at low points.

13.20 Pit Head losses

To be calculated using procedure in the **ARR** and **Austrroads** design procedures.

13.21 Property Connections

A property connection shall be placed at the lowest point of each property and shall be connected to an underground drain.

Property connections are required to control the whole of the allotment. Whenever depth of a connection is critical and is required to be deeper for adequate lot control, the invert level of the property connection shall be calculated and shown on the plans.

Refer Standard Drawings for the property connection arrangement and **minimum** depth requirement.

13.22 Surface Drainage

13.22.1 Flow

The maximum depth of flow in a channel, for a 5 year ARI (20% AEP) design storm, shall be 0.14m for barrier type kerb and channel and 0.11m for SM2 roll-over type kerb and channel.

The maximum width of flow in the channel and roadway for a 5 year ARI (20% AEP) design storm shall not be greater than 3.0m, or the width of a parking lane if one is provided.

In locations where the level at a property line is below the kerb level, care should be taken to ensure the maximum allowable depth of flow is not exceeded.

Where a low point occurs in a longitudinal road grading or at the end of a court bowl, the footpath or fixed level at the property line shall be designed to prevent inundation of adjoining lots while providing for any overland flow path required for the 1% AEP runoff.

13.22.2 Gap Flows

The maximum depth and velocity of flow along an overland flow path for a 1% AEP design storm shall be in accordance with relevant requirements including the Melbourne Water 'Land Development Manual', except as specified in Clause 13.22.3.



13.22.3 Freeboard

Finished levels of allotments adjacent to overland flow paths for a 1% AEP design storm should ensure gap flows are retained in the road reserve. The 150mm freeboard (i.e. the level 150mm above the gap flow level) will be allowed to extend a maximum of 2.0m into the lot.

13.22.4 Overland Flow Paths

Trapped low points in streets and reserves adjacent to private property shall only be permitted where an overland flow path can be provided for the 1% AEP design storm clear of private property and unencumbered open space. The use of surface grates and pipes with capacity exceeding the 20% AEP design shall not be relied upon to avoid the provision of the overland flow path.

13.23 Water Quality

Where required, drainage design will incorporate water quality treatment measures to enhance quality of the drainage runoff before discharging into waterways or other main drainage networks. Water Sensitive Urban Designs shall be prepared in consultation with Council's engineering and planning departments and in accordance with the requirements of MWC's publication "**WSUD Engineering Procedures**".

13.24 Sub Surface Drainage

Sub surface drainage is to be provided as indicated in the attached standard drawings and shall discharge into pits at a level above the highest obvert of any stormwater pipe open to the pit.

In situations where the swell potential of the sub grade is 2.5% or more (i.e. highly expansive subgrade), a continuous unbroken capping layer is generally required. In these cases the invert of the sub surface drain is to be raised such that it drains the pavement only. Trenches for the sub surface drains must not be below the capping layer into the subgrade.



14. Utility Service Conduits

14.1 Utility Service Conduits

14.1.1 Location

Service conduits to each allotment, on the opposite side of the road to the proposed utility main, shall be provided under the pavement of all subdivision roads. Conduits are also required under footpaths and retaining walls. Generally, conduits should be located towards the centre of residential allotments.

14.1.2 Cover

The minimum cover to conduits is 450mm below the finished pavement surface. Conduits are to be laid within the subgrade or construction layer with a minimum 100mm cover. Conduits shall not be placed within the pavement nor capping layers. Conduits are to be laid at a grade of 1 in 100 falling to the side of the proposed utility main.

14.1.3 Marking

The position of the conduit is to be marked on the face of the kerb on each side of the road as shown on the Standard Drawings.

14.1.4 Trench Backfill

Trenches in which conduits are laid shall be backfilled with approved material as specified. Where a capping layer is required as a part of the pavement, conduits shall be installed prior to placing the capping layer to provide an unbroken capping layer.

14.1.5 Conduit Pipes

Conduit pipes servicing allotments are to meet the relevant Servicing Authority's requirements.

Generally the minimum size shall be:

- Gas and Water: 50mm
- Electricity and Telecommunications 50mm

*All other requirements for conduits shall be in accordance with Council Specifications.

*100 mm water conduits required for Dual Tapping (ie: Potable and non-potable water)

14.2 Fibre to the Premises (FTTP) Network

Installation of optic fibre conduits and pits should be in accordance with the **NBN Co "Installing Pit and Conduit Infrastructure – Guidelines for Developers"** as specified by the relevant Planning Permit.

15. Structural Elements

15.1 General

When an item of infrastructure, whether part of the road and drainage works or hard landscaping, contains any structural element the following criteria should be satisfied.

15.2 Design Criteria

a) Joint spacing, type, location, construction details and pouring sequence for concrete pavements shall be shown on plans for each type of concrete pavements (roads or pedestrian). Concrete Pavement design computations must be submitted to Council for review and approval.

b) Concrete Pavement joints and spacing details for standard concrete footpaths shall be in accordance with the Standard Drawings.

c) Concrete type and grade must be clearly stated on plans.

d) All design loadings, material specifications and structural design must be in accordance with the applicable Australian Standards.

e) Design criteria for each structural element must be clearly shown in the structural computations provided to Council.

f) Unless noted otherwise, all structures must be designed for the following durability criteria:

Table 20 Durability Criteria

Structure Type	Life Span (years)
Bridges/Culverts	100
Structures Supporting Road Infrastructure (retaining walls, etc)	100
Boardwalks, shelters, pergolas, major street furniture and art supporting structures	25
General (if not specified in this table)	25
Temporary Structures	To be discussed with Council

g) Concept Design including a design criteria shall be submitted to Council for approval prior to submission of the final documents.

h) Copies/size of plans for submissions shall be in accordance with Council's general engineering approval requirements. A copy of structural computations and design certificates must be provided.

- i) Structural and civil engineering designs submitted in a package with landscape works shall be presented on a separate plan(s) indicating all construction details but excluding cladding or architectural details, additional finishes and 'soft landscaping' details.
- j) Any balustrades that prevent falls from heights greater than 600 mm shall be designed in accordance to the relevant Australian Standards.
- k) All exposed steelwork shall be hot-dip galvanised. All timber grades and types adopted must be in accordance with the durability criteria as specified in Australian Standards or as directed by Council.
- m) Steelwork connections shall bolted or pre-welded (shop-welded) and hot dip galvanized. On site welding is not acceptable unless it is demonstrated that there is no other connection method possible.
- n) Copies of Geotechnical Engineering reports shall be provided together with the foundation computations. Bearing pressures specified on plans must be verified by a qualified geotechnical engineer on site prior to construction.

15.3 Construction Supervision & Certificates

- a) During construction Council Officers shall be notified of all hold points unless confirmed otherwise by Council as part of design approval.
- b) Contractor/Developer shall ensure that a registered building practitioner or VicRoads accredited bridge consultant is supervising all structural works on site and, at the completion of the construction works, provide a Certificate of Compliance – Construction which verifies that the construction works were completed in accordance with the approved design plans.
- c) A copy of all Site Inspection Reports shall be forwarded to Council for its records.
- d) A copy of the standard structural details and/or shop drawings shall be provided to Council, together with the "As Constructed" documentation (unless issued by Council as a "Standard Drawing").
- e) As constructed plans shall be provided prior to Council's acceptance of Practical Completion (for the purpose of a Statement of Compliance).
- f) Defects Liability Period (DLP) applied to the structures will be in accordance with the requirements of the Planning Permit.



15.4 Bridges

15.4.1 Basis for Design

All bridge design shall be in accordance with the current version of **AS5100**.

15.4.2 Certification

All bridge design must be certified by an independent qualified bridge engineer prequalified by VicRoads.

15.4.3 Bridge Cross Section

A minor structure (whether bridge or box culvert) with the top of the deck at road level, with a length measured along the centre line of the road of 6.0m or less, shall extend the full width of the road reserve.

A bridge, or box culvert with the deck at road level, with a length measured along the road centreline of greater than 6.0m, shall have a width between kerbs equal to that of the approach road (i.e. the road in which it is located) plus provision for pedestrians and cyclists.

In the case of roads with dual carriageways, a bridge is to be built on the alignment and width between kerbs (excluding emergency stopping lanes) of each pavement plus provision for pedestrians and cyclists.

15.4.4 Footway Clearance

A pedestrian footway shall have a clear width of not less than 3.0m, from the inside face of the handrail to the back of the kerb.

15.4.5 Fencing and handrailing

Protective fencing is to be extended to a point where the slope becomes less than 25%.

All bridge railing and pedestrian fencing shall be designed for pedestrian loading and vehicle impact and comply with The Building Code of Australia.

15.4.6 Surfacing

A bridge or box culvert with the deck at road level shall be surfaced with asphaltic concrete of minimum thickness 50mm.

16. Associated Infrastructure

16.1 General

Associated infrastructure are the additional infrastructure not specified elsewhere in this manual and will generally comprise street furniture, street lighting, utilities such as water and gas reticulation, sewerage, power and lighting and communications networks.

16.2 Principles

The principles associated with providing associated infrastructure are as follows:

- All associated infrastructure to be vested in the Council shall meet Council's requirements and standards.
- The urban character and amenity of a locality, neighbourhood or development shall not be adversely impacted by the associated infrastructure.
- The location of the associated Infrastructure shall not conflict with other existing or proposed services and Council Infrastructure.
- The requirements of all servicing authorities shall be considered before giving approval for any particular service.
- The requirements of any relevant Codes of Practice, Australian Standard, regulation or act of parliament shall be considered by Council before approving the type and location of any associated infrastructure.

16.3 Water Supply

The design, documentation and installation of reticulated water supply required to service the development shall be in accordance with the relevant Authority requirements.

