City of Whittlesea

CONSTRUCTION SPECIFICATION

FOR

ROAD AND DRAINAGE WORKS

SECTION 1 - GENERAL CLAUSES

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	1.3, Table 1.11.1
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REV. 3	May 2003	No amendments
REV. 2	March 2003	1.5b, 1.6, Table 1.11.1, 1.14, 1.16
REV. 1	February 2003	1.1, 1.3, Table 1.11.1
Revision No.	Date	Affected Clause

SECTION 1 - GENERAL CLAUSES

1.1 GENERAL

Sections 1 to 95 of this specification have been prepared for the construction of civil works and other infrastructure within the City of Whittlesea.

This technical specification shall be applicable to:

a) Works carried out for or on behalf of the City of Whittlesea as "Principal" in the first instance, and
b) Development works carried out by others as "Principal" in the second instance and where upon completion such Works reverts to the City of Whittlesea in accordance with Local Government Act 1989 and Subdivisions Act 1988.

1.2 SPECIFIC CONDITIONS

This specification is a technical specification for the City of Whittlesea and may be amplified by inclusion in the contract documents of additional specific conditions (Entitled "Job Specification") relating otherwise to the Contract.

1.3 DEFINITIONS

"Principal" - (also known as Corporation) shall mean the person or entity as defined in the General Conditions of Contract instigating and requesting the completion of the works as described in the said Contract. In the first instance, it will be the City of Whittlesea where works are carried out under the Contract for the City of Whittlesea. In the second instance, it shall be the owner/proprietor of the development (Developer).

"Superintendent" - shall mean the person appointed to the position and named in the Contract by the Principal and notified in writing to the Contractor to act as the Superintendent (managing the contract) for the purpose of the Contract defined in the General Conditions of Contract.

"Superintendent Representative" – shall mean the person/s appointed by the Superintendent to act in that position for the time being or from time to time during the currency of the Contract and notified in writing to act as the Superintendent for the purpose of the Contract defined in the General Conditions of Contract.

"Civil Construction Supervisor" - shall mean the person authorised by the City of Whittlesea to carry out inspection of the works on behalf of the City of Whittlesea.

"Council" - shall mean the Mayor and Councillors of the City of Whittlesea or their authorised representatives.

"Director Infrastructure & Technology" - means the person appointed by the City of Whittlesea to that role or that person's authorised representatives. In the first instance, shall be the Superintendent of the Contract where City of Whittlesea is the Principal.

"VicRoads" means the authority previously known variously as the "Road Construction Authority" or "RCA" or "Roads Corporation" or "CRB" or "Country Roads Board" and shall mean one and the same as referred to in these specifications as the State Road Authority of Victoria.

"Relevant Authority" shall mean the Authority or Instrumental Body or its representative in which certain parts of the works shall be vested for future care and maintenance.

"Standard Drawings" shall mean City of Whittlesea Standard Drawings (latest issue).

1.4 DESCRIPTION OF WORKS

This specification covers the supply of all labour and materials for the construction of roads and drains and associated works generally including earthworks, underground drains and pits, footpaths, kerb and channels, road pavements, agricultural drains, street signs, conduits and any other work related to the construction of Council's public roads, subdivisions and private development controlled by Planning Permits.

1.11 COUNCIL INSPECTIONS

1.11.1 Inspection

When the Works of the Contract are for a subdivision or other development in fulfilment of a Town Planning Permit condition the Contractor shall at all times, allow the Director Infrastructure & Technology and its representatives to inspect and measure any part of the Works. No part of the Works shall have further works placed there or shall be covered up or put out of view without the approval of the Civil Construction Supervisor, whose approval shall not be unreasonably withheld or delayed.

Ordinary inspections are required at the various stages of the Works generally in accordance with Table 1.11.1 and in addition extraordinary inspections may be required from time to time at the direction of the Director Infrastructure & Technology and its representatives.

1.11.2 Hold Points

Hold points are those points beyond which the work may not proceed without review by the Civil Construction Supervisor.

Hold points are identified in Table 1.11.1 by the letters **HP** in the "Type" column.

Hold points are also identified, in the VicRoads Standard Specifications, which can form part of the Contract, by the letters **HP** in the left margin and by bold text print or arise from non-conformances.

The review of a hold point will not relieve the Contractor of responsibility for satisfactory execution or performance of the Work.

Text, which is bolded but not identified by the letters **HP** in the left margin, is not a Hold Point. These are specified obligations on the Contractor requiring the review or approval of the Civil Construction Supervisor. They are bolded for ease of identification.

1.11.3 Notice For Inspection

The Contractor shall give 24 hours notice to the Civil Construction Supervisor when an inspection is required.

1.11.4 Inspection After Normal Hours

Before commencing work under the Contract, the Contractor shall advise the Superintendent, in writing, the working hours proposed for the execution of the Works under the Contract.

When construction work is proposed to be carried on outside the normal working hours of 7.30 am to 4.00 pm weekdays, or on week-ends or public holidays, the Contractor will be required to give the Superintendent sufficient notice, but not less than 24 hours, of an intention to work so that any necessary arrangements, as directed by the Superintendent, for public notifications or inspection arrangements may be made.

1.11.5 Protection of Pavements Used as Access to Work Site

At all times during the course of the Works up to and including Practical Completion, sealed road surfaces used to access the Works, whether part of the Contract or adjacent to it, shall be maintained in a clean and safe condition.

