

4 Specification

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1. GENERAL DESCRIPTION OF WORKS

The whole of the works in this Contract must be carried out as shown on the accompanying plans and sections and in accordance with these Specifications, Schedules and General Conditions of Contract, and to such lines and levels as may be directed by the Superintendent and to his satisfaction.

2. INTRODUCTION

The proposed works include:

- a) reconstruction of concrete and bluestone pitcher kerb and channel;
- b) realignment of the kerb and channel at the intersection of Mills St and Canterbury Place. The new alignment involves narrowing the intersection to slow down traffic and improve pedestrian safety;
- c) asphalt re-sheeting of the road pavement;
- d) reconstruction of vehicle crossings;
- e) reconstruction of pedestrian crossings at both ends of the street;
- f) reconstruction of asphalt footpath;
- g) construction of stormwater pits and underground drainage along Canterbury Place; and
- h) upgrade underground drainage in Herbert Street between Canterbury Place and Wright Street.

1. SCOPE OF BUSINESS REQUIREMENT/BACKGROUND

The existing concrete and bluestone kerb and pitcher channels are undulating due to depression of the foundation over time causing poor surface drainage to existing stormwater runoff. Inadequate drainage in Herbert Street between Canterbury Place and Wright Street has caused significant road flooding during large storms. Works to improve the drainage system within this area, pedestrian safety and removal of runoff from the road pavement include:

- a) removing and reconstructing the kerb and channel on both sides of the street;
- b) improvements to the existing underground drainage system;
- c) resheeting the road pavement between kerb lip to lip;
- d) realigning the existing kerb and channel;
- e) reconstruction of section of asphalt footpath; and
- f) reconstruction of section of road to allow for adequate crossfall.

4. MANAGEMENT SYSTEM

- (a) Tenderers must be able to demonstrate that they have an approved and third party accredited management system in place which covers the following issues:
 - i. quality;
 - ii. environment protection;
 - iii. health and safety;
 - iv. project management; and
 - v. inspection and test plans.

- (b) The following systems, where they are third party accredited, are deemed to meet the requirements of this clause:
 - i. Integrated Management System, operated by the Civil Contractor's Federation; and
 - ii. systems that meet the requirements of all of the following: AS4801 (OHS), AS9000 series (Quality) and AS1400 series (Environment).

5. DRAWINGS AND SPECIFICATIONS.

Drawings and specifications can be accessed via www.tenderlink.com/portphillip.

6. DEFINITIONS

In the Contract, except where the context otherwise requires:

- a) "Council Assets" means any item owned, leased or in the control of the Council;
- b) "Customer Service" means the provision of polite, positive and professional services to all customers;
- c) "Emergency Call-out" means any request or need to perform urgent work outside of normal working hours, to rectify a situation which has caused injury, damage, nuisance or affected public health or if not attended to has the potential to cause injury, damage, nuisance or affect public health;
- d) "Local Law" means any local law made by the Council pursuant to the *Local Government Act 1989*; and
- e) "Trench" means any horizontal or inclined way or opening commencing at and extending below the surface of the ground and open to the surface along its length, the length of which is not less than its depth and the width of which is less than its length and used or to be used for laying of pipe or cable, and includes all works and plant associated with the construction of such an opening.

7. SCOPE OF SERVICE

Not applicable.

8. GENERAL CONDITIONS OF CONTRACT

The General Conditions of Contract AS2124-1992 apply to this contract. Annexures to the Australian Standard General Conditions of Contract are attached.

9. FORM OF CONTRACT

The Contract is a lump sum contract.

10. SALES TAX

Not applicable.

11. GST

Refer to the contract conditions

12. COMPLIANCE WITH REGULATIONS AND LOCAL LAWS

The Contractor and its employees and sub-contractors must abide by all laws, regulations, local laws or by-laws whilst carrying out the contract.

13. SECURITY DEPOSIT

Refer to the contract conditions.

14. INSURANCE

Refer to the contract conditions.

15. ASSISTANCE TO COUNCIL SUPERVISORS

Any assistance required by the Council's supervisory staff in checking or measuring any phase of the works, shall be provided by the Contractor.

16. COMPLAINTS HANDLING

The Contractor must receive and record complaints daily relating to the provision of the service, and attend to the complaints within twenty-four hours or sooner if they are urgent.

The Contractor must attend a weekly inspection and must provide a written report to the Superintendent setting out all complaints and the action taken by the Contractor to rectify the complaints.

17. CONTRACTOR'S STAFF AND SUB-CONTRACTORS

The Contractor, Contractor's staff and subcontractors must at all times represent the Council in a proper manner. All contact with the public must be courteous and co-operative.

The Contractor must have a clear customer focus when carrying out the Works and must be pro-active in managing the Works to eliminate any potential causes of complaints. The Contractor is the front line of the Principal's customer service on this project and the Contractor's performance impacts greatly on the public's perception of the Council.

Therefore, the Contractor must carry out and complete the Works in a manner that results in minimal inconvenience or impact on the customers, and preserves or enhances the Council's reputation with customers.

18. FACILITIES, VEHICLES AND EQUIPMENT

The Contractor must provide, operate and maintain the facilities, vehicles and equipment necessary for the proper performance of the required services.

Where vehicles, plant and equipment are involved with the conduct of the services, the Contractor must maintain a preventative maintenance plan for such equipment. This plan must be made available to the Superintendent on request.

19. MATERIALS

No excavation is to be commenced on any part of the Contract until in the opinion of the Superintendent sufficient quantities of timbering, shoring, staging, scaffolding, cement, pipes, sand and other materials are ready for immediate use, together with the necessary appliances and plant to ensure the speedy and uninterrupted progress and continuance of the works after they have been commenced.

Delays and stoppages in the progress of the works arising from disputes as to the quality of materials or the insufficiency of supply of plant and materials, and any damage or injury caused to buildings, to the works of the Contract or adjacent works, buildings, streets, lands, fences, etc., and arising out of such stoppage or delay, shall be solely and entirely at the risk and expense of the Contractor. The Superintendent may deduct the costs arising from any delays in reinstatement of surfaces from any monies due or becoming due to the Contractor.

The Contractor must advise the Superintendent of any toxic or hazardous material that is intended for use on site and provide a product detail sheet and/or Material Safety Data Sheet (MSDS). The Contractor must comply with all regulations, including those pertaining to the storage and use of hazardous materials.

The Contractor must supply all material. Bluestone pitcher kerb and channel must be cleaned and reused.

Port Phillip City Council ("the Council") supports and encourages the recycling of any disposed construction materials associated with the road and drainage works such as asphalt, concrete, crushed rock, stones, bricks, steel etc. The Contractor must either recycle himself or deliver all recyclable material removed from the site, to a recycling yard for recycling purpose. Council may request the Contractor to show evidence in the form of delivery dockets that this is being carried out.

20. PROJECT MANAGEMENT

The Contractor must ensure that there is no disruption to service users at the time of commencement of the contract and must provide a transitional plan to the Superintendent at least seven days prior to the commencement of the Works which outlines the steps which will be taken to achieve a smooth transition. The transitional plan must address tasks between contract award and commencement, the time required after award to complete preparations required, milestone schedule for tasks planned in the initial operating phase, transition management/supervisory personnel and liaison details including staffing arrangements.

The work shall proceed in accordance with the Transition Plan. The Contractor shall be allowed to occupy and take up only such portion of the streets, roads, foreshores or reserves through which the works are to be carried out as the Superintendent may from time to time consider necessary. In the event of the Contractor failing to proceed with work satisfactorily after any portion of the road, street, foreshore or reserve has been opened up, the Superintendent shall have

full power to complete the Works in such a manner as he may think fit at the sole risk and expense of the Contractor.

20.1. Construction Program

The Contractor must not commence any part of the Works without the Superintendent's approval.

20.1.1. General

- (a) Pursuant to Clause 33.2 of the General Conditions of Contract, the Contractor must submit a detailed construction programme to the Superintendent for acceptance within seven (7) days of the Date of Acceptance of Tender. Such construction program must:
 - i. be submitted in accordance with sub-clause (c);
 - ii. comply with the Date of Practical Completion set out in Annexure A to the General Conditions of Contract; and
 - iii. conform with the draft construction program submitted by the Contractor and accepted by the Principal at the time of tender.
- (b) If the Superintendent considers that the construction program submitted does not show sufficient details, or is impracticable or does not conform to the requirements of the Contract, he may direct the Contractor to amend the program. Such amendments shall be provided within seven (7) days of written notice to do so.
- (c) The construction program submitted under paragraphs (a) and (b) above, and any subsequent amendments thereto submitted by the Contractor shall, when accepted by the Superintendent, be termed the Construction Program.
- (d) Details to be shown on the Construction Program shall include, but not be limited to:
 - i. details of the proposed order of work and the planned dates of completion of the various parts of the Works;
 - ii. placing of orders by both the Contractor and sub-contractors;
 - iii. tests and inspections; and
 - iv. dates of site testing and commissioning.

The Contractor must provide an updated Construction Program whenever directed by the Superintendent, in accordance with Clause 33.2 of AS2124-1992.

At intervals determined by the Superintendent, and not exceeding 28 days, the Contractor and the Superintendent together, shall review the actual progress of the Works in comparison with the Construction Program. If in the opinion of the Superintendent, this review shows that the Contractor will not complete the Works by the Date of

Practical Completion, the Contractor shall within seven (7) days, amend the Construction Program so that it complies with the date of Practical Completion and resubmit it to the Superintendent for acceptance.

20.1.2. Notification and Communication

- a) The Contractor shall give five (5) clear working days notice to the Superintendent in writing prior to commencing the Works.
- b) The Contractor shall give five (5) clear working days notice to all abutting and affected property owners and/or occupiers, in writing, prior to commencing works regarding the proposed works and the anticipated impact on them such as access to their property and in relation to on street parking. As required, the Contractor must arrange alternative parking arrangements for affected owners/occupiers in conjunction with the Superintendent and Council's Traffic Control and Parking Unit.

20.2. Payment

- (a) Payment shall be made on the basis of the lump sum set down against each item in the Schedule of Rates.
- (b) Pursuant to Clause 42.1 of the General Conditions of Contract, each of the Contractor's claims must be numbered consecutively, must be submitted to the Superintendent and must be accompanied by an approved schedule giving the following particulars:
 - i. every item for which payment (in whole or part) is being claimed up to the date of the claim;
 - ii. the amount of payment being claimed in respect of each item;
 - iii. details of variations, if any issued by the Superintendent, with the amounts to be added or deducted. Each variation shall be identified by the numbers and title;
 - iv. a summary of day work, if any, ordered by the Superintendent;
 - v. a summary grouped in the same manner as the Schedule of Rates showing the total gross value of work done to the date of claim for payment;
 - vi. the deduction in respect of retention monies, details being given where necessary;
 - vii. the resulting nett total amount claimed;
 - viii. the deduction in respect of amounts previously certified for payment; and

- ix. the resulting amount claimed as payment due on the application.

20.3. Contract Control and Co-ordination

- (a) The Contractor must have a representative on site at all times while works are in progress.
- (b) During the Contract term, all communications from the Superintendent to any sub-contractors and from any sub-contractors must be through the Contractor.
- (c) The Contractor must co-ordinate all his activities and those of his sub-contractors to ensure the successful completion of the Works.
- (d) The Contractor must keep the Superintendent continually informed of all matters related to coordination with his sub-contractors, the Principal, service authorities and other interested parties.
- (e) The Contractor must allow in his price for the attendance of coordination meetings at intervals of fourteen (14) days during the Contract term. Such meetings shall be in addition to any meetings to be held for the review of progress.

20.4. Defects Liability Period Contact Number

- (a) The Contractor shall provide a contact telephone number for use during the Defects Liability Period. This telephone number shall be manned during normal business hours, and shall be monitored during non-business hours in a manner that ensures that the Contractor will respond to calls within two hours.
- (b) If the Contractor cannot be contacted, or if no response is received within two hours, the Principal may make its own arrangements to rectify the defect. The Principal's costs in doing so shall be deducted from monies retained by the principal in the form of a security deposit and/or bank guarantee.
- (c) In the event of an emergency, nothing in this clause shall override the provisions of AS 2124-1992.

20.5. Construction Works Agreement

The amount payable under the Contract will not be adjusted for site allowance for labour determined for the Site or other costs associated with the employment of labour arising from compliance with the Site conditions. The Contractor shall be deemed to have allowed for all such costs in the Contract Sum.

20.6. Disclosure of Information

Neither the Contractor nor any of his sub-contractors shall provide any information, document or article pertaining to the Works under this Contract for publication in any media without the written approval of the Council's authorised officer

21. SITE CLIMATIC CONDITIONS

The Contractor shall inform itself fully in regard to the climatic conditions likely to be experienced at the Site, and shall make his own assessment of the effect that such conditions may have on the execution of the Works.

22. THE SITE AND CONSTRUCTION FACILITIES

22.1. Site Management

22.1.1. Contractor's Responsibility

- (a) The Contractor must make suitable arrangements with and obtain approval from the appropriate authorities for the passage of the Contractor's heavy construction traffic and large loads on local and state roads and bridges.
- (b) The Contractor shall be solely responsible for all claims which may be the result of damage caused by its construction traffic on public roads and land.
- (c) Possession of any land by the Contractor shall be subject to the unrestricted right of entry of the Superintendent, his representative, or any representative of any Authority during the term of the Contract.

22.1.2. Contractor's Area and Work Site

- (a) The Contractor shall confine its operations associated with the construction of the Works to within the area shown on the Drawings or as determined by the Superintendent ("Works Site").
- (b) Should the Contractor require additional land outside the Works Site the Contractor shall, before or at the time of receiving possession of the Site, arrange with the relevant authorities and obtain such permits as required for the additional area of land to be incorporated into the Works Site.
- (c) Areas of land adjacent to the site owned by municipal councils (eg: on a municipal boundary) and considered necessary for access and storage purposes under the Contract shall be the subject of negotiations between the Contractor and officers of the relevant Council. Any associated costs will be deemed to be included in the lump sum for site establishment in the Schedule of Rates

- (d) The Contractor may erect construction facilities within the Contractor's area. These construction facilities may include such buildings as are necessary for the purposes of the Contract but shall not include living accommodation.
- (e) The design, erection, operation and maintenance of the construction facilities described in paragraphs (d) above shall be in accordance with the regulations of the appropriate statutory authorities and the Contractor shall ensure that, where necessary, all drawings and specifications prepared in connection with the facilities are endorsed by those authorities before they are submitted to the Superintendent for approval.
- (f) Where the Contractor provides its own on-site construction facilities, the Contractor must keep them in good repair and remove them on completion of the Works, or when requested to do so by the Superintendent.

22.1.3. Clearing and Grubbing

- (a) Unless otherwise specified, the area of clearing and grubbing required shall be sufficient to enable the satisfactory construction of the Works specified and shown on the plans.
- (b) All debris removed in clearing and grubbing shall be removed from the site of the work in advance of construction operations. Adjacent roadways, drains and other areas shall be left with a neat finished appearance free from unsightly debris. Grubbed and cleared material shall not be stacked or burnt without the written consent of the Superintendent.

22.1.4. Removal and Disposal of Existing Features

- (a) The Contractor must remove all existing obstructions not required for the purposes of this Contract. The Contractor shall make the necessary arrangements for disposal of such materials. No tipping facility will be provided by the Superintendent within the municipal district for the disposal of material, unless otherwise directed by the Superintendent.
- (b) All bluestone, signs and furniture to be removed shall be transported to either the Council Depot (cnr Boundary Road and White Street, South Melbourne or a nominated stockpile site within the municipality, and stacked in a neat pile on the site at the location nominated by the Superintendent.

22.1.5. Demolition

- (a) It will be assumed that the Contractor inspected the site during the tender period to assess site access limitations, extent of existing elements to be demolished and removed from site or stacked on site. All demolition is to be carried out in a safe manner.

22.1.6. Security of the Site

- (a) The Contractor must provide at its own cost security for the site and the Works, its construction facilities, and plant and equipment associated with the Works.
- (b) The Contractor must erect security fencing and lockable gates around the Contractor's Area and, where practicable to do so, around the Works Site and must maintain the fence and gates in good condition to exclude unauthorised entry into the Works Site.
- (c) The Contractor is fully responsible for the safe keeping of materials, plant and equipment supplied by the Principal to the Contractor. Losses due to theft or vandalism or damage to the Principal's materials and plant and equipment shall be repaired or replaced by the Contractor.
- (d) Plant and equipment left unattended on the Site must be securely locked to prevent their operation or removal by unauthorised persons. All plant and equipment operated by hydraulic mechanisms must be lowered to the ground or lowered to their normal resting positions when not in use. Material shall also be secured by the Contractor to prevent their removal by unauthorised persons. In the event of any loss or damage, the Council will not be held responsible.

22.1.7 Other Contractors

- (a) Pursuant to Clause 27.1 of the General Conditions of Contract, the Principal and other contractors may be carrying out work at or in the vicinity of the Site.
- (b) The Principal, other organisations and contractors shall have the right to use without charge any roads which have been constructed by the Contractor leading to and within the Site.

22.1.8 Site Deliveries

Deliveries of the Contractor's materials and equipment to the Site shall be made only during the approved hours and days of working and delivered by the way of access as approved by the Superintendent and in accordance with Clause 18.1.1 hereof.

22.1.9 Storage of Materials on the Site

- (a) The Contractor must ensure that all materials, plant and equipment are stored on the Site or within the Contractor's Area in a safe and secure manner so as to prevent any damage to the Works and prevent hazards to persons. All materials, plant and equipment shall be handled and transported in a safe manner.

As part of the Contractor's quality system all materials on the Site shall be identified and clearly labelled and, where appropriate, the Contractor shall have current material safety data sheets available on the Site in respect of those materials.

- (b) The Contractor must ensure that any material of a hazardous nature, used or encountered in work under the Contract, is handled according to the manufacturer's safety data sheets or in accordance with Environment Protection Authority ("EPA") or relevant legislative requirements.
- (c) Where the Contractor has to store materials, equipment and excavated material outside the designated Site, the Contractor must comply with the requirements of the Council or other relevant authority or owner of the land.
- (d) The Contractor must not obstruct any drains, channels or gutters in any street or other formed area. These must be diverted by the Contractor, where necessary, or appropriate measures taken to allow for the free and unobstructed passage of water in accordance with the requirements of the relevant authority.
- (e) No deleterious substances such as, but not limited to, oil, petrol, diesel fuel, lime, cement or paint shall be stored on any grassed areas. Adequate precautions must be taken to prevent the spillage of any such substance and must be locked away at the end of each days work. All such substances, contaminated soil and waste substances shall be collected, removed from the Site and disposed of in a lawful manner. No building materials plant, equipment or portable buildings shall be stored or placed on grassed areas, unless prior approval is obtained and the sites are properly and completely reinstated after removal of the materials.

22.1.10 Tidy Work Sites

- (a) Pursuant to Clause 38 of the General Conditions of Contract, the Contractor must, during the construction of the Works, keep the Site and the Works free of litter and rubbish and, on completion of the Works, the Contractor must remove from the Site and all other areas utilised by it for the purposes of the Contract, all plant, structures, temporary fences and gates, temporary access roads and hard standing, rubbish, unused materials construction facilities, and other materials belonging to the Contractor or used under direction, and leave the Site and such other areas clean and tidy to the satisfaction of the Superintendent. In disposing of such rubbish and other materials the Contractor shall not dispose of them on land under the control of the Principal without the written approval of the Superintendent.
- (b) Excavated materials must not be stockpiled on sealed road surfaces, in kerb and channels or road table drains.

- (c) Only quantities of quarry products sufficient for the day's work shall be stockpiled on site. Stockpiles shall be kept neat at all times, and particular care must be taken to ensure that stockpiles:
 - i. cannot be washed into drains or water courses; or
 - ii. are not sited on lawns or another areas that would otherwise be unaffected by the works.
- (d) Footpaths and pedestrian walkways must be kept free of all materials at all times. Any materials spilt shall immediately be swept or otherwise cleaned off the path.
- (e) All rubbish, excess spoil and cut/pruned vegetation must be removed from site to an approved disposal site before the conclusion of work each day. The refuse and debris and any other surplus material shall become the property of the Contractor once it has left the Site and must be disposed of in a lawful manner.
- (f) The Contractor shall, after the removal of all debris, surplus material, Temporary Works and Constructional Plant restore the Site and all other areas utilised by it by filling, shaping, or levelling to a stable, free draining state and planting an approved species of grass or other finish as appropriate, to the satisfaction of the Superintendent.

22.1.11 Site Agreements

The Contractor shall be deemed to have investigated and allowed for in its tender for complying with any existing or new Site industrial agreements. The Contract Sum will not be adjusted for any Site allowances for labour determined for the Site or for other costs associated with the employment of labour arising from the compliance by the Contractor with any Site industrial agreement.

22.1.12 Supervision

- (a) The work shall be carried out under the directions of and to the satisfaction of the Superintendent. All orders and instructions to the Contractor shall be given by the Superintendent or his representatives on behalf of Council.
- (b) When requested, the Contractor must give to the Superintendent, or his representative, access to the Works and must provide every reasonable facility necessary for the supervision, examination and testing of any works or materials for the Contract and any places where the said work or materials are being carried out or prepared.

- (c) Before commencing the spreading of any materials in the works, concreting, drainage works, bituminous works, bluestone works, or other works as directed by the Superintendent, the Contractor must give the Superintendent at least twenty-four (24) hours notice (exclusive of non-working days) of his intention to do so, in order that arrangements may be made for the Superintendent or his representative to be present to observe the material used and the manner of execution of the works.
- (d) The failure of the Superintendent or his representative to condemn any material being used or any work being done shall not relieve the Contractor of his responsibility to see that all materials used and all work done complies with this Specification and Contract, or his obligation to make good any faults or defects which might develop or be detected during the progress or the work or during the maintenance period.
- (e) If the Contractor fails to comply with the requirements of this clause, the Superintendent may correct the faults referred to and deduct the cost of doing so from any monies due or to become due to the Contractor under the terms of this Contract.

22.2. Setting out Works

- (a) Pursuant to Clause 28 of the Conditions of Contract AS2124-1992, the Contractor shall be completely responsible for the setting out of works and the accuracy of lines and levels, and shall provide himself with all necessary appliances such as dumpy levels, spirit levels, straight edges, boning rods, measuring tapes, templates, etc., and these shall be available for use at all times during the works
- (b) The Contractor shall employ an approved competent and experienced surveyor to set out the works on the Contractor's behalf. The surveyor shall be a practising survey specialist with formal qualifications in surveying. In circumstances where it is necessary to set out the works using cadastral information, the surveyor shall be a licensed surveyor.
- (c) Bench marks and/or permanent survey marks are located as shown on the plans.
- (d) Any benchmarks, including temporary bench marks, set out by the Contractor's surveyor shall not be placed within the "No Go Zone" (as defined by the Chief Electrical Inspector) of electricity supply authority assets.

22.3. Traffic

- (a) Before any works are commenced in connection with the Contract which will in any way obstruct, endanger, or inconvenience the traffic (whether pedestrian or vehicular) using the roadway and paths, the Contractor must construct, arrange or provide suitable and sufficient crossovers, detours or passing places for the use of the traffic by day and night, and under all conditions of weather, and to the entire

satisfaction of the Superintendent. The Contractor must thereafter maintain them in a complete and satisfactory condition at all times in use (both day and night) and they shall, under all weather conditions, be safe and trafficable.

- (b) The Contractor shall be responsible for the safety of traffic and the public by erecting, and keeping erected during the continuance of the Works, proper warnings, barriers or crossovers or other obstructions efficiently lighted with red, green or orange lamps kept operating on each night (including weekends and public holidays) from sunset to sunrise to the satisfaction of the Superintendent. The Contractor shall be responsible for any damages arising from the neglect or insufficiency of such precautions.
- (c) At the commencement of the Contract the Contractor shall construct a barricade around the boundary of the Site to secure the Site. The Contractor must maintain the integrity of the barricade during the contract term. The Contractor is to be mindful of the high winds in the area.
- (d) The Contractor must not, by his operations, obstruct any side road or branch track, break down any fences, obstruct any drain or water course other than as specified; but, if such obstructions or breakages occur, he shall at once remove the obstructions and repair the breakages.
- (e) The Contractor shall at all times be prepared to render immediate assistance without charge to the drivers or passengers of any vehicle, or pedestrians who may be delayed, obstructed or in difficulties while passing the area under his control.
- (f) The Contractor must maintain vehicular access to residential properties in the vicinity of works, at all times, unless given the permission of the Superintendent. Temporary pedestrian and vehicular access is to be provided to the satisfaction of the Superintendent.
- (g) Signage, warning devices, lights and other traffic control shall comply with the provisions of Vic Roads Signing Code of Practice to the satisfaction of the Superintendent.
- (h) A traffic management plan to conforming to AS1742.3 providing for vehicular and pedestrian traffic management including and not limited to barricades, barriers, signage, flash lights and other traffic controls must be submitted to the Superintendent for approval prior to commencement of works
- (i) The Contractor shall be deemed to have allowed for the costs of the traffic management in the tender price.

22.4. Facilities Provided by the Principal

The Principal will make available to the Contractor, an area of land defined as the Contractor's Area. This area will be made available without costs to the Contractor for use in carrying out the Works and the Principal shall make no charge for the use thereof.