The Consultant/Developer is responsible for liaising and co-ordinating with the Authority responsible for water infrastructure.

The location and spacing of fire hydrants are generally to be to the satisfaction of the responsible fire authority (Country Fire Authority). However in some instances, this responsibility may be transferred to Council.

Design Standard used by Water Authorities is MRWA WSAA Water Code (Melbourne Retail Water Authority).

16.4 Recycled Water

The design, documentation and installation of all recycled water supply required to service the development shall be in accordance with the relevant Authority criteria, specifications and instructions.

The Consultant/Developer is responsible for liaising and co-ordinating with the Authority responsible for recycled water infrastructure.

Design Standard used by Water Authorities is MRWA WSAA Water Code (Melbourne Retail Water Authority).



16.5 Sewer

The design, documentation and installation of all reticulated sewerage required to service the development shall be in accordance with the relevant Authority criteria, specifications and instructions.

The Consultant/Developer is responsible for liaising and co-ordinating with the Authority responsible for sewerage infrastructure.

Design Standards used by Water Authorities are MRWA WSAA Sewer Code (Melbourne Retail Water Authority).

16.6 Gas

The design, documentation and installation of all related gas reticulation required to service the development shall be in accordance with the relevant Authority criteria, specifications and instructions.

The Consultant/Developer is responsible for liaising and co-ordinating with the Authority responsible for gas infrastructure.

16.7 Electricity

16.7.1 Design

The design, documentation and installation of all electrical infrastructure required to service the development shall be in accordance with the relevant Authority criteria, specifications and instructions.

The Consultant/Developer is responsible for liaising and co-ordinating with the Authority responsible for electricity infrastructure including public lighting.

16.7.2 Electricity Sub Station/Kiosk Location

Utility service substation/kiosk sites must only be located on any land identified as public open space or to be used for any municipal purposes if agreed by the responsible authority.

Placement of electricity sub station/kiosks is subject to:

- Access for installation and maintenance purposes.
- Providing an appropriate landscape treatment to screen the installation.



16.8 Telecommunications and Data

The design, documentation and installation of all telecommunications reticulation required to service the development shall be in accordance with the relevant Authority criteria, specifications and instructions.

The Consultant/Developer is responsible for liaising and co-ordinating with the authorities responsible for telecommunications including FTTP.

16.9 Public Lighting

The objective for the provision of public lighting is:

- Consistent, equitable and environmentally responsible public lighting that appropriately caters for the safety and security of all sectors of the community.

16.9.1 Provision for Public Lighting

All roads within the new subdivision shall be provided with public lighting in accordance with the requirements of the relevant Australian Standards. New lighting shall be located outside the clear zones wherever possible, and shall meet the standards for **Category V or Category P** lighting, as appropriate.

Category V lighting is applicable on roads where visual requirements of motorists are dominant, such as sub-arterial roads. Category P lighting is applicable on roads (and other public outdoor areas) where the visual requirements of pedestrians are dominant, such as local roads and outdoor shopping precincts.

All public lighting shall incorporate the use of energy efficient globes (eg. LED).

16.9.2 Decorative and Non-Standard Lighting

Where decorative or non-standard lighting is permitted by Council, lamps and luminaires shall comply with the Public Lighting Service Provider's technical requirements and shall be approved by Council.


16.9.3 Non-standard Lighting Fee

Where decorative or non-standard street lighting is permitted by Council, Council will require payment of a fee prior to the release of lots within that stage of development.

Non-standard pole and lantern types shall be in accordance with Council's general lighting policies.

16.9.4 Lighting Design

Lighting design shall be in accordance with the relevant Australian Standards, including the current issue of **AS/ANZ 1158 – Lighting for Roads and Public Spaces**.



Lighting installations for Arterial Roads and associated intersections are reviewed and approved by VicRoads as the responsible coordinating road authority. Copies of drawings shall be forwarded to Council for assessment after which advice will be forwarded to VicRoads prior to approval.

Allowance for pole locations shall be provided within all road reserves and offsets are to be shown in “Service Location Tables” on FLP’s and Road Construction Plans.

A minimum 800mm offset shall be provided from back of kerb to pole for all roads with P category lighting, including laneways and shared zones where kerbing is provided.

A minimum 1000mm clearance is required from face of pole to:

- Edge of carriageway in laneways, shared zones and extended driveways where no kerbing is provided. Kerb outstands may be requested for pole protection in some circumstances,
- Edge of pram crossings and private vehicle crossings within nature strips.
“Easy Fit” pole bases/foundations are required where maintenance access is restricted (e.g. in laneways, “paper roads” and shared driveways).

With the exception of lighting in speed zones of 50 km/hr or less, frangible poles shall be adopted for roads with V category lighting in accordance with AS 1158 – Lighting for Roads and Public Places. The specific pole type (impact absorbing or slip base) shall be determined according to VicRoads standards and shall be nominated on the drawings.

Provision of public lighting on footpath and bike paths should be as per the PSP or Council’s landscape guidelines. All cabling for this purpose shall be from a metered point of supply at the reserve boundary and Council will accept responsibility for the tariff.

Bollard lighting is acceptable only in reserves where vertical illumination is not required for the relevant lighting category.

Lighting obstructions (e.g. from existing large trees) shall be taken into account when locating poles and assessing luminance requirements.

16.9.5 Pre-submission requirements

Prior to the submission of Public Lighting Plans the following shall be confirmed with Council:

- Lighting design categories for all roads and pathways;
- Locations of all principal pathways in parks/reserves outside road reserves;
- Locations and type of other items/structures that may require public lighting;
- Style and colour of non-standard poles and fittings and type of lantern; and
- A Functional Layout Plan has been approved in accordance with any planning permit requirement.

16.10 Permanent Survey Marks

New permanent survey marks shall be documented and installed in appropriate locations for the future use of Council and Licensed Surveyors generally.

Contact Council for details of local requirements such as location, spacing and formal registration by a Licensed Surveyor upon completion.

16.11 Street Name Signs

All subdivisions require the installation of street name signs generally in accordance with **AS 1742.5 – Manual of Uniform traffic control devices – Street name and community facility name signs**. Contact Council for details of local requirements for type, style and content.



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PART D
CONSTRUCTION

17. Construction Framework

17.1 Introduction

Part D of this manual provides the context within which the construction process is implemented.

17.2 Construction of Works - Planning Framework

The **Subdivision Act 1988** (Clause 17) requires that works shall not be commenced until:

- The plan of subdivision has been certified;
- The engineering plans and specifications have been approved;
- All applicable planning permit conditions have been satisfied; and
- All agreements required by other authorities have been made.

Clause 16 of the Subdivision Act 1988 requires works to comply with:

- The certified plan;
- The approved engineering plan(s); and
- The standards specified in the planning scheme or the permit.

All works shall also comply with any other documentation required by Council.

17.3 Order of Precedence

Unless otherwise specified the following hierarchy of documents shall be used. If there is conflict between any referenced documents and the specification, the higher listed documents shall take precedence over lower listed documents.

- i. Acts of Parliament and Regulations (Federal / Victorian);
- ii. Growth Areas Engineering Design and Construction Manual;
- iii. EDCM Standard Drawings;
- iv. Approved Drawings;
- v. EDCM Standard Specification for Road and Drainage Works.
- vi. VicRoads Codes of Practice and Bridge Technical Notes;
- vii. Australian Standards (except test methods);
- viii. VicRoads Test Methods;
- ix. Australian Standards Test Methods;
- x. Austroads Test Methods;
- xi. Other Standards and Test Methods;
- xii. VicRoads Technical Bulletins;
- xiii. Austroads Guideline Documents; and
- xiv. Other Publications

17.4 Roles of the Parties

The roles of the developer, council and the contractor are distinct, sharing a common focus on the delivery of engineering infrastructure for our new suburbs.

These roles overlap and can sometimes be at odds with each other unless there is a common and shared vision with clear accountabilities and responsibilities.

Adoption of a Construction Agreement between Developer, Contractor and Council to clarify respective roles is supported in principle and will be considered in future reviews of this manual and will also be referred to a proposed state wide standardisation process.

18. Pre-commencement Procedures

18.1 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) must be prepared by the Contractor and submitted to Council prior to any works commencing on site. The plan shall aim at minimising the impact of construction works, particularly erosion and sediment control.

The Construction Environmental Management Plan shall be based on the current **EPA publication 960, 2004 – “Doing It Right on Subdivisions, Temporary Environmental Protection Measures for Subdivision Construction Sites”**.

Where the plan is complete Council will respond to the submitted construction environment management plan within 5 working days of receipt. Where the Planning Permit requires the CEMP to be endorsed longer approval times may apply.

18.2 Traffic Management Plan

A Traffic Management Plan in accordance with the **Road Management Act 2004, Worksite Safety-Traffic Management Code of Practice** must be prepared by the Contractor and submitted to Council and VicRoads (where applicable) prior to any works commencing on site.

The Traffic Management Plan shall include (but not be limited to) site access, safe travel through the site and appropriate signing strategies.

A “**Memorandum of Authorisation**” from VicRoads must be submitted with the Plan in instances where a reduction in speed limit is required through a worksite or for any other Major Traffic Control Devices that require authorisation as specified by the **Road Safety (Traffic Management) Regulations 2009**.

Major Traffic Control Devices are listed in **Schedule 1** of the Regulations.

Where required by the Planning Permit, all truck routes associated with the development shall be submitted to Council for approval. A plan clearly showing the estate name, stage of development, planning permit number and intended routes for all trucks accessing the development site shall be submitted to Council for approval, prior to works commencing.

Council will **respond** to the submitted Traffic Management Plan:

- Within **5 working days** of receipt of the documentation.