The Contractor shall comply with the conditions of the:

- Site Management Plan for the Contract, the
- Environmental Protection Act, the
- Litter Act, and any

- Permits issued for the Works

to ensure that no spoil or litter is deposited or left where it will reduce amenity or impact upon traffic and/or public safety.

The Contractor shall take every precaution to keep clay off sealed pavement surfaces. The Contractor shall make good, at his own expense, any clean up of soiling or any damage to existing pavements used for entry to, transit through, or exit from the work site. The level of prevention to avoid slippery asphalt and/or damage to bitumen shall be at the discretion of the Director Infrastructure & Technology .

Examples of the type of prevention methods that may be required include, but are not necessarily limited to:

- Wheel wash facility
- Rumble bars over a cleanable pit
- Confined rubble access.

1.11.6 Erosion Control During Construction

The Contractor shall identify likely erosion locations during the construction and provide temporary erosion control measures, where necessary. The Site Management Plan shall be kept up to date to indicated locations and details of erosion control measures, such as silt fences, rip-rap etc.

Subject to the approval of the Superintendent, temporary erosion control works, that are not superseded by permanent erosion controls specified in the Contract, may be retained at completion.

1.11.7 Silting of Downstream Drains

Where silting occurs in down stream drains for whatever reason as a result of operations on site or cleaning of roads adjacent to the site, the Contractor shall be responsible for removing the silt and cleaning the drains to the satisfaction of the Civil Construction Supervisor.

Table 1.11.1: TABLE OF ORDINARY INSPECTIONS

STAGE	REQUIREMENT	TYPE
PRELIMINARIES:		
Environment protection	In place prior to any other works	**HP**
Site safety	Installation	**IP**
BULK EARTHWORKS:		
Grubbing and Clearing	a) After tree protection fencing	**HP**
	b) Prior to removal of native trees	**HP**
Stripping and/or base preparation	Prior to placing filling on stripped areas	**HP**
Boxing	Road formation prior to covering	**HP**
Subgrade	Proof rolling – to Clause 20.3.2	**HP**
Formation	Finished earthworks within tolerance, prior to topsoiling(or mulching)	**HP**
Nature strips	Formation within tolerance, prior to topsoiling	**HP**
DRAINAGE:		
Stormwater Drains	a) Foundation bed	**IP**
	b) Levels, alignment, jointing and haunching prior to backfilling	**HP**
	c) After backfilling	**IP**
Pits and Structures	a) Prior to pouring concrete	**HP**
	b) Backfilling prior to pavement	**HP**
Agricultural Drains	a) Prior to backfilling	**HP**
	b) During electricity pole installation	**IP**
House Drains	Prior to backfill	**HP**
CONDUITS:		
Across Road	Prior to backfilling	**HP**
Footpath/Nature Strip	Prior to backfilling	**HP**
CONCRETE:		
Kerbs and Channel	a) Proof roll bedding	**HP**
	b) Alignment prior to pouring concrete	**HP**
	c) Concrete curing method and application	**IP**
	d) Backing up prior to pavement	**IP**
Footpath	Bedding and alignment prior to pouring	**HP**
Vehicle crossings, Thresholds and Islands	a) Bedding, levels & dowels prior to pouring	**HP**
	b) Concrete curing method and application	**HP**
PAVEMENT:		
Base Course	Proof roll and compaction	**HP**
Intermediate Courses	Proof roll each layer	**IP**
Top course	Proof roll and compaction	**HP**
Asphalt / Seal	a) Depth/spread rate, temperature and compaction	**IP**
	b) Spotting out prior to linemarking	**HP**
Concrete Pavements	Formwork, reinforcement and jointing prior to pouring	**HP**
PRACTICAL COMPLETION:		
Access and Public Safety	Prior to commencement of Defects Liability period. NB: Wearing course asphalt and final linemarking works will be completed after 12 months of “Practical Completion” of all other works	**HP**

1.12 SUSPENSION ORDER BY THE DIRECTOR INFRASTRUCTURE & TECHNOLOGY

The Director Infrastructure & Technology may order any section of the Works to be halted if in his opinion the requirements of this specification are not being complied with. Such order shall be communicated to the Superintendent who shall be responsible for obtaining approval from the Director Infrastructure & Technology for resumption of the Works. No claim against the Principal shall be considered, unless the Superintendent, in accordance with the General Conditions, gives such an order.

1.13 DEFECTS LIABILITY AND DEFECTS LIABILITY PERIOD

Clause 37 of the General Conditions of Contract refers to the Defects Liability Period.

When the Works of the Contract are for a subdivision or other development in fulfilment of a Town Planning permit condition. The Defects Liability Period shall not commence until such time as the Council certifies that there is Practical Completion of all roads, drainage and associated works necessary for the satisfactory compliance with conditions for that development permit. The Defects Liability Period shall not be less than twelve (12) months from the date of Practical Completion.

During the Defects Liability Period, the Director Infrastructure & Technology will arrange for routine municipal maintenance to commence, such as street cleansing and repair of damage by others. Such municipal maintenance shall not reduce the Contractor's responsibilities under this Contract for the timely remediation of any defects in the Works that may be identified by the Superintendent. Development works carried out by others as "Principal" where upon completion such Works reverts to the City of Whittlesea in accordance with Local Government Act 1989 and Subdivisions Act 1988 the Defects Liability Period shall not be less than three (3) months from the date of Practical Completion.