22.5. Facilities to be provided by the Contractor

22.5.1. Site Accommodation and Facilities

- (a) The Contractor shall, within the Contractor's Area, provide site accommodation and facilities complying with, but not necessarily limited to the requirements set out in paragraph (b) below for himself and his sub-contractors. All expenses incurred in providing and maintaining such accommodation and facilities shall be deemed to have been included in the Contract Price.
- (b) The site accommodation and facilities provided by the Contractor shall include:
 - i. the Contractor's site offices;
 - ii. a sick bay equipped in accordance with the requirements of paragraph 22.5.2 of this Specification; and
 - iii. all weather access and parking facilities adequate for the Contractor's and his sub-contractor's workforce.

22.5.2. First Aid and Medical facilities

- (a) The Contractor is fully responsible for the provision of first aid services to his staff and workforce, including the transport of injured personnel to hospital or other appropriate accommodation as and when required.
- (b) The provision of first aid shall be in accordance with the Code of Practice for First Aid in the Workplace.
- (c) The Contractor shall provide notices giving the names and telephone numbers of at least two (2) medical doctors practising in the vicinity of the Site and the telephone numbers of the ambulance service. These notices shall be prominently displayed adjacent to each telephone to be used on the Site during construction.

22.5.3. Water Supply

- (a) Unless provided for elsewhere in the Contract documents, the Contractor shall make its own arrangements with the relevant water supply company or authority for the provision of a water supply point near the Site and shall pay all costs associated with the provision of the water supply and the use of the water throughout the Contract term.
- (b) The Contractor is responsible for the reticulation of the water supply from the point of supply to all points of the Site.

22.5.4. Electricity Supply

- (a) The Principal has no reticulated power supply available for use by the Contractor at the site.
- (b) The Contractor shall make its own arrangements for the supply of electric power to the Site for its own use and shall pay all charges for the installation and use of electric power.
- (c) All costs associated with the supply and use of electric power for construction purposes shall be deemed to be included in the Contract Sum.
- (d) All electrical installations carried out by the Contractor shall comply in all respects with AS3000, the Code of Practice for Temporary Electrical Installations for Buildings and Construction Sites and the requirement of the local electricity supply retailer.
- (e) If necessary to prevent damage to the Works or delays to the Date of Practical Completion the Contractor shall make provision for an on-site generator which shall be suitably silenced. The provision and use of this plant shall comply with all current regulations and Codes of Practices and shall be at no extra cost to the Principal.
- (f) Any pumps used for dewatering between 6:00 pm and 8:00 am must be electrically driven to minimize noise in residential areas.

22.5.5. Telecommunications

- (a) The Contractor shall make its own arrangements for the provision of its telecommunications requirements.
- (b) The Contractor shall be deemed to have satisfied itself that any mobile telecommunication device operates satisfactorily over the whole of the Site.
- (c) The Contractor shall make due allowance for the amount of time required to provide fixed telecommunications at the Site as no extension to the Date of Practical Completion will be allowed on the basis of any claimed delay.

22.5.6. Sanitary Provisions

- (a) The Contractor must comply with the Code of Practice titled Building and Construction Workplaces issued by the Health and Safety Authority Organisation, Victoria.
- (b) The Contractor must provide suitable and approved sanitary accommodation for persons employed on the works, as approved by Council's Environmental Health Coordinator. The Contractor shall pay all associated fees and charges.

- (c) The Contractor must, at its own cost, provide toilet and adequate wash facilities for its personnel and that of its sub-contractors. These facilities shall be connected to a storage tank, or other facility approved by the Superintendent, which shall have a minimum of 14 days storage capacity and shall be located in a place approved by the Superintendent.
- (d) The Contractor must provide watertight refuse bins for use by its workforce.
- (e) The Contractor must arrange for the removal of all sewage from the holding tank and for all garbage and refuse to be collected at regular intervals and disposed of at approved and lawful locations outside the Work Site.

22.5.7. Works Site Security

The Contractor shall be responsible for the security of the Contractor's Area, the Works of the Contract and any of his equipment or materials that are on Site. The Contractor may erect temporary fencing within the Contractor's Area for security purposes.

22.5.8. Site Maintenance, Clean Up and Restoration

- (a) For the purpose of Clause 38 of the General Conditions of Contract, temporary works and construction plant to be removed from Site upon completion of the Works shall include, but not be limited to, all plant, structures, temporary access roads and hard stand, rubbish, unused materials, construction facilities and other materials belonging to the Contractor or used under his direction. In disposing of such rubbish and other material. The Contractor shall not dispose of them on land under the control of the Principal.
- (b) The Contractor shall restore the Site and all areas utilized by him for filling, shaping or levelling to a stable and free draining state to the satisfaction of the Superintendent.

22.6. Existing Structures, Services and Other Property

- (a) The locations of various underground structures, services and other property as shown on the Drawings are believed to be correct but do not purport to be absolutely so. The Drawings have been provided for the information of the Contractor but shall not be used as if the structures, services or the property will be found exactly as plotted or that they are complete or accurate. The Principal does not warrant the correctness of such information.
- (b) Prior to commencing Works, the Contractor shall obtain all relevant information from the appropriate Authorities concerning the location of any water, sewerage or gas mains, storm water drains, electric power, telecommunication lines (either above or below the ground), which may be affected by the Works.

- (c) The Contractor shall be responsible for any damage, which has been caused by any works or operations under his control to any water, sewerage or gas mains, or any main, cable or pole of the electricity or telecommunication supply. He shall also be responsible for any damage caused by the works of this contract by any fault that may develop in any of the above-mentioned mains, etc., due to works under his control. He shall make his own arrangements with the Authorities concerned for any repairs which may be necessary, and shall have no claim against Council for any loss or damage occasioned by any such damage or defects.
- (d) The Contractor must, where any damage has occurred to services, notify the Superintendent and also the responsible authority concerned, and make all arrangements for any necessary repairs.
- (e) The Contractor must make provision for the sealing and removal of unused services, for the cutting, sealing and reconnection of any services temporarily requiring attention, and shall ensure that all leaks and defects in any services are stopped and repaired before construction proceeds or recommence, all as approved by the responsible authority.
- (f) The Contractor shall be responsible for organising any service alteration, so that services are sufficiently clear of pavement, concrete and drainage works. It is necessary for the appropriate service company to carry out any alterations. Any service alteration shall be paid by Council on the rate provided in the "Schedule of Provisional Items".
- (g) All fire plugs, valve boxes, manhole covers and other miscellaneous covers are to be set by the Contractor to match the finished surface levels in compliance with typical details. Adjustment of all covers shall be arranged by the Contractor with the appropriate service authority, and all associated costs are deemed to be included in the tender price.
- (h) The Contractor shall have no claim against Council for any delay, loss or inconvenience which may occur through the necessity of such alterations.
- (i) The Contractor is warned of the danger and loss caused by interference with the conductors, insulators or structures on the transmission lines of the appropriate power company. No blasting or clearing operations shall be carried out in the vicinity of such lines, or any other Authorities mains, without adequate precautions being taken to prevent possible damage. The power company, or any other Authority, has the power to recover damages from the person(s) responsible for such loss or damage.
- (j) During the course of the Works, various authorities may require emergency access to various infrastructure assets. The Contractor must, at all times, ensure that construction plant, equipment, materials, debris, spoil etc associated with the Works are kept clear of:

- i. Water supply and Sewerage assets:
Fire plugs, Valves (all types). manholes, inspection shafts, access to pump stations; and
- ii. other authority assets where emergency access may be required, for example gas main control facilities.

22.7. Protection of Existing Features

22.7.1. Property – Protection and Reinstatement

- (a) The Contractor must not, without the written consent of the owner, interfere with any public or private property or improvements except in accordance with this Contract, and shall protect and maintain, free from injury or interference, any structure or any private or public service or other property liable to be damaged by the Works.
- (b) Where the Works include any item or items which make it necessary to go into or through private property as, for example, the installation of drains through private property, the Contractor must take all possible precautions to prevent the property or improvements being damaged, and to avoid (as far as possible) any inconvenience to residents and the public. Under no circumstances shall soil or other materials be heaped or allowed to fall and remain against buildings or fences without the written consent of the owner, and then only provided that adequate precautions are taken for the protection and safety of those fences and/or buildings.
- (c) In the event of any damage to any such structure, service or property, the party controlling it must be immediately informed of the damage.
- (d) The Contractor must (at his own expense), as soon as the progress of works permits, repair and restore any structure, service or property damaged in any way to the like order and condition in which it was before such damage. The Contractor must provide (at his own expense) any materials and/or labour, which are required for the satisfactory reinstatement of same. The repairs may be made by the party controlling the structure, service or property, and the cost of such repairs may be deducted from the monies due or which may from time to time become due to the Contractor. The Contractor shall also be liable for any loss or damage, which may result from such damage or interference to any structure, service or property and for any claim arising from delay in repairing and restoring it.
- (e) All roads, channels, paths, drives, yards or other places used in connection with the work shall be kept free of unnecessary obstruction whilst the work is proceeding, and left tidy on completion to the satisfaction of the Superintendent.
- (f) The Contractor shall be responsible for any damage done by himself, his servants, employees or agents, or by any plant or equipment used or connected with the work in any way, whether owned by the Contractor or not, on or to any private or public property. The Principal shall be at

liberty, and is hereby authorised by the Contractor, to assess any such damage so done on or to private or public property. The Principal is to be at liberty to, and is hereby authorised to, pay and discharge any claim or demand by any person or Corporation in connection with the matters aforesaid or any of them, and to deduct any monies whatsoever coming due or payable to the Contractor.

- (g) Where work is to be done in a sewerage or drainage easement, drainage reserve, or any other reservation or easement through private property, the Contractor will normally be required to confine his operations to the width allowed in such easement reserves or reservation. Any concessions the Contractor may require (apart from the said easement), and particularly in regard to access, must be obtained by him from the property owners or other parties concerned at his own expense entirely. Approved slip panels are to be provided by the Contractor in all fences crossed by such easement or reserves. If required, provision must be made for livestock to have access at all times to any creek, or to land on each side of the easement.
- (h) Where the construction of any works has required the Contractor to go into or through private property the Contractor shall, prior to the expiration of the maintenance period, obtain from the owner or owners involved written advice that the Contractor has reinstated the parts of their property affected to their satisfaction. In cases of dispute between owners concerned and the Contractor, the matter shall be referred to the Superintendent for decision, and whose decision shall be final and binding on the Contractor.
- (i) Property shall include all buildings or structures, fences, services or drains, crops or growth of vegetables, cattle, horses, or livestock and vehicles.

22.7.2. Clearances

Before final payment is made, the Contractor must provide written clearances for all damages that may have occurred during the execution of the Works.

Where the Works are either within a private property, affect access to that property, or affect areas in which the owner has an interest (eg nature strip and footpath area) a release form must be obtained from the property owner for the property as soon as practicable after restoration is complete.

If a customer lodges a complaint, a release form is also required when the complaint is resolved (refer also to Clause 16 Complaints Handling).

When signed by a customer, a release form shows that the customer is satisfied at the time of signing. However this does not prevent the customer requesting further restoration that may be required at a later date.

Release forms on pre-printed forms must be used. The Contractor may be permitted to use alternative formats and/or content, subject to a draft version being approved by the Superintendent.

The Contractor is responsible for liaising with customers, and obtaining release forms with customers' signatures.

The Contractor must deliver the original versions of the signed release forms to the Superintendent at the commencement of the Defects Liability Period.

In cases where a customer refuses to sign a Release Form, the Contractor must notify the Superintendent. The Superintendent and a representative of the Principal (if required) will then inspect the area in question, to ascertain the status and adequacy of the restoration undertaken by the Contractor.

Following this inspection, and discussions with the customer (if applicable) the Superintendent will determine whether the standard of reinstatement works is adequate. Where the standard is determined to be inadequate, the Superintendent shall direct the Contractor to perform more restoration to achieve the desired standard. The Contractor shall not be entitled to any additional payment for this work, unless the Superintendent also determines that the work is additional to what was required under the contract.

If the restoration is deemed to be satisfactory, the Superintendent may deem the restoration works to be adequate and may certify payment for the work completed, despite not having a clearance.

The Defects Liability Period will be extended for the whole of the Works until all release forms are received, except where the Superintendent has deemed the restoration to be satisfactory.

23. PROSECUTION OF THE WORK

23.1. Hours and Days of Working

Definitions:

The following definitions apply for the purposes of this Clause:

- a) "Extended Weekend" – means a weekend adjacent to a public holiday or an industry rostered day off.

23.1.1. Normal Hours of Work:

- (a) Pursuant to Clause 32 of the General Conditions of Contract, the Contractor's working hours at the Site shall be restricted to between 7:00am and 5:30pm Monday to Friday inclusive, but excluding statutory public holidays and Industry Award Rostered Days Off.
- (b) No work other than routine maintenance on the Contractor's plant will be permitted on Saturdays, Sundays, public holidays and Industry Rostered Days Off without prior written approval of the Superintendent. Such maintenance work shall only be carried out between 8:00am and 4:00pm. Any routine maintenance shall be carried out and in such fashion as not to cause any spillage of any material and shall be limited to minor maintenance such as that normally carried out to equipment on a daily basis. No servicing or repair of equipment shall be undertaken on site without the express permission of the Superintendent.

23.1.2. Construction Work outside Normal Hours

- (a) If the Contractor desires to carry out the works outside the normal working hours, he shall make a written request to the Superintendent (in a format acceptable to the Superintendent). The request must be delivered to the Superintendent no later than 12:00 noon on the preceding Thursday. Providing inspection services can be made available, the Superintendent may grant written permission. The Contractor shall pay in full, for time beyond the normal working hours, all wages and/or salaries of supervising personnel.

On the last normal day prior to an Extended Weekend, the following activities must be completed no later than 4:00pm:

- a) all construction works must be completed, shafts and trenches backfilled, road openings adequately sealed using premix;
- b) all safety requirements (including, but not limited to, barriers and road signage) must be in place;
- c) all environmental protection requirements must be in place. This includes, but is not limited to, ensuring all silt traps are maintained and working correctly, and all drainage systems (both natural and man

made) are protected against sediment entry;

- d) all efforts must be pursued to remove any unused stockpiles of quarry products, topsoil or excavated material off site. However if this is not possible, then stockpiles must be appropriately barricaded, and secured in accordance with EPA guidelines to ensure sediments do not enter drainage systems; and
- e) all reinstatement and clean-up works must be completed.

23.2. Deliveries to Site

Deliveries to the Site shall be made only during normal working hours as defined in Clause 19.1.1 and by way of the access described in Clause 23.1.2.

24. QUALITY ASSURANCE

24.1. Quality Plan

- (a) The Contractor must establish and implement a Quality Assurance Plan complying with the requirements of AS/NZS 9001-1994 in conjunction with AS/NZS 3905.2-1993. Sub-contractors' Quality Assurance Plans shall be deemed to form part of the Contractor's Quality Assurance Plan.
- (b) Details of the Contractor's proposed Quality Assurance Plan shall be submitted to the Superintendent for approval within fourteen (14) days of the Date of Acceptance of Tender. Such submission shall be made in accordance with the requirements of sub-clauses 24.2.
- (c) Any delay by the Contractor in obtaining the approval of the Quality Plan by the Superintendent shall be at the Contractor's expense and the Contractor shall not be entitled to any extension of time due to such delay unless the Superintendent has taken more than 14 days to reply to the Contractor's submission.
- (d) Works shall not commence until the Superintendent has approved in writing the Contractor's Quality Plan.

24.2. Quality Plan Requirements

The Contractor's Quality Assurance Plan shall incorporate:

- a) such measures as are necessary to trace each product or service from receipt through construction; and
- b) quality assurance and quality control procedures covering all material supply, manufacture and construction carried out by the Contractor and any of its sub-contractors.

Quality control tests and inspections shall include, but not be limited to, the following:

- a) the tests and inspections required in accordance with this Specification. The frequency of such tests and inspections shall be not less than the requirements set out in this Specification, and
- b) such tests as are necessary to demonstrate that materials and equipment comply with the requirements of this Specification.

Whenever practicable, the Contractor shall carry out material testing such that the results are available for review by the Superintendent prior to the materials being incorporated into the Works.

The Contractor's traceability procedures shall include, but not be limited to, a means of identifying in the Works, the location of all materials represented by a sample which has undergone a quality test.

24.3. Quality Plan Contents

The Quality Plan shall include, but not be limited to the following:

- a) inspection and test plans for all materials and construction work;
- b) hold points that require approval of the Superintendent before proceeding;
- c) non-conformance identification and action procedures;
- d) details of quality personnel and relationship to the company; and
- e) safety procedures and checklists.

25. OCCUPATIONAL HEALTH AND SAFETY ASSURANCE

- (a) Pursuant to Clause 14.1 of the General Conditions of Contract, the Contractor must comply with the requirements of the *Occupational Health and Safety Act 2004*, Regulations under the Act and those Codes and Draft Codes of practice and Regulations, including plant Regulations, which are relevant to the Works.
- (b) The Contractor must, before commencing work on Site, submit to the Superintendent for acceptance in accordance with sub-clauses 20.2.2 of this Specification, the Contractor's Occupational Health and Safety Plan, which must include as a minimum:
 - i. occupational health and safety policy and objectives;
 - ii. the Contractor's organisational structure and responsibilities;
 - iii. induction and training of employees and all subcontractors and plant hirers;
 - iv. nomination of OHS committee representatives;
 - v. method/frequency of conducting OHS meetings;

- vi. accident and emergency procedures, complete with emergency telephone numbers; and
 - vii. accident investigation and reporting.
- (c) The Occupational Health and Safety Plan may include Safe Working Procedures/Instructions. Where these have been developed to control Class 1 and 2 risks identified in the Job Safety Analysis (“JSA”), they shall clearly describe the work sequence. Employees engaged in these tasks shall be trained in the Safe Working Procedure.

25.1. SAFE WORK METHOD STATEMENT (“SWMS”)

The primary objectives of the SWMS are to:

- a) identify hazards associated with Contract tasks and activities;
- b) determine the level of risk;
- c) establish appropriate risk control measures; and
- d) ensure that all subcontractors and plant hirers have been alerted to all the hazards and safety issues that will be encountered on the Work Site. This must be included in all submitted SWMSs.

The SWMS shall be submitted in a tabular format to a level of detail acceptable to the Superintendent. Typical hazards may include, but are not limited to:

- a) collapse of earth;
- b) falling into excavations;
- c) temporary electrical supplies, power leads;
- d) untidy Work Sites;
- e) tunnel support;
- f) work in confined spaces;
- g) plant/equipment operation and maintenance (includes covers, winches, pressure vessels, excavations, etc);
- h) traffic management;
- i) noise;
- j) public safety; and
- k) underground and overhead assets.

If work techniques change during the construction process, the Contractor must submit an amended version of the JSA to accommodate the changed conditions / situations.

25.2. OHS Performance Monitoring

- (a) The Contractor must provide evidence to the Superintendent on a monthly basis in the form of a Contractor OHS Performance Report. The content of the report must include, but not necessarily be limited to:
- i. number of lost time injuries;
 - ii. working days lost due to injury;
 - iii. current status of any injured personnel; and
 - iv. evidence of the implementation of corrective action undertaken as a result of OHS inspections and audits.
- (b) The OHS Performance Report shall be submitted by the Contractor to the Superintendent no later than the 23rd of each month (or prior business day if the 23rd is not a normal business day). Failure to submit the Report may be grounds for withholding the monthly Pay Certificate.
- (c) When requested, the Contractor must provide to the Superintendent reports on OHS inspections, audits and assessments undertaken during the Contract Term.

25.3. Incident Notification

- (a) If the Contractor is required by the WorkSafe Victoria (refer to the *Guide to Incident Notification*) or any regulations to give any notice of an accident occurring during the performance of the Works, the Contractor must at the same time or as soon thereafter as possible in the circumstances give a copy of the notice to the Superintendent.
- (b) The Contractor shall promptly notify the Superintendent WorkSafe Victoria of:
- i. any accident, incident or injury which occurs during the carrying out of the contract works;
 - ii. any near miss; and
 - iii. all lost time incidents.
- (c) The Contractor shall submit a written report to the VWA and the Principal within 48 hours of any such incident, giving complete details and including results of investigations into its cause, and any recommendations or strategies for prevention in the future on the Incident Notification Form.
- (d) The Contractor must provide to the Superintendent, details of any incident involving third parties which may or may not lead to investigation of the Contractor by Council or an insurance claim against either party. When requested by the Superintendent, the Contractor is to provide all specified details of any such incident without delay. The request is likely to arise

from a report or complaint by a member of the public in relation to the Contractor's operations in the provision of the service. The required information may include, but will not necessarily be restricted to, the full details of the personnel, facilities, vehicles and equipment involved, the date and place, the nature of any damage to property or injury to personnel, and the action taken by the Contractor to prevent recurrence.

25.4. Responding to and managing incidents

- (a) The Contractor must, at least 7 days prior to commencing works, supply to the Superintendent the name(s) and telephone number(s) of its nominated personnel for incident response and management. The nominations must ensure that a response will be available, 24 hours per day, 7 days a week, in the event of any incident involving the works.
- (b) The Contractor's nominees must not use an answering machine on the nominated telephone contact numbers.
- (c) If the Contractor cannot be contacted, or if no response is received within two hours, the Principal may make its own arrangements to manage the incident. The Principal's costs in doing so shall be deducted from monies owing to the Contractor.

25.5. Confined Space

- (a) All work in confined spaces shall be carried out in accordance with the requirements of WorkSafe Victoria's *Compliance Code For Confined Spaces* (dated September 2008);
- (b) During the course of any works in Confined Spaces, the Contractor shall:
 - i. provide all equipment necessary to comply with the requirements of this Appendix, and ensure its correct use by all personnel employed by the Contractor and/or subcontractors; and
 - ii. ensure that the atmosphere in any confined space is both initially tested and then monitored for both contaminants and oxygen deficiency while occupied, with an approved calibrated monitoring device.
- (c) The Contractor must ensure that all personnel working at a confined space site possess a current Confined Space qualification from an approved and accredited training provider. An approved 12 month refresher course is deemed to meet the Council's requirements. The personnel shall produce satisfactory evidence of their confined space qualification, and its currency, upon request. A failure to do so may result in a direction for that person to be removed from the confined space site.

25.6. No Go Zones – Electricity Supply Authority Assets

- (a) All work in the vicinity of electrical authority supply assets shall be carried out in strict compliance with the requirements of the Chief Electrical Inspector.
- (b) For the purposes of this Clause:
 - i. "Electrical Assets" means electricity supply authority assets;
 - ii. "Spotter Zone" means the area in the vicinity of any electrical asset where the Chief Electrical Inspector deems that a spotter is required; and
 - iii. "No Go Zone" is the area in the vicinity of any electrical asset defined as a No Go Zone by the Chief Electrical Inspector.
- (c) Work in Spotter Zones
 - i. The Contractor must ensure that a trained and certified "Spotter" is assigned to each and every site where work is carried out within the "Spotter Zone".
 - ii. "Trained and certified" means that the person has attended a spotters course which meets the requirements of the Chief Electrical Inspector, and has subsequently been certified as holding the required competencies.
- (d) Work in No Go Zones

No work shall commence in a No Go Zone, unless the Contractor has:

 - i. applied for, and obtained a written and signed Permit to Work from the Electricity Supply Authority for that specific site. The application must be accompanied by a full risk assessment;
 - ii. provided a copy of the Permit to Work, and the Risk Assessment, to the Superintendent;
 - iii. complied with all conditions laid down by the electricity supply authority in the Permit to Work; and
 - iv. met with representatives of the Superintendent and the electricity supply authority on site.

25.7. Lifting Equipment

- (a) Slings must be tested by an approved laboratory, and must be tagged. Tags must show information including, but not necessarily limited to:
 - (i) Working Load Limit (WLL); and
 - (ii) date of test.
- (b) Slings and their fittings must be compatible in terms of WLL.

- (c) Lifting or spreader beams must be tested by an approved laboratory, and the WLL must be durable marked, either by painting or stamping, on the beam. Beam fittings must be compatible in terms of WLL.
- (d) Hooks must be fitted with latches and safety locks.

25.8. Excavation and Tunnelling Operations

- (a) For the purposes of this Clause, an excavation is defined to include any mine, trench, shaft or tunnel.
- (b) All excavations shall be carried out in accordance with the Code of Practice for Safety Precautions in Trenching Operations
- (c) For each Work Site involving either an excavation greater than 1.5 metres deep or a tunnel, a person with an approved qualification, must be nominated. The nominee must attend the site during each work shift, and will be responsible for all operations at that site. A failure to attend, or a failure by the Contractor to nominate an acceptable person, will result in the Superintendent issuing a direction to cease work at that site until such time as the Contractor rectifies the problem.
- (d) Sufficient shoring in good condition shall be maintained at each Work Site for the day's activities. The shoring shall be capable of providing adequate support, taking into consideration the depth and geology of the excavation.
- (e) At the completion of each days work, or whenever the Contractor's personnel are not actually in attendance at the excavation site, the excavation shall be either backfilled, or fully secured against unauthorised entry by using steel plates, timber or other approved method. The covering must be secured in an approved manner (eg: timbers to be nailed down).

A failure to adequately secure an excavation will result in the Superintendent taking action, at the Contractor's cost, to secure the excavation.

25.9. Protection of Open Excavations

- (a) Excavation Protection Systems

Excavations must be protected using chain mesh panels that are a minimum vertical height of 2 metres above natural surface. The panels shall be fastened together in a manner that prevents unauthorised access to the excavation. A gate may be provided for access, but the gate must be secured by an approved chain and padlock system to prevent unauthorised access to the excavation when the gate is not in use.