18.3 Pre-Commencement Meeting

The Consulting Engineer is to arrange a pre-commencement site meeting with Council’s Construction Supervisor, the contractor and the consultants. At this meeting, the documentation required under clauses 18.1 and 18.2 and other relevant items will be considered. While all documentation does not need to be completed for the pre-commencement site meeting, these must be submitted by the Contractor and approved by Council, prior to works commencing.

Pre-commencement meetings should be held no greater than 3 weeks prior to the commencement date of construction.

19. Construction Procedures

19.1 Contractor Integrated Management System

All works must be executed in compliance with the approved **Contractor Integrated Management System** comprising environmental, quality and safety components. Contractors shall be accredited under the Civil Contractors Federation IMS system or other approved system.

19.2 Occupational Health and Safety

For the purpose of the **Occupational Health and Safety Act and Regulations**, the developer is the Principal Contractor and entirely responsible for all occupational health and safety matters on site, unless the developer has nominated a person to undertake this role (i.e. Contractor) in accordance with the requirements of the Act and Regulations.

It is important that all work is carried out in a safe manner to ensure the safety of the Contractors work force, the Principal's staff or agents who have access to the site as well as the general public.

In accordance with the **OH&S Regulations**, any person undertaking "construction work" must hold a current construction induction card or other recognised qualification.

19.3 Council Inspections, Hold and Witness Points

During the construction of the works, Council representative(s) will undertake inspections at nominated Council hold points or at other times as may be necessary. Nominated Council Hold Points (CHP) and Council Witness Points (CWP) are outlined in **Appendix G**.

The Contractor shall allow Council representative(s) to inspect and measure any part of the development works. Works must not proceed beyond any nominated **hold point** without inspection and approval by the council representative(s).

The Contractor shall give **24 hours notice** to the Council representative(s) when an inspection at a nominated hold point is required.

Any extraordinary inspection outside of nominated hold points desired by the Contractor shall be arranged directly with the council representative(s).

When construction works are undertaken outside Council's normal working hours it will be necessary for the Contractor/Consulting Engineer to provide Council with 24 hours notice of its intention to work.

Payment of fees associated with extraordinary inspections by Council representative(s) outside of normal working hours shall apply and shall be borne directly by the Contractor or Developer.

19.4 Hours of Work

The Contractor shall comply with the regulations of the **Environmental Protection Authority, Local Laws** and other **Statutory Regulations**, which may prevail in respect of working hours.



19.5 Site Access

Site access shall be restricted to that shown on the **Construction Environmental Management Plan** or as otherwise authorised in writing by Council.

19.6 Protection of Property and Services

The Contractor shall in preparing a Site Management Plan take into account protection of all property and services, whether internal or external to the site.

19.7 Sanitary Accommodation

The Contractor shall provide approved sanitary accommodation for all employees on the Works, in accordance with the requirements of the **Council, Workcover and O.H. & S. Act**.

19.8 Protection of Roads

The Contractor will be held responsible for any vehicle engaged on the works depositing material or rubbish on road pavements, road reserves, or other improvements.

19.9 Management of Traffic

Traffic shall be managed in accordance with the **Road Management Act 2004, Worksite Safety-Traffic Management Code of Practice** which includes requirements in relation to the preparation of Traffic Management Plans.



20. Site Management

20.1 Tree and Vegetation Preservation

The PSP for the area and the Planning Permit for the development will usually outline tree and vegetation **preservation and protection requirements**, including their location, the need to mark on site any trees or vegetation earmarked for removal and the need to erect appropriate protective fencing or other measures for trees and vegetation to be retained.

All trees and vegetation nominated in the PSP or planning permit to be preserved cannot be removed or otherwise disturbed or damaged during construction.

Disturbance or damage to trees shall be construed to mean any action which endangers the survival of a tree and may include any or all of the following:

- Breaking of substantial limbs (being limbs of size greater than 20% of the trunk diameter);
- Removal of any portion of the bark of the tree trunk;
- Cutting of major root systems of the tree (being roots of size greater than 20% of the trunk diameter);
- Filling around a tree trunk without the precautions prescribed by the Superintendent being observed;
- Compacting soil above the root zone (area within the spread of the tree canopy) by repeated passage or parking of equipment; and
- Spillage of toxic substances within the spread of the tree canopy.

The Contractor shall ensure that all workers and sub-contractors on the site are appropriately **inducted** to ensure that trees or vegetation which are required to be preserved are not lopped, disturbed or damaged. Where any tree is so located that it may conflict with the works, Council's advice as to its treatment shall be obtained prior to those works being commenced.

Some services will require installation by tunnelling under, **boring** or hand excavation in the vicinity of trees and vegetation to avoid damage to root systems. In such instances boring will be the preferred method and the depth of the bore must be at least 0.7 metres below the ground surface at the base of the tree or vegetation.

Where disturbance or damage does occur, the Contractor shall arrange for a qualified **tree surgeon** to inspect the damaged tree or vegetation and with the prior approval of the Superintendent, have the necessary repairs effected.

20.2 Weed Importation and Transportation

It is the contractor's responsibility to ensure that earthwork activities do not deposit noxious weeds or the seeds of a noxious weed onto land.

The key legislation relating to weed spread in Victoria is the **Catchment and Land Protection Act 1994**. Many of the provisions relating to weed spread can be found in Section 70A and 71. Among these provisions, the Act prescribes offences relating to precautions that must be taken when moving machinery and equipment, transporting noxious weeds and moving soil, sand, gravel or stone which may be infested with noxious weeds.



Appropriate measures should be undertaken to ensure that noxious weeds are not transported on earthworks equipment or in soil or material leaving or entering the worksite.

20.3 Containment

The contractor must erect and maintain all necessary fences and barricades required to suitably contain the worksite to ensure the safety of the public and protection of the works.

Appropriate signage is to be placed where exclusion zones apply warning persons of the said exclusion zone.

Where specific site requirements in relation to OH & S have been identified, these requirements are to be clearly displayed via appropriate signage situated at all worksite entrance points.

Where fences or barricades are situated within an existing road reserves, or are impacting on existing traffic conditions, a detailed traffic management plan must be submitted to the road authority.

20.4 Livestock

Before entering the Site of the Works to commence work or effect delivery of plant, materials or equipment, the Contractor shall make proper provision to ensure that any livestock on or near the Site of the Works are adequately restrained from straying.

20.5 Unauthorised Disposal

The Contractor is to ensure that the Site is properly signed and barricaded to prevent unauthorised disposal of waste material on the Site by others.

Any rubbish or waste deposited is to be cleared from the Site immediately.

20.6 Fires

No fires shall be lit on the Site of the Works for any purpose unless approved by Council.



21. General Technical Conditions Relating to Works

21.1 General

This section of the Manual covers general technical requirements relating to the construction of the works.

21.2 Survey Marks and Set-Out Works

The Bench Marks for this Work shall be shown on a Drawing prepared by the Principal's Licensed Surveyors.

A minimum of three (3) bench marks will be shown on the plans and must be maintained by the Contractor during the course of the works and until the commencement of the defect liability period.

All allotment title dimensions and numbers shall be obtained from the latest version of the certified Plan of Subdivision.

21.3 Topsoil and Allotment Filling

21.3.1 Stripping and Stockpiling of Topsoil

Approval for the removal and disposal of any excavated material or topsoil from the subject land is required from the Council.

Should construction methods and/or weather conditions prevent the winning of topsoil or should there be insufficient suitable topsoil to be obtained from the stripping operation the Contractor shall either:

- Import approved topsoil; or
- Win topsoil from other approved stages of the development.

As directed by the Superintendent.


If topsoil is to be imported, consideration should be given as to whether this material has the potential to introduce noxious weeds, seeds or propagules.

21.3.2 Grading of Allotments and Reserves

Other than filled areas, which are to be treated in accordance with the following, all the allotments shall be graded to form a uniform slope to the drainage point.

21.3.3 Filling on Allotments and Reserves

- All filling work and subsequent compaction shall be undertaken in accordance with **AS 3798 "Guidelines on earthworks for commercial and residential developments"**.
- All filling introduced onto site must be fully supported by clean fill certificates complying with the relevant requirements of the EPA.

- 
- Where the depth of fill is greater than 300 mm all filling within the lot must be compacted to the requirements of this manual and trimmed and shaped to match existing site levels.
 - All works constructed within a floodway shall have all spoil removed to an area that is above the 1% AEP flood level.
 - A minimum of one compaction test per allotment shall be conducted at a distance of greater than 6 metres from the road reserve boundary. Lot filling testing shall be included in the Contractor's Inspection and Test Plans submitted for Council's consideration.
 - All areas that are to involve earthworks shall have the topsoil stripped, stockpiled and reinstated.
 - Topsoil or fill which contains or is likely to contain any part of a noxious weed, must not be transported wither to or from the worksite.
 - Before completing the site works the depth of topsoil replicating predevelopment depths shall be placed and rehabilitated over all areas where there have been earth works.

21.3.4 Early Completion of Allotment Grading

Where practicable, the Contractor shall programme the works of this Contract in such a manner that the final grading and/or topsoiling of allotments is completed as soon as practicable after drains, sewers and earthworks are carried out.

It shall then be the Contractor's responsibility to limit the passage of construction equipment over the allotments to the minimum necessary for completion of other works.

21.3.5 Acceptable Materials

Material to be used for fill construction shall satisfy the requirements of **AS 3798 "Guidelines on earthworks for commercial and residential developments"**.

Material to be used for fill construction shall satisfy the requirements of the **Catchment and Land Protection Act 1994** and be free from declared noxious weeds or parts thereof.