1.14 AS CONSTRUCTED DRAWINGS

The Contractor shall, within 30 days of Practical Completion of the Works, provide the Director Infrastructure & Technology with "As Constructed" drawings in AutoCAD and PDF file digital format.

Where the development is carried out by others as Principal the Superintendent shall review the "As Constructed" drawings and forward them to the Director Infrastructure & Technology in both hard copy and in AutoCAD and PDF file digital format within 30 days of Practical Completion of the Works.

1.15 FINAL COMPLETION

The whole of the Works shall be subject to Final Inspection at the end of the Defects Liability Period. Provided all defects are resolved to the satisfaction of the Director Infrastructure & Technology , a Final Completion Certificate can then be issued.

Prior to the Council taking over the future care and maintenance of work constructed under the requirements of the Subdivision Act 1988, all of the Works must be contained within roads, reserves and / or easements created for the purpose and approved by the Register of Titles.

1.16 DEFAULT

Any works covered up or materials placed without the required inspections in Table 1.11.1 shall be considered a default and where directed by the Director Infrastructure & Technology shall be removed and re-executed at the Contractor's expense.

SECTION 5 - PROVISION FOR TRAFFIC

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	5.6
REV. 3	May 2003	No amendments
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REV. 1	February 2003	5.2, 5.3, 5.6
Revision No.	Date	Affected Clause

SECTION 5 - PROVISION FOR TRAFFIC

5.1 DESCRIPTION

This section covers requirements for the provision for traffic and the Contractor is solely responsible for traffic control.

5.2 DEFINITIONS

Work Zone

The length of roadway within the Contract limit of the Works as specified.

Work Area

The specific area where work is being carried out, as defined in the Contract.

Side Track

A temporary roadway constructed within the road reserve to carry traffic around the Works or Work Zone.

Traffic Detour

A detour of traffic away from the Work Zone or the Works via alternative roads or streets.

5.3 GENERAL

Unless otherwise specified, the Contractor shall make provision for traffic, including pedestrians, in accordance with this section and the relevant parts of the VicRoads Roadworks Signing Code of Practice, hereinafter referred to as the Code, or Australian Standard AS 1742.3 “Manual of Uniform Traffic Control Devices”.

The Contractor shall make such provision for traffic notwithstanding anything contained in the General Conditions of Contract and without derogating in any way from the Contractor’s obligations pursuant to the General Conditions of Contract and in particular from the Contractor’s obligations pursuant to the General Conditions of Contract.

When requested in writing by the Director Infrastructure & Technology the Contractor shall submit, before commencing any part of the Works, details of the proposed provisions for traffic. Such details are also to be provided for review by the Superintendent during the Contract.

The number, type and location of signs and devices shall be not less than the standards set out in the Code as applicable and shall also meet the requirements of this section.

Should circumstances arise which are not adequately covered by the Code or this section, the Contractor shall submit alternative proposals to the Director Infrastructure & Technology for review prior to work proceeding.

Work shall not commence or continue at any location until all appropriate signs and devices such as lamps, barricades, traffic control apparatus and the like are in place, side tracks have been constructed where required, line marking completed where required, and have been reviewed by the Superintendent.

At all times when the Contractor’s employees are on site, the Contractor shall render immediate assistance without charge to any person whose lawful passage through a Work Area may be obstructed or made difficult by or as a result of the Contractor’s operations.

Unless otherwise approved by the Director Infrastructure & Technology when work is not being performed on the site, traffic shall not be carried through that Work Zone or the Work Area on sidetracks, detours or part widths of the existing pavement.

5.4 CONTRACTOR'S REPRESENTATIVES

On commencement of the Works, the Contractor shall advise the Superintendent in writing of the names, addresses and telephone numbers of employees who can be contacted in any emergency which may require repairs to the Works under the Contract or the replacement or maintenance of signs and devices.

Any proposed changes of representatives, together with their contact telephone numbers or addresses shall be notified promptly to the Superintendent, prior to the change, and confirmed in writing to the Superintendent.

5.5 HOURS OF WORK FOR HEAVILY TRAFFICKED ROADS

Where the Director Infrastructure & Technology nominates a road as a heavily trafficked road and where traffic lanes are proposed to be affected or restricted, the hours of work available to the Contractor shall be between 9.00 am and 4.00 pm.

Work outside these hours shall not be undertaken without the express permission of the Director Infrastructure & Technology

5.6 CARE OF AREAS USED BY TRAFFIC

Both during and at the end of each day's work, the Contractor shall be responsible for ensuring that the pavement and shoulders being used by traffic within the Work Area, and all other areas within the Work Zone where the Contractor has undertaken work, are in a safe and trafficable condition.

Any material which has fallen on any travelled path, or road leading to/from the work site, as a result of the transportation of materials or other operations shall immediately be removed by the Contractor. Any material stored or deposited near the travelled path which could constitute a hazard to traffic shall immediately be removed by the Contractor. Any soiling of adjacent road pavements, caused by vehicles or equipment engaged in these activities, shall immediately be cleaned off by the Contractor, at his expense, and to the satisfaction of the Superintendent.