An appropriate visual warning system must be installed to highlight the presence of the excavation. Paraweb fixed to the chain mesh panels is deemed

suitable for this purpose during daylight hours. The Contractor must develop an adequate visual warning system for use between sunset and sunrise.

If the excavation is located near a road, and traffic is assessed to be a possible hazard, then the excavation shall be additionally protected using either plastic water-filled barriers or concrete barriers that are approved by Vic Roads.

Para Webb is NOT ACCEPTABLE on its own as an excavation protection system.

Barrier tape (75 mm red/white striped or similar) is NOT ACCEPTABLE under any circumstances.

(b) Provision of Kickboards

Excavation support systems shall protrude 300 mm above the top of the excavation to provide a kickboard protection along the excavation sides, and to prevent loose items falling into the excavation. Where the support system is at surface level to enable vehicle access, temporary kickboards shall be securely placed whilst the location is not actually being used for vehicle access.

(c) Removal of protection System to Permit Work

If active work is not taking place at the excavation, the protection system shall remain in place at all times.

If any active work at the excavation is underway:

- (i) remove only the minimum required amount of the protection system to allow the work to proceed;
- (ii) vehicle barriers (where required by this clause), and the protection for any adjacent pedestrian path, shall remain in place at all times active work at the excavation is underway; and
- (iii) all signage required by the VicRoads Signing Code of Practice shall be remain in place at all times.

(d) Excavations In or Near Footpaths

Excavations in or near footpaths shall be protected in accordance with the above sub-clauses.

Any work near footpaths must be carried out in a manner that ensures the safety of pedestrians. Footpaths must be kept clear at all times. In particular, spoil, quarry materials, plant and tools must not be left, deposited, or allowed to remain, on footpaths.

If it is necessary to close a footpath for any reason, the Contractor must set up and maintain an alternative footpath that is safe for pedestrian use, and with a surface that is smooth such that there are no tripping hazards, and prams can be wheeled across the surface without difficulty.

Appropriate traffic signage shall be used to clearly inform pedestrians of the diversion to the alternative footpath.

(e) Excavations in Road Reserves

Excavations in road reserves shall be protected in accordance with the above sub-clauses and the VicRoads Roadworks Signing Code of Practice. Flashing warning lights shall be used as required by the VicRoads Roadworks Signing Code of Practice.

Outside working hours, or when no work is planned for an excavation in a road on any working day, the protection system shall remain in place at all times.

Traffic shall be diverted in accordance with the approved Traffic Management Plan. All Work Zone Traffic Management Plans must comply with AS1742.3 (2009) and associated field guides. The Contractor must submit such plans to the Superintendent for approval prior to commencement of such works.

An exception to this requirement is an excavation in a sealed road pavement, where the Contractor shall, unless otherwise directed, re-open the road to traffic by covering the excavation with a steel plate that is structurally adequate to carry road traffic. The plate shall be securely pinned to the road surface with steel pins in a manner that ensures the plate cannot move under traffic loading.

Cold mix shall be applied around the plate edges to provide a suitable transition to reduce traffic noise.

Appropriate traffic warning signage shall be placed to warn motorcyclists and cyclists that the plate may have a slippery surface.

25.10. Safety Audits

- (a) From time to time, the Principal or Superintendent may arrange for third party audits of the Contractor's operations to be conducted. Auditing will include, but not necessarily be limited to:
- i. plant and equipment;
 - ii. protection of sites;
 - iii. work methods; and
 - iv. traffic management.
- (b) The Contractor must allow access to all areas of the work, and all items of plant and equipment, to enable the audits to be conducted. Failure to provide such access will require the Superintendent to assume that there is a safety issue, and the Superintendent or his representative/s or inspector/s will direct that site or plant or equipment item (as applicable) to immediately cease operations.
- (c) The Contractor must rectify any defect identified during an audit immediately, or within the time frame decided by the Superintendent. Failure to comply shall result in the Contractor being directed to either remove from the site any plant or equipment involved, or shut down the affected site, until such time as the defect is remedied.
- (d) The Contractor will be directed to remove from site any of his personnel that fail to comply with a direction to remedy defects.

- (e) The cost of the audits will be borne by the Principal. The cost to make good any defects identified as a result of the audit shall be borne by the Contractor. Costs associated with any delays caused by the time taken to remedy an identified defect, or direction to remove a person, plant or equipment item from the site, shall be borne by the Contractor. No extension of time will be granted as a result of such delays.

25.11. Personal Protective Equipment

- (a) The Contractor must ensure that all personnel on the site correctly wear approved safety apparel including, but not limited to, safety helmets, safety boots, and where appropriate, gloves and eye protection.
- (b) Any personnel working within:
 - i. a road reserve shall wear an approved traffic safety vest; and
 - ii. a noisy environment shall wear approved hearing protection.
- (c) Plant operators and truck drivers must wear safety helmets, and traffic safety vests when in road reserves, whenever they are outside the cabin of their vehicles.

25.12. Breaches of Safety Requirements

Where the Superintendent and/or his representative deem that a work practice contravenes safe working requirements, then the Superintendent and/or his representative may immediately suspend the works. All costs associated with such a suspension shall be borne by the Contractor, and no extensions of time will be granted.

In taking this action, it is the intention of the Principal to educate and enforce the need for the Contractor and his staff to take a serious approach to occupational health and safety, and to reduce the safety risks associated with the works under this Contract. The Contractor is reminded that both the Principal and the Contractor could be held liable for any breach of the *Occupational Health and Safety Act 2004*.

In tendering for this Contract, the Contractor has undertaken to fully comply with safe work practices. It is therefore expected that all the Contractor's personnel will be fully trained in the requirements for, and use of, safety equipment and safe work practices. Therefore, there is no requirement for warnings to be given prior to suspension of works for contravention of the following:

- (a) failure to correctly wear an approved safety helmet on a Work Site (mobile plant operators are only exempt from this requirement whilst located within the cabin of their vehicles);
- (b) failure to correctly wear an approved safety vest on a Work Site within a road reserve. (Mobile plant operators are only exempt from this requirement whilst located within the cabin of their vehicles);

- (c) failure of Traffic Management Signage and Equipment to comply with the VicRoads *Code of Practice for Worksite Safety – Traffic Management* in accordance with the *Road Management Act 2004*;
- (d) failure to adequately support an excavation; and
- (e) failure to adequately secure an unattended excavation.

25.13. Major Breaches of Health and Safety Requirements

- (a) If during the performance of the Works, the Superintendent informs the Contractor that it is the opinion of the Superintendent that the Contractor is either:
 - i. not conducting the work in compliance with the SWMS, health and safety management procedures, relevant legislation or health and safety procedures provided by the Principal from time to time; or
 - ii. conducting the work in such a way as to endanger the health and safety of any person;

then the Contractor shall promptly remedy the breach of health and safety requirements.

- (b) The Superintendent may direct the Contractor to suspend the work until such time as the Contractor satisfies the Superintendent that the work can be resumed in a safe manner.

All costs associated with such a suspension shall be borne by the Contractor, and no extensions of time will be granted.

- (c) If the Contractor fails to rectify any breach of health and safety for which the work has been suspended, or if the Contractor's performance has involved recurring breaches of health and safety, this will constitute a substantial breach of contract. The Principal may therefore, at its option, terminate the Contract forthwith, and the Principal's liability shall be limited to payment for the work performed by the Contractor up to the time of termination or an earlier suspension of works.

26. DOCUMENTATION

26.1. Principal's Documentation

26.1.1. Drawings

- (a) The Principal's Drawings show design intent.
- (b) The Contractor shall check all Drawings carefully and advise the Superintendent within ten (10) days of issue of the Drawings of any

discrepancies, errors or omissions. Full instructions will be furnished to the Contractor should any discrepancies, errors or omissions be found.

- (c) Work shall be based upon dimensions determined by the Contractor within the scope of the design intent. Where dimensions or levels are shown on the Drawings, these dimensions or levels shall be adopted unless site conditions require otherwise.
- (d) In the event that details shown on the Principal's Drawings differ from those shown on standard or other Drawings, the details shown on the Principal's Drawings shall prevail.

26.2. Contractor's Documentation

26.2.1. General

- (a) Pursuant to Clause 8.4 of the General Conditions of Contract, the Contractor shall submit Drawings and Specifications for approval or acceptance by the Superintendent in accordance with the requirements of this Clause.
- (b) All drawings, calculations and the like prepared by the Contractor for use on the Works shall be checked and signed by a responsible representative of the Contractor prior to submission. The Superintendent will not accept unsigned drawings, computations and the like.
- (c) All documents submitted by the Contractor shall be in the English language. All dimensions and other measurements shall be in metric units.
- (d) After acceptance, the Contractor's Drawings and Specifications shall become the property of the Principal. The Principal undertakes not to divulge design data contained therein to a third party without the approval of the Contractor.

26.2.2. Submission of Documents for Acceptance or Approval

- (a) All documents submitted by the Contractor for acceptance or approval by the Superintendent shall be forwarded together with a Document Transmittal Form. A sample document transmittal form will be supplied to the Contractor by the Superintendent upon the Contractor's request.
- (b) The Contractor shall submit three (3) clean copies of each document submitted to the Superintendent.
- (c) The Superintendent will advise the Contractor of his decision with regard to acceptance or otherwise of the submitted documents within the time stated in the Annexure to the General Conditions of Contract

– Part A. Such decision will be marked on one (1) copy of the submitted document which will be signed by the Superintendent and returned to the Contractor for action as appropriate.

- (d) Acceptance of a particular document does not relieve the Contractor of complete responsibility for the engineering and drafting correctness.
- (e) Documents may alternatively be marked “Not Accepted” or “Accepted as Noted” in which case revisions to the documents and re-submission to the Superintendent within two weeks of return of the documents by the Superintendent are required until such time as the document is accepted.
- (f) Where a document is marked “Accepted as Noted” it may be used for provisional ordering of materials only and the document shall be resubmitted.

26.2.3. Effect of Acceptance or Approval of Contractor’s Documents

- (a) Approval or acceptance by the Superintendent of any proposal for executing the Works, including drawings, Specifications or resources to be employed under the Contract shall not relieve the Contractor of his responsibilities for any errors therein and shall not be regarded as an assumption of risks or liability by the Principal and the Contractor shall have no claim under the Contract on account of failure or partial failure or inefficiency or insufficiency of any plan or method of work or material or equipment so approved or accepted. Such approval or acceptance shall be considered to mean only that the Superintendent has no objection to these proposals.
- (b) Notwithstanding any approval or acceptance by the Superintendent. The Contractor shall remain fully responsible for delivering up the Works complete and correct in every detail.

27. ENVIRONMENT PROTECTION

27.1. Environmental Management System

The Contractor shall maintain a third-party accredited Environmental Management System (EMS) during the contract term.

27.1.1. Minimum Requirements

The Contractor's EMS shall include procedures to effectively manage the following issues. The procedures will form the basis for the development of the Contractor's Site Environment Action Plan (“SEAP”).

- Air Quality.
- Asbestos, Concrete, Prime and Bitumen.
- Community Relations.
- Flora and Fauna.
- Heritage and Archaeology.

- Management of Prescribed Wastes.
- Noise Pollution.
- Products and Materials.
- Soil Management (including Contaminated Soils).
- Storage of Fuels/Chemicals on-site.
- Vibration.
- Visual Impacts, Litter and Amenities.
- Waste Minimisation and Cleaner Production.
- Water Quality, and Erosion and Sediment Control.

27.1.2. Application of Contractor's EMS for the Works

The Contractor shall apply its EMS to the Works to protect the environment and provide beneficial outcomes for the environment wherever possible. The application of the EMS shall satisfy the Principal's requirements listed herein.

27.1.3. Site Environment Action Plans

The Contractor shall prepare a SEAP for the Works under the Contract. The SEAP shall be a dynamic document, which changes as conditions change, and shall be used to inform the Contractor's staff of their responsibilities, and the action that must be taken to achieve environmental targets.

The Contractor shall produce the SEAP for audit upon request by the Superintendent, or by the Principal's auditor.

The SEAP shall be used to identify:

- a) key contacts (including the staff member on site at all times) for the Works;
- b) the characteristics of the project, eg size, type of project, equipment used, waste generation, risks and hazards;
- c) performance targets, and clear objectives which they are intended to achieve;
- d) specific and realistic actions required to achieve targets;
- e) responsibilities, time frames, financial and time requirements;
- f) risks and proposed control measures;
- g) changes in site conditions; and
- h) improvements in environmental performance.

27.1.4. Nominated Environmental Representative

The Contractor shall nominate its environmental representative, and advise the Superintendent.

27.2. Removal and Disposal of Rubbish

The Contractor must maintain the Work Site in a reasonably neat condition by regularly removing all rubbish and unused materials. Rubbish must be disposed of at a municipal landfill, or as otherwise approved by the Superintendent.

The Contractor must ensure that the Site is properly signed and barricaded to prevent unauthorised disposal of waste material and/or rubbish by its staff, sub-contractors or others. Any rubbish and/or waste material so deposited is to be cleared from the Site immediately, at the Contractor's cost.

The Contractor must remove and dispose of excess spoil from the Site, except where detailed by the Contract documents or Drawings, or where otherwise directed by the Superintendent.

27.3. Noise Control

The Contractor must conform with AS 2436-1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites". The Contractor must avoid practices which lead to excessive noise and disturbance to site occupants and adjoining landowners and occupiers. Noise emanating from spoil dumping into trucks and from other machinery shall be minimised.

The Contractor must conduct all Works in residential areas, or in areas adjacent to and adversely affecting residential areas, between 7:00am and 5:30pm, unless otherwise required under the Contract. This does not apply to works necessitated by an emergency, or when the Superintendent specifically directs the Contractor otherwise.

The Contractor must ensure that all noise emissions from the Contractor's Plant during operation are within the legislative and regulatory requirements.

Manual operations must not be conducted at times so as to cause a nuisance through excessive noise to the local community.

27.3.1. Silencing of Machinery – General

Machinery including jackhammers must be silenced. Compressors must be fitted with acoustic canopies to minimise noise levels. All machinery must be kept properly greased.

27.3.2. Machinery Used Outside Working Hours

All machinery used outside normal working hours, such as pumps, motors etc must be electrically driven or otherwise fully silenced.

27.4. Minimising Mud and Dust

The Contractor must adopt practices that ensure that the dust and mud associated with the Works are minimised.

27.4.1. Complaints

The Contractor must immediately rectify any complaint from adjoining landowners and occupiers concerning disturbance, dust and mud. The cost of resolving complaints and cleaning up (where required) shall be borne by the Contractor.

27.4.2. Mud and Dust on Construction Equipment

Control measures must be implemented to prevent mud or dust from wheels and tracks of construction equipment being carried onto roads, paved streets, footpaths and the like. Mud accidentally deposited on paved surfaces shall be removed immediately by the Contractor. It must NOT be washed into the drainage system without the express written permission of the relevant municipality or the responsible authority.

27.5. Disposal of Contaminants

The Contractor must properly dispose of all solid, liquid and gaseous contaminants in accordance with all statutory and contractual requirements.

- (a) Gaseous contaminants shall be discharged in a manner that complies with the State Environment Protection Policy for the Air Environment.
- (b) Liquid contaminants to be disposed to stormwater must comply with the requirements of the State Environment Protection Policy for the Waters of Victoria. Liquid contaminants to be disposed to sewer must first be approved by South East Water Limited, and shall be contained in approved vessels for disposal at approved sites.
- (c) The Contractor must dispose of solid contaminants by removal from site to an appropriate municipal landfill, or registered private landfill, which is licensed to accept the contaminant.

27.6. Preventing Damage to Vegetation

The Contractor must take all care to avoid damaging any shrubs, bushes, trees or other significant vegetation, during the works. This includes actions such as:

- a. keep Works area within drip free line of all equipment, building materials and debris. Do not lean materials, equipment or debris against trunks and avoid piling under tree canopies;
- b. fencing off vegetation to keep machinery away and tying back stems and branches to keep them out of the path of machinery;
- c. do not carry out cut and fill operations within the drip line of any trees to be retained other than those specifically nominated on the final grading. Should the Contractor deem it necessary to carry out cut and fill operations within the drip line of any tree to be retained, the written approval of the Superintendent must be obtained prior to any such works being undertaken;
- d. do not rip out the roots of any plant. Obtain the Superintendent's permission for removal of tree roots greater than 40mm in diameter;
- e. trees in more than 300mm of fill shall be provided with a breathing layer around the collar of the tree;
- f. when excavations are carried out in the vicinity of trees to be retained, use hand excavation to locate any roots. Do not cut roots exceeding 40mm diameter unless permitted. Clean cut with a sharp saw any roots which need to be removed before commencing machine excavation. Do not use an axe to cut roots. Seal tree root cuts with "Steriprune" or equivalent approved tree wound sealant;
- g. recording the location of, then transplanting and maintaining, small significant trees/shrubs etc, and replacing and re-establishing them

as near as possible to their original location after completion of works;

- h. providing landowners with advanced potted trees/shrubs to compensate for trees that had to be removed and could not be successfully re-established; and
- i. should any trees nominated to be retained are removed or damaged by the Contractor, damage shall be applied in accordance with the following formula and shall be deducted from the Contract Sum.

27.6.1.Damages Formula

Five hundred dollars (\$500.00) per 25mm diameter of trunk or any branch removed. The diameter of the trunk shall be measured 1200mm above the base of the tree or in the case of the branch, 1200mm above the base of the branch.

27.6.2. Tree Surgery

- a) All tree surgery shall be approved by the Superintendent. Tree surgery will be carried out by a qualified arborist at full cost to the Contractor. The Contractor must allow for this cost in his tender.
- b) The Contractor shall make good any damage to tree crown or root systems as soon as possible by an approved Tree Surgeon. When a tree has been damaged to such an extent that it must be removed, the Contractor shall at no variation to the contract, provide a new suitable approved tree, as directed by the Superintendent.

27.7. Control of Sediment Pollution

The Contractor must implement sediment control measures to minimise the impact of contaminated stormwater on the environment. If contaminated stormwater enters a drainage line or stormwater drainage system, it will eventually discharge into, and pollute, a waterway or marine environment.

The proposed sediment controls must take into account the nature of the site. Factors such as rainfall patterns, soil type and topography need to be considered when selecting the appropriate control measure.

Careful pre-planning to prevent erosion and sediment control will result in many on-site advantages in addition to protecting the environment.

In order to comply with these requirements and with the emission limits for waste discharges to water specified in State Environment Protection Policy (Waters of Victoria), the Contractor must:

- (a) comply with the requirements of the following EPA documents. (These documents can be downloaded from www.epa.vic.gov.au):
 - i) Environmental Guidelines for Major Construction Sites;
 - ii) Construction Techniques for Sediment Pollution Control;
- (b) ensure that the concentration of suspended solids and turbidity in waters pumped into the drainage system do not exceed the emission limits for waste discharges to water as specified in Schedule E of the *State Environment Protection Policy (Waters of Victoria)*. To achieve this it may be necessary to:
 - i) adequately plan, install and maintain the sediment control of the construction site and ensure that construction activities such as excavating and dewatering do not result in turbid water entering drainage networks;
 - ii) implement daily monitoring of the turbidity of water pumped directly to a natural waterway or a drainage system discharging to a natural waterway;

- iii) supervise all pumping and implement precautions to minimise the turbidity of pumped water;
- (c) adopt practices to ensure that turbid water shall not enter the drainage systems. Suggested practices could include, but are not limited to:
- i) construction of detention basins and settling ponds particularly on larger sites;
 - ii) discharge of silt laden waters onto vegetated areas of suitable size and slope to filter out suspended silts;
 - iii) where land is not available or suitable for settling ponds and/or vegetated filter strips, then silt laden water may need to be subject to a specifically designed physical filtration and/or chemical flocculation system to remove suspended silts;
- (d) advise the Superintendent of the proposed method prior to commencing construction. Suggested options / methods that the Contractor may use to achieve the measures are as follows:

(Note: These options / methods only present a few of what is available and the Contractor may use others that exist. The Superintendent will need to approve any such options / methods that the Contractor decides to use)

- *Temporary culvert/side entry pit entry:*
Planks of timber around culverts/side entry pits with either or both geotextile, gravel behind timber to allow water to pass through, but retain the silt.
 - *Silt fences:*
Fabric filter (geotextile) reinforced with mesh and crushed rock.
 - *Side entry pits:*
Plug side entry pits and discharge into pit, then dispose of at sites where other controls have been installed. This may require transportation of water off site.
 - *Baffle tanks:*
 - Site baffle tanks designed to manage the site flows.
 - Hessian bags (sausages) filled with crushed rock laid across gutters in series as required.
- (e) Stockpiles of spoil and materials must be kept to a minimum as well as being located clear of footpaths and street channels.

Other steps that may be necessary to prevent sediment from these stockpiles entering the drainage system would be the use of such options as:

- i) tarpaulins or plastic sheeting over the stockpiles.

- ii) storage bins;
 - iii) use of timber toe boards around the stockpiles; and
- (f) Use suitable methods on construction sites when dewatering and road cleaning / jetting.
- (g) DO NOT use hay bales as the only sediment control in residential streets.

If all known on-site treatment methods are unsuitable or impracticable, then turbid and silt laden water must be removed by tankers for treatment and disposal at an appropriate wastewater treatment facility.

28. GROUNDWORKS

28.1. Earthworks

Definitions

Rock - solid material unable to be removed by back-hoe or in the case where hand excavation is required, when the rock cannot be loosened by hand pick.

Floaters - classified as rock only when their least dimension exceeds 600mm or when their volume exceeds 0.20m³

28.1.1. General

- The Contractor shall excavate or fill as necessary all road pavement beds, path and channel beds, etc., to bring the whole of the formation as specified to the permanent levels shown on the accompanying plans. Should the foundations of any channel, drain, roadway or path be taken out below the level shown on the plan, the Contractor at his own expense must consolidate and make good such foundation with approved granular material or waste rock, as specified in clause 22.1.6.
- The whole of the formation shall be neatly trimmed and graded to regular and even grades and compacted with an eight (8) tonne roller or by other approved means to the satisfaction of the Superintendent
- Where defective material is encountered, the Contractor must box out and fill with an approved granular material, as specified in Clause 28.1.6, and thoroughly consolidate in accordance with Clause 28.1.7, or as directed by the Superintendent.
- Where the new work is adjacent to existing pavement, unconstructed pavement, nature strips, etc., the Contractor shall provide suitable ramping beyond the limits of the job in order to match existing conditions, to the satisfaction of the Superintendent. Such ramping shall consist of 150mm consolidated depth, 20mm Class 2 F.C.R. or asphalt as requested by the Superintendent.
- The Contractor shall allow the cost of this work in his "Excavation" item.

28.1.2. Excavation

- (a) Excavate existing site material to conform to the formation and subgrade level, allowing for the specified pavement, topsoil and mulch depths.
- (b) Obtain approval of authorities before excavating any public road or footpath.
- (c) The Contractor must satisfy himself as to the various types of ground likely to be met with during construction, and shall make due allowance for contingencies arising there-from in his tender. No variation in the rates as set out in the schedule will be made on account of the nature of the ground encountered in excavation.
- (d) Blasting or the use of explosives shall not be used for excavation purposes.
- (e) If in removing floaters, the Contractor increases the specified widths or depths of the excavation such additional excavation shall be made at the Contractor's expense and shall be filled with materials similar to those specified for the work, or with other approved materials, compacted as specified, at no extra cost to the Principal.
- (f) Rock shall be measured in the solid jointly by representatives of the Contractor and the Superintendent within the confines of the excavation and with the limits shown on the Drawings, or specified, prior to backfilling. No allowance will be made for overbreak.
- (g) The Contractor must give the Superintendent two clear working days notice to permit inspection, measurement and approval or otherwise before proceeding.
- (h) Rock encountered in excess of that described in the documents shall be paid for at the figures contained in the Rates for Variations purposes.
- (i) Excavated material generally shall be measured as it existed in the solid state prior to excavation.
- (j) Excavated material shall not be deposited in such a way as to cause obstruction to roadways, premises etc.
- (k) All topsoil shall be preserved and used when back filling if appropriate.
- (l) All surplus materials from excavations shall be disposed of as soon as possible from the site. The Contractor shall make the necessary arrangements for disposal of spoil. No tipping facility will be provided by within the municipal district for the disposal of spoil.

28.1.3. Shoring

- (a) Provide all shoring, planking and strutting where necessary to retain the sides of the excavations, and to ensure safe working. Provide safety covers over holes.