21.3.6 Naturestrips and Batters

The Contractor shall remove a sufficient quantity of the best of the topsoil available from the site before commencing excavation. This topsoil shall be stockpiled on the site and used as topsoil for the naturestrips and batters. Naturestrips and batters shall be neatly raked and trimmed on an even grade from edge of path to back of kerb in the case of naturestrips and to the lines and grades shown on the Contract

Drawings or as specified for fill or cut batters.

The Contractor shall complete allotment grading except for areas adjacent to footpath, prior to placement of base course asphalt.

21.3.7 Overbreak of Excavation in Easements

Overbreak is defined as excavation which is a departure from drawings and specification and shall be recorded as a non-conformance on the 'as constructed' drawings.

22. Subdivision Works Specifications

22.1 Basis for Standard Specification

The specifications relating to subdivision works are based on the VicRoads' STANDARD SPECIFICATIONS FOR ROADWORKS AND BRIDGEWORKS and **have been modified to suit subdivision works**.

The Specifications only relates to the quality of the works. Developers should include in an appendix to the Specifications any additional clauses they may require as the Principal relating to approval of variations, the contractors safety systems, etc. The Specification documents should not be modified.

22.2 List of Standard Specifications

Table 21 below provides a list of the standard EDCM specifications utilised for this manual

Table 21 EDCM Specification – Standard Clauses

	Sect	Title	Last Amend
GENERAL			
Section	173	Examination and Testing of Materials and Work (Roadworks)	
	175	Referenced Documents for Standard Specifications for Roadworks and Bridgeworks	
FORMATION			
Section	201	Site Clearing	
	204	Earthworks	
	205	Rock Fill	
	210	Geotextiles in Earthworks	
	290	Lime Stabilisation of Earthworks Materials	
FLEXIBLE PAVEMENTS			
Section	304	Unbound Flexible Pavement Construction	
	306	Cement Treated Subbase Pavement	
	310	Preparation of Granular Pavements for Bituminous Surfacing	



	Sect	Title	Last Amend
ASPHALT AND SURFACE TREATMENTS			
Section	402	Removal of Pavement by Cold Planing	
	405	Regulation Gap Graded Asphalt	
	407	Hot Mix Asphalt	
	408	Sprayed Bituminous Surfacing	
	409	Warm Mix Asphalts	
	421	Bitumen Crumb Rubber Asphalt	
INCIDENTAL CONSTRUCTION			
Section	701	Underground Stormwater Drains	
	702	Subsurface Drainage	
	703	General Concrete Paving	
	704	Precast Concrete Kerb	
	705	Drainage Pits	
	706	Installation or Replacement of Utility Infrastructure within Road Reserves	
	707	Fencing	
	708	Steel Beam Guard Fence	
	709	Guide Posts	
	710	Fixing Raised Pavement Markers	
	711	Wire Rope Safety Barrier	
	712	Block Paving	
	713	Beaching	
	714	Erection of Signs	
	715	Gabions and Rock Mattress	
	721	Pavement Markings	



	Sect	Title	Last Amend
MATERIALS			
Section	801	Source Rock for the Production of Crushed Rock and Aggregates	
	802	Bituminous Cold and Warm Mixes	
	811	Gravel, Sand and Soft or Ripped Rock for Base and Subbase Pavement	
	812	Crushed Rock for Base and Subbase Pavement	
	815	Cementitiously Treated Crushed Rock for Subbase Pavement	
	820	Crushed Concrete for Pavement Subbase and Light Duty Base	
	821	Cementitiously Treated Crushed Concrete for Pavement Subbase	
	831	Aggregate for Sprayed Bituminous Surfacing	
	832	Sands for Sprayed Bituminous Surfacing	
	853	Hot Melt Bitumen Adhesive for Raised Pavement Marker Installation	
	860	Manufacture of Road Signs	

23. Construction General

This section covers general items relating to construction and is a modified version of **Clause 160** of VicRoads **STANDARD SPECIFICATIONS FOR ROADWORKS AND BRIDGEWORKS**.

23.1 Quality Management

23.1.1 Quality Management Systems Standards

The Works shall be undertaken in accordance with a Quality Management System that meets the requirements of relevant AS/NZS ISO Standards and **Clause 24.2**.

23.2 Site

23.2.1 Commencement of Work

HP The Contractor shall not commence work on site before the following documents have been approved by the Council:

- (d) Construction Environmental Management Plan;
- (e) Traffic Management Plan;
- (f) A pre-commencement meeting has been held.

23.2.2 Contractor's Site Compound

The Contractor shall erect, maintain, secure and subsequently remove such buildings, compounds, toilet / washroom accommodation, and associated services as are required by the Contractor for the supervision and construction of the Works. The Contractor shall obtain all necessary local municipal permits and approvals associated with the site establishment and access arrangements associated with its site compound.

The location and form of such buildings and compounds shall be selected by the Contractor so as to:

- a) minimise noise, disturbance and inconvenience to all abutting properties;
- b) maintain a minimum clearance of 30 m to the closest boundary of all abutting properties;
- c) be consistent with, and complement the Environmental Management Plan and Health and Safety Co-ordination Plan;
- d) provide suitable hard stand areas for storage of materials and equipment and parking vehicles;
- e) allow for all pedestrian traffic.

The Contractor, subject to the agreement of the Superintendent and the local municipal authority, may be permitted to use portions of the site, for establishment of buildings and compounds.

At the completion of the Works, these facilities will remain the property of the Contractor and shall be removed from the Site and the area left to the satisfaction of the Council.

23.2.3 Contractor's Representatives

On commencement of work, the Contractor shall advise the Superintendent in writing of the names, addresses and telephone numbers of employees who can be contacted in an emergency and out of hours under the Contract. Any proposed changes of representatives, addresses or telephone numbers shall be notified promptly to the Superintendent and confirmed in writing to the Superintendent.

The Superintendent shall advise the Council Supervisor of the contact details.

23.2.4 Procurement of Water for Construction Purposes

The Contractor shall make its own arrangements for water supply to provide the quantity and quality required to complete the work. For any chosen source of water supply, the Contractor shall obtain the necessary approvals from the appropriate authorities and shall act in accordance with any conditions stipulated.

23.2.5 Major Traffic Control Devices

The Contractor shall ensure that a **Memorandum of Authorisation** is obtained prior to the erection, removal or modification of major traffic control devices as defined in Schedule 1 of the **Road Safety (Traffic Management) Regulations 2009**.

Details of the times and dates of erection and removal of major control items and of any changes to such items shall be forwarded to the Superintendent within five business days after the erection and removal of or changes to the major traffic control items.

23.3 Program and Progress

23.3.1 Working Hours

Before commencing any works on site, the Superintendent shall advise the Council Supervisor in writing, the working hours proposed for the execution of the work which must be in accordance with the EPA guidelines.

- (a) no work shall be carried out between Good Friday and Easter Monday inclusive, on any Sunday, public holiday, or during the Christmas to New Year periods;
- (b) no work shall be carried out on the site outside the period between 7.00 a.m. or sunrise, whichever is the later, and 6.00 p.m. or sunset, whichever is the earlier;

unless otherwise specified or approved by the Council Supervisor.

Work outside the proposed working hours without written approval of the Council Supervisor may proceed only in the following situations:

- in cases of emergency;
- where situations would create significant traffic disruption and/or hazardous conditions unless rectified; or
- when plant breakdown or extenuating circumstances have delayed an activity that cannot be stopped.

23.4 Prosecution of Work

23.4.1 Site Management and Supervision

(a) Site Supervision

The Contractor's site management, programming and program control, quality assurance and methods of work shall be supervised daily by an experienced and qualified engineer. This engineer shall possess the experience and qualifications which would be acceptable to the Institution of Engineers Australia as satisfying the requirements for Corporate Membership, including at least five years' experience in the relevant construction field.

(b) Site Survey

For the purposes of setting out the Works in conformity with the specification and drawings, the Contractor shall engage an experienced and qualified surveyor. This surveyor shall possess the experience and qualifications which would be acceptable to the Institution of Surveyors, Australia as satisfying the requirements for Corporate or Associate Membership or alternatively, possess the experience and qualifications which would be acceptable for Membership to the Institution of Engineering and Mining Surveyors, Australia.

(c) Landscape Supervisor

The Contractor shall nominate a Landscape Supervisor to be on site for the duration of all landscape work. This person shall have a Landscape Trade Certificate (TAFE), equivalent qualification or at least 2 years horticultural expertise on work of a similar size and scope.

Should the Contractor's site supervisory staff prove unsatisfactory with respect to progress, quality of work and methods of work, the Council may direct the Superintendent to provide such additional competent and experienced staff as may be necessary to ensure satisfactory progress of the Works and that the quality and the methods of work are acceptable.

23.4.2 Co Operation

The Contractor shall co operate with all other contractors and other work forces so as to avoid delay or hindrance to their work and to ensure that all work is performed expeditiously.

23.4.3 Maintenance of Existing Roads

The Contractor shall maintain the existing roads and all other road reservation areas within the Limits of Works for the period between the date of possession of site and Practical Completion of the whole of the Works including periods of suspension.

The Contractor shall respond to an emergency with an "Initial Emergency Response Unit" consisting of the following:

- a minimum of 2 personnel with appropriate traffic management qualifications and vehicle,
- an emergency kit of temporary warning signs, flashing lights, barriers, safety clothing, shovels, brooms, chainsaw and a mobile telephone.

In addition the Contractor shall maintain on site one (1) cubic metre of sand or other absorptive product and one half (1/2) a cubic metre of premix asphalt exclusively for use in the event of an emergency.