5.7 CONSTRUCTION OPERATIONS AFFECTING TRAFFIC

(a) General

The Contractor shall so conduct the operations as to minimise obstruction and inconvenience to the public, and shall not have under construction any greater length or amount of work than can be managed properly with due regard to the convenience of the public.

If the intermingling of construction machinery with traffic is unavoidable the intermingling shall be minimised at all times.

Unless otherwise specified, the Contractor shall:

(i) provide a minimum safe working width for the Contractor's construction plant plus an absolute minimum clearance to the edge of the traffic path of 1.2 m;

(ii) provide a minimum one way clear travel path width for traffic of not less than 2.8 m for one-way operation and 6 m for two-way operation;

(iii) locate the longitudinal joint(s) for pavement construction and/or cold planning works at either the traffic lane line(s) or at the centre of the traffic lane(s) or as specified in Clause 65 for asphalt paving.

The shoulder (sealed or unsealed) shall only be used as part of the travelled path with the agreement of the Director Infrastructure & Technology .

(b) Dust

Immediate action shall be taken by the Contractor to minimise dusty conditions arising from any operations which result in reduced visibility for road users.

(c) Earthworks

Unless otherwise approved by the Superintendent, earthworks shall proceed only in areas clear of travelled paths and footpaths.

Where construction is being carried out over part of the carriageway width, the following conditions shall apply:

(i) Steps or batters within 1.5 m of the travelled path of the carriageway shall be delineated as specified in the Code. Where the step or batter forms a drop in level of more than 200 mm at a slope steeper than 1 in 6, precast concrete or water filled plastic barricades shall be used in addition to delineation.

(ii) Where the level difference is in the form of a step or batter of less than 80 mm and is between the travelled paths, such step or batter shall be removed before the close of work each day and the full width of carriageway made available to traffic overnight. The removal of such step or batter shall be effected by shaping to a crossfall not steeper than 1 in 10.

(d) Pavement

Unless otherwise specified, prior to the close of work each day all steps between layers of unbound pavement material being placed shall be tapered to a slope not steeper than 1 in 10.

(e) Footpaths and Pedestrian Walkways

Unless otherwise specified, temporary footpaths or pedestrian walkways within the work area shall be not less than 1 metre wide, shall have a firm, even and free draining surface and shall be free from steps and obstructions.

5.8 ACCESS TO SIDE ROADS AND ABUTTING PROPERTY

Construction operations shall be conducted in such a manner as to minimise inconvenience to abutting property owners. Unless otherwise specified, access to properties and side roads shall be maintained at all times wherever practicable other than when the Works present a traffic hazard or the work would suffer damage as a result of the passage of traffic.

Where the Contractor proposes to restrict access to abutting properties as a result of the Contractor's operations, the Contractor shall provide a minimum of 24 hours notice to the affected property owner/occupier.

Access shall not be denied to any abutting property outside the customary working hours.

5.9 DETOURS AND SIDE TRACKS

(a) Side Tracks

HP Traffic shall not be diverted on to any side track until permission to use such side track has been given by the Director Infrastructure & Technology .

(b) Detours

Unless otherwise specified, traffic shall not be detoured without Council permission.
Prior to the issue of the Final Certificate, unless otherwise specified, detours and side tracks used or constructed during the Contract shall be restored to the condition existing at the time of commencement of the Works under the Contract. Where the Contractor is responsible for the restoration of detours and side tracks, the Contractor shall produce from the local authorities or

landowners concerned clearances in writing stating that such detours and side tracks have been restored to their satisfaction.

Where Council, as well as the Contractor, has some responsibility for the restoration of any detours or sidetracks, the Contractor shall not commence any restoration work until the Contractor has submitted details to the Director Infrastructure & Technology for review of the work to be undertaken.

5.10 SIGNS AND DEVICES

Unless otherwise specified, the Contractor shall supply all signs and devices required to complete the work covered by this section.
Signs and devices shall comply with the relevant requirements of the Code together with the following additional requirements:

(a) Pavement Markers

Pavement markers shall comply with the requirements of AS 1906, Retroreflective Materials and Devices for Road Traffic Control Purposes, Part 3 - Raised Pavement Markers (Retroreflective and Non Retroreflective).

(b) Retroreflective Sheeting

Retroreflective sheeting used on any sign or device shall comply with the requirements of AS 1906, Retroreflective Materials and Devices for Road Traffic Control Purposes, Part 1 - Retroreflective Materials, for Class 2 material, except that the coefficient of luminous intensity shall be not less than 50% of the values given in Table 2.2 of AS 1906, Part 1, for each designated colour when tested in the clean condition.

(c) Signs

Dirty, illegible, damaged or faded signs shall not be used if there is any doubt that the message or intent of the sign is unclear or confusing to road users. The Contractor shall clean, replace or renew all signs as required to ensure legibility.

5.11 STORAGE OF PLANT

When not in use, the Contractor shall be responsible for the safe storage of plant and equipment clear of the travelled path. Wherever possible, plant and equipment shall be stored not less than 3 m from the edge of the traffic path in built up areas and not less than 5 m outside built up areas. If it is not possible to provide such clearance, the plant and equipment shall be moved from the Work Area to a suitable storage site or be protected by suitable signs, lights and devices.