- (b) The Contractor shall be responsible at all times for the safety of the excavation. Where shoring of the trench is desired, where collapse of the trench is likely or where directed by the Superintendent, the Contractor must supply and fix approved timber or steel shoring.
- (c) The work shall proceed in a careful, secure and safe manner with due precaution against accidents. The Contractor shall carry out shoring of trenches in accordance with all statutory requirements. All requirements of WorkSafe Victoria shall be complied with, and such requirements are deemed to be included by the tenderer when making up his tender price.
- (d) If in the opinion of the Superintendent, any portion of the work is not sufficiently supported, he may order the Contractor to provide additional supports at his (the Contractor's) expense. Compliance with such order shall not relieve the Contractor of the responsibility for the adequacy of such supports. Care shall be taken to avoid voids outside sheeting. If voids are formed, they shall immediately be filled and rammed to the satisfaction of the Superintendent.
- (e) All shoring components shall be in accordance with relevant regulations and must be of sufficient strength to withstand loading from the trench walls without failure or undue deflection.
- (f) For the purpose of preventing injury to persons or property, the Superintendent may direct, or the Contractor may decide to leave in place, to be embedded in the backfill of the trench any sheeting or bracing which is at a depth greater than 1.2 metres below the natural surface, or finished surface level whichever is lower. Sheeting or bracing within 1.2 metres of the natural surface of any site may be left in the back filled trench only on the written permission of the Superintendent.
- (g) All such sheeting and bracing, as directed by the Superintendent left in place shall be paid for by the Contractor, and shall be deemed included in the Contractor's schedule of prices for the associated construction.
- (h) The right of the Superintendent to order sheeting or bracing to be left in any trench shall not be construed as obligation on the part of the Superintendent to issue such an order. The Superintendent's omission to issue such an order shall not relieve the Contractor of the responsibility for damage caused by caving, or movement of ground adjacent to any excavation.
- (i) All sheeting and bracing which may not under the preceding clauses be left in place shall be removed as the excavation is back filled in such a manner as not to endanger laid and jointed pipes and conduits or adjacent structures. The removal of such sheeting and bracing shall be deemed included in the Contractor's schedule of prices for the associated construction.

28.1.4. Dewatering

- (a) The Contractor is responsible for the diversion of surface waters, subsurface waters and drainage away from the excavated, levelled and filled areas, to enable satisfactory completion of the works and to protect the works from damage.
- (b) The Contractor must provide sufficient de-watering pumps and associated equipment to effectively undertake and maintain satisfactorily dry conditions for construction of the works. Should the Superintendent consider the provision of such equipment is insufficient for the work, he may by written order require the Contractor to provide further equipment without any additional costs to the Principal. Should the Contractor fail to comply within one day of receipt of such a written order, the Superintendent may obtain such equipment on hire and it shall be in order for the hire charges to be deducted from monies owing to the Contractor by the Principal.
- (c) All pumps used between 6:00pm and 8:00am must be electrically driven to minimise noise. Power supply shall be obtained by the Contractor at the Contractor's expense. All other pumps used must comply with the *Environment Protection (Residential Noise) Regulations 2008* and Council's Local Laws on noise control.
- (d) Immediately before placing concrete or masonry on ground, remove all free water and foreign matter. Prevent any water flow over freshly laid work

28.1.5. Removal of Soft Areas or Unsuitable Material

- (a) The Contractor shall remove unsuitable soil from the formation that is below the pavement bed or planned formation level, if so directed by the Superintendent and replace it with materials approved of by the Superintendent. Such filling shall be consolidated in accordance with Clause 28.1.7 below.
- (b) The following conditions shall apply to the payment for extra excavation and backfilling:
 - (i) if the necessity for replacement of the soil was brought about by the Contractor's negligence or improper methods, no payment will be made for the extra excavation and back filling involved; and
 - (ii) in the case of the extra excavation and back filling being ordered by the Superintendent, the excavation and back filling shall be paid for at applicable rates shown on the Schedule.
- (c) The Contractor shall make available to the Superintendent all labour necessary to excavate test holes three hundred millimetres (300mm) deep below the bed level.
- (d) All wet soil which is drainable must be drained and compacted by the Contractor as part of the item "Earthworks" in his Contract. "Drainable Soil" means soil (other than clay) which will drain into the sub-soil or being laid at a suitable level.

- (e) Nothing in this clause shall entitle the Contractor to an extra payment for remedying a condition brought about by an act or failure on his part or any of his employees or agents.

28.1.6.Fill Material

- (a) The Contractor shall be responsible for locating, selecting, removing and transporting the fill material to the site.
- (b) The Contractor is responsible for arranging soil tests on the proposed imported fill to verify compliance with the given requirements. Such tests shall be done by a NATA registered laboratory.
- (c) The test results shall be made available to the Superintendent before the material is brought to the site.
- (d) Costs associated with the tests shall be borne by the Contractor.
- (e) Material for fill shall be imported fill as specified below:
- (i) imported fill shall be obtained from an approved source. The material shall be stable and well graded, free from organic or deleterious matter, and shall meet the following requirements:
 - particle size after compaction - maximum 75mm;
 - % passing 19mm As Sieve - maximum 80%;
 - % passing 0.075mm As Sieve - maximum 50%;
 - (ii) material retained on a 2.36mm AS Sieve shall consist of hard durable particles of rock and/or gravel;
 - (iii) materials passing a 0.425mm AS Sieve shall have the following physical properties:
 - i) liquid limit - maximum 50;
 - ii) plasticity index - 6 to 30; and
 - iii) LL x % passing 0.426 Sieve - maximum 1600.
- (f) The Contractor must keep on site a sample of and test results on fill material he proposes to import which shall comply with the Specification. Approval of the sample and test results shall not constitute approval of all material from the source from which the sample was taken.
- (g) Where the Superintendent considers that the imported fill materials differ from that of the approved sample, further compliance testing may be ordered at the Contractor's expense.
- (h) Fill material which is not approved, or has become contaminated or saturated, shall be immediately removed from the site to a place of legal disposal.

28.1.7. Compaction of Earthworks

- (a) Compaction of earth works shall include compaction of the sub-grade in cuttings, compaction of areas upon which fills are to be placed, and compaction of all fill material to the standards indicated hereunder. All compactions shall be carried out using rollers approved by the Superintendent to achieve the following compaction requirements:
 - (i) the top 150mm of the sub-grade in cutting shall be compacted to a dry density not less than 95% of the maximum value obtained in the Standard Compaction Test in accordance with E.I.I. of AS 1289;
 - (ii) areas upon which fills are to be placed shall be compacted to a dry density not less than 95% of the maximum density required under (a) above, in the top 50mm of the area;
 - (iii) all fill material shall be compacted to a dry density not less than 95% of the minimum density required under (i) above;
 - (iv) All fill material, together with any material under fills, which is less than 500mm below the finished pavement surface, shall be compacted to a dry density not less than 100% of the minimum density required under (i) above;
- (b) Compaction of earth works shall be carried out at a moisture content appropriate to the compacting equipment being used and between 85% - 125% of the optimum moisture content found in the above test; and
- (c) Any filling required shall be consolidated in layers of loose material not exceeding 150mm in thickness.

28.1.8. Pavement Bed

- (a) The formation shall receive a final shaping with a grading machine supplemented with handwork where necessary to ensure a smooth surface and uniform cross sections. When final shaping is complete, the surface of the sub-grade shall conform accurately to the line, grade and cross section shown on the plans, and no roots sod or other deleterious matter or stones which would fail to pass a seventy-five millimetre (75mm) ring shall be in the top one hundred and fifty millimetres (150mm) of the sub-grade.
- (b) The pavement sub-grade shall be inspected and approved prior to the placing of any road pavement materials.
- (c) When directed by the Superintendent, the value of the California Bearing Ratio (CBR) of the sub-grade shall be determined by the use of the Dynamic Cone Penetrometer as described in AS 1289.
- (d) The Superintendent may require a minimum CBR of 4.5% to be attained, regardless of moisture content, prior to placing of the pavement material. Proof rolling of the pavement sub-grade will be

required prior to placement of pavement materials. Proof rolling shall be carried out to the satisfaction of the Superintendent.

28.2. Crushed Rock Pavement Construction

28.2.1. Description

- (a) This work shall consist of the supply, spreading and compaction of crushed rock in accordance with this Specification and in conformity with the lines, grades, thickness, and cross sections shown on the Drawings or established by the Superintendent within the tolerances specified.
- (b) Unless otherwise specified, the Contractor shall make his own arrangements to obtain all materials required to complete the work specified to the satisfaction of the Superintendent.

28.2.2. Conformity with Drawings

- (a) All pavement courses consisting of one or more layers of the same material shall be finished to reasonably smooth and uniform surfaces, and shall conform to the lines, grades, thickness and cross sections shown on the Drawings or directed by the Superintendent within the following limits:
 - (i) Level
The top of each pavement course shall not vary from the specified level by more than five millimetres (5mm). Where pavements are constructed against a kerb, plinth or channel, the edge of the pavement shall be constructed flush with the edge, as appropriate unless otherwise specified or shown on the Drawings.
 - (ii) Thickness.
The thickness of the top course of the pavement shall not be less than specified or shown on the Drawings. The total thickness of the pavement shall not be less than the specified thickness by more than ten millimetres (10mm).
 - (iii) Shape.
No point in the finished surface shall vary more than five millimetres (5mm), either from a three metre straight edge laid parallel to the centre line of the pavement or from a template placed at right angles to the centre line.

28.2.3. Materials

- (a) The whole of the material shall be crushed from clean durable rock free from loam, clay, vegetable matter or other deleterious substances.
- (b) Crushed rock shall comply with the requirements for grading and physical properties set out below.

Grading

MATERIAL	% BY WEIGHT PASSING SIEVE DESIGNATED (mm)									
	53.0	37.5	26.5	19	13.2	9.50	4.75	2.36	0.43	0.075
Base (Top Course) 20mm Class 2 F.C.R.	-	-	100	95	78	63	44	29	12	2
	-	-	100	100	92	83	64	47	20	6
Base (Bottom Course) 40mm Class 3 F.C.R.	100	95	80	66	-	44	29	21	9	4
	100	100	90	82	-	64	49	38	18	9

Physical Properties

MATERIAL	Properties of Material Passing 0.43 Sieve				Linear Shrinkage	Los Angeles Abrasion Loss
	C.B. R %	Liquid Limit	P.I.			
	Min	Max	Min.	Max.	Min.	Max.
20mm Class 2 F.C.R.	120	25%	0	3%	1.5%	30%
1 40mm Class 3 C.C.R.	80	25%	0	10%	3%	35%

28.2.4. Spreading Pavement Materials

- (c) Where pavement material is to be spread on a prepared base other than existing pavement, the first layer shall be spread and compacted immediately after the sub-grade has been approved, in order to minimise the entry of water, or drying out or deformation of the sub-grade.
- (d) The pavement material shall be spread in even and equal layers to the width shown on the Drawings, at such a rate that after compaction the final thickness shall not be less than that specified. The maximum thickness of layers before compaction shall be 150mm.
- (e) Each layer shall be spread and thoroughly compacted before the next layer is spread, and the Contractor shall keep the lower layer in good condition during the spreading of the succeeding layer. No layer of pavement material shall be spread until the previous layer has been approved by the Superintendent.
- (f) Pavement materials shall be spread by running from the tailboards of trucks into even layers or by the use of an approved spreading device.
- (g) Tipping from the trucks in heaps on the sub-grade will not be permitted without the prior approval of the Superintendent. When tipping in heaps is permitted, all materials so tipped shall be completely removed from their dumped position and spread to the required thickness by power grader within one (1) hour.
- (h) Care shall be taken to prevent segregation of pavement materials into fine and coarse components. Where segregation does occur, the material shall be re-mixed and re-spread to the approval of the Superintendent.

28.2.5. Compaction

- (a) In accordance with Clause 28.1.7, the whole of the pavement bed shall be thoroughly compacted and approved before any pavement material is spread. Compaction of the pavement will be effected with an approved machine loaded to ten (10) tonnes or a vibrating roller of

this effective weight and by continuous grading to maintain the correct shape. Construction and ordinary traffic shall be directed to assist uniform compaction of the pavement if practicable.

- (b) Rolling shall begin at the side of the pavement and work towards the centre in longitudinal traverses, and all deficiencies shall be remedied in the presence of the Superintendent and to his entire satisfaction. The Contractor shall water the pavement material to assist in compaction. The amount of water shall be determined by the Superintendent, and the Contractor shall have sufficient plant on the job to adequately water the crushed rock being spread.
- (c) The crushed rock shall be compacted at approximately optimum moisture content to dry density of not less than 95% of the maximum value obtained in the Modified Compaction Test AS 1289, except that material within 100mm of the finished surface levels shall be compacted to a dry density of not less than 98% of this value.
- (d) When directed by the Superintendent, the value of the in place density of the pavement material shall be determined by:
 - (i) I.C.P.A device, Test Method R.C.A. 316.06;
 - (ii) sand replacement, using a sand cone, as described in AS 1289; or
 - (iii) a method approved by the Superintendent.
- (e) The Superintendent may require deflection testing to be carried out on the compacted pavement. The deflection at each test site shall be measured beneath a single axle loaded to 8165 kg and fitted with dual wheels having 10.0 X 20-12 ply tyres; each wheel shall be placed to give a centre distance between the tyres of 330mm. The procedure and results shall be in accordance with the methods and standards as set out in the AusRoad Technical Bulletin Test method AG:AM/T007 Pavement Deflection Measurement With Deflecto Graph..

28.2.6. Maintenance during Construction

- (a) The Contractor shall cart the pavement material over the pavement as it is spread, with vehicles using no definite line of traffic, but moving in various lines so that the whole pavement width will be trafficked by the vehicles.
- (b) No ruts, waves or isolated hard spots shall be allowed to form, and the Contractor shall keep the pavement formed to the required template by the constant use of power grader. Grading must be carried out continuously and to the complete satisfaction of the Superintendent.

28.2.7. Preparation for Sealing

- (a) On completion of the crushed rock pavement courses, and at a time approved or directed by the Superintendent, the pavement surface shall be prepared for bituminous surfacing by scarifying, watering,

grading and rolling to produce a hard dense surface capable of being swept with rotary brooms to leave a tight surface free from loose material and true to shape and level in accordance with Clause 24.2.2.

- (b) The surface so prepared shall be free from scaling and scabbing. The pavement shall comply with the density requirements of Clause 24.2.5 and shall be uniform in texture, with no laminations within 75mm of the finished surface.

28.3. Concrete Works

28.3.1. Description

This work shall consist of supplying and placing Portland cement concrete in accordance with this specification and with conformity with the lines, grades and dimensions shown on the plans and as directed by the Superintendent.

28.3.2. Materials

- (a) **Concrete Materials**
All materials to be used shall be supplied by the Contractor. They shall comply with the requirements of the following Australian Standard Specifications as applicable:

- i. Cement - AS3972 - 1991 Portland Cement;
- ii. Aggregate: AS2758.1 - 1985 Aggregate for concrete (Excluding Lightweight Aggregates); and
- iii. Ready Mix Concrete - AS1379 - 1991 Ready Mix Concrete

The maximum size of aggregate to be used shall be 20mm

- (b) **Water**
(i) The water used shall be approved by the Superintendent, and shall be clean and free from all substances harmful to concrete and its reinforcement. Harmful substances include, oils, organic substances, vegetable matter, acids, alkalis and dissolved salts.

- (ii) The quality of mixing water to be used in the concrete mix shall comply with the requirements of Clause 2.4 of AS 1379. However, the amounts of chloride and chlorine in the water shall not be greater than 0.03%.

- (c) **Reinforcement**

- (i) Unless shown otherwise on the Drawings, reinforcement for concrete shall consist of round mild steel bars complying with the requirements of:
- AS1302 - 1991 Reinforcing bars for reinforced concrete;
 - AS1303 - 1991 Hard drawn steel wire for reinforced concrete;

- AS1304 - 1991 Hard drawn steel wire for reinforcing fabric for reinforced concrete;
 - (ii) steel reinforcement shall be free from grease, tar, paint, oil, mud, loose mill scale, mortar, loose or thick rust, or any coating; and
 - (iii) all reinforcement shall be supplied by the Contractor;
- (d) Chemical Admixtures
 - (i) The use of chemical admixtures is subject to the prior approval of the Superintendent. If and when permitted, chemical admixtures and their use shall conform to AS 1478 "Chemical Admixtures for Use in Concrete"; and
 - (ii) Admixtures containing calcium chloride shall not be used.
- (e) Fly Ash

The use of fly ash as a partial substitute for cement or for any other use is not permitted;
- (f) Aggregates

Fine and coarse aggregates for concrete shall conform to AS 1465.
- (g) Waterstops
 - (i) Waterstops are subject to approval and shall be of extruded polyvinyl chloride complying with BS 2571, Class 3, Compound Type G4.
 - (ii) All externally placed water stops shall have nailing strips 3mm thick and 10mm wide, located such that they do not impair the efficiency of the water stop.
 - (iii) Centrally placed water stops shall have tying strips not less than 3mm thick and 15mm wide, with metal eyelets at not more than 300mm spacing.
- (h) Joint Fillers

Joint fillers shall be approved resin bonded cork fillers complying with the requirements of ASTM D1752-67 for Type II fillers.

 - (i) Joint Sealant

Joint sealants are subject to approval and shall be non toxic, two part polyurethane based material.
 - (j) Curing Compounds

Curing compounds shall be chlorinated rubber based compounds complying with ASTM C309 and AS 3799 – 1990.

28.3.3. Alignment and Levels

- (a) The Contractor shall excavate and fill as may be required to bring the pavement bed to the full specified depth below finished pavement level. All formation shall be thoroughly compacted in accordance with

Clause 28.1.7 of this Specification and shall be neatly trimmed true to line, level and cross slope so as to provide for the full thickness of concrete at all places.

- (b) Where paving is to be laid on excavated or filled formation, the beds shall be excavated to not less than 50mm below finished level and brought to finished level with properly compacted 20mm Class 2 Crushed Rock or other approved materials.
- (c) Any soft sections in the formation shall be excavated and filled with Fine Crushed Rock or other material to the approval of the Superintendent, and the hole shall be thoroughly compacted as specified herein. No additional payment will be allowed for this work.

28.3.4. Strength

- (a) The concrete used shall be a dense uniformly graded mix, and shall conform to AS 3972.
- (b) Unless otherwise specified or shown on the Drawings, concrete shall develop the following cylinder strengths:

Age of Cylinder (days)	Compressive Strength (MPA min)
7	22
28	32

- (c) Concrete used in kerb extrusion machines will not be subject to these compressive strength requirements but shall have a minimum cement content of 280kg/m³ of finished concrete.
- (d) The Contractor is responsible for arranging concrete tests to verify compliance with the given requirements. The Contractor shall also arrange for testing of the concrete when required by the Superintendent. Such tests shall be done by a NATA registered laboratory. Costs associated with the tests shall be borne by the Contractor.
- (e) The test specimens shall consist of three 200mm x 100mm diameter cylinders made from any sample representative of the day's concrete. When more than fifteen (15) cubic metres of concrete is placed in one day, three cylinders shall be made for each 15 cubic metre or part thereof.
- (f) One test cylinder of each set of three specimens shall be tested at seven (7) days, one other at twenty-eight (28) days, and the third when required by the Superintendent. Should any two cylinders of a set fail to fulfil the compressive strength requirements specified, the Superintendent may reject the whole or part of the concrete represented by these specimens in which case it shall be removed and replaced in accordance with the General Conditions of Contract.

- (g) The method marking, curing and testing concrete compression cylinders shall be in accordance with AS 1012, except until despatched to the laboratory. The cylinders shall be stored undisturbed at the site in a moist condition, sheltered from the sun and wind and protected from extremes of temperature. The Contractor shall be responsible for providing the necessary curing facilities and for curing the test cylinders on the site.

28.3.5. Consistency

- (a) The concrete to be placed in the work shall be of such consistency that it can be readily placed and compacted in the forms without causing segregation of the materials or excess free water to collect on the surface.
- (b) The consistency of the concrete shall be determined by a slump test in accordance with AS1012 - Part 3 or such other method as approved by the Superintendent.
- (c) The Superintendent shall approve the maximum slump to be used for each portion of the work and concrete with a slump in excess of this figure shall be liable to rejection. In no case shall concrete with a slump exceeding 95mm be accepted unless prior written agreement from the Superintendent to use an approved water reducing admixture is obtained.
- (d) Concrete for use in kerb extrusion machines shall be of such consistency that after extrusion, the shape of the kerb is maintained.

28.3.6. Falsework

- (a) Falsework is defined as the structural system required to support the framework, permanent structural components, material, plant, equipment and personnel required in the construction of the works. The structural system comprises foundations and all structural members supporting the formwork, or supporting permanent structural components.
- (b) Falsework shall be designed to withstand all forces resulting from the dead, superimposed and wind loads or from the loads specified in AS 3610 "Formwork for Concrete" and AS 1170 Parts 1 and 2 "Loading Code", whichever produces the most significant effect, and any additional loads that may be imposed on the falsework during construction. The design shall take into account the magnitude, direction and duration of these forces individually and collectively.

28.3.7. Formwork

- (a) All formwork shall comply with the requirements of AS3610 – 1990.

- (b) Design and construct formwork so that concrete, when cast in the forms, will have the dimensions, shape, profile, location and surface finish required by the contract.
- (c) Forms shall be rigid, water tight and braced and fixed so that they will maintain position and shape during the casting of the concrete. Forms shall be constructed so that they can be removed without damage to the concrete.
- (d) Timber form work shall be in long lengths free from loose knots and surface defects and uniform in thickness. Form materials before re-use shall have all protruding nails withdrawn, holes stopped and surfaces to be in contact with concrete thoroughly cleaned. Forms shall not be re-used if bulged or warped.
- (e) Form work shall be backed with seasoned or kiln dried tongued and grooved timber fixed without gaps. Heavy plywood lining with opened space backing or supporting stubs may be used only with the approval of the Superintendent.
- (f) The form work for each monolithic section of the work shall be completely constructed before concreting of that section is commenced.
- (g) Unless otherwise approved by the Superintendent, forms for surfaces otherwise than requiring Type 1 finish shall consist of one of the following:
 - (i) Seasoned or kiln dried, tongue and grooved timber dressed on the inner surface;
 - (ii) Metal shutters in which the heads of all fastenings are countersunk and the joints flush fitting and adequately sealed; and
 - (iii) Pressed wood or plywood supported or backed with timber of size and spacing approved by the Superintendent.
- (h) Forms for surfaces requiring Type 2 surface finish shall be lined with butt jointed sheets of pressed wood or plywood having a minimum thickness of 5mm. These sheets shall be capable of withstanding immersion in water for twenty-four (24) hours without signs of bulging, warping and disintegration. The butt joint shall be flush and fit closely, and any gaps shall be filled with putty or other approved filling material.
- (i) The forms shall be inspected immediately preceding the placing of the concrete, and any bulging, warping or lack of support shall be remedied. All dirt, sawdust, shavings, or other debris within the forms shall be removed. Temporary openings shall be provided at the base of the forms whenever necessary to facilitate cleaning and inspection.
- (j) Before reinforcement or concrete is placed in the forms, the inside surfaces of forms shall be coated with non-staining mineral oil, grease or other approved agent to ensure non-adhesion of the mortar.

- (k) The embedded portion of form ties or fasteners shall terminate at a distance from the formed face not less than the cover specified for the adjacent steel reinforcement.
- (l) Placing of concrete will not be permitted to commence until the formwork has been checked and approved by the Superintendent. Such approval will not relieve the Contractor of responsibility for any defects in the formwork which may become apparent during or after casting of concrete
- (m) Unless otherwise directed by the Superintendent, all exposed sharp edges shall be chamfered not less than 20mm x 20mm to prevent mortar runs and to preserve smooth, straight lines. Internal angles shall be filleted where shown on Drawings.
- (n) Where timber spreaders are used inside forms or between the inside faces of the forms adequate measures shall be taken to ensure their removal before or during placing of the concrete.

28.3.8. Placing of Reinforcement

- (a) Reinforcement shall be carefully formed to the dimensions and shapes shown on the Drawings. For mild steel reinforcing bars cold bends shall be made around a pin having a diameter of four or more times the normal diameter of the bars. Reinforcement shall not be bent or straightened in a manner that will damage the material. Bars with kinks or bends not shown on the plans shall not be used. Heating of reinforcement is not permitted.
- (b) All reinforcement when placed shall be free from grease, tar, paint, oil, mud, loose mill scale, loose or thick rust, and shall present a clean surface.
- (c) Where practicable, all reinforcement shall be supplied in the full length shown in the Drawings. Where not practicable, the Contractor shall splice the reinforcement by lapping where directed. The lap shall be not less than forty (40) times the nominal diameter of the bars.
- (d) All reinforcement shall be accurately placed in the positions shown on the Drawings, and shall be securely held during the depositing and compacting of the concrete by wiring together with annealed iron wire of diameter not less than 1.25mm and by blocking and supporting from the forms with plastic or mortar chairs approved by the Superintendent, or by other approved methods.
- (e) Bars shall be tied at all intersections except where spacing is less than 300mm in any direction when alternative intersections shall be tied.
- (f) Reinforcement supports shall be made of durable materials strong enough to withstand the imposed loads without movement of the reinforcement. They shall be positively attached to the reinforcement and be of such size as to maintain the specified cover. They shall be

of a non-corrosive material when used in the zone of concrete cover to the reinforcement.

- (g) Wooden supports shall not be used, nor shall metal supports or tie wires which extend to the surface of the concrete. Placing bars on layers of fresh concrete as the work progresses and adjusting bars during the placing of the concrete is not permitted
- (h) Placing and fastening of reinforcement in each section of the work shall be inspected and approved by the Superintendent before any concrete is deposited in the section.
- (i) Unless otherwise shown on the Drawings, the minimum clear cover to reinforcement shall be one and one half (1 1/2) times the diameter of the bars, with a minimum of 50mm.
- (j) Where steel reinforcement projects for the purpose of bonding on subsequent work, care shall be taken to avoid damage to the bars after they have been set and any damage to the bars or their setting shall be repaired by the Contractor.