Where a maintenance feature is identified outside the specified intervention standard the Superintendent may:

- (a) direct the Contractor to bring the deficient asset feature elements to within the specified intervention standard within a period to be determined by the Superintendent; or
- (b) arrange for the rectification of those features by others and in this event a deduction will be made to the Contract Sum for the full cost of such works.

The Superintendent will provide a written record of the Contract Completion Condition Survey to the Contractor.

23.4.4 Examination and Testing of Materials and Work

(a) General

The Contractor shall be responsible for carrying out all examination and testing of materials and work under the Contract in accordance with the requirements of the specification.

Unless otherwise specified, materials and workmanship shall comply with the relevant standard as defined in Section 175 of the Vic Roads Specification.

(b) Allowance for Testing in Construction Program

The Contractor shall make allowance in the construction program for the time necessary to arrange for and to carry out examination and testing of materials and work.

(c) Notification

Where inspection of materials or work by the Council is specified as a hold point, or where a hold point is created by a non-conformance, at least 24 hours' notice of testing and/or inspection shall be given to the Council.

(d) Tests

Unless otherwise specified, all tests and sampling shall be undertaken in accordance with the appropriate VicRoads codes of practice and applicable test methods as current at the time of performance of the tests. Unless otherwise specified, all tests shall be conducted by experienced testing officers in a laboratory accredited by the National Association of Testing Authorities (NATA) for the test methods used under the Contract and all tests shall be endorsed in accordance with the NATA registration for that laboratory.

Lists of current VicRoads codes of practice are available either online at the VicRoads website (Publications and Forms) or by subscription to the update service by VicRoads Bookshop.

All construction materials sampling shall be undertaken by personnel from a NATA laboratory accredited for the appropriate sampling methods.



(e) Test Results

The Contractor shall submit to Council all test results prior to the release of the Hold Point or as required.

(f) Calibration

All test equipment used for tests, carried out in accordance with Clause 23.4.4(d) above, shall be calibrated by a laboratory accredited by NATA for the particular calibration method.

23.4.5 Drainage of Work Site

The Contractor shall at all times provide for the safe discharge of seepage, drainage and stormwater during the execution of the works under the Contract. The Contractor shall be responsible to obtain all approvals from the local authorities and accept all costs associated with the discharge of any water into an existing outfall on a temporary or permanent basis.

23.4.6 Clean Up of Site

Unless otherwise specified, the Contractor shall remove from site, before the cessation of work each day, all temporary or surplus material not forming part of the specified works. The Contractor shall be responsible for the proper disposal of the temporary or surplus material.

23.4.7 Instructions by Other Government Departments and Authorities

Other government departments and authorities and their representatives, whether federal, state or local, often have responsibilities that impact on the works.

The Contractor shall co-operate with an authorised representative who is requesting access to the site under powers conferred by legislation and follow any instructions given by the authorised representative in the format nominated by the legislation.

23.5 Off Site

23.5.1 Inspection of Property

Prior to commencing operations, the Contractor shall engage a suitably qualified and experienced architectural consultant to undertake inspections on all buildings and structures (including heritage structures) within a minimum distance of 100 m of the site. Two copies of the written existing conditions report for each property, including any photographs, shall be prepared and signed by the property owner and the architectural consultant.

The condition of the buildings, structures and the property shall be detailed in the existing conditions reports which shall form the basis of assessment of any structural damage to buildings and structures arising out of the Contractor's operations in the event of a claim by the owner/ occupier. The Contractor shall be responsible for the repair of any damage caused to property due to the Contractor's operations.

The Contractor shall submit to the Superintendent a copy of all existing condition reports of property and buildings prior to commencing work adjacent to such property or building. The copy of this report will be returned to the Contractor within 10 business days of submission.

For the purposes of this clause the Site is defined as the nearest point of the work adjacent to any building or structure.

The Contractor shall bear all costs associated with any claim for damages resulting from the effects of the Contractor's operations, including ground vibration, directly caused by the Contractor's construction methods. The cost of such damage shall be in addition to damage caused by other action attributed to the Contractor's work.

Before final payment is made, the Contractor shall obtain written clearance from all landowners and occupiers affected by the provision of this clause, to certify that the landowner and occupier have no claim for any loss or damage due to the Contractor's operation. A copy of all written clearances shall be forwarded to the Superintendent prior to the Contractor's Final Claim.

23.5.2 Work in Private Property

Where the works require the Contractor to enter private property to carry out work, the Contractor shall provide the details of the access arrangements to Council including the scope of the works, timing and reinstatement arrangements.

Entry shall be by a gate, or gates to be erected by the Contractor which shall be kept securely locked when not in use. Where fences are rabbit proof, the gates erected shall also be made and kept rabbit proof, and the Contractor shall be responsible and liable for the trespass of vermin.

23.5.3 Clearances from Landowners and Occupiers

Before Statement of Compliance is given, the Developer shall produce written clearances from all landowners and occupiers whose properties have been entered by the Contractor or the Contractor's employees or agents, for the purpose of carrying out work under the Contract, to certify that the landowner and occupier have no claim for any loss or damage due to the Contractor's operations and that the land and improvements have been left in a satisfactory condition.

23.5.4 Community Liaison

Where the work under the Contract may cause disruption, annoyance or inconvenience to the public, the Developer shall be responsible for all aspects of community consultation and advice to the public. Such advice shall include early notice to provide a high level of public awareness prior to particular events/activities, responding to any queries and resolution of issues during particular events/activities, and post-implementation advice to respond to any queries and resolve difficulties.

23.5.5 Use and Care of Roads

The Developer shall be responsible for repair of damage caused to any roads, bridges or other structures by transporting material required for the works. The Contractor is advised that VicRoads and municipal councils have power under their respective Acts to recover the cost of repair of damage to roads. In respect of repair of damage to roads, the Contractor will be deemed before commencing the works:

- (a) to have inspected the roads used for transport;
- (b) to have acquired, by consultation with the municipal or other authorities concerned, knowledge of the roads and any existing or likely restrictions upon their use which could affect the transport proposals;
- (c) to have assessed the possibility and extent of any damage to the roads which may be caused by transport during the works;
- (d) to have made due allowance for the effects of such restrictions and for the cost of rectification of such damage in accordance with the requirements of the authorities concerned.

23.5.6 Defects Liability

Any omissions and defects which existed at the time of the Statement of Compliance shall be corrected by the Contractor within the time nominated by the Council in writing. Where the Council has not nominated the time for correction of omissions and defects the Contractor shall undertake any required work within 20 business days of the commencement date of the Statement of Compliance.

23.6 Insurance and Incident Reporting

23.6.1 Work Over Railway Property

Where the work includes work on, or in the vicinity of, property owned by or under the control of the Director of Public Transport or the Victorian Rail Track Corporation or any other rail service or rolling stock provider established from time to time or its successor(s), the Contractor shall notify the Victorian Managed Insurance Authority (VMIA):

- (a) that such work will occur; and
- (b) to include the names of the Director of Public Transport, the Victorian Rail Track Corporation and/or other rail service or rolling stock provider as additional named insured on the policy.

23.6.2 General

The effecting of insurance as required by the insurance clauses in this contract shall not in any way limit or derogate from the liabilities or obligations of the Contractor in performing its work under the Contract.

24. Quality Systems

24.1 Quality Assurance Specification - General

This section specifies those parts of the works, which are subject to specific Quality Assurance requirements.

24.2 Quality Assurance Requirements

The required Quality System Standard is the current AS9001/NZS 9001 or the Civil Contractors Federation IMS.

All works are to be constructed in accordance with the current Specifications, Standard Drawings and Certification Lists. The Contractor is expected to maintain up to date copies of these documents.

24.3 Construction Hold Points

Hold Points shall be recorded on the Construction Program and Inspection and Test Plan. Hold Points and Witness points required by Council are listed in Appendix G. Hold Points specified within the various EDCM construction specifications as being required by the Superintendent, are to be followed on an “as required” basis.

24.4 Drainage Witness Points

Contractor shall give the Superintendent 24 hours’ notice of Witness Points.

Table 23 Drainage Witness Points

Witness Point No.	Process Stage
DW 1	Notification of works near existing live utility services
DW 2	Notification of interference with traffic flow of any type
DW 3	Notification of re-commencement of trenching
DW 4	Notification of pouring of first drainage pit

24.5 Access

The Superintendent, representatives of Council and the Principal’s Surveyor shall require access to the Contractor’s and subcontractor’s workplaces for the purpose of quality monitoring, auditing and asset recording.



24.6 Audits

Council shall carry out random audits and any non-conformance's will be explained to the Contractor at the time and a written non-conformance sent to the Superintendent.

The Superintendent or an agent of the Superintendent shall carry out audits as he sees fit and as determined by the level of conformance.

Random external audits of technical procedures and work instructions may be carried out on the site.

Official external audits of the quality system if required shall be held at the Contractor's office and 48 hours notice shall be given.

24.7 Inspection and Test Plans (ITP's)

ITP'S shall be in a format to suit the Contractor's quality system but must include requirements of Appendix G for hold and witness points

24.8 Traceability

24.8.1 Drainage

Traceability shall only apply to deliveries of concrete. The Contractor shall ensure that the location of the placed concrete is traceable at all times.

24.8.2 Asset Recording

The Developer shall undertake and complete all asset recording requirements as required to the stage of acceptance of the data in digital form. These works will be subject to full Quality Assurance requirements.



25. Finalising the Works

25.1 As Constructed Information

Prior to Councils' consent to "Practical Completion", as constructed" details shall be prepared and issued to Council – refer to **section 9 "Certification and Compliance"**.

25.2 Certification of Final Levels

Upon Completion of topsoiling and allotment grading, "as constructed" details certified by a licensed surveyor showing levels of allotments at corners and ridge lines shall be provided to Council.