5.12 HIGH VISIBILITY JACKETS

All personnel, including supervisors, surveyors, labourers and plant operators, shall wear fluorescent red/orange day/night high visibility traffic jackets properly fastened at all times.

SECTION 10 - CLEARING AND GRUBBING

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	No amendments
REV. 3	May 2003	No amendments
REV. 2	March 2003	10.2, 10.3
REV. 1	February 2003	10.6
Revision No.	Date	Affected Clause

SECTION 10 - CLEARING AND GRUBBING

10.1 DESCRIPTION

This section covers the requirements for clearing and grubbing and for the disposal of the materials produced by clearing and grubbing of the site.

(a) The Contractor shall give seven "working" days notice to the Director Infrastructure & Technology of the intention to commence work.

(b) Prior to commencement the Contractor shall have submitted to the Superintendent a Site Management Plan and attend a site meeting with the Superintendent and Director Infrastructure & Technology .

10.2 DEFINITION

Clearing and grubbing

Clearing and grubbing is the removal from the site of:

(a) vegetation such as trees, tree stumps, tree roots, logs, brush, noxious weeds and decayed vegetable matter and

(b) refuse such as pole stumps, rubbish dumps and sawdust piles resting on or protruding from the ground surface; and

(c) obstructions such as concrete paving, concrete edgings, drainage pits, foundations, fences and disused structures, but not underground obstructions such as drainage pipes, service conduits and fuel tanks (which, where required, shall be nominated elsewhere in the drawings and specification).

The manner and extent of such work shall be controlled and in accordance with the drawings, permits and site management plan issued to or prepared by the Contractor.

10.3 PRESERVATION OF VEGETATION, HERITAGE SITES AND ARTIFACTS

(a) Vegetation shall be preserved from clearing or damage in accordance with the City of Whittlesea's Roadside Management Handbook and as required by Clause 1.8 of this Specification, except where:

(i) The area of existing road reservation which is to be cut or filled in excess of 200mm is the subject of a Town Planning Permit authorising the removal of "native roadside vegetation".

(ii) Individual River Red Gums, living or dead, have been nominated on the drawings as being the subject of a Town Planning Permit authorising their removal and the conditions for removal are satisfied.

(iii) Existing native vegetation has been nominated on the drawings for removal and the conditions for removal satisfied.

(b) Heritage sites identified on the drawings as such shall be protected and/or relocated in accordance with the requirements of any permit for the contract works and the applicable legislation generally.

Any site or building identified by the Director Infrastructure & Technology as worthy of protection during the course of this Contract shall be immediately protected and preserved until such time as an appropriate evaluation has been made and Council approval for its demolition, removal or retention is issued.

(c) Aboriginal sites and/or artefacts identified either on the drawings or during construction shall be protected in accordance with the applicable legislation for such.

The Contractor is responsible for making such investigations, deemed to be appropriate by the Director Infrastructure & Technology , into the requirements of local aboriginal representatives.

10.4 CLEARING

Unless otherwise specified, the area within the specified limits shall be cleared of all vegetation, refuse and obstructions down to natural surface.

Trees shall be brought down in such manner as to avoid danger to personnel and traffic or damage to other trees, shrubs, structures or property outside the area being cleared or designated to be retained within the area being cleared.

Tree branches extending over the carriageway shall be trimmed to provide a clearance of at least 6 m above the carriageway surface. Where whole branches are to be removed, the Contractor shall use the three cut method which requires:

(a) the under cut;
(b) the upper cut (further away from the trunk than (a) above) to remove the branch; and
(c) the final trim cut which is to be cut close to the main trunk but outside the branch collar.

10.5 GRUBBING

In areas where excavation or filling up to 1m in height will be made, all vegetation, refuse and obstructions shall be grubbed to a depth of not less than 300mm below the stripped surface or not less than 600mm below any pavement subgrade, whichever is the lesser treatment. In areas to be covered by embankments exceeding 1 metre in height, foundations may remain if located or cut off not more than 400mm above the natural surface but not less than 1metre below subgrade.

Holes resulting from grubbing shall be backfilled with material similar to the surrounding material and compacted to the same degree as the surrounding material.

10.6 DISPOSAL OF MATERIALS

Unless otherwise specified any salvageable materials from the site shall be stockpiled as directed by the Superintendent in accordance with the Site Management Plan.

Where burning is proposed, the Contractor shall observe the relevant requirements of the Metropolitan Fire Brigade Board, the Country Fire Authority, the Department of Sustainability and Environment and Council or other authorities concerning stacking and burning of materials and shall hold all necessary permits before any burning off is commenced.

Before commencing any burning operations, the Contractor shall submit all such permits to the Superintendent for review.

All burning shall be carried out in a safe and controlled manner that protects adjoining areas and does not obscure the visibility of motorists. No material shall be stacked or burned on property beyond the Work Area. Residue from burning shall be removed from the surface of the site. Tyres or discarded rubber shall not be disposed of by burning.

Where it is not practical or not permitted by the relevant authorities to dispose of material by burning, the material shall be removed from the site.

10.7 SURVEY MARKS

During clearing and grubbing operations, care shall be taken not to disturb any survey marks, bench marks or level pegs.

Reinstatement of any Permanent Survey Marks (PSM) Temporary Bench Marks (TBM) or level pegs disturbed by the Contractor shall be arranged by the Superintendent and the cost shall be born by the Contractor.