28.3.9. Mixing of Concrete

(a) General

- (i) Concrete shall be mixed only in approved plant.
- (ii) Unless approved by the Superintendent, concrete shall not be mixed while the air temperature is, or within twenty-four (24) hours is likely to be in the opinion of the Superintendent, below 4.5 degrees Celsius or while the shade temperature exceeds 37.7 degrees Celsius. The temperature of the concrete placed in the work shall not be less than 10 degrees Celsius nor more than 27 degrees Celsius.

(b) Equipment

Concrete shall be mixed with mechanically operated mixers in sound mechanical condition. The interior of the drum and the mixer blades shall be kept thoroughly clean and free from hardened concrete or mortar by cleaning at frequent intervals, and in any case before the commencement of or after a break in mixing operations

(c) Mixing at Site or at Central Mixing Plant

- i. The mixing of concrete shall be done in a batch mixer of suitable size and approved type, which will ensure a uniform distribution of the materials throughout the mass. The mixer shall be equipped with a suitable charging hopper and water storage.
- ii. The volume of the mixed material shall not exceed the manufacturer's rated capacity of the mixer. Charging of the mixer shall be arranged so that portion of the water will be in the drum before the

addition of the other ingredients. During charging of the mixer the inlet valve to the water supply tank (if any) shall be closed.

- iii. The mixing time for each batch shall not be less than 1 1/2 minutes after all ingredients are assembled in the mixer and prior to any portion of the batch being removed. For mixers of greater capacity than one cubic metre, the minimum mixing times shall be increased as required by the Superintendent.
- iv. The mixer or paddles shall rotate during the whole period of mixing at the speed recommended by the manufacturers.
- v. The first batch shall contain an excess amount of cement, sand and water sufficient to coat the inside of the mixer without reducing the required mortar contents of the mix.
- vi. Mixers shall be capable of discharging concrete with a degree of uniformity such that, when samples taken at the one quarter and three quarter points of the batch volume are tested for consistency, the difference between the two slumps shall not exceed one half of the average of the two slumps. Each mixer shall be tested for compliance with the specification before any concrete is supplied for any major concreting operation.

(d) Mixing in Transit

- i. Truck mixers shall comply with the requirements of the preceding clauses, where applicable, and shall be of the revolving drum type, water tight and so constructed that the concrete can be mixed to ensure a uniform distribution of materials throughout the mass.
- ii. All solid materials for the concrete shall be accurately measured in accordance with this specification and charged into the drum at the proportioning plant. The mixing water may be added directly to the batch or, alternatively, the truck mixer shall be equipped with a tank for carrying mixing water. Only the prescribed amount of water shall be placed in the tank unless the tank is equipped with a device by which the quantity of water can be reliably measured.
- iii. Truck mixers may be required to be provided with means by which the mixing time can be readily verified by the Superintendent.

- iv. The size of the batch in the truck mixers shall not exceed the manufacturer's rated capacity, nor shall it exceed 60% of the gross volume of the drum.
- v. Mixing shall begin within thirty (30) minutes after the cement has been added to the aggregates except that, when the air temperature is above 32 degrees Celsius, this limit will be reduced to fifteen (15) minutes.
- vi. The number of revolutions at the mixing speed shall be not less than fifty-five (55) nor more than one hundred (100) after all ingredients, including the water, are in the drum. All revolutions in excess of one hundred (100) shall be at the agitating speed recommended by the machinery manufacturer.

28.3.10. Placing of Concrete

- (a) After mixing, concrete shall be placed in forms without delay. The methods of transport, handling and placing shall be such as will prevent the segregation or loss of the ingredients. Dropping the concrete a greater height than 1.5m is not permitted.
- (b) Depositing of large quantities of concrete at any point and moving or working it along the forms is not permitted.
- (c) Any concrete which has developed its initial set, or which is not placed in the forms and compacted within twenty (20) minutes after it is discharged from the mixer, shall not be used.
- (d) Concrete shall be placed in the forms within such intervals of time that the contact surface of the preceding concrete is still in the plastic condition.
- (e) Concrete shall not be placed under water.
- (f) Concrete shall not be placed without the approval of the Superintendent.

28.3.11. Compaction of Concrete

- (a) During and immediately after placing, the concrete shall be thoroughly compacted by means of continuous tamping and vibration to ensure that the finished concrete is dense, and that it has a uniform surface finish.
- (b) Care shall be taken to fill every part of the forms, to force the concrete round and under the reinforcement without displacing the reinforcement or the formwork, to work coarse aggregate back from the face and to remove air bubbles and voids.

- (c) Vibration shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in the forms over distances so great as to form segregation, and vibrations shall not be used to transport concrete in the forms.
- (d) Vibration shall be applied at the point of deposit and in the areas of freshly deposited concrete. The vibrators shall be inserted and withdrawn out of the concrete slowly. The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete, but shall not be continued at any point to the extent that localised areas of grout are formed. Application of vibrators shall be at points uniformly spaced and not farther apart than twice the radius over which the vibration is visibly effective.
- (e) Vibration shall be supplemented by such hand tamping as is necessary to ensure smooth surfaces and dense concrete, along form surfaces and in corners and locations impossible to reach with vibrators.
- (f) Vibrators (internal and external) shall be of a type and design approved by the Superintendent, and shall have a minimum frequency of vibration of 7000 revolutions per minute. The intensity of vibration shall be such as to visibly affect a mass of concrete of 25mm slump over a radius of at least 450mm. Provide not less than one reserve vibrator in working order.
- (g) Workers employed in compacting concrete shall be competent and experienced in this work. Any worker who is deemed by the Superintendent to be unsatisfactory shall be replaced immediately at the request of the Superintendent.

28.3.12. Thickness of Concrete Pavement

Unless specified or shown on the Drawings, footpaths and median surfacing shall be 100mm thick, except that median surfacing within two metres of the ends of medians and paving at vehicular crossings shall be 150mm thick, unless specified or shown otherwise on the plans. All paving shall be reinforced with F82 fabric placed 50mm from the top of the slab.

28.3.13. Joints

- (a) General
 - (i) Unless prior approval to the contrary has been obtained from the Superintendent, all joints shall be to the details and at the locations shown on the Drawings. No joints shall be omitted, nor shall additional joints be made without the approval of the Superintendent.
 - (ii) Joints shall be properly formed with due allowance for any reinforcement, dowel bars and water stops that are continuous across the joint and so detailed as to prevent loss of mortar from the concrete.

(b) Construction Joint

- (i) Before placing new concrete against concrete which has set, the forms shall be re-tightened if necessary and the surface of the set concrete shall be roughened to expose the coarse aggregate and cleaned of foreign matter, laitance, and loose material. Immediately prior to placing further concrete the contact surface shall be covered uniformly with a thin coat of cement-water paste of creamy consistency.
- (ii) Construction joints caused by unscheduled work stoppages shall be avoided.
- (iii) Surface preparation work shall be completed and reviewed by the Superintendent before concreting proceeds.

(c) Expansion Joint

- (i) The Contractor shall provide expansion joints as follows unless otherwise specified or shown on the plans:
 - 10mm wide joint at all junctions of concrete paving of different thickness.
 - 10mm wide joints at intervals as shown on the Drawings.
- (ii) The expansion joints shall be formed by straight lengths of hard wood or steel of suitable length, of thickness equal to the width of joint specified, and of depth equal to the greater thickness of adjacent paving. These shall be cleaned and oiled before use and shall be secured in a position, plumb and normal to the pavement edge, before the concrete is poured, and shall be removed after initial setting has taken place in accordance with AS 3600.
- (iii) No reinforcement or embedded metal item, other than sleeved dowel bars, shall be permitted to continue through an expansion joint.

(d) Joint Sealants

- (i) Expansion and isolation joint material shall consist of an approved polysulphide sealant jointing compound coloured to suit the concrete, unless otherwise specified which shall be so placed that the top of the joining material shall be 3mm below the level of the adjacent concrete.
- (ii) All work in connection with the sealing of joints shall be carried out strictly in accordance with the approved manufacturer's written instructions.

(e) Waterstops

- (i) Water stops shall be securely held in place so as to maintain their correct position during Construction. Ties shall be provided at not more than 300mm spacing for all centre placed

water stops. The water stop system shall provide for complete continuity across all joints.

- (ii) Only simple heat fused butt joints will be allowed on site, and these joints shall be carried out strictly in accordance with the manufacturer's instructions. Intersections such as tees, crosses, etc., shall be obtained or pre-fabricated as factory made specials, and shall not be carried out on site.

28.3.14. Curing

- (a) Concrete surfaces exposed to conditions causing premature drying shall be protected by covering as soon as possible with canvas, straw, hessian, sand or other satisfactory material and kept moist, or if the surfaces are not covered they shall be kept moist by flushing or sprinkling. Curing shall continue for a period of not less than seven (7) days.
- (b) Freshly finished concrete surfaces shall be effectively protected from rain or injury from other sources until hard set has occurred.
- (c) If requested by the Contractor, consideration will be given to the use of a curing compound for curing purposes, but, in general, moisture curing shall be adopted. Curing compounds shall be effective during the whole period of curing, and shall not be applied to surfaces which are to be bonded later to another surface.
- (d) Full details must be submitted for the approval of the Superintendent and shall include the time and rate of application and the effectiveness of compound as a curing agent. Such compounds may be colourless or preferably white pigmented, and shall not have a deleterious affect on the concrete. Compounds which stain the surface of the concrete shall not be used, nor shall white compounds which cause the concrete to darken or yellow appreciably.

28.3.15. Removal of Forms

- (a) Stripping and removal of formwork shall be carried out in accordance with the requirements of AS3610 – 1990.
- (b) Unless adequate supports are provided, forms shall not be removed until the concrete has achieved adequate strength. Forms shall not be removed without the permission of the Superintendent.

28.3.16. Surface Finish

- (a) All concrete surfaces shall be true and even, free from honeycombed surfaces, depressions, projections or rejections. Rough or porous area and holes shall be filled with mortar. Bolts, wires and other items passing through the concrete to hold the forms shall be cut off or set back 25mm below the surface and the resultant holes filled with mortar.

- (b) If the Superintendent considers that the formed surface finish of the completed work does not comply with the Specification he may require evaluation of the finish in accordance with AS 3610. In this case, evaluation shall be carried out by the Contractor in the presence of the Superintendent.

28.3.17. Defective Concrete

- (a) The Contractor is fully responsible for employing effective methods of mixing, placing, protecting and curing concrete and for the adequacy of the forms. Approval of any such work or methods by the Superintendent will not relieve the Contractor of this responsibility.
- (b) Concrete not placed and completed in accordance with this specification, or which in the opinion of the Superintendent is defective, shall be removed within the limits assigned by the Superintendent and replaced by the Contractor at his expense.

28.3.18. Testing

- (a) **Testing Concrete**
Sampling, testing and compliance for materials and workmanship shall be in accordance with AS3600 - 1994. The cost of all sampling and testing shall be at the expense of the Contractor.
- (b) **Testing for Water Tightness**
 - (i) The requirement for water tightness testing applies to all structures, and portions of structures, which are required to be water retaining or water excluding.
 - (ii) Carry out testing in accordance with the procedures and acceptance limits specified in AS 3735.
 - (iii) Do not backfill against the water retaining structure until the watertightness testing has been satisfactorily completed.
 - (iv) The water test will not be accepted until all visible weeps and damp areas are rectified and the structure(s) is retested in accordance with AS 3735.

28.3.19. Grout

- (a) Grout shall be an approved non-shrink cement based natural aggregate grout having a minimum 28 day compressive strength of 45 MPa.
- (b) Volumes to be grouted shall be cleaned by thoroughly flushing with water immediately prior to grouting.
- (c) Pumping of grout shall begin as soon as possible after mixing, and shall continue until grout of the consistency equivalent to that injected flows without the presence of air bubbles from vent openings.
- (d) In the event of a blockage or interruption of grouting, all grout shall be removed by flushing with water.

28.3.20. CONCRETE KERB AND CHANNELS – MANUALLY OR MACHINE PLACED.

- (a) All concrete kerb and channel, both manually and machine, shall be placed in accordance with AS2876 - 1987.
- (b) Concrete used in kerb extrusion machines shall have a density not less than 96% of density achieved in a specimen cylinder prepared in accordance with AS1012.8 – 1986 clause 1.7.5
- (c) All concrete for kerb and channel shall have a minimum compressive strength of 32 MPa at 28 days. Slump for machine extruded to be 10-20mm and manually formed and poured to be 70-80mm.
- (d) Extruded kerb shall be dense with regular sides, edges and chamfers finished to a fine surface free from blow holes and dragging and shall be impervious. Finishing with grout will NOT be permitted.
- (e) Shrinkage control joints shall be formed at 3m spacings. Where the kerb intersects into crossovers or undergo sharp changes in direction, the first shrinkage control should be positioned at this point or no further than 2m from the point.

Shrinkage control joints shall also be introduced at both ends and mid point of curved sections of kerb and channel.

- (f) The kerb and channel shall be cured in accordance with the previous clauses of this specification. To achieve the required quality and durability, the proposed method of curing by the contractor must be submitted and approved by the superintendent prior to the commencement of kerb works.
- (g) The Contractor shall carry out concrete core tests in accordance with AS 1012. Intervals of such tests shall be one per lot. A lot shall be the kerb and channel cast in one day production. The location for testing shall be the kerb and channel tray or where there is no channel, the top of the kerb, on the steepest downhill grade on which the kerb machine is travelling.
- (h) On incidental or isolated or on works where the total length of kerb cast in one day production is less than 150 m, three core test shall be conducted. The Contractor shall request the Superintendent to nominate the position of the each test.
- (i) The cost of testing shall be borne by the Contractor and the tendered price must have included the testing provisions.
- (j) The Contractor shall fill holes due to core sampling with a suitable concrete mix coloured to match the kerb and channel with 48 hours of testing or boring.

28.3.21. Provision for Signs

Where shown on the Drawings or directed by the Superintendent, Model 23-VR2 "V-Loc", or approved equivalent sockets are to be placed in position to receive future sign posts.

28.3.22. Payment

- (a) The unit of measurement of concrete paving shall be the square metre for each and every thickness of pavement.
- (b) The Contractor shall allow in his schedule of prices item 'pavement construction' for all materials, labour, tools and plant necessary for the satisfactory completion of this work in accordance with the plans and this Specification.

28.4. Bluestone Works – Bluestone pitcher kerb & channel and rights of way (laneways).

28.4.1. Materials

- (a) The pitchers to be used for the kerb and channel and laneways works shall be the pitchers excavated on site. If these pitchers are insufficient the Contractor shall, at his cost, transport pitchers from Council stores in the municipality.
- (b) All other materials required for this Contract shall be supplied by the Contractor.
- (c) All pitchers from the site or from Council's stores shall be stripped of all adhering foreign materials and thoroughly cleaned to the satisfaction of the Superintendent before they are used.
- (d) Please contact Fulton Hogan Pty Ltd on 9209 6211 to collect the padlock key to the yard. Fulton Hogan's office is located at the corner of White Street and Boundary Street, South Melbourne. Council's storage yard is located at the intersection of Graham Street and Williamstown Road, Port Melbourne.

28.4.2. Tolerances on Line, Level and Shape

All surfaces shall be finished in conformity with the lines, grades, thicknesses and cross-sections shown on the Drawings or specified or as directed by the engineer within the following limits:-

- (a) crossings and surfacing shall be shaped to match existing fixtures (i.e. pit covers, edgings, driveways, etc) within 5mm. Elsewhere the departure of the finished work from line or level shall not exceed 10mm at any point, and the rate of change of deviation from line or level shall not exceed 10mm in 10m; and
- (b) except on curves or in shaped areas, the deviation of the finished work from a 3m straight edge shall not exceed 10mm at any point.

28.4.3. Mortar for Bluestone Work

- (a) All mortar used for bluestone kerbing or paving shall be poured or placed in-situ. Under no circumstances shall any mixes be hosed into place.
- (b) The mortar mixes shall be "Readymix Bluestone Grout" or equivalent consisting of a mix grout of:
 - i) 16% cement;
 - ii) 16% stonedust;
 - iii) 67% blended washed sand; and

- iv) 1% lime.
- (c) Mortar shall be mixed with clean water and used within half an hour of mixing.
- (d) All mortar shall be batched in batching boxes and mixed in a revolving mixer until all materials have been evenly blended through the mortar to form a homogenous mix.

28.4.4. Colouring of Mortar/Grouting

- (a) Colour additives are to be used in mortars used for jointing and filling of gaps between bluestone pitchers.
- (b) Colour additives used shall be Bayer synthetic black oxides (Bayferrox®318) added at a rate of 40 kg/m³ and thoroughly mixed through the mortar so that it is of even consistency. Appropriate mix of colour additives will provide charcoal colour effect.
- (c) Charcoal coloured mortar shall be used for the full depth of the bluestone pitchers.
- (d) The cavity between pitchers/bluestones shall be free of all debris and fine matter prior to grouting. Grouting shall be carried out within 48 hours after laying of pitchers/bluestones.

28.4.5. Cleaning Up

- (a) The Contractor is responsible for all cleaning up of surplus material from the site except bluestone pitchers.
- (b) All materials removed from the site during these operations shall become the responsibility of the Contractor who shall be liable for the legal disposal of this material.
- (c) Each bluestone shall be stripped and cleaned of all adhering foreign materials and shall be broomed to remove any excess material which may have adhered to them.
- (d) Bluestone pitchers which are surplus at the completion of the works shall be removed from the site by the Contractor and transported to Council's stores within the municipality at his cost.

28.4.6. Curing

- (a) For 48 hours following the completion of any concreting or pitcher setting, works shall be covered with hessian or other suitable material and kept damp to prevent rapid drying out.
- (b) All work shall be kept barricaded for 48 hours and under no circumstances shall be permitted to carry vehicular traffic until 7 days

have lapsed since pouring, save at the express direction of the Superintendent.

- (c) Where vehicular access is required, the Contractor must provide approved planks or steel plates, and place these as directed.

28.5. CONCRETE AND DRESSED BLUESTONE PAVERS IN FOOTPATH, SHOPPING AREA ETC.

28.5.1. General

- (a) This Clause is limited to the installation of concrete and dressed bluestone pavers for footpath and shopping area etc. The Contractor must liaise with traders, owners and residents affected for a mutually convenient time for the works.
- (b) Finished paved surface shall be uniform and even and conform to the following tolerances:
 - (i) departure from design level not more than 10mm;
 - (ii) any lipping of adjacent units not more than 2mm; and
 - (iii) departure from a 3 meter long straight edge, placed longitudinally to the footpath shall not exceed 2mm.
- (c) Paving shall proceed in one direction commencing from the established reference lines, in a continuous manner and constant rate. Discontinuity shall only be allowed around covers and other service openings where cutting of paving units is required.
- (d) Pavers shall be laid to the alignment shown in the Drawings. The Contractor shall be responsible for setting out control lines to ensure that paving pattern is maintained.
- (e) Access to buildings shall be maintained at all times. Pavement areas subject to pedestrian and vehicle traffic within the first 24 hours of curing shall be protected using boards or similar to the satisfaction of the Superintendent.
- (f) The Contractor must make due allowance in his tender price for collecting the pavers, cutting around covers, kerbs, etc. cutting of slabs adjacent to buildings as necessary and grinding of paver surface to eliminate lips between paving units.
- (g) Pavers shall be cut and ground wet to control dust. The Contractor shall bear all cost and must take care to minimise dust during this operation.
- (h) Immediately after paving the paver surface shall be ground to eliminate lips between pavers. Upon completion of laying and joining grouting, paving surfaces shall be washed clean with no mortar remaining.

28.5.2. Standards - Mortars and Admixtures

Mortar components shall, unless otherwise specified, comply with the relevant portions of the Australian Standards for building materials.

Cement: Portland Type A cement to AS 1315 – 1982

Sand

Concrete aggregates to AS 2758 Pt 1 – 1985

Water: Shall be drinking water, supplied from the local water authority outlets, and shall be free of contaminants.

28.5.3. Slurry Components and Preparation

(a) General

A bonding slurry shall be applied at the interface of the in-situ concrete base and the bedding mortar and at the interface of the bedding mortar and bluestone paver.

(b) Components

The bonding slurry shall consist of, in measures by volume:

- i) 1 part Fine washed sand
- ii) 6 parts Portland type A cement

(c) Mixing

- (i) Mixing shall be performed either by hand, using a clean container and mixing tool, or in a cement mixer by adding sand and cement to the liquid (which shall initially be proportioned as one part by volume) whilst mixing continuously to ensure a smooth homogenous consistency, free of lumps.
- (ii) The amount of mix shall not exceed the quantity required to lay bluestone pavers within 45 to 60 minutes, depending on climatic conditions.

28.5.4. Mortar Bed Components and Preparation

(a) General

Pavers shall be fully bedded in a 32 MPa concrete mortar mix of a ***minimum thickness of 25mm and a maximum thickness of 40mm.***

28.5.5. Grout Components and Preparation

- (a) **General**
Joints 10mm wide between concrete paving slabs shall be grouted to full depth of the paving slab with a non shrink cementitious grout. Grouting shall be carried out within 48 hours after laying of pavers.
- (b) **Bluestone Pavers**
For bluestone pavers colour additives used in this contract works shall be Bayer synthetic black oxides (Bayferrox®318) added at a rate of 40 kg/m³ and thoroughly mixed through the mortar so that it is of even consistency. Appropriate mix of colour additives will provide charcoal colour effect. Charcoal coloured mortar shall be used for the full depth of the bluestone pavers.
- (c) **Components**
The grouting mix shall be a dry mix bagged proprietary brand fine aggregate/cement/admixtures type grout (DURABED Construction Grout by ORMANOID or approved equivalent) with high flow and low shrinkage properties, non staining in the course of its application and of a compressive strength in excess of 20MPa at 7 days.
- (d) **Mixing**
Mixing shall be in accordance with the manufacturer's specification.

28.5.6. Installation of pavers

The following installation procedure shall be strictly adhered to:

- (a) sweep reinforced concrete sub-base and remove all foreign materials;
- (b) prepare concrete mortar mix;
- (c) prepare slurry mix;
- (d) dampen crushed rock sub-base with clean water. Using a hand broom, apply slurry mix to crushed rock (approx. 1mm thick) to area which will not exceed extent of paver unit to be immediately laid. Slurry must remain wet to carry out next step;
- (e) shovel mortar mix into position and loosely screed so that combined bed and paver thickness is higher than desired surface level by 5mm;
- (f) bed down dry paver (moist is acceptable but not soaked) and hit evenly over whole paver surface with a rubber mallet to approximately 2mm higher than the desired finished level;
- (g) remove paver by means of lifting tool or by hand, fill voids with additional mortar and then loosen up bed lightly by criss-crossing hand trowel through bed;

- (h) apply coating of slurry to underside of paver, ensuring that the initial application is stiffly brushed into the paver in a rotating motion, and build up slurry thickness to approximately 1mm;
- (i) bed down paver as per step (f) to finished surface level;
- (j) trowel fill any voids with mortar at front edge and/or front corners of paver;
- (k) discard excess mortar;
- (l) on completion of area cover paver with hessian sheets and spray with water mist. Allow to remain moist for 12 hours minimum. Subject to the approval of the Superintendent, place wooden boards, or similar, over paving which is subject to pedestrian traffic within the first 12 hours of curing;
- (m) after a minimum of 12 hours curing the joints may be grouted. Where necessary remove foreign material within joints;
- (n) prepare grout mix;
- (o) dampen joints with sponge and pour grout mix into joints ensuring full penetration for the thickness of the paving slab by lightly tamping down a trowel edge into the grouting mix. Use a rubber squeegee to spread grout evenly into all joints until filled flush with the top of the stone. Remove excess grout, allow initial set and lightly broom off remaining excess perpendicular to joints; and
- (p) wipe paver clean with damp sponge.

28.5.7. Quality Control

The Contractor's must ensure strict compliance with the specification by his labour force and/or sub-contractors.

28.6. Asphalt

28.6.1. General

This section covers the requirements for the manufacture and placing of asphalt of Types T, V, H, N, L and R and of Sizes 7, 10, 14, 20 and 28. The requirements relate to quality of materials, mix design, supply and placing of the asphalt.

28.6.2. Definitions

- (a) **Hot Mix Asphalt** (hereinafter referred to as Asphalt)
Asphalt is a designed and controlled, dense graded mixture of coarse and fine aggregates, filler and bitumen binder which is mixed, spread and compacted to a

uniform dense mass while hot. Asphalt types are designated by the symbols T, V, H, N, L or R.

(b) **Asphalt Types**

- (i) Asphalt Type L - a light duty asphalt with low air voids and high durability used as wearing course in very lightly trafficked areas (e.g. residential streets and car parks).
- (ii) Asphalt Type N - a normal duty asphalt suitable for intermediate and wearing courses for light to moderately trafficked areas.
- (iii) Asphalt Type T - similar to a Type N mix, but with increased stiffness for use in base, intermediate and wearing courses in moderate to heavily trafficked areas.
- (iv) Asphalt Type H - similar to a Type T asphalt, but with higher quality coarse aggregates for use as a wearing course in very heavily trafficked areas.
- (v) Asphalt Type V - similar to Type H asphalt but with higher air voids for improved stability at very heavily trafficked signalised intersections or roundabouts.
- (vi) Asphalt Type R - similar to Type T asphalt but with a higher bitumen content for use as a fatigue resistant base layer in deep strength or full depth asphalt pavements greater than 175 mm deep.

(c) **Asphalt Base Course**

Asphalt base course is that part of an asphalt pavement supporting the intermediate and wearing courses. It rests directly on the sub grade or sub base pavement.