25.3 Cleaning up of Works

The Contractor shall clean up and leave tidy the work as it proceeds and before the commencement of the Defects Liability Period shall remove all temporary structures, which may have been constructed for the Contractor's convenience while carrying out the work, and remove all equipment and surplus materials from the site.

It is the contractor's responsibility to ensure machinery, implements or other equipment used for the purposes of earthworks are not moved from land to a road without first taking reasonable precaution to ensure it is free from the seeds of any noxious weed and any other part of a noxious weed that is capable of growing.

The Contractor will be held responsible for any vehicle engaged on the works depositing material or rubbish on road pavements.

25.4 Cleaning of Asphalt Pavement and Drains

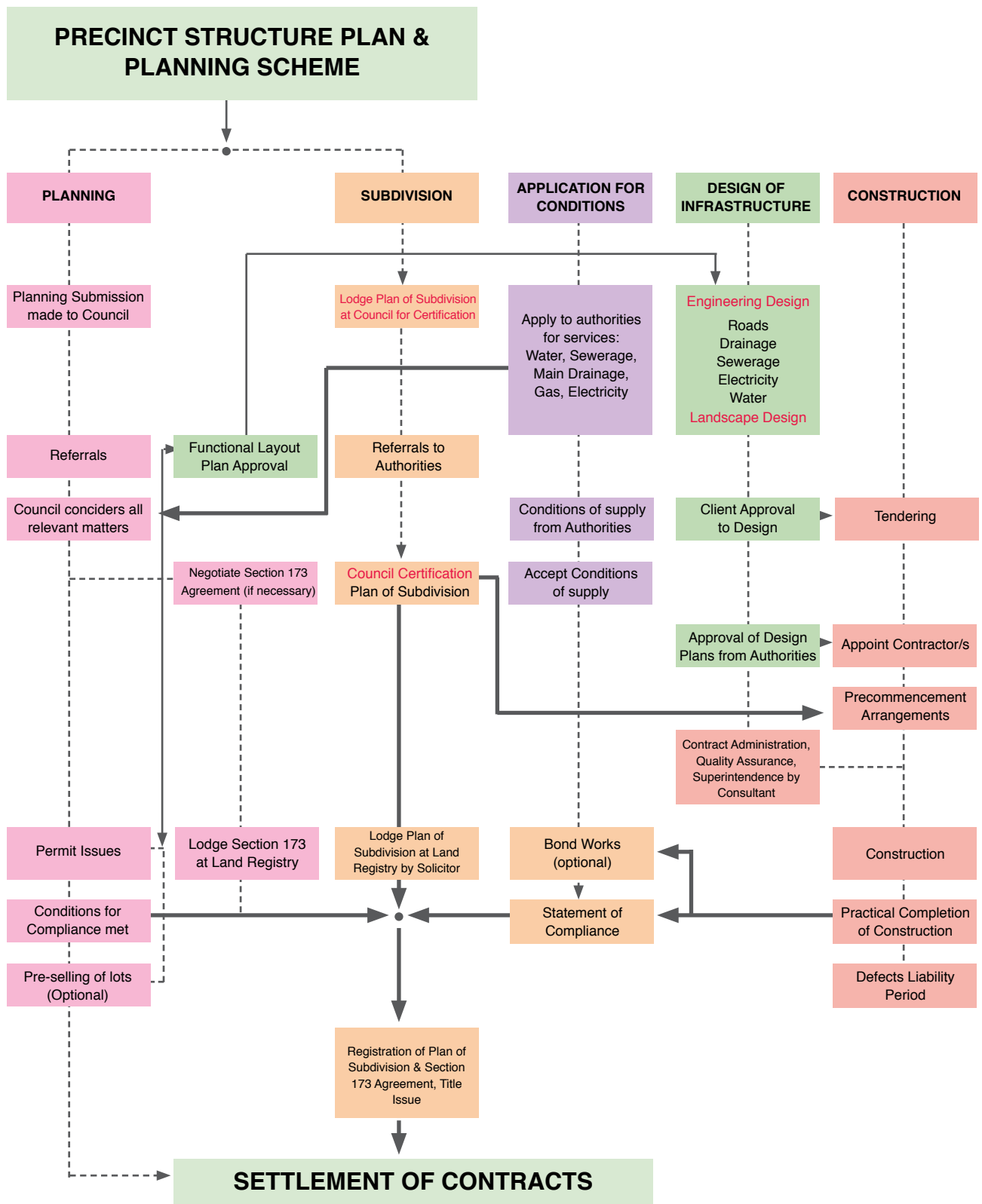
At the end of the defects liability period, the Contractor shall ensure that the road pavement and drains are sufficiently clean to enable a visual inspection for the purpose of checking for faults.

25.5 Final Re-peg

Final pegging by the Principal's Surveyor is required to be carried out prior to the Statement of Compliance.

Appendix A

Land Subdivision Process Flow Chart



Appendix B

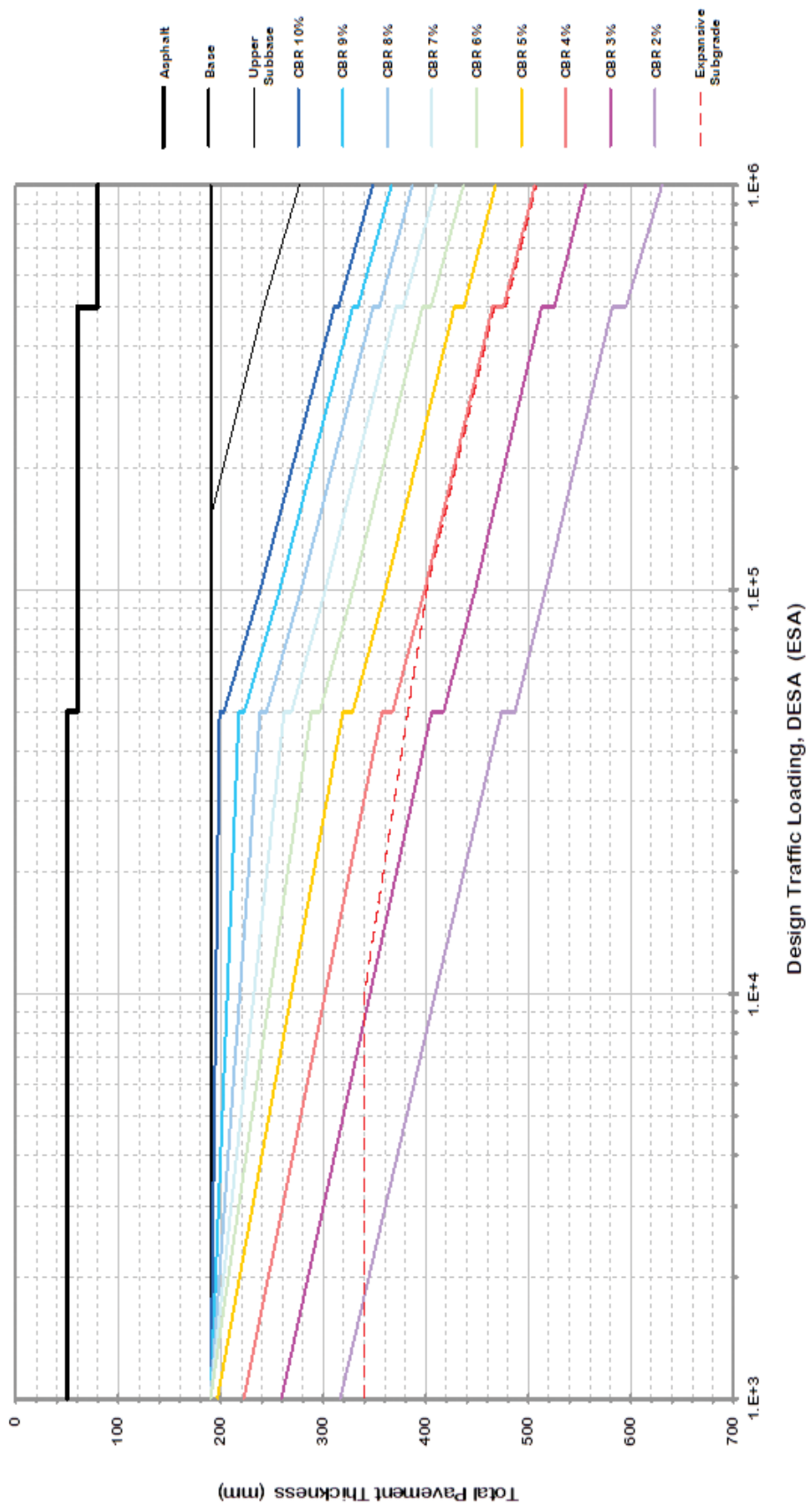
Pavement Design Charts

Table 24 Typical Design Traffic Data

ANNUAL AVERAGE DAILY TRAFFIC (Two Way)				TRAFFIC DIRECTION FACTORS			TRAFFIC GROWTH PARAMETERS			DESIGN VEHICLE LOAD PARAMETERS				COMPUTED DESIGN IN THE DESIGN LANE		
AADT (vpd)	%HVs (%)	HVs (hvpd)		Traffic Lanes	Direction Factor	Lane Distribution	Period (years)	Growth Rate	Growth Factor	HVAGs per HV	ESAs per HVAG	ESAs per HV	HVs (hvpd)	N _{DT} (HVAGs)	DESA (ESAs)	
100	3%	3		1	1	1	20	0.0%	20.00	2.00	0.20	0.40	3	4.4E+4	8.8E+3	
250	4%	10		1	1	1	20	0.0%	20.00	2.05	0.25	0.51	10	1.5E+5	3.7E+4	
500	5%	25		1	1	1	20	0.5%	20.98	2.10	0.30	0.63	25	4.0E+5	1.2E+5	
100	3%	3		2	0.5	1	20	0.0%	20.00	2.00	0.20	0.40	2	2.9E+4	5.8E+3	
250	4%	10		2	0.5	1	20	0.0%	20.00	2.05	0.25	0.51	5	7.5E+4	1.9E+4	
500	5%	25		2	0.5	1	20	0.5%	20.98	2.10	0.30	0.63	13	2.1E+5	6.3E+4	
1,000	6%	60		2	0.5	1	20	1.0%	22.02	2.15	0.35	0.75	30	5.2E+5	1.8E+5	
2,500	7%	175		2	0.5	1	20	1.5%	23.12	2.20	0.40	0.88	88	1.6E+6	6.5E+5	
5,000	8%	400		2	0.5	1	20	2.0%	24.30	2.25	0.45	1.01	200	4.0E+6	1.8E+6	
10,000	9%	900		2	0.5	1	20	2.5%	25.54	2.30	0.50	1.15	450	9.7E+6	4.8E+6	
25,000	10%	2,500		4	0.5	1	20	3.0%	26.87	2.35	0.55	1.29	1,250	2.9E+7	1.6E+7	
50,000	11%	5,500		4	0.5	1	20	3.0%	26.87	2.40	0.60	1.44	2,750	6.5E+7	3.9E+7	