10.8 DAMAGE TO FENCES

Any damage to gates and /or fences shall be repaired immediately by the Contractor to a condition at least equal to that existing before damage and no additional payment will be made for this work.

SECTION 15 - EXAMINATION AND TESTING OF WORK

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
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REV. 1	February 2003	15.1, 15.2, 15.4a,c.
Revision No.	Date	Affected Clause

SECTION 15 - EXAMINATION AND TESTING OF MATERIALS AND WORK

15.1 DESCRIPTION

This section covers some of the requirements for examination and testing of materials and work associated with roadwork construction. Particular examination and testing requirements are separately specified in the relevant sections of this technical specification.

15.2 STANDARDS

Unless otherwise nominated in specific sections of this technical specification or approved by the Director Infrastructure & Technology , examination and testing of materials and work (Roadworks) shall be in accordance with VicRoads Standard Specifications for Roadworks – Section 173 - Examination and Testing of Materials (Roadworks), (current issue).

15.3 TESTING COSTS

All testing costs are to be borne by the Contractor.

15.4 EXAMINATION AND TESTING

(a) General

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

Unless otherwise specified, materials and workmanship shall comply with the relevant Australian Standards.

(b) Allowance for Testing in Construction Program

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

(c) Notification

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

(d) Tests

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

For materials sampling, the Contractor may nominate a Certified Construction Materials Tester certified and registered by NATA for the sampling involved.

(e) Test Results

The Contractor shall submit to the Superintendent a summary of testing undertaken at intervals not exceeding one month or more frequently if requested by the Superintendent. The summary shall include details of all tests undertaken, the result of each test and sufficient additional information to demonstrate that the specified minimum frequency of testing is being complied with.

The summary of test results submitted to the Superintendent shall also be made available to the Director Infrastructure & Technology within one week of the nominated reporting period.

(f) Calibration

All test equipment used for tests, carried out in accordance with Clause 15.4 (d) above, shall be calibrated by a laboratory accredited by NATA for the particular calibration method.

SECTION 20 - EARTHWORKS

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SECTION 20 – EARTHWORKS

20.1 EXCAVATIONS

20.1.1 Description

This section covers the requirements for forming and grading of earthworks including excavation, placement and compaction of Type A, Type B, Type C fill, oversize material, topsoil and permeable fill, disposal of surplus and unsuitable materials, and the trimming of batters, surface drains and formation.

Similarly, with clearing and grubbing no excavation works are to commence prior to a pre-commencement meeting or submission and approval of a Site Management Plan.

20.1.2 Standards

Earthworks under roads shall be in accordance with VicRoads Standard Specification - Earthworks, Section 204 (current issue).

AS 1141 : Methods for Sampling and Testing Aggregates.
AS 1289 : Methods of Testing Soils for Engineering Purposes.
AS 3798 : Guidelines on Earthworks for Commercial and Residential Developments.

20.1.3 Definitions

In addition to the definitions included in VicRoads specification Section 204 – Earthworks Clause 204.02 the following shall apply:

Base:

The trimmed or prepared portion of existing ground upon which the formation and/or subgrade are constructed.

20.1.4 General

The Work Zone to be prepared for road pavement shall be stripped of any existing fill, vegetation, other perishable material and topsoil and shall be brought to the specified width, alignment, level, shape and compaction. Unless otherwise specified or agreed to by the Superintendent, surplus excavated material shall be disposed of by removing from the site. All holes, ruts and other depressions shall be scarified and filled with materials similar to those existing in the roadbed.

The long term performance of the road pavement depends upon the subgrade moisture conditions during construction. Excessively wet or excessively dry conditions during construction are to be avoided. Excessively wet conditions will cause shrinkage and possible pavement distress as the subgrade dries out. Excessively dry conditions during construction could result in heave of the pavement as the subgrade later takes up moisture.

All subgrade preparation, cut and fill placement and compaction shall be continuously supervised and the relative density checked by field density testing. Tests shall be performed in accordance with the test methods specified in Australian Standard AS1289 – Method of Testing Soils for Engineering Purposes.

The Australian Standard AS3798 – Guidelines on Earthworks for Commercial and Residential Developments provides recommendations for the engagement of a Geotechnical Testing Authority (GTA) and the level of responsibility that shall be adopted. For all road embankment and allotment filling for subdivisions, inspection and testing shall be '*Level 1'* and Test Report(s), in the form provided in Appendix C, must be provided to the Superintendent in accordance with AS3798. The GTA shall include in the report an opinion upon the suitability of the filling as structural fill as defined in AS3798.

20.1.5 Embankment Treatment

20.1.5.2 Preparation

Embankment batters shall be prepared for topsoiling by:-

a) Excavating to a minimum of 150 mm below finished surface levels.
b) Contour ripping to the satisfaction of the Superintendent, to ensure a key between batter and topsoil.
c) Ripped areas are to be lightly smudged to provide a generally even surface.

21.1.5.2 Top Dressing

Embankment batters shall be top dressed with a minimum 150 mm of topsoil. After topdressing, batters shall be coated with 'Hydro-seed' with bitumen emulsion tackifier, or other approved stabilisation treatment.

Embankment batters shall be finished, as specified above, in a timely manner, prior to erosion taking place.