(d) **Asphalt Intermediate Course**

Asphalt intermediate course is that part of the asphalt pavement immediately under the wearing course. It rests on the asphalt (or granular) base course.

(e) **Asphalt Regulating Course**

Asphalt regulating course is an asphalt course of variable thickness applied to the road surface to adjust the shape prior to surfacing or re-surfacing.

(f) **Asphalt Wearing Course**

Asphalt wearing course is the final part of the pavement upon which the traffic travels except for Open Graded Asphalt (OGA) where the wearing course is the layer beneath the OGA.

(g) **Asphalt Pavement**

Asphalt pavement comprises the combined thickness of all asphalt courses as defined in Clause 22.6.24 or as otherwise specified.

(h) **Asphalt Course**

An asphalt course comprises one or more layers of a single asphalt type.

(i) **Asphalt layer**

An asphalt layer comprises a single paving run of uniform asphalt.

(j) **Binder**

Binder is bitumen or the modified bituminous material used to hold a mixture of aggregates together as a cohesive mass.

(k) **Bulk Density**

Bulk density is the mass per unit volume of the compacted mix (expressed in tonnes per cubic metre) where the volume is the gross volume of the mix including the total air voids.

(l) **Registered Mix**

An Asphalt mix which has been placed on the VicRoads Asphalt Mix Design Register after the supplier has produced evidence to show that the mix complies with the mix design requirements specified in Clause 22.6.6.

(m) **Reclaimed Asphalt Pavement (RAP)**

Asphalt which has been removed from an existing asphalt pavement and processed by crushing and/or screening for addition as a component in a registered asphalt mix.

(n) **Coarse Aggregates**

Coarse aggregates are aggregates retained on a 4.75 mm AS sieve.

(o) **Fine Aggregates**

Fine aggregates are aggregates passing a 4.75 mm AS sieve.

(p) **Mineral Matter**

Mineral matter includes coarse and fine aggregates, plus filler.

(q) **Placing**

Placing is the spreading and compacting of asphalt, including operations necessary for preparation of the surface.

(r) **Assigned Polished Stone Value**

The assigned polished stone value is a friction rating derived from polished stone value test results and is assigned to each source by VicRoads on the basis of past test data obtained from testing products.

28.6.3. Aggregates

(a) **General**

(i) The combined aggregate mixture shall consist of crushed rock or a mixture of crushed rock and sand.

(ii) Aggregates shall consist of clean, hard, durable, angular rock fragments of uniform quality.

(iii) Sand aggregates shall consist of clean, hard, durable grains free from lumps, clay, mica and foreign matter.

(b) **Source Rock**

Source rock shall comply with the requirements of VicRoads Specification Section 801 - Source Rock for the Production of Crushed Rock and Aggregates.

(c) **Crushed Aggregate Products**

(i) The Flakiness Index of each separate sized coarse aggregate, with a nominal size of 10 mm or larger, shall comply with Table 28.6.3.1.

- (ii) Unsound rock and marginal rock in that fraction of the combined mixture retained on a 4.75 mm AS sieve shall not exceed the relevant percentages specified in Table 407.031. If no facilities exist at the mixing plant to sample the combined mixture, the unsound rock and marginal rock in that fraction of each aggregate retained on a 4.75 mm AS sieve shall not exceed the relevant percentages specified in Table 28.6.3.1.

Table 28.6.3.1

Type of Asphalt	Flakiness Index (%) max	Total of Marginal And Unsound Rock (% by mass) max	Unsound Rock (% by mass) max
V and H	35	8	3
T, N, L and R	35	10	5

- (d) Crusher Fines
Crusher fines shall:
- (i) consist of a uniformly graded product of separate particles from the crushing of rock which complies with the requirements of Clause 28.6.3 (b) appropriate to the asphalt type being produced;
 - (ii) be free from lumps and aggregations; and
 - (iii) comply with the grading limits specified in Table 28.6.3.2

Table 28.6.3.2

Sieve Size AS (mm)	Percentage Passing (by mass)
6.70	100
4.75	70 – 100
0.600	20 – 55
0.075	5 - 20

- (iv) comply with the relevant requirements specified in Table 28.6.3.3

Table 28.6.3.3

Test Value	
Degradation Factor – Crusher Fines (Min)	Plasticity Index (Max)
60	3

- (e) **Aggregates for Asphalt Use as Wearing Course**
 - (i) Coarse aggregates shall be a mixture of separate one-sized aggregates.
 - (ii) Coarse aggregates for Type T, H or V asphalt shall have a minimum assigned polished stone value of 48.
 - (iii) Fine aggregates shall be a mixture of one or more natural sands and crusher fines such that the fraction of the job mix passing a 4.75 mm AS sieve shall contain not less than 20% and not more than 65% by mass of natural sands unless otherwise approved by the Superintendent
- (f) **Aggregates for Asphalt Used as Intermediate or Base Course**
The combined aggregates shall consist either wholly of crushed material or of a mixture of crushed material and natural sands provided that the fraction of the mix passing the 4.75 mm AS sieve shall contain not more than 50% by mass of natural sands unless otherwise approved by the Superintendent.

28.6.4. Filler

- (a) Filler shall comply with Australian Standard 2357, Mineral Fillers for Asphalt.
- (b) The added filler required by Clause 22.6.7 to be included in wearing course mixes shall be hydrated lime, Portland cement or cement works flue dust.

28.6.5. Bituminous Material

- (a) **Bitumen Class**
Unless otherwise specified, the class of bitumen for each asphalt type shall be as specified in Table 28.6.5.1.

Table 28.6.5.1

Asphalt Type	Bitumen Class
L and N	170
T, H, V and R	320
T 600	600

Bitumen shall comply with Australian Standard 2008, Residual Bitumen for Pavements and with the additional requirement specified in Table 28.6.5.2.

Table 28.6.5.2

Class of Bitumen	Durability * Minimum time to reach the specified apparent viscosity level (SAVL) days
170	9
320	7

* AS 2341.13 - Determination of Durability of Bitumen

(b) Bitumen Recovered

The mean of three Viscosity tests taken on bitumen recovered from mixed asphalt, sampled from the paving site immediately prior to placement, or from the roadbed, shall comply with the requirement specified in Table 28.6.5.3

Table 28.6.5.3

Class of Bitumen	Viscosity Range at 25°C kPa.s		
	Wearing Course	Intermediate Course	Base Course
170	200 – 600	200 – 1100	200 – 1600
320	500 – 600	500 – 2300	500 – 3000
600	-	800 - 3200	800 - 3200

- (c) Bitumen Emulsion
 Bitumen emulsion shall be a cationic rapid setting type manufactured from Class 170 bitumen. It shall comply with Australian Standard 1160, Bitumen Emulsions for Construction and Maintenance of Pavements. Emulsion diluted with water shall contain a minimum bitumen content of 30%.
- (d) Polymer Modified Binder
 Where polymer modified binder (PMB) is specified the Contractor shall comply with the following requirements:
- (i) PMB shall comply with the requirements of the Specification Framework for Polymer Modified Binders (Austroads APRG Report No. 19, May 1997);
 - (ii) the material shall be handled in accordance with the manufacturer's specification;
 - (iii) a certificate of quality from the manufacturer shall be submitted for each load of PMB received; and
 - (iv) the PMB shall be transported and stored in such a manner to avoid contamination.
- (e) Where requested by the Superintendent, the Contractor must provide test certificates stating the quality of bitumen used. These certificates shall be issued by a laboratory registered by the National Association of Testing Authorities for the performance of such tests.

28.6.6. Mix Design

- (a) The Contractor shall provide all mix designs and be responsible for the performance of all registered mixes.
- (b) VicRoads has established a register of asphalt mixes from asphalt manufacturers who have produced mix designs satisfying the requirements of this clause and 28.6.7. To apply for registration of an asphalt mix, the information listed below shall be submitted to the Superintendent at least two weeks prior to the proposed date for the commencement of supply of the asphalt. No asphalt shall be supplied until the mix has been registered.
- (c) The Superintendent shall be notified of any proposed changes to the components or proportions of components used in the registered mix

- (d) New mix designs shall be carried out:
- (i) where it is proposed to change the source grading or nature of the components or binders; and
 - (ii) when current registered mix designs are more than two years old.
- (e) For every application to register a mix, VicRoads will notify the Contractor in writing the result of the application within two weeks. The Contractor's mix identification number shall be recorded on the register to identify the mix. If a registered mix has unsatisfactory handling or field performance, the Contractor may request the Superintendent to de-register the mix. Alternatively, the Superintendent may de-register the mix pending a review of the design and immediately advise the Contractor of action taken.
- (f) A mix containing Polymer Modified Binder ("PMB") substituted for bitumen binder in an existing registered mix is regarded as a new mix and will require separate registration. PMB Asphalt shall have the design binder content increased by 0.3% by mass compared to the bitumen binder mix. The information required in paragraphs (ix) to (xi) of this clause including the class of PMB proposed shall be submitted when seeking registration of a PMB asphalt mix.
- (g) The following information shall be submitted for each new mix design:
- (i) grading test results for each component;
 - (ii) proportion of each component in the mix;
 - (iii) grading of the mix;
 - (iv) unsound and marginal rock content of the coarse aggregate fraction;
 - (v) flakiness index of each separate coarse aggregate of size 10 and above;
 - (vi) degradation factor and plasticity index for the crusher fines component;
 - (vii) properties as listed below, determined from tests performed on Marshall cylinders compacted at three different bitumen contents using Class 170 binder within the range specified in Table 28.6.7.2
 - stability (kN)
 - flow (mm)
 - air voids (%)
 - voids in mineral aggregates (%)
 - bulk density (t/m^3)
 - bitumen film thickness (microns)
 - (viii) graphs showing the properties listed in (vii), plotted against the respective bitumen contents;
 - (ix) supply of five compacted cylinders of Size 14 and Size 20 Type T oven conditioned mixes at the design binder content to a density of

between 96% and 98% Marshall density compacted using the gyratory compaction method;

- (x) the supplier and source of binder; and
- (xi) supply of three 63.5 ±5 mm x 50 ±5 mm x 400 mm ±5 mm asphalt beams for a Size 20 Type T and a Size 14 Type T or H mix sawn from a slab compacted using a rolling wheel or segmental wheel compactor to between 96% and 98% Marshall density at the design binder content.

28.6.7. Mix Design requirements

- (a) The grading of mineral matter and the proportions of mineral matter and bitumen in the mix after mixing but before compaction, shall lie within the limits specified in Tables 28.6.7.1 and 28.6.7.2 for each size of asphalt unless otherwise approved by the Superintendent.

Table 28.6.7.1 - Grading of Mineral Matter (including any filler)

Sieve Size AS (mm)	Percentage Passing (by mass)				
	Size 7 Mix	Size 10 Mix	Size 14 Mix	Size 20 Mix	Size 28 Mix
37.5					100
26.5				100	90 - 98
19.0			100	95 - 100	75 - 95
13.2		100	85 - 100	77 - 90	60 - 80
9.50	100	90 - 100	70 - 85	63 - 80	50 - 70
6.70	80 - 100	70 - 90	60 - 75	52 - 65	40 - 60
4.75	70 - 90	58 - 76	50 - 70	45 - 55	35 - 50
2.36	45 - 65	40 - 58 *(40 - 46)	35 - 52 *(35 - 42)	30 - 43	25 - 40
1.18	34 - 55	27 - 48	24 - 40	20 - 35	17 - 33
0.60	22 - 45	17 - 38	15 - 30 *(15 - 26)	14 - 27	12 - 26
0.30	14 - 33	11 - 26	10 - 24	9 - 21	8 - 20
0.15	8 - 18	7 - 18	7 - 16	7 - 15	6 - 14
0.075	5 - 8	4 - 7	4 - 7	3 - 6	3 - 6
Total Mineral Matter	100	100	100	100	100

*For Asphalt Type T, V, H and N used for wearing course.

Table 28.6.7.2 - Proportions of Mineral Matter and Bitumen

Material	Percentage (by mass)				
	Size 7 Mix	Size 10 Mix	Size 14 Mix	Size 20 Mix	Size 28 Mix
Mineral Matter	95.0 - 92.5	95.5 - 93.0	95.5 - 93.5	96.0 - 93.5	96.5 - 94.5
Bitumen	5.0 - 7.5	4.5 - 7.0	4.5 - 6.5	4.0 - 6.5	3.5 - 5.5

Total Mix	100	100	100	100	100
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- (b) The Marshall cylinder test properties of the mix for asphalt Types T, V, H, N and L shall comply with Tables 28.6.7.3 and 28.6.7.4.

Table 28.6.7.3 - Asphalt Type T, V, H, and N

Mix Size (mm)	Stability (kN) min	Flow (mm)		Air Voids (%)				Voids in Mineral Aggregate min	Bitumen film Thickness (micron) min
				Type V		Type H, N, T			
		Min	Max	min	max	min	max		
7	5.5	1.5	3.5			4.9	5.3	17	7.5
10	6.5	1.5	3.5	5.9	6.3	4.9	5.3	17	7.5
14	6.5	1.5	3.5	5.9	6.3	4.9	5.3	16	7.5
20	6.5	1.5	3.5			4.9	5.3	15	7.5
28	6.5	1.5	3.5			4.9	5.3	14	7.5

Table 28.6.7.4 - Asphalt Type L

Mix Size (mm)	Stability (kN) min	Flow (mm)		Air Voids (%)		Voids in Mineral Aggregate min	Bitumen film Thickness (micron) min
		Min	Max	min	max		
7	4.5	1.5	3.5	3.8	4.2	16	8.0
10	5.5	1.5	3.5	3.8	4.2	16	8.0

- (c) For Asphalt Type R (Size 20), the properties of the mix shall be established from the relevant Size 20 Type N mix with an increase in bitumen content of 1.0% by mass of the total mix.
- (d) For wearing course asphalt, and any asphalt containing aggregates of coarse or medium grained acid igneous rocks (e.g. granite, adamellite, granodiorite, quartz porphyry) shall contain not less than 1% added filler. Where acid igneous aggregates are used in a drum mixing plant, the added filler shall be 1% hydrated lime.

28.6.8. Production Tolerances

The production tolerances on the grading aim of the mix before compaction shall be as specified in Table 28.6.8.1.

Table 28.6.8.1

Sieve Size AS (mm)	Tolerance on Percentage Passing (by mass)				
	Size 7 Mix	Size 10 Mix	Size 14 Mix	Size 20 Mix	Size 28 Mix
37.5	Nil	Nil	Nil	Nil	Nil
26.5	Nil	Nil	Nil	Nil	± 6
19.0	Nil	Nil	Nil	± 6	± 6
13.2	Nil	Nil	± 6	± 6	± 6
9.5	Nil	± 6	± 6	± 6	± 6
6.70 – 4.75	± 6	± 6	± 6	± 6	± 6
2.36 – 0.600	± 5	± 5	± 5	± 5	± 5
0.300 – 0.150	± 3	± 3	± 3	± 3	± 3
0.075	± 1.0	± 1.0	± 1.0	± 1.0	± 1.0

The production tolerances on the grading aim of the mix after compaction shall be as specified in Table 28.6.8.1 except that the positive tolerance shall be increased by one percentage point.

The tolerance on the bitumen content in the mix shall be ±0.3% of the total mix by mass.

28.6.9. Mixing and Mixing Temperature

- (a) The temperature of bitumen and aggregates at the mixing plant and the temperature of the asphalt as it is discharged from the mixing plant shall not exceed the limits specified in Table 28.6.9.1.

Table 28.6.9.1

Material	Temperature °C (max)
2 Bitumen delivered into plant storage	185
Bitumen delivered into mixer	165
Aggregates before mixing	200
Asphalt at discharge from mixing plant	175

- (b) The mixing period shall be such that at least 95% of the coarse aggregate particles are fully coated with bitumen.
- (c) After completion of mixing the moisture content of the mix shall not exceed 0.5%.
- (d) Asphalt which has been manufactured at temperatures in excess of limits specified in Table 28.6.9.1 or which has been stored in an insulated bin for more than 18 hours for Class 170 and 320 bitumen binders (and not more than 4 hours for Class 600 bitumen binder and PMB) shall be rejected and recycled unless the Contractor can demonstrate that excessive binder hardening or a significant change in mix performance properties has not occurred. Material recycled from within the plant may be used in the mix at a proportion not greater than 5% by mass of the total aggregates.

28.6.10. Asphalt Recycled from Reclaimed Asphalt Pavement

(a) General requirements

Unless otherwise specified, Reclaimed Asphalt Pavement (RAP) may be re-cycled by adding it to new asphalt during the mixing process subject to the following requirements:

- (i) all asphalt containing RAP shall comply with all aspects of Section 24.6 for the size and type of asphalt specified for use;
- (ii) RAP shall consist of milled or excavated asphalt pavement free of foreign material such as unbound granular base, broken concrete or other contaminants and shall be crushed and screened to a maximum size not exceeding the size of asphalt produced;
- (iii) the asphalt manufacturing process shall provide for addition of RAP to a batch plant pugmill or drum mixer separately from other mix components by a method that avoids damage to the mix by overheating.

(b) Restrictions on the Use of RAP

- (i) No RAP shall be added to Asphalt Types H, T or V wearing courses or any asphalt containing Class 600 bitumen or PMB.
- (ii) Up to 10% of RAP by mass may be added to Type L and N wearing courses.
- (iii) Up to 20% RAP by mass may be added to Type N and T intermediate courses and Types R and T base courses.

28.6.11. Frequency of Inspection and Testing at the Mixing Plant

The frequency shall not be less than that shown in Table 28.6.11, except that the Superintendent may agree to a lower frequency where the Contractor has implemented a system of statistical process control and can demonstrate that such lower frequency is adequate to assure the quality of the product.

Table 28.6.11.1

Checks Required	Minimum Frequency
Scrutiny for segregation, uncoated particles, separated bitumen, excess bitumen or overheating before despatch from the plant	Each loaded truck
Temperature of asphalt before despatch from the plant	Each loaded truck or at intervals of 15 minutes if more than one truck is despatched in 15 minutes
Unsound rock content	On each day: One test on each component unless certification of specification compliance

Checks Required	Minimum Frequency
	is received for each delivery to the mixing plant.
Degradation factor of crusher fines	At monthly intervals
Plasticity index of crusher fines	At monthly intervals
Flakiness index of coarse aggregate 10 mm and larger	At monthly intervals
Bitumen content and full sieve analysis of asphalt (full extraction test)	On each day: One test per 250 tonnes or part thereof of the asphalt plant production on a representative sample taken from a delivery truck
Viscosity of bitumen	Certification of specification compliance for each delivery of bitumen supplied to the mixing plant.
Viscosity at 165°, torsional recovery, and softening point of PMB	At weekly intervals: For batches of PMB stored in excess of a week in binder storage tanks at the asphalt plant.
Recovered binder viscosity	Three tests on samples of asphalt taken from the paving site on the first 500 tonnes of any registered mix which has not been previously supplied to VicRoads. This requirement only applies to Size 14 Type T or H, and Size 20 Types T, R and T600.

The Contractor shall make available for inspection at the plant all work sheets and results of checks carried out.

28.6.12. Rate of Delivery

Asphalt shall be placed at the highest practicable rate in order to minimise the time traffic is disrupted and to avoid intermittent paving.

28.6.13. Ambient Conditions for Placing

The surface on which asphalt is to be placed shall be essentially dry and free from puddles.

- (a) Intermediate and Base Courses
Asphalt shall not be placed when the majority of the area to be paved has a surface temperature of less than 5°C except that asphalt containing Class 600 bitumen or PMB shall not be placed when the majority of area to be paved has a surface temperature less than 10°C.
- (b) Wearing Course
Wearing course asphalt shall not be placed when the majority of the area to be paved has a surface temperature of less than 10°C, except that for mixes containing PMB where the majority of the area to be paved has a surface temperature above 15°C.

28.6.14. Surface Preparation

Prior to tack coating and placing of asphalt, the Contractor shall remove all deleterious material and sweep clean the area upon which asphalt is to be placed.

28.6.15. Tack Coat

- (a) A tack coat shall be applied to the cleaned surface on which asphalt is to be placed.
- (b) Tack coat shall consist of cationic bitumen emulsion and shall be applied only to a clean, essentially dry surface, free from puddles.
- (c) Tack coat shall be sprayed in a uniform film over the entire road surface.
- (d) Unless otherwise directed, the application rate for bitumen emulsion tack coat shall be 0.15 to 0.3 litres/m² (60% Bitumen content) or 0.3 to 0.6 litres/m² (30% bitumen content) except for joints and chases where rates shall be doubled.
- (e) Before asphalt is placed a period of time sufficient to allow the tack coat to set up and become tacky shall elapse.
- (f) Any tack coat not covered by asphalt shall be covered with clean grit or sand before the road is opened to traffic.
- (g) Where asphalt is to be spread over clean, freshly laid asphalt, or over a clean, primed surface, or where the depth of the layer exceeds 50 mm, the Contractor may omit the tack coat unless otherwise directed or specified.

28.6.16. Delivery

(a) General

Delivery shall only be made during the hours listed for possession of site. Asphalt delivered to the site, which is segregated, has been overheated, is too cold, contains separated bitumen or uncoated particles which does not comply with the Specification shall be removed from the site at the Contractor's expense.

(b) Delivery Dockets

Delivery docket shall show:

- (i) name of supplier and location of plant;
- (ii) docket number;
- (iii) name of user;
- (iv) project name and location (or contract number);
- (v) registered number or fleet number of the vehicle;

- (vi) date and time of loading;
 - (vii) size and type of asphalt;
 - (viii) empty and loaded mass of the vehicle, or the total of the electronically measured batch weights printed on the docket;
 - (ix) class of bitumen, or proprietary name of modified binder; and
 - (x) temperature of load at mixing plant when measured.
- (c) Where asphalt is scheduled for measurement by mass, a copy of the delivery docket for each load shall be given to the Superintendent at the point of delivery, or delivered or mailed to the Superintendent at the end of each day's work.
- (d) Where asphalt is measured by other means and for lump sum contracts, the Contractor shall make delivery dockets available for inspection on request by the Superintendent.

28.6.17. Joints and Junctions

(a) General

- (i) The location of all joints shall be planned before work commences to achieve the specified offsets between layers and the final position of joints in the wearing course.
- (ii) The number of joints shall be minimised by adopting good asphalt paving practices. If requested by the Superintendent, the Contractor shall produce drawings showing the location of longitudinal joints of asphalt layers in respect to the traffic lane lines.
- (iii) All joints shall be well bonded and sealed and the surface across the joint shall meet the requirements of Clause 24.6.23(b).
- (iv) Where fresh asphalt is to be placed against the exposed edge of existing asphalt on a longitudinal joint which has not been placed the same day, or against the exposed edge of a transverse joint where existing asphalt has cooled to below 100°C, it shall be considered a cold joint.
- (v) All cold joints between adjacent runs and abutting concrete edges shall be heavily tack coated.
- (vi) Where cold joints are constructed, any loose or poorly compacted existing asphalt on the exposed edge shall be trimmed back to produce a face of fully compacted asphalt along the exposed edge before fresh asphalt is placed.

(b) Transverse Joints

- (i) Transverse joints in adjoining paver runs shall be offset by not less than 2 m.

- (ii) Transverse joints shall be offset from layer to layer by not less than 2 m.
- (c) Longitudinal Joints
- (i) Longitudinal joints in the wearing course shall coincide with traffic lane lines.
 - (ii) Longitudinal joints in intermediate and base courses shall be offset from layer to layer by not less than 150 mm and shall be within 300 mm of the traffic lane line or the centre of traffic lane.
 - (iii) Longitudinal joints shall be parallel to the traffic lanes unless otherwise specified.
 - (iv) Unless otherwise specified, or approved by the Superintendent, hot or warm joints shall be constructed either by paving in echelon or by matching up all longitudinal joints over the full width of the carriageway each day.
 - (v) Subject to approval by the Superintendent, a longitudinal joint in the wearing course may be located up to 300 mm from the traffic lane line or the centre of a traffic lane to achieve the minimum clearance between the paver screed and the traffic path of 1.2 metres and the minimum traffic path width of 2.8 metres.

(d) Junctions

At junctions where the new asphalt mat is required to match the level of existing pavement surface at the limits of work, chases shall be cut into the existing pavement:

- (i) If cold planing is specified, a wedge of asphalt tapering from 0 to a depth of 2.5 times the nominal size of the asphalt shall be removed from the existing pavement to the minimum width as follows:
 - side streets and median openings - 600 mm
 - through carriageways with a speed limit of 75 km/h or less - 3 m
 - through carriageways with a speed limit of more than 75 km/h - 6 m.
- (ii) If cold planing is not specified, a 40 mm wide by 20 mm deep chase shall be cut from the existing pavement and where directed, angled at about six transverse to one longitudinal to the direction of travel.

(e) Treatment of Exposed Edges under Traffic.

On completion of each day's work and prior to opening to traffic, the following treatment of exposed edges shall be adopted for asphalt work:

- (i) Longitudinal Edges
All longitudinal joints within the trafficked area shall be matched up between paver runs except for a short section required to achieve

the minimum offset between transverse joints. Any exposed longitudinal edges within the trafficked area shall be ramped down at a slope of not steeper than 5 horizontal to 1 vertical by constructing a temporary wedge of hot mixed or cold mixed asphalt. In unusual situations such as the sudden onset of inclement weather, a longer length of longitudinal joint may be exposed provided it is ramped down as specified.