Figure 3 Pavement Design Chart



Appendix C

Form relating to design submissions

Form for Engineering Design Submission

Subdivision Description

.....

Planning Permit Number

Planning Permit Issue Date

	Included	√
Date of Approval	Not Included	X
.....	Not Applicable	NA

1. Functional Layout Plan

a)	Number of Copies provided	
----	---------------------------------	--

2. Design Drawings

a)	Number of A1 size drawings provided	
----	---	--

3. Public Lighting Plans

	Copy provided	
--	---------------------	--

4. Drainage Concept

	Copy provided	
--	---------------------	--

5. Drainage Catchment Plan

	Copy provided	
--	---------------------	--

6. Drainage Computations for Q5 and Q100

	Copy provided	
--	---------------------	--

7. Melbourne Water Drainage Scheme Plans

	Copy provided	
--	---------------------	--

8. Traffic Management Report

	Copy provided	
--	---------------------	--



9. Geotechnical Report

Copy provided	
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10. Pavement Design

Copy provided	
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11. Water Main Reticulation Plans

Copy provided	
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12. Sewer Main Reticulation Plans

Copy provided	
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13. Recycled Water Reticulation Plans

Copy provided	
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14. Tree Removal/Retention Plans

Copy provided	
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15. Weed Management Plan

Copy provided	
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16. Approved Permit Plan

Copy provided	
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17. Road Safety Design Audit Report

Copy provided	
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18. Specification

Number of copies provided	
---------------------------------	--

Applicant	
Company/Firm	
Contact Details	
.....	
Signed	Date
Name and contact details of Developer :	
.....	



Appendix D

Standard Drawings

EDCM	REVISION	DATE	DESCRIPTION
201	0	December 2015	Joint Detail for Road Pavements
202	0	December 2015	Subsurface Drain Back of Kerb
301	0	December 2015	Barrier Kerb, Edge and Invert Profiles
302	0	December 2015	Semi Mountable & Mountable Kerb profiles
303	0	December 2015	Kerb Markings
401	0	December 2015	Concrete Footpath Cross Sections and Joints
402	0	December 2015	Concrete Joint Locations And Thicknesses at Pits
403	0	December 2015	Pedestrian Crossing Kerb Ramp Details
501	0	December 2015	Residential Vehicle Crossing – Single
502	0	December 2015	Residential Vehicle Crossing – Double
503	0	December 2015	Heavy Duty Vehicle Crossing
601	0	December 2015	Single Side Entry Pit Grated 600 - B2 Kerb & Channel
602	0	December 2015	Double Side Entry Pit Grated 600 - B2 Kerb & Channel
603	0	December 2015	Single Side Entry Pit Grated SM2 Kerb & Channel
604	0	December 2015	Double Side Entry Pit Grated SM2 Kerb & Channel
605	0	December 2015	900 x 600 Junction Pit Up To 3600 mm Depth
606	0	December 2015	900 x 600 Junction Pits 3601 mm To 10,800 mm Depth
607	0	December 2015	Haunched Junction Pit Up To 3600 mm Depth
608	0	December 2015	Haunched Junction Pits 3601 mm To 10,800 mm Depth
609	0	December 2015	Step Irons
701	0	December 2015	Property Inlet Type A
702	0	December 2015	Property Inlet Type B
703	0	December 2015	Property Inlet Type C
704	0	December 2015	Property Inlet Type D

Appendix E

Useful References and Resources

Agencies

<i>Reference Agency</i>	<i>Contact Details</i>	<i>Description</i>
Victorian Planning Authority	http://www.vpavic.gov.au	<ul style="list-style-type: none"> ● Precinct Structure Planning Guidelines. ● PSP Road Note.
Melbourne Water	http://melbournewater.com.au	<ul style="list-style-type: none"> ● Drainage and Waterways Authority. ● WSUD Engineering Procedures: Stormwater (2004). ● WSUD Design Construction and Maintenance Guidelines. ● Land Development Manual.
Victorian Planning Provisions	http://www.dse.vic.gov.au/planning	<ul style="list-style-type: none"> ● Clause 56 – subdivision provisions.
Environment Protection Agency	http://www.epa.vic.gov.au/water	<ul style="list-style-type: none"> ● Protection and monitoring of water environments. ● Drainage, recycling, rivers, streams and creeks.
CSIRO	http://www.publish.csiro.au (Books & CD's – engineering)	<ul style="list-style-type: none"> ● “Urban Stormwater – Best Practice Environmental Management Guideline”, EPA, CSIRO, Melbourne Water et all.
CFA	http://www.cfa.vic.gov.au	<ul style="list-style-type: none"> ● Requirements for Water Supplies and Access for Subdivision in Residential 1 and 2 and Township Zones. ● “Preferred Requirements: Water supplies and access for subdivision in Rural Zones.” ● “Identification of Street Hydrants for Fire fighting Purposes”. ● Structural Fire Safety Practice Note PN14 Appendix C– CFA/MFB Position on the Use of recycled Water for Fire fighting”. ● “Planning Guidelines for Subdivisions in bushfire prone areas. ● Information on the bushfire risk for specific development sites
Department of Transport	www.transport.vic.gov.au	<ul style="list-style-type: none"> ● Public Transport Guidelines for Land Use and Development
APRG	www.arrb.com.au	<ul style="list-style-type: none"> ● Report No 21 ‘A Guide to the Design of New Pavements for Light Traffic.’
Austrroads	www.austrroads.com.au	<ul style="list-style-type: none"> ● Austrroads Guide to Road Design ● Austrroads ‘Guide to the Structural Design of Road Pavements’. ● Austrroads (May 2008). Guide To Pavement Technology - Part 2 : Pavement Structural Design. Publication No. AGPT02/08. (AGPT02).

Reference Agency	Contact Details	Description
Cement and Concrete Association of Australia	www.hotfrog.com.au	<ul style="list-style-type: none"> ● Publication T51 'Guide to Residential Streets and Paths'.
Clearwater	www.clearwater.asn.au	<ul style="list-style-type: none"> ● Training and resource material on Sustainable Urban Water Management (SUWM) ● WSUD Policies and Guidelines
Dial Before You Dig services.	www.dialbeforeyoudig.com.au	<ul style="list-style-type: none"> ● Advice on locations of underground utility ● Registration of new underground infrastructure ● Service Guidelines for Victoria
D-Spec	www.aspecstandard.com.au	<ul style="list-style-type: none"> ● Specification for provision of digital drainage asset data.
Engineers Australia Institution of Engineers Australia	www.engineersaustralia.org.au	<ul style="list-style-type: none"> ● "Australian Runoff Quality Guidelines", Engineers Australia. ● "Australian Rainfall and Runoff", Institution of Engineers Australia, (AR&R).
NBN Co Limited	www.nbnco.com.au	<ul style="list-style-type: none"> ● Guidelines for Fibre to the Premises Underground Deployment
Roads and Traffic Authority NSW	www.rta.nsw.gov.au	<ul style="list-style-type: none"> ● 'Concrete Roundabout Pavements – A Guide to their Design and Construction.'
Standards Australia	www.standards.org.au	<ul style="list-style-type: none"> ● "Fibre Reinforced Concrete Pipes" 4139. ● "Design for Installation of buried concrete pipes" AS 3725.
Urban Road Pavement Design Guide	www.whittlesea.vic.gov.au	<ul style="list-style-type: none"> ● Guide to urban road pavement design for growth area councils prepared by Allan Bowman.
VicRoads	www.vicroads.gov.au	<ul style="list-style-type: none"> ● Various <i>VicRoads' Technical Bulletins</i> as appropriate ● (July 2010). Code of Practice RC 500.22 : Code of Practice for Selection & Design of Pavements & Surfacings (RC 500.22). ● (Current). Standard Specifications for Roadworks & Bridgeworks. (VicRoads Standard Specifications). ● VicRoads' Manual of Codes of Practice. ● VicRoads' Manual of Testing. ● "Drainage Design Guidelines", VicRoads.