Where weather or restrictive access conditions prevent the use of plant, batters shall be trimmed by hand. An extension to the Contract shall not be granted when shaping, grading and topsoiling of such areas by hand is required.

20.1.6 Erosion Control

Where embankment batters exceed 1 in 6 gradient, or where the Superintendent judges the batter to be prone to erosion and grassing alone is considered insufficient, then the Contractor shall provide additional protection.

20.1.7 Silt Fences

The Contractor shall provide silt fences along the back of footpaths to prevent silting due to overland erosion when the embankment gradient behind the footpath exceeds 1in 6.

Silt fences shall be constructed of approved geofabric material, securely held in place with durable stakes suitable for use over 12 months. Silt fencing materials shall not be recoverable by the Contractor.

20.1.8 Driveways in Cut

Driveways in cut shall have hay bails installed across the full width at the property boundary. Hay bails shall be securely staked in place with star pickets to form a continuous barrier across the driveway entry. Hay bails shall be left in place upon completion of the Works.

20.2 CUT – SUBGRADE ON NATURAL GROUND

20.2.1 Excavation for Road Pavement

Excavation conditions generally throughout the City of Whittlesea include the random presence of Weathered Basalt and Basalt Boulders (Floaters) of various sizes. Excavation in basalt and breaking of large basalt boulders shall require the Contractor to use hydraulic rock breaking equipment.

Basalt boulders are commonly found in large sizes and weathered basalt may be encountered at shallow depth. Removal of large basalt boulders may cause over-excavation within the Work Zone. The Contractor is deemed to have made allowance for such removal and the backfilling of the resultant over-excavation in his tender for this Contract. Backfilling of areas of over-excavation shall be in accordance with Clause 20.6.

20.2.2 Base as Subgrade

Where the base is subgrade, the upper 150 mm shall, unless otherwise specified, be scarified and trimmed and shall be compacted to satisfy test rolling requirements specified in Section 15.

20.2.3 Base as Existing Pavement

Where the base is existing pavement, the upper 100 mm shall, unless otherwise specified, be scarified, reshaped and compacted as specified before additional material is spread.

20.3 TREATMENT OF SUBGRADE

20.3.1 Subgrade Preparation

The exposed subgrade soils shall be moisture conditioned as required to a depth of not less than 200mm and compacted using an approved roller to achieve a minimum dry density ratio of not less than 98% Standard in accordance with AS1289.5.1.1, 5.4.1 or 5.7.1. The moisture content of the soil should be maintained within 85% to 110% of Standard Optimum Moisture Content (SOMC) during compaction.

20.3.2 Roll Testing of Subgrade

The Contractor shall submit to the Superintendent for review and acceptance a test rolling procedure to be used where nominated in Section 20 of the Works Specification or as directed by the Superintendent.

The test rolling of the prepared subgrade shall be carried out to the extent required by the Superintendent, using a fully loaded water truck or other plant approved by the Superintendent.

The subgrade shall be test rolled immediately following completion of compaction, except in the case of a stabilised subgrade, which shall be tested not less than 72 hours after compaction.

Proof rolling shall be undertaken at the following locations:

- Finished subgrade level for fill
- Trimmed subgrade in natural soils
- Finished capping layer level, when not shown on the approved drawings as a lower subbase layer that forms part of the designed pavement thickness.

Compliance with the test rolling and proof rolling requirements of this clause shall be when an area, in the opinion of the Superintendent, withstands test rolling without rutting and with only minor visible deformation and springing.

20.3.3 Subgrade Strength

Subgrade improvement is most often required because of the presence of unsuitable materials or the presence of high moisture content at the time of construction. An appropriate working platform, or subgrade improvement layer, may need to be incorporated into the formation at the time of construction to facilitate placement and compaction of subsequent pavement layers. In determining the need for subgrade improvement, the potential for the subgrade to be weakened if drainage of the formation is inadequate during construction shall be taken into account.

Where subgrade improvement layers are incorporated into the pavement structure, the usual requirements for compaction shall apply. In the case of test rolling however, the requirement to test roll underlying improvement layers and subgrade may be waived and only the uppermost improvement layer is required to be test rolled so as to withstand visible deformation and springing.

Any isolated small areas of subgrade which are weaker than the subgrade CBR assigned for design of the pavement at the time of construction, shall be treated by excavation to a sound base and backfilled to subgrade level with imported Type A capping layer materials, provided that they have a laboratory soaked CBR greater the subgrade design CBR value

20.3.4 Soft Subgrades

a) Contractor's Responsibility

Soft, wet or unstable subgrade soils to depths of up to 150mm below the designed levels of the subgrade are the responsibility of the Contractor and must be rectified by methods specified in Clause 20, or as directed by the Superintendent. The material removed shall be replaced with approved fill as specified in VicRoads standard specification Section 204 or imported low expansive material complying with Table 20.3.5B.

b) Excavation Authorised by the Superintendent

Where soft, wet or unstable subgrade soils to depths greater than 150mm below the design subgrade level exist or develop during construction, and where directed and authorised in writing by the Superintendent, they shall be excavated and replaced with approved imported fill. The material shall be moisture conditioned, placed and compacted in accordance with VicRoads standard specification Section 204 – Earthworks Clause 204.10 (current issue).