- (ii) At the end of the paving run in the transverse direction, the new asphalt mat shall be squared up to a straight line and ramped down by constructing a temporary wedge of hot mixed or cold mixed asphalt. Temporary ramping shall not be steeper than 20 horizontal to 1 vertical for traffic speeds of more than 75 km/h or 10 horizontal to 1 vertical for traffic speeds of 75 km/h or less.
- (iii) **Removal of Temporary Ramping**
Before commencement of each day's work, all temporary ramping shall be removed by cutting back along a straight line to expose a vertical face of fully compacted asphalt at the specified layer depth.

28.6.18. Commencement of Placing

HP The placement of any asphalt layer shall not commence until the consent to proceed is obtained from the Superintendent.

28.6.19. Regulating Course

A regulating course of asphalt of the type and size specified shall be placed for correction of longitudinal and transverse pavement shape so the resulting surface is parallel with the finished surface.

28.6.20. Spreading

- (a) **General**
 - (i) Asphalt shall be spread in layers at the compacted thicknesses shown on the Drawings or specified.
 - (ii) All asphalt shall be spread with an asphalt paver except for small areas where use of a paver is not practicable.
- (b) **Level Control**
 - (i) **General**
 - Asphalt shall be spread in layers at the compacted thickness specified or shown on the Drawings.
 - All asphalt shall be spread with an asphalt paver except for small areas where use of a paver is not practicable.
 - Unless otherwise specified in Clause 24.6.20(c), asphalt paver screed levels shall be controlled by a suitable combination of manual and automatic controls operating from fixed or moving references.
 - (ii) **Manual Control**

- Manual control is permitted except where automatic level control is specified.
 - The Superintendent may direct that for the wearing course layer on new construction, the paver screed level controls shall remain at a fixed setting or that a joint matching shoe shall be used.
- (iii) Automatic Control
- Fixed Level Control
Where fixed level control is specified, the paver screed shall be automatically controlled by reference to stringline or other approved system.
 - Moving Reference Control
Where moving reference control is specified, both sides of the paver screed shall be automatically controlled by reference device. Levelling beams shall be supported independently of the paver and provide a minimum of 8 separate contact points over a minimum length of 9 metres.
- (c) Spreading by Paver
- (i) Asphalt shall be spread without tearing or gouging.
 - (ii) The Contractor must conduct spreading operations to ensure that the paver speed matches the rate of supply so that the number of paving stops are minimised.
 - (iii) If the paver is required to stop and asphalt in front of the screed cools to below 120°C, a transverse joint shall be constructed.
 - (iv) For asphalt work carried out on a road to be opened for traffic at the completion of work each day, each layer of asphalt shall cover the full width of the trafficked area. The requirements of Clause 24.6.17(e) shall be followed in respect of the treatment required for exposed edges.
- (d) Spreading By Hand
Hand spreading shall only be used for small awkward areas where it is not practical to use a paver.
- (e) Echelon Paving
- (i) Where specified in Clause 24.6.24(d) two pavers in echelon shall be used in locations where a full carriageway wider than 6 m is available clear of traffic.
 - (ii) Where the width of the mat to be placed in a single paving run exceeds 6.0 metres, two or more pavers shall be used in echelon.

28.6.21. Compaction

Asphalt shall be uniformly compacted to the standards specified in Clause 24.6.22 as soon as the asphalt has cooled sufficiently to support the roller without undue displacement.

28.6.22. Requirements for Testing and Acceptance of Compaction

(a) General

Work shall be tested and accepted for compaction on either a lot basis as provided in Clause 28.6.22(b) or on a procedural basis as provided in Clause 28.6.22(c). If not otherwise specified or directed, acceptance of compaction where the quantity of the particular size or type of asphalt to be supplied exceeds 300 tonne, shall be on a lot basis. For all other works, acceptance of compaction shall be on a procedural basis.

(b) Testing and Acceptance of Compaction on a Lot Basis

(i) A lot presented for testing consists of that part of a particular layer of asphalt which is placed in one day under uniform conditions and is essentially homogeneous in respect to material and appearance.

(ii) Sites for density testing shall be selected on an essentially random basis provided that no site shall be selected within 200 mm of a joint constructed against a cold edge.

(iii) For core sample tests, the layer thickness is the mean thickness of the core samples and for nuclear gauge tests, the layer thickness is the nominal layer thickness.

(iv) Asphalt Density Ratio is defined as the percentage ratio of the field bulk density to the assigned bulk density of the approved laboratory mix design.

(v) The Characteristic Value of Density Ratio is the calculated value of $\bar{x} - 0.92S$ for six tests per lot where \bar{x} and S are respectively the mean and standard deviation of the individual density ratio test values for the lot.

(vi) The work represented by a lot of six tests shall be assessed as shown in Table 28.6.22.1.

Table 28.6.22.1

For layers less than 50 mm thickness		For layers 50 mm thickness or greater	
Characteristic Value of the Density Ratio (Rc)	Assessment	Characteristic Value of the Density Ratio (Rc)	Assessment
94.0% or more	Accept lot	96.0% or more	Accept lot
91.0% to 93.9%	Lot will be accepted at a reduced rate calculated by $P = 10 R_c - 840$	91.0% to 95.9%	Lot will be accepted at a reduced rate calculated by $P = 6 R_c - 476$

(Rc) is the Characteristic Value of the density ratio for the lot and (P) is the percentage of the relevant scheduled rate to be paid which shall not be greater than 100%.

- (vii) Where the Contract is a lump sum contract the relevant scheduled rate will be that shown in the "Rates for Variation Purposes" schedule accompanying the lump sum tender. If no such rate is provided a variation will be considered in accordance with Clause 40.2 of the General Conditions of Contract - Valuation of Variations.
- (viii) Where one or more individual core thicknesses are less than the relevant values shown in Table 28.6.22.2, they shall be discarded and the acceptance assessment modified in accordance with Table 28.6.22.3 provided that there remain at least 4 test values.

Table 28.6.22.2

Size of Asphalt	Individual Core Thickness (min)(mm)
7	14
10	20
14	28
20	40
28	56

Table 28.6.22.3

For layers less than 50 mm thickness		For layers 50 mm thickness or greater	
Mean Value of the Density Ratio (Rm)	Assessment	Mean Value of the Density Ratio (Rm)	Assessment
95.5% or more	Accept lot	97.0% or more	Accept lot
92.5% to 95.4%	Lot will be accepted at a reduced rate calculated by $P = 10 Rm - 855$	92.0% to 95.9%	Lot will be accepted at a reduced rate calculated by $P = 6 Rm - 482$

(Rm) is the mean of the individual density ratios for the lot and (P) is the percentage of the relevant scheduled rate to be paid which shall not be greater than 100%.

(c) Acceptance of Compaction on a Procedural Basis

Acceptance of work as far as compaction is concerned shall be based on the adoption of approved placing procedures and a density test check plan that provides for a minimum test frequency of 5% of relevant lots to be tested. The test check plan shall provide for additional testing to demonstrate correction of non-conformance. If not otherwise agreed, placing procedures

shall be in accordance with Australian Standard AS 2734 Asphalt (Hot-Mixed) Paving - Guide to Good Practice.

28.6.23. Surface Finish and Conformity with Drawings and Specifications

- (a) The finished surface of asphalt wearing course shall be of uniform appearance, free of dragged areas, cracks, open textured patches and roller marks.
- (b) Each asphalt course shall, after final compaction, comply within the following limits to the levels, lines, grades, thicknesses and cross-sections as specified or shown on the Drawings.
 - (i) **Level of Each Asphalt Course**
The level of the top of each course shall not differ from the specified level by more than 10 mm, except that where asphalt is placed against kerb and channel the surface at the edge of the wearing course shall be flush with or not more than 5 mm above the lip of the channel unless otherwise specified or shown on the Drawings.
 - (ii) **Shape**
No point on the finished surface of the wearing course shall lie more than 4 mm below a 3 m straight edge laid either parallel to the centreline of the pavement or, except on crowned sections, at right angles to the centreline. For intermediate and base course layers, the distance below the straight edge shall not exceed 6 mm and 10 mm respectively
 - (iii) **Thickness of Asphalt Pavement for New Pavement Construction**
Where a uniform thickness of new asphalt pavement construction is specified, the mean thickness of a lot of asphalt shall be not less than the combined thickness of all asphalt courses specified in Clause 28.6.24 or shown on the Drawings. For the purpose of this clause a lot shall be defined as an area of up to 4000 m².
 - (iv) **Alignment**
Where asphalt pavement is not placed against a concrete edging, the edge of asphalt layers shall not be more than 50 mm inside nor more than 100 mm outside, the designed offset from centreline or design line. Within these tolerances, the rate of change of offset of the edge of layer shall not be greater than 25 mm in 10 m.
 - (v) **Width**
Where asphalt pavement is not placed against a concrete edging, the width of asphalt layers shall not be less than the design or specified width of layer by more than 50 mm or greater than the design or specified width by more than 100 mm and the average width over any 300 m shall not be less than the design or specified width.

28.6.24. Schedule of Details

- (a) Asphalt Requirements – refer project specific drawings

Course	Layer	Nominal Size of Asphalt (mm)	Type of Asphalt	Thickness of Layer (mm)
Wearing	Open Graded	##:	##:	##:
	Wearing	##:	##:	##:
Intermediate	Regulation	##:	##:	##:
	Intermediate 1	##:	##:	##:
	Intermediate 2	##:	##:	##:
Base	Base 1	##:	##:	##:
	Base 2	##:	##:	##:
Combined Thickness of Asphalt Pavement (less the Open Graded Asphalt Wearing Course Layer)				

- (b) Polymer Modified Binder
 ****The grade of PMB in the # course shall be #.
- (c) Automatic Level Control Requirements
- (i) Fixed Level Control
 *** String Line ***

 *** Other ***
- (ii) Moving Reference Control
 *** Joint matching shoe

 *** Joint matching shoe and levelling beam

 *** Joint matching shoe, levelling beam and cross fall slope control

 ***Other
- (d) Paving in Echelon (see also Clause 22.6.20(e))
 *** Two pavers in echelon shall be used on the through carriageway from ## to ##.

29. DRAINAGE AND CONDUIT LAYING

29.1. GENERAL

- (a) The Contractor shall excavate for, bed and lay pipe drains and conduits as specified true to the alignments and levels indicated on the accompanying plans. All pipes and conduits shall be supplied and delivered to the site by the contractor.
- (b) Where the construction of a trench is planned, the Contractor at the time of signing the Contract shall complete the Notice of Intention to commence operations in trenches, shafts, tunnels or other excavations. This notice will then be forwarded to WorkSafe Victoria with the name of the approved Foreman for the job, and other details as specified on the form.

- (c) Where trenches are to be dug at a depth greater than 1.5 metres the contractor shall be responsible to see that all the requirements of the *Mines Act 1958* and *Occupational Health and Safety Regulations 2007* are fulfilled. .

29.2. Materials

29.2.1. Conduits

- (a) Unless otherwise specified, the Contractor shall provide all conduits which shall comply with the following standards as appropriate:

Plastic Conduit - AS 2053, AS 1477, AS 1159

- (b) All reinforced concrete pipes are to be the class specified in the Drawings and shall be to AS 4058 "Pre Cast Concrete Pipes" unless specified or indicated otherwise.
- (c) Other types of conduit may be used with the approval of the Superintendent.

29.2.2. Bedding and Backfill Materials

Unless otherwise specified, the Contractor shall supply all bedding and backfill material in accordance with the requirements of this specification.

29.2.3. Pits

Unless otherwise specified, the Contractor shall supply all pits and lids in accordance with the requirements of this Specification.

29.3. Permits

- (a) Road opening permits, if required shall be taken out by the Contractor at the office of the Superintendent.
- (b) Any other permits required shall be taken out with the appropriate authority.
- (c) All costs and charges for the above permits shall be deemed to have been allowed for by the Contractor in the relevant schedule items and no liability will be accepted.

29.4. Excavation

- (a) Unless otherwise specified, all road crossings shall be installed by boring.
- (b) Unless otherwise specified, the annulus between the bore or carrier-conduit shall be filled by pressure grouting.
- (c) If boring proves impractical, the approval of the Superintendent shall be obtained before the road is open trenched.
- (d) The methods of working and timing of any excavations in road pavements and the associated control of traffic shall be subject to the review of the Superintendent.

- (e) Open trenching shall be permitted in unpaved areas and across unpaved subgrade areas.
- (f) Where open trench methods are accepted, the line of trenches wherever practical, shall be straight and from the shortest link between terminals.
- (g) Adequate drains to approved outlets shall be provided from junction pits.
- (h) Any drains or services disturbed during the excavation or laying of conduits shall be immediately reported to the Superintendent and shall be reinstated promptly.
- (i) Prior to trafficking, the reinstatement shall be reviewed by the Superintendent.
- (j) Trenches shall be graded to allow condensation and seepage to flow from conduits to the outlet provided.
- (k) Any paved surface at the edges of the trench shall be sawcut.
- (l) No trench shall be opened up until sufficient conduits are on the ground ready for laying. Not more than thirty (30) lineal metres is to be opened up at one time.
- (m) All trenches shall be excavated rectangular in section and the bottom width shall be not less than the diameter of the pipe plus 250mm and not greater than the diameter of the pipe plus 350mm, unless otherwise specified or shown on the plans.
- (n) All excavations are to be taken out for conduit laying to a sufficient depth below the specified invert levels and grades to allow for the wall thickness of the pipe and the specified depth of bedding materials.

29.5. Bedding Material

- (a) Bedding material shall be provided and placed full width of the trench.
- (b) Bedding material shall be compacted 20mm Class 2 fine crushed rock unless specified otherwise, free from clay or other deleterious matter, and shall be placed and compacted in layers not exceeding 150mm and compacted to a minimum thickness of 75mm or as specified on the plans, whichever is the greater, to the satisfaction of the Superintendent.
- (c) The plasticity index of the bedding materials shall not exceed 8%.
- (d) Following compaction, the bedding material shall be shaped sufficiently to maintain the conduit in line as the sections are placed in position.
- (e) For galvanised wrought iron or cast iron conduits less than 200mm nominal diameter or for conduits of other materials less than 100mm nominal diameter, shaping of bedding is not required.

29.6. Pipe Laying

29.6.1. Pipe laying for Drainage pipe system

- (a) Care must be taken to ensure that the inverts of each pipe length fit accurately with one another at the joints.
- (b) Any pipes not laid within 12mm of the design invert level and within 25mm of the correct alignment shall be rejected and re-laid.
- (c) The Contractor shall supply all pipes unless otherwise specified, necessary to complete the contract and shall lay pipes as indicated on the accompanying plans.
- (d) Pipes shall be laid separately and for pipes with elliptical reinforcement rotated to their correct laying position, and the barrels shall be supported throughout their full length upon a bed of first quality well graded 20mm Class 2 Fine Crushed Rock, having a minimum compacted depth of 75mm. Socket holes shall be cut in the bottom of the trench of such size and depth as to allow the joints to be properly made.
- (e) All pipes shall be laid as to true inverts, straight lines and falls, each pipe being separately boned. Each pipe shall be cleaned inside and shall be tested for soundness before being laid.
- (f) When pipes have been bedded and set as specified, the Contractor shall fill the trench with approved 20mm Class 2 fine crushed rock and shall thoroughly compact same. No pipes shall be laid in any section of trench until the pipe trench has been inspected and approved by the Superintendent.

29.6.2. Pipe laying for other conduits

- (a) Pipes shall be placed centrally in the trench on the prepared bedding and held firmly in place.
- (b) When the sections are in position additional layers of bedding material shall be placed and compacted to a height of 150mm above the bedding previously laid.

29.7. Pipe Jointing

- (a) All reinforced concrete pipes less than 225mm diameter are to be spigot and faucet rubber ring type unless otherwise directed by the Superintendent.
- (b) Cement mortar for jointing shall be mixed in the following proportions:
 - 1 part by volume Portland cement; and
 - 3 parts by volume of sand.

29.7.1. Cement Mortar Joints.

- (a) Laying shall commence at the down stream end and the pipes shall be laid with faucets pointing upstream.
- (b) All pipes are to be bedded sufficiently thick to back the pipes firmly and to prevent any possibility of the pipes being displaced during or after jointing.
- (c) Each spigot is to enter the full depth of the faucet of the adjacent pipes and is to be truly concentric therewith, so as to make the interior of the pipe smooth and continuous and with no lip at the invert. When the spigot has been fully entered into the faucet it is to be filled with cement mortar, splayed off outside and finished with a carefully cut and struck joint.
- (d) All excess mortar shall be removed from the interior of the pipe.

29.7.2. Lock Joints

- (a) Laying shall commence at the downstream and the pipes shall be laid with the sockets pointing upstream.
- (b) The spigot of the pipe being laid shall be pushed fully home into the socket of the pipe already laid.
- (c) The external and internal grooves formed at the joint shall be cleaned of all foreign matter, painted with a cement wash and then completely filled with cement mortar.
- (d) Sand bands are to be supplied by the contractor and installed around pipe joints to the satisfaction of the Superintendent to prevent infiltration of sand into the drainage system.
- (e) Where required by the Superintendent, jointing shall be carried out by mortar bandages 75mm wide and 25mm thick and reinforced with brick bond mesh.

29.7.3. Solvent Weld Joint for UPVC Pipes

- (a) All solvents used are to conform to AS 3879 and under no circumstances are they to be diluted or have any material added to them.
- (b) The joint is to be dry and free from all dirt, oil and grease. A thin layer of solvent is applied to the inside of the socket and the outside of the spigot and the pipes are pushed together. The joint should not be subject to strain for five (5) minutes and pressure test should only be conducted after twenty-four (24) hours.

29.8. Laying and Jointing Household Stormwater Drains

- (a) The Contract price per metre for this work provides for payment to be made for drains (unless otherwise specified in the Schedule of Prices) laid by reasons of one or more of the following three circumstances:
- (i) the invert level of the new kerb and channel being that much higher than the original invert as to necessitate lifting and regrading;
 - (ii) new drainage lines being laid where directed by the Engineer;
and
 - (iii) existing drainage lines more than one pipe length away from back of new kerb being in an unsatisfactory state prior to the commencement of the works of this Contract.
- (b) All pipes shall be laid by an experienced drainer true to line and grade with a continuous fall to the channel invert. Mortar for jointing shall be composed of 1 part Portland cement to 3 parts of approved sand. Joints shall be thoroughly caulked and finished smooth and pipe end fitted to kerb outlet with a collar of mortar.
- (c) The Contract price for this item shall include the cost of carrying out all the works described in this clause together with the required excavation and refilling of pipe trenches and together with an ancillary works and expenses in connection therewith.

29.8.1. Bedding Preparation

- (a) Bedding of concrete, crushed rock, gravel, or other materials approved by the Superintendent shall be placed as follows:-
- (i) Edgings
Not less than 75mm compacted thickness.
 - (ii) Footpaths and Surfacing
Unless otherwise specified or shown on the Drawings not less than 50mm compacted thickness.
- (b) Bedding shall be trimmed to the appropriate levels, moistened as necessary and firmly compacted.
- (c) For footpaths and surfacing the subgrade shall be brought true to grade and cross section as shown on the Drawings or directed by the Engineer by filling and excavating as necessary. All soft wet or unstable material shall be removed to a depth of not less than 75mm below the design level of the underside of the concrete and the resulting space filled with approved material moistened and compacted to form a stable foundation.
- (d) Immediately before mortar is placed, the bedding shall be moist but shall have no free water on the surface.

29.9. Inspection

- (a) No section of a trench may be back filled above the springing line until the pipeline has been inspected and approved by the Superintendent and the necessary direction given to back fill. However, the pipes may be loaded pending approval to back fill by placement of material across the centre of the pipe to a depth of not more than 300mm.
- (b) If, in the opinion of the Superintendent, the pipeline and associated works are not constructed in accordance with the Drawings or this Specification, or that workmanship is poor or detrimental to the life of the structure, he may order sections or all of the pipeline or associated works be removed and replaced, or in cases modified, all to the satisfaction of the Superintendent, and at the cost of the Contractor.

29.10. Backfilling

- (a) After the pipe laying has been completed, inspected and approved by the Superintendent, backfill shall be placed as follows under, around, and above the pipe sections unless otherwise specified or shown on the Drawings.
- (b) The Contractor must thoroughly compact all filling material by ramming and/or watering in layers not more than 150mm loose thickness to a dry density not less than 100% of the maximum value obtained in the Standard Compaction Test in accordance with E.I.I. of AS 1289.
- (c) During filling, the maximum difference between filling on opposite sides of the culvert shall not exceed one-quarter the height of the culvert or 0.5m, whichever is the less.
- (d) Unless the Superintendent directs or consents otherwise, filling shall not be placed within 2m of an exposed drainage end where a further section is to be placed.
- (e) The Contractor is responsible for the removal of remaining spoil from the Work Site.

29.10.1. Trench Conditions

- (a) Drains Under Area to be Paved
 - (i) Where a pipe is to be laid under an existing pavement, or under a new pavement to be constructed as part of the works of this contract, or when specified, the trench shall be wholly back filled to the base of the pavement with Class 2 size 20mm FCR which shall be placed and consolidated as specified in Clause 25.9(b).
 - (ii) Pavement materials shall be as specified and shall comply with the relevant requirements of the appropriate pavement sections.
- (b) Drains Under Area not to be Paved
 - (i) In other areas the trench shall be backfilled with selected backfill material to a level of 0.4m above the top of the conduit and with

ordinary backfill above that level. Refer to the table below for details of selected and ordinary fill material.

- (ii) If site backfill is not available the Contractor shall find, transport and place, as specified, backfill, fulfilling the requirements listed above. Backfill shall be free from perishable matter and shall conform with the appropriate grading requirements of the table below.
- (iii) In unpaved areas care shall be taken to ensure that the top soil for a depth of 200mm shall be preserved and, when trenches have been back filled and compacted to approval, this top soil shall be placed and raked over the area of the trenches.

Material	Sieve Size – AS (mm)					Plasticity Index	
	75.0	37.5	19.0	2.36	0.075		
	Percentage Passing (by mass)						
Selected backfill *	-	100	-	-	10 - 40	5	20
Ordinary backfill *	100	-	-	40 - 100	-	-	-

** Backfill shall be free of perishable matter*

29.10.2. Backfilling in Non-Trench Conditions

- (a) Sand or other approved backfill material shall be placed for the full width of the previously placed bedding material to a height of 0.3m above the top of the culvert, or to subgrade level, whichever is the lower.
- (b) To provide support for the backfill material, ordinary backfill material, as specified in Clause 25.9, shall be placed simultaneously with and to the same level as the other backfill material to a distance two culvert diameters clear of the culvert.

29.11. Stormwater Pits

- (a) The Contractor shall excavate and construct cast in situ pits in accordance with details and locations indicated on the plans, or as directed by the Superintendent. NO PRE CAST PITS ARE ACCEPTABLE UNDER THIS CONTRACT.
- (b) Inverts of the pits must be covered as shown on the plans or as directed by the Superintendent, to provide for the smooth flow of water without any sharp corners or protuberances.
- (c) All work must be finished in a workmanlike manner and to the approval of the Superintendent.
- (d) Cement rendering must be complete within four (4) hours of the pouring of the concrete.
- (e) Step irons of approved design shall be constructed of 20mm diameter mild steel and heavily galvanised, and shall be built into the walls of the

pits having a depth of 1 metre or more. Step irons shall be spaced at 300mm intervals.

29.11.1. Concrete

Concrete, the materials and methods of mixing, placing and curing shall comply with the requirements set out in Clause 24.3 of this specification

29.11.2. Form Work

- (a) Formwork must conform to the shape, lines and dimensions required in the finished concrete. The material to be used shall consist of timber dressed in the inner face so that a smooth surface is obtained, or shall consist of metal in which all heads of fastenings are countersunk. For unexposed surfaces, undressed timber may be used.
- (b) Double box formwork shall be used for the construction of the top 300mm of all the pits and in all cases where the nature of the ground does not permit trimming to provide a firm, even surface against which to place concrete.
- (c) Forms must be substantial and rigid, shall be so constructed that they may be removed without injury to the concrete, shall be water tight, and shall be braced or tied together so as to maintain position and shape.
- (d) All dimensions affecting the construction of subsequent portions of the work must be carefully checked after the forms are erected and before any concrete is placed. To ensure the non-adhesion of the mortar, the inside surfaces of forms shall be coated with non-staining mineral oil.
- (e) The forms must be inspected immediately preceding the placing of the concrete and any bulging, warping, or lack of support shall be remedied, and all dirt, sawdust, shaving, or other debris within the form shall be removed.
- (f) The whole of the formwork for each monolithic section of the work must be wholly constructed before concreting of that section is commenced.
- (g) Placing of the concrete will not be permitted to start until the Superintendent has checked the formwork.
- (h) Forms must not be removed sooner than twenty-four (24) hours after the placing of the last concrete in that section.

29.11.3. Pit floors

Floors of all pits shall be bedded upon 150mm thickness of compacted sand and shall be poured prior to the construction of the remainder of the pit.

29.11.4. Pit tops

The tops of pit walls shall be constructed as follows:

- (a) Side Entry Pits

Tops of walls finished to permit the precast covers to sit evenly and with tops flush with the surrounding finished ground and kerb levels.