Appendix F

Construction Specifications

Detailed Construction Specifications

Not included in this document

Appendix G

Nominated Council Hold Points and Council Witness Points

NOMINATED COUNCIL HOLD POINTS AND COUNCIL WITNESS POINTS

CHP are required to be inspected and signed off by Council representative prior to works continuing
CWP are to be witnessed only, as required by the Council

STAGE		REQUIREMENT	TIMING	TYPE	
PRELIMINARIES					
1	a	Environmental Protection	Protection measures in place	Prior to works commencing	CHP
	b	Traffic Management	Vehicle/Pedestrian guidance in place	Prior to works commencing	CHP
	c	Site Safety	Safety measures in place	Prior to works commencing	CWP
	d	Pre-commencement	Pre-commencement Meeting	Prior to works commencing	CHP
BULK EARTHWORKS					
2	a	Grubbing and Clearing	Tree protection fencing	After installation	CHP
	b		Removal of native trees	Prior to removal	CHP
	c	Stripping and/or base preparation	Placing filling on stripped areas	Prior to placing filling	CHP
	d	Boxing	Road formation	Prior to covering	CHP
		Subgrade (non-expansive) Construction Layer (expansive)	Proof rolling, compaction test results (as required), levels and shape	Prior to placement of pavement	CHP
	e	Subgrade Improvement	Treatment of Soft Areas	Prior to backfilling	CHP
	f	Capping Layer	Proof rolling, test results, levels and shape	Prior to placement of pavement	CHP
	g	Formation	Grading and levels	Prior to topsoiling	CHP
	h	Nature Strips	Grading and levels	Prior to topsoiling	CHP
DRAINAGE					
3	a	Drainage pipes	Foundation Bed	Prior to laying of pipes	CWP
	b		Levels, alignment, jointing and haunching	Prior to backfilling	CHP



<i>STAGE</i>		<i>REQUIREMENT</i>	<i>TIMING</i>	<i>TYPE</i>	
	c		Backfill	After Backfilling	CWP
	d	Pits and Structures	Formwork, bedding and reinforcement	Prior to pouring concrete	CHP
	e		Backfilling	Prior to pavement	CHP
	f	Agricultural Drains	Levels and alignment	Prior to Backfilling	CHP
	g		Electricity Pole installation	During installation	CWP
	h	House Drains	Levels and alignment	Prior to backfilling	CHP
	i		Pipe connection at outlet	Prior to backfilling	CHP
	j	Raingardens	Media Material Test Results	Prior to placement of material	CHP
	k	Culverts	Levels and alignment	Prior to placement	CHP
SEWER					
4		Sewer trench	Compaction Test Results	After Backfilling	CWP
CONDUITS					
5	a	Road crossings	Levels and alignment	Prior to Backfilling	CHP
	b	Footpath/Nature Strip	Levels and alignment	Prior to Backfilling	CHP
CONCRETE					
6	a	Concrete curing & compaction	Curing method and application	During work	CWP
	b	Kerb and Channel	Proof roll bedding	Prior to placement of kerb and channel	CHP
	c		Alignment	Prior to pouring	CHP
	d		Backing up	Prior to placement of pavement	CWP
	e	Footpath	Bedding, alignment, reinforcement, jointing	Prior to pouring concrete	CHP



<i>STAGE</i>		<i>REQUIREMENT</i>	<i>TIMING</i>	<i>TYPE</i>	
	f	Vehicle Crossings	Bedding, levels, reinforcement and dowels	Prior to pouring concrete	CHP
	g	Thresholds and Islands	Bedding, levels, reinforcement and dowels.	Prior to pouring concrete	CHP
PAVEMENT – CRUSHED ROCK					
7	a	Lower Sub Base Course	Levels and shape, proof roll and compaction test	Prior to placement of Upper Sub Base course	CHP
	b	Upper Sub Base Course(s)	Levels and shape, proof roll each layer and compaction test	Prior to placement of Base course	CHP
	c	Base Course	Levels and shape, proof roll and compaction test	Prior to placement of asphalt/seal	CHP
PAVEMENT - ASPHALT / BITUMEN / CONCRETE					
8	a	Preparation of pavement surface	Sweeping, cleaning, removal of loose material	Prior to placing seal or asphalt	CHP
	b	Seal	Sweeping, paper protection	Prior to placement of seal	CHP
	c	Asphalt Base Course	Depth, spread rate, temperature, compaction	During Works	CHP
	d	Asphalt Intermediate Course	Depth, spread rate, temperature, compaction	During Works	CHP
	e	Asphalt Wearing Course	Depth, spread rate, temperature, compaction	During Works	CHP
	f	Concrete Pavements	Formwork, reinforcement and jointing	Prior to pouring	CHP
	g	Linemarking	Spotting out	Prior to linemarking	CHP
ROCK BEACHING					
9		Bedding	Level and compaction	Prior to placing rock beaching	CHP



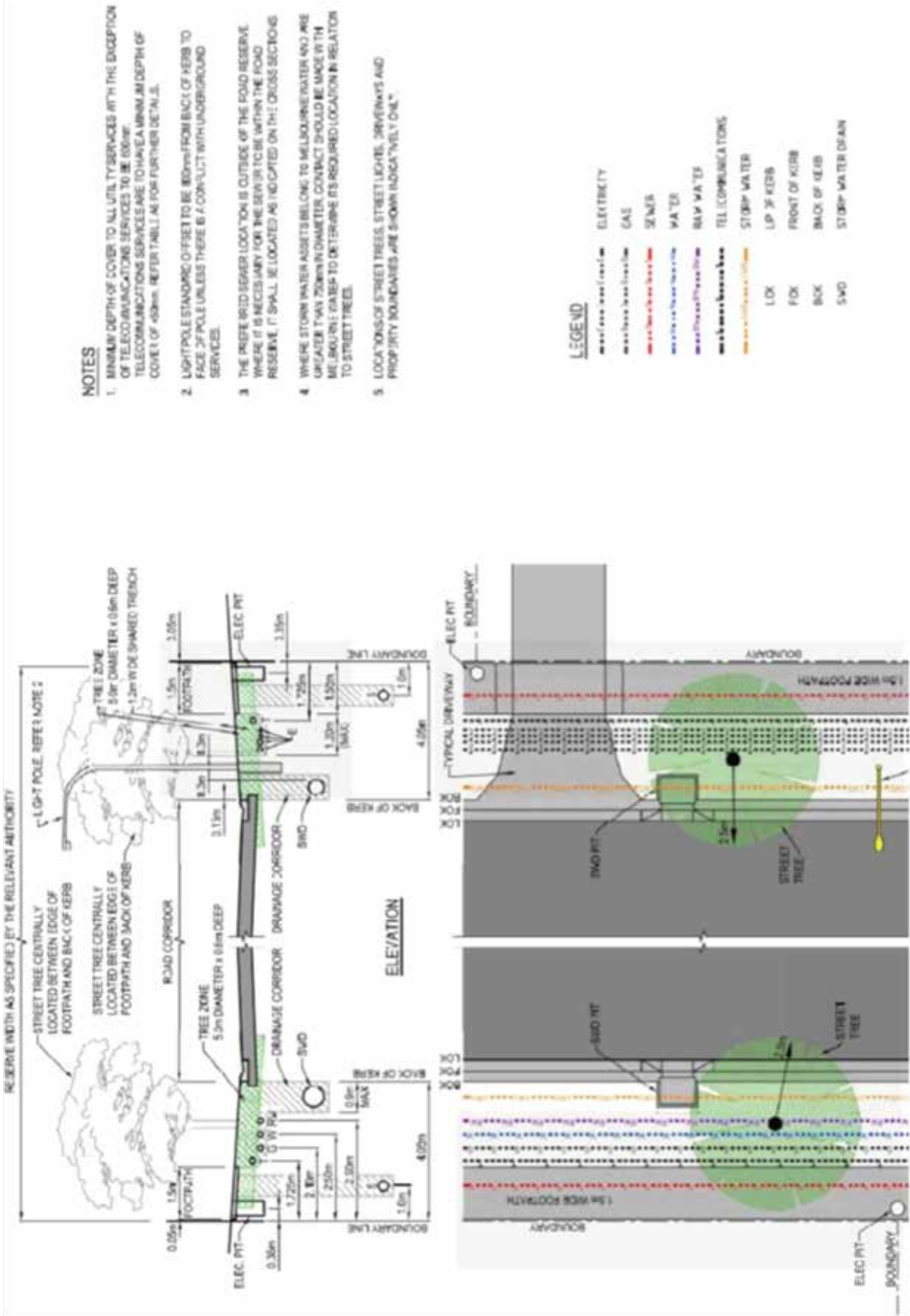
<i>STAGE</i>		<i>REQUIREMENT</i>	<i>TIMING</i>	<i>TYPE</i>	
PRACTICAL COMPLETION					
10	a	WSUD Treatments	Test results to demonstrate Raingardens and Bioretention Systems built to design and functioning	Prior to commencement of defects liability period.	CHP
	b	Quality, Access and Public Safety	Practical completion Inspection	Prior to consenting to commencement of the defects liability period	CHP
END OF DEFECTS LIABILITY					
11		Quality, Access and Public Safety	End of Defects Liability Inspection	Prior to consenting to the end of the defects liability period	CHP



Appendix H

Service Locations in Access Streets

Service Locations in Access Streets



Acknowledgements

The review of the Engineering Design and Construction Manual for Subdivision in Growth Areas, April 2011, was carried out in 2017/18 under the auspices of the Victorian Planning Authority.

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• Property Council	• Wyndham City
• Country Fire Authority	• City of Whittlesea
• Department of Planning and Community Development	• CPG
• Yarra Valley Water	• Department of Transport
• GTK Australia	• Civil Contractors Federation
• Gearon	• Melbourne Water
• Moorabool Shire Council	• CitiPower & Powercor
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• Stockland	• Cardno Grogan Richards
• Shire of Cardinia	• Shire of Melton



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