- (b) Junction Pits
Tops of walls finished to permit the precast cover slabs to sit evenly and with tops flush with the surrounding finished ground level.
- (c) Easement Pits
Tops of walls shall be finished to permit the pre-cast concrete lids to sit evenly and with the tops flush with the surrounding finished surface levels. Provision is to be made for surface water as indicated on the accompanying Drawings.
- (d) Footpath Grating Pits
Footpath grating pits shall be constructed strictly in accordance with the accompanying Drawings, provision being made for entry of surface water by means of grating at footpath surface level.
- (e) Rollover Kerb Grating Pits
Tops of walls finished to permit the pre-cast covers to sit evenly and with top of cover flush with adjacent kerb level.
- (f) Surface Water Grating Pit
Tops of walls finished to permit grating frame to sit evenly and level such that grating is situated at the specified reduced level.

29.11.5. Cover Slabs

- (a) All cover slabs shall be in accordance with details shown on accompanying plans. All covers and gratings shall be supplied by the Contractor.
- (b) Covers and gratings shall be installed by the Contractor to details and locations indicated on the Drawings.
- (c) All covers and gratings shall be installed strictly in accordance with the manufacturer's directions.

29.12. Electrical Conduits

- (a) Conduits for electrical cables must be provided with two galvanised draw wires or synthetic chord not less than 3mm diameter. Where the conduit terminates in a pit not less than 0.5m of the draw wires shall be left coiled in the pit. Where the conduit does not terminate in a pit, the draw wires shall be tied to a metal peg 100mm x 100mm, not less than 400mm long, driven firmly into the ground with the top 50mm projecting above finished surface and painted yellow.
- (b) Except for precast concrete conduits which shall be self-draining, all conduits for electrical purposes must be watertight, and any junction boxes or terminal pits shall be either watertight or suitably drained.
- (c) Where shown on the Drawings, or where the conduit terminates in a paved area or at the junction with another conduit, a pit not less than

300mm x 150mm fitted with a specified cover must be provided at the terminal.

29.13. Cut in Connections

- (a) When any pipe is cut into a larger diameter pipe, such connection shall be neatly made.
- (b) No part of the smaller pipe shall project into the larger pipe.
- (c) The junction of the pipes shall be surrounded with a cement mortar collar neatly finished.
- (d) "Cut In" connections shall not be permitted into pipes of lesser diameter than 300mm.

29.14. Measurement and Payment for General Items

- (a) Measurement
 - (i) Kerb and Channel, Household Stormwater Drains
Measurement will be the slope length measured along the drain; for kerbs and channels at the face of kerb or invert of channel, including pits within the limits shown on the Drawings, including vehicles and perambulator crossings.
- (b) Payment
 - (ii) Payment for schedule items will include full compensation for furnishing all labour, handling any materials supplied, supply of all other necessary materials, disposal of surplus material including any specified herein or as directed by the Superintendent.
 - (iii) In Schedule of Rates tenders all works, unless agreed otherwise by the Superintendent, will be paid for at the appropriate rate on the basis of the Schedule of Rates.
 - (iv) The schedule item under which payment will be made will be determined by the amount of work available to be done in one visit to the site.
 - (v) Payment for items of work not specified in the Schedule of Rates has to be agreed upon in writing between the Contractor and the Superintendent before commencement of work.

30. LANDSCAPING AND TREE PLANTING

30.1. Tree Protection Guideline

30.1.1. Street Trees

The Council and the local community place a high value on street trees and consider their protection extremely important. The following procedures should be observed at all times when working near trees.

30.1.2. Planning

Before commencing work on site, assess and identify all trees which are indicated to be retained or removed, trees which may require partial cutting back or other work, and trees which are indicated to be removed, or required to be removed to enable construction or access.

Mark clearly trees to be retained with conspicuous plastic ribbon around the trunk and maintain ribbons until Practical Completion.

The Contractor must notify the Superintendent of all trees proposed to be removed or cut back and arrange for a joint site inspection to confirm and approve the trees affected.

Existing trees outside the line of works shall be retained and protected during construction. Do not remove or cut back any trees for site sheds, storage or access without the prior approval of the Superintendent.

Provide temporary protection to all trees in close proximity to the construction site, which may be damaged by construction works. Such protection shall include fencing, barricades or other suitable procedures.

30.1.3. Timing

Where possible, any works close to street trees should be scheduled to occur between April and September when trees are generally dormant and better able to cope with disturbance close to their roots.

30.1.4. Tree Protection

A joint inspection with the Superintendent shall be made prior to any excavation works within the tree root zone of all trees to be retained. The root zone shall be deemed to be equal to the diameter of the tree canopy or drip line.

This zone shall be clearly defined using star pickets and barrier tape or similar methods. No stockpiling, loading of building materials, disposal of waste or driving of vehicles is not permitted within this zone. If it is not practical to establish a tree protection zone contact Council's Tree Management Officer to discuss suitable alternatives.

30.1.5. Roots

Exposed tree roots must be protected from drying out, especially during hot weather conditions. If tree roots are to remain exposed for more than one day they should be covered with wet hessian or mulch.

30.1.6.Branches

Where erection of a gantry is required close to tree canopies, the Contractor will need to plan around existing tree branches. Some minor pruning may be permissible, however major branches need to be worked around and protected during the construction period.

30.1.7.Tree Pruning or Removal

Street trees within the municipality must only be pruned or removed by Citywide Service Solutions Pty Ltd ("Citywide"), Council's nominated tree maintenance contractor, unless otherwise agreed with the Tree Management Officer. Upon agreement of any proposed works, the Contractor may be required to deal directly with Citywide.

30.1.8.Trenching near Trees

Any excavation within the drip line or canopy of the tree shall be by underground boring as opposed to open trenching. This technology is now widely available and is often more economical as less reinstatement is required. Where boring is not possible, digging must be done by hand and any exposed tree roots must be pruned with secateurs or a sharp saw. Tree roots over 50mm in diameter should not be cut without the prior approval of Council's Tree Management Officer.

30.1.9.Damage to trees

Where any accidental damage occurs to trees during construction, the Tree Management Officer should be contacted immediately. Costs associated with any corrective pruning required must be borne directly by the responsible party. These works can only be carried out by Citywide. If the Tree Management Officer deems that a tree requires removal due to damage, the responsible party may be required to pay the amenity value of the tree, plus removal and replacement costs.

Council reserves the right to determine a monetary amount for the loss of amenity due to damaged trees and deduct this amount as appropriate from the Contract Sum.

30.1.10. Reinstatement

All lawns and nature strips disturbed during excavation works must be reinstated to their former condition as soon as possible to the satisfaction of the relevant Parks and Open Space Works Officer.

30.2. Topsoil

30.2.1.On Site Topsoil

- (a) Topsoil from site clearing may be stockpiled and used subject to:
 - (i) approval by the Superintendent that the topsoil is suitable for re-use;

- (ii) approval by the Superintendent of the depth of top-soil to be used;
 - (iii) approval by the Superintendent for each proposed area of re-use;
 - (iv) proper stockpiling in approved locations; and
 - (v) protection from contamination by construction debris.
- (b) On-site topsoil must be free from rubble, clods of subsoil, stone and other extraneous material, and its use is subject to the approval of the Superintendent.

30.2.2.Imported Topsoil

- (a) Approved imported topsoil shall be spread over the prepared subgrade and compacted to a depth of 150mm of all garden beds and 50mm over grass areas to be reinstated. Topsoil shall be free from perennial weeds and their roots, stone or rubble, clods of subsoil and other extraneous material, and shall not be delivered while in a saturated condition.
- (b) The topsoil shall be of a type specified for the project. Where no specific topsoil type is specified, it shall have the following characteristics:-
 - (i) *Texture* : Light to medium; i.e. capable of handling when moist, but lacking cohesion so that it will fall apart easily.
 - (ii) *Acidity*. Slightly acid to neutral. pH. 6.0 -pH 7.0
 - (iii) *Stone Content*. Less than 5% by dry weight with stone size not exceeding 10mm.
 - (iv) *Organic matter*. Decomposed - up to 40% by volume. Undecomposed - less than 5% by volume. Free of weeds, sticks, etc.
 - (v) *Extraneous matter*. Absolutely free from rubbish, petrol, oil, lime debris, etc.
 - (vi) *General Description*: Imported topsoil to garden beds shall be a light to medium friable clay loam.

30.2.3.Soil Samples

- (a) The Contractor must submit to the Superintendent for approval a minimum of 14 (fourteen) days prior to delivery, representative samples of topsoil.
- (b) The samples must be labelled with the name and address of the supplier.

30.2.4. Delivery of Imported Topsoil

- (a) After approval of soil samples, the Contractor must notify the Superintendent of the intended date of delivery of the soil. All soils delivered to the site shall be consistent with the samples approved by the Superintendent.
- (b) If there is any doubt to the consistency of the delivered topsoil conforming to the approved samples the Superintendent may request additional soil tests. The cost of additional testing shall be borne by the Contractor. All imported topsoil shall be stockpiled as directed on site by the Superintendent.

30.2.5. Preparation and Spreading

- (a) Imported topsoil shall be spread and firmly compacted, but not over compacted, to a depth of 200mm in new garden beds and on site topsoil shall be spread and firmly compacted, but not over compacted, to a depth 100mm in existing garden beds where required (consolidated depths).
- (b) Where harmful material has been spilt on the subgrade or topsoil, the affected material shall be excavated and removed from site.
- (c) Finished surface levels of garden beds shall grade evenly toward grated pits and other drainage structures, and shall be graded down to finish 25mm below the finished levels of paved surfaces and kerbs. The finished surface level of garden beds shall be mounded slightly in the centre to allow for free drainage.

30.3. Site Works and Planting Preparation

30.3.1. Weed Control

- (a) Weed control shall be undertaken by either chemical or mechanical means to ensure that all mulched areas are maintained in a weed free state and all grassed areas are maintained free of artichoke thistle, fennel, Patterson's Curse and boxthorne and all other broad leaf weeds.
- (b) Sprayed areas shall be left for a period of 10 days before cultivation. Any weeds still alive after 10 days shall be re-sprayed or hand weeded until all weed growth is eradicated.
- (c) Remove all weeds from the landscaping areas before planting, and remove from site.

30.3.2. Herbicides and Pesticides

- (a) Only herbicides and pesticides registered for the use in Victoria may be used.

- (b) All herbicides and pesticides are to be used strictly in accordance with the manufacturer's instructions and at the recommended rates.
- (c) Products containing the following active ingredients may be used:-
 - i. Glyphosate;
 - ii. Fluazifop; or
 - iii. Metsulfuron methyl.
- (d) Products with other active ingredients shall be submitted to the Superintendent for review prior to use.

30.3.3. Removal of Debris

- (a) All rocks which are greater than 50 mm in its least dimension, and all debris shall be removed from areas to be grassed and from mulched garden beds. Dislodged rocks in mulched garden beds shall be removed if they cause a hazard or maintenance problem as determined by the Superintendent.
- (b) Additional topsoil shall be used to fill any depressions and holes caused by the removal of rock and other debris from areas that have been prepared for planting or grassing.

30.3.4. Gypsum Application & Ripping

- (a) Gypsum supplied by the Contractor shall be from a natural source. In all areas to be grassed and planted, gypsum shall be supplied and installed on prepared subsoil at a rate of 2kg/m².
- (b) After the approval of gypsum spreading, the subsoil shall be ripped to a minimum depth of 100mm by suitable mechanical equipment to eliminate compacted areas and hard pans and to thoroughly mix the gypsum. Clods greater than 50 mm are to be broken down or removed. Topsoil shall not be cultivated into underlying sub-soil layers.

30.4. Planting

The works include, but not limited to, supply, delivery, installation, fertilising and maintenance of trees, shrubs and groundcovers.

30.4.1. Plant Stock

- (a) Plant stock shall be true to species and the best of their respective kinds. They shall have a well developed root system and be free from pests, disease, injury and all weeds.
- (b) Plants shall be subject to inspection and approval by the Superintendent. All plant stock shall be supplied from approved nurseries and tagged with their correct botanical names.

- (c) Deliver plant stock to the site on a day to day basis, and plant immediately after delivery.

30.4.2. Setting Out of Planting Beds

- (b) The Contractor is responsible for the setting out of the garden beds consistent with the planting areas defined on the Drawings. For the purpose of setting out, the location and size of the planting areas can be scaled off the Drawings if there are no dimensions and set out points.
- (c) The Contractor shall remove weeds, mulch and plant material from tree bed areas. The Contractor shall ensure that the exposed sub-soil is free from rock, rubble, clods of clay, lime and other extraneous material, which shall be removed from site at the Contractor's expense.
- (d) Prior to planting, all plants shall be laid out in their pots for approval by the Superintendent before commencing works.
- (e) Mulched garden beds areas shall be set out on the ground for review by the Superintendent prior to commencement of cultivation and planting works.

30.4.3. Planting Conditions

- (a) Do not plant in unsuitable weather conditions such as extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation when the soil is wet, or during frost periods.

30.4.4. Watering

- (a) The Contractor must make arrangements for the watering of the plants stock and shall be wholly responsible for ensuring uninterrupted access to sufficient quantities of water to satisfactorily complete the planting.
- (b) All plants must be watered before planting, during and immediately after planting, and at such other times during the contract period as required to maintain growth free of water stress.

30.4.5. Planting Procedure

- (a) Thoroughly soak all plants before planting. Care must be taken that the roots of plant stock are not exposed to drying influences such as sun, wind or frost. On hot or windy days the stock shall be covered with damp hessian during planting operations. The Superintendent may direct suspension of planting in periods of frost, drought, or when the soil is too wet.
- (b) All stock shall be set plumb and placed to ensure a normal relationship of the crown to the soil surface.

- (c) Remove plant from pot and gently tease out roots in such a way that they no longer conform to the pot shape. Care is to be taken not to damage the central root ball.
- (d) Place stock in the centre of the hole with care to avoid damage to roots. Supply an approved slow release fertilizer, such as "Osmocote Long Life Fertiliser" with an NPK ratio of 18:4.8:8.3 or an approved equivalent, according to manufacturer's instructions to each plant, at the base of the planting hole and mix thoroughly.
- (e) Backfill the plant hole with approved topsoil whilst at the same time applying water to the plant hole in the standard "watering in" method.
- (f) A raised ring of soil shall be constructed at the base of each plant to provide a basin for watering.
- (g) Lightly tamp and water to eliminate air pockets. Ensure that topsoil is not placed over the top of the root ball, so that the plant stem remains the same height above ground as it was in the container.
- (h) Provide agricultural pipe to advanced trees for watering as detailed.
- (i) Apply wetting agent, Debco Saturaid at 300 gm/m² evenly over the planting area and thoroughly water all plants immediately.

30.4.6. Mulch

- (a) Supply and spread a 75mm consolidated depth thickness of mulch on all planting areas following planting. Mulch shall be kept clear of plant stems.
- (b) Mulch shall be recycled mulch Mossrock Fine Pine Flake, or similar approved, free of weeds, deleterious material and toxins. Particle sizes shall be no wider than 30mm and no longer than 100mm.
- (c) Mulch must be recycled, and obtained from a sustainable, approved supplier. A mulch sample must be submitted to the Superintendent for approval prior to use.
- (d) Mulch in garden beds shall extend at least 500mm beyond plants at the outer edges of the beds.
- (e) The Contractor shall submit samples of mulch for review prior to the commencement of mulching.

30.4.7. Clean-up

- (a) On completion of all work, remove all surplus materials off the site, clean areas disturbed or affected by the work.

30.4.8. STAKING

- (a) Each plant along the outer edges of the garden beds shall be installed with a tree guard.
- (b) Tree guards shall be opaque plastic 400mm in diameter and 450mm high and be of sufficient gauge and UV inhibitor to ensure a minimum two years life.
- (c) Tree guard and marker stakes shall be 750 x 25 x 25 mm.
- (d) Stakes for advanced trees shall be 2400 x 50 x 50 treated pine or hardwood.
- (e) Ties for advanced trees shall be flexible, soft strapping and of a type which shall not detrimentally abrade or bruise the bark of the tree. Plastic covered wire, string hessian and twine are not acceptable.

30.4.9. Temporary Fencing

The Contractor shall erect temporary barricades around planting beds and trees for the period of the contract and maintenance period, to prevent storage of materials, soil compaction or other damage during this period.

30.5. Tree Supply

30.5.1. Definition

Caliper:	Measured at 300mm above ground
Size index:	Product of height (m) x calliper (mm)
Tubestock:	Trees grown in containers, height:diameter ratio > 2:1, typically < 1L.
Small trees:	Trees grown in containers < 20L (other than tubestock), and balled and burlapped or root control bag (RCB) grown trees of size index < 35.
Advanced tree:	Trees grown in containers > 20L, and balled and burlapped or RCB grown trees of size index > 35.

30.6. Granitic Gravel

30.6.1. General

- (a) The works in this section include supply and installation of approved granitic gravel paving.
- (b) The Contractor must submit a 1kg sample to the Superintendent for approval prior to delivery to site. All gravel paving shall comply with the approved samples.
- (c) The Contractor shall supply and spread the granitic gravel as detailed on the Drawings. Where no depth is specified, a minimum 75mm consolidated depth thickness of granitic gravel shall be installed.

30.6.2. Granitic Gravel Paving

- (a) Gravel shall be granitic gravel, sourced from Pyalong, Victoria or "Tooborac" from ROCLA and match the sample provided by the Superintendent, or an approved equivalent.
- (b) Maximum fine silt and clay contents shall not exceed 6%, as specified by AS 1141 (set).
- (c) All granitic gravel courses, consisting of one or more layers of the same material, shall be finished to a reasonable smooth and uniform surface and after compaction shall conform to the lines, grades, thickness and cross-sections shown on the Drawings, or specified or directed by the Superintendent within the limits of the following clauses.

30.6.3.Level

- (a) The top of each pavement course shall not differ from the specified level by more than 5 mm. Where pavements are constructed against a kerb and channel, the top of the pavement shall be constructed to a level with top of kerb. Pavement shall be level with edge of garden beds.

30.6.4.Subgrade

- (a) Subgrade shall be formed at the required depth below finished surface level in accordance with dimensions as shown on the Drawings. All soft, yielding or unstable materials and other unsuitable material shall be removed and replaced by approved materials. The subgrade shall be thoroughly compacted.

30.6.5.Base Courses

- (a) Base course shall be 50mm Class 2 FCR compacted to 98% SMD on clean and compacted subgrade. During placing and compaction all material shall be maintained at the optimum moisture content. Compact using mechanical means to achieve a dry density ratio of 95% when tested to AS 1289.5.4.1.

30.6.6.Topcourse

- (a) Material shall be approved granitic gravel suitable for path construction. The Contractor must provide a sample of the selected material, suitable for compacted path construction, for approval by the Superintendent prior to delivery to site.
- (b) The granitic gravel shall be carefully handled and spread to ensure that the components remain well blended and do not separate.
- (c) They shall be carefully placed upon the subgrade and compacted in layers to achieve a dense solid surface that is resistant to scuffing, slumping and scouring. The Contractor shall ensure that all granitic sand surfaces are fully compacted in 25 mm layers. The surface of these areas must be free draining.

- (d) The Contractor shall maintain the moisture content at the optimum level for placing and construction throughout the entire construction period.
- (e) Lay the mix just damp but not wet to finish 75mm thick, unless specified otherwise, after compacting, with an even surface, flush with edgings and within the surface tolerance.
- (f) Avoid compaction within 500mm of tree bases. Lightly compact around trees.

30.7. Lawn Areas

30.7.1. Preparation

- (a) Remove debris from area. Adjust levels of sub-grade by cut or fill as necessary to achieve the required finished levels and falls as shown on the Drawings. Grade subgrade to drain positively to drains. Remove surplus excavated material from the site. Cultivate subgrade to 150mm minimum depth
- (b) Place 100mm layer of imported topsoil over area.
- (c) Cultivate to a minimum depth of 150mm. Where machinery cannot be used for whatever reason, allow to hand dig to achieve thorough and even mixing of topsoil and sub-grade. Place second 100mm layer of topsoil over the area and apply moisture retention agent "Debco Saturaid" as per manufacturer's recommendation. Cultivate and grade to smooth even falls as shown. All grass surfaces to drain evenly toward grated pits where installed.
- (d) All finished levels are to match top of adjacent kerbs, pavements and garden beds after compaction.
- (e) Evenly spread a prepared mix of approved lawn fertiliser (N:P:K ratio 8:10:10 or Pivot 800 or equivalent as specified at a rate of 3kg per 100m² over prepared soil area and incorporate to a depth of 25mm by raking or similar, leaving surface a smooth even grade.

30.7.2. Turf

- (a) Turf to be ANCO Kikuyu-Tall Fescue mix, free from foreign species present as living material, seeds, bulbs or rhizomes.
- (b) Lay turf rolls out to form a stretcher bond brickwork pattern, with edges of rolls butted to adjoining rolls. Tamp or roll the area after laying to provide a smooth even surface. Thoroughly water the area as soon as laying is completed or during laying operations if weather conditions require it. At the completion of installation, turf to be a uniform green colour, free from damage or symptoms of dehydration, gaps between sods to be absent.
- (c) Protect the areas against trespass and traffic until the grass is well established. Maintain grass until a healthy, dense sward is achieved

over whole area. Attend to minor repairs, including patching up after planting and overseeding any other bare areas found to exist.

- (d) The first cut and any subsequent mowing shall be carried out as directed or at intervals to maintain the standard of grass and height of grass at 40-60mm.

30.7.3. Hydroseeding

- (a) The Contractor must supply all materials and labour to prepare existing topsoil, improve and cultivate, supply and installation of topsoil and additional imported soil as required and apply hydroseed to all areas as specified on the Drawings.
- (b) Cultivate and clean to 100mm below finished level, all graded new grass area and disturbed areas to be grassed. Remove from the site any debris brought to the surface during cultivation. Grass of existing nature strip can be left as far as practicable.
- (c) Topsoiling to grassed areas must be comprised of a 100mm depth of stockpiled on site, or imported, topsoil as required. Topsoil is to be evenly spread and shall be brought to a fine tilth before hydroseeding commences. The topsoil surface shall be inspected by the Superintendent prior to grassing or hydroseeding.
- (d) A "Lawn starter" fertilizer such as Pivot 800 or approved equivalent at a rate as recommended by manufacturer shall be applied evenly to the prepared bed and raked lightly into the surface to a depth of 50mm. The fertilizer may be applied at the same time as hydroseeding, but not more than 48 hours before.
- (e) If the prepared area becomes compacted from any cause before hydroseeding is to begin, rework the ground surface.
- (f) Hydroseed with approved grass mix - as per the table below - and binder mix to achieve dense grass swath.

Grassed Varieties	%Composition by weight
Perennial Rye	70
Creeping Red Fescue	20
Kentucky Bluegrass	7
Bent Grass	3

- (g) Hydromulching shall be of the highest quality industry standards and undertaken by an approved and experienced hydromulching contractor.
- (h) All hydroseeding must have an even cover and be free from any bare patches.
- (i) The Contractor is to clean over sprayed hydroseeding from all light poles, pavements, furniture, feature bollards and other street furniture immediately after hydroseeding.

- (j) The Contractor shall protect newly sown areas against trespass and traffic until grass is well established, with star pickets or timber stakes and barrier tape.
- (k) The Contractor shall allow for making over and reseeding all areas where grass fails to germinate within one month from the date of original seeding.
- (l) First cut of the grass area is to be carried out when the grass reaches 50-75mm high, mown to a height of 40mm. Subsequent mowings shall be carried out at intervals to maintain the standard of grass not exceeding 50mm in height.

30.8. Timber Edging

30.8.1. Materials and Workmanship

- (a) Materials shall be the best of their respective kinds all in accordance with the requirements of the relevant Australian Standards.
- (b) Any materials rejected as unsuitable by the Superintendent shall be removed from site and replaced by the Contractor at his own expense.

30.8.2. Timber Edgeboards

- (a) The Contractor must supply and install treated pine edging to all interfaces between garden beds and grass as indicated on the Drawings and as detailed.
- (b) Timber edging must be of 75 x 38 mm treated pine set on edge with the top flush with the adjoining grass area or gravel surface. All edging to be continuous, with all timber lengths butt jointed.
- (c) Timber edging must be kept vertical at all times.
- (d) The edging must be staked at 1,200mm centres with 75 x 25 x 300 mm long treated pine stakes. Fix stakes to edge with 2 No. 50mm galvanised self tapping screws.

30.9. Maintenance

30.9.1. Landscaping Maintenance

- (a) The Contractor is responsible for the satisfactory establishment and maintenance of all landscaping works for 26 weeks after the issue of Certificate of Practical Completion.
- (b) Maintenance shall include watering of plants, cultivation of planting areas to keep free of weeds, all watering necessary to maintain healthy

growth of grass, cutting grass, immediate replacement of dead plants, cleaning up ground and care of temporary protecting fences and all other works necessary to ensure satisfactory upkeep of the site.

- (c) Any soil subsidence or erosion that may occur after the soil filling and preparation operations shall be made good.
- (d) All mulched surfaces shall be kept in a clean and tidy condition and be reinstated or topped up where necessary.
- (e) Granitic gravel surfaces must be maintained true and level and any subsidence rectified immediately. Localised ponding of water must be addressed to prevent deterioration of the path surface.

30.9.2. Tree Planting Maintenance

- (a) The Contractor is responsible for the satisfactory establishment and maintenance of all tree planting for 12 months after the issue of Certificate of Practical Completion.
- (b) This includes watering of trees, cultivation of planting areas to keep free of weeds, all watering necessary to maintain healthy growth, immediate replacement of dead trees, cleaning up ground and care of temporary protecting fences and all other works necessary to ensure satisfactory upkeep of the site.