Granular material shall not be used below agricultural drains or table drains, material of low permeability (as defined in Table 20.3.5B) shall be used in each of these locations.

All soft, wet or unstable subgrade soils to depths greater than 150mm below the design subgrade level which, in the opinion of the Superintendent, have been caused by the Contractor's negligence or improper work methods, shall be rectified as described above at the Contactor's expense.

Where material is unsuitable, it shall be treated insitu or excavated and replaced.

Where material has become unsuitable to any depth due to the Contactor's negligence or use of inappropriate methods it shall be treated insitu or excavated and replaced and no additional payment will be made for this work.

Where the base is damaged as the result of traffic or any other cause during the Contract period it shall be made good by the Contractor.

20.3.5 Subgrades on Moderately or Highly Expansive Soils

Where the subgrade soils (fill or Natural) have been assessed as having a moderate or greater expansive type in accordance the classification system in Table 20.3.5A, the top of the subgrade soil shall be removed and replaced with a layer of selected capping material having a minimum compacted depth of 150mm.

TABLE 20.3.5A:

Expansive Type	Liquid Limit (%)	Plasticity Index	PI x % < 0.425	Potential Swell %
Very High	> 70	> 45	> 3200	> 5.0
High	> 70	> 45	2200 – 3200	2.5 – 5.0
Moderate	50 – 70	25 – 45	1200 – 2200	0.5 – 2.5
Low	< 50	< 25	< 1200	< 0.5

The capping layer shall comprise approved imported material complying with the limits shown in Table 20.3.5B.

TABLE 20.3.5B:

Physical Properties			Limits of Grading (% Passing) After Compaction Sieve Size AS (mm)			Plasticity Index x % passing 0.425 mm after compaction (max.)	Plasticity Index After Compaction (max)
CBR (min) %	Swell (max) %	Permeability (max) m/sec	75.0	4.75	0.075	1000	25
8	1.5	$1x10^{-9}$	100	60 - 80	10 - 40		

Note:
CBR and Swell values are to be determined on specimens obtained from fraction of material passing 19.0mm sieve, compacted at optimum moisture content and 98% of maximum dry density as determined by test using Standard Compactive effort, and soaked for 4 days prior to testing for CBR and Swell.

The Permeability value is to be determined on specimens obtained from that fraction of material which passes a 19.0mm AS sieve, compacted at optimum moisture content and 98% of maximum dry density as determined by testing using Standard Compactive effort as for CBR and Swell.

20.3.6 Treatment of Unstable or Wet Subgrades

If the clay subgrade is in a saturated state, with moisture content in excess of the optimum, and rolling of the subgrade is not possible, the Contractor shall advise the Superintendent. Subject to the approval of the Superintendent and depending upon the prevailing weather conditions lime stabilisation below the base level may be substituted to improve the subgrade.

Where the subgrade clay contains excessive basalt boulders and stabilisation is not practicable the saturated clay shall be removed and replaced with approved filling in accordance with VicRoads standard specification Section 204 – Earthworks Clause 204.10 (current issue).

20.4 TREATMENT OF ROCKY SUBGRADE

Unless otherwise specified, where the excavation at base level is rocky material or contains excessive basalt boulders, the subgrade shall be loosened and rocks or boulders removed to the following depths in all areas on which pavement is to be placed:

- Bedrock – minimum of 150mm below base level
- Loose rock and boulders – minimum 300 mm below base level

Any resulting depressions shall be backfilled with Type A material of low permeability complying with Table 20.3.5B. Such backfilling, together with the remaining loosened material, shall be reworked and compacted as specified.

20.5 BLASTING

Blasting will only be permitted in the execution of the Works under the Contract with the written permission of the Manager Engineering Services. Submissions of requests for permission to use explosives shall be in accordance with Council guidelines 'Blasting and Explosives – Conditions for Agreement to Use'.

Unless otherwise consented to by the Superintendent, no explosives shall be manufactured or charges loaded before 7.00 a.m. or after 3.00 p.m. or on any day other than an ordinary working day and no charge shall be primed and no shot fired before 9.00 a.m. or after 3.30 p.m.

The Contractor shall give occupants of nearby buildings and structures, and owners of underground services adequate notice of intended blasting. Prior to blasting the Contractor shall arrange with occupants and the owners of underground services for any necessary protection of persons, property or livestock.

20.6 FILL CONSTRUCTION

20.6.1 General

Fill construction includes the preparation of areas upon which fills are to be constructed and the provisions of Clause 20.1.4 shall apply.

The selection, placement and compaction of filling for roadworks shall be carried out using Type A selected material in accordance with VicRoads standard specification Section 204 – Earthworks Clause 204.10 (current issue).

The selection, placement and compaction of filling shall be carried out under Level 1 supervision and reporting for structural fill in accordance with AS3798-1996 Earthworks for Residential and Commercial Development.

20.6.2 Use of Basaltic Clays as Fill in Embankments

Basaltic clay is extremely difficult to work as it must be compacted at or very close to its optimum moisture content and its use as structural fill is not permitted because when not compacted under optimum moisture content conditions basaltic clay can exhibit measurable volume change with time.

20.6.3 Imported Granular Fill

Imported granular fill shall be essentially granular with the following characteristics:

- Maximum nominal particle size 75 mm.
- Plasticity Index times %'age passing 0.425mm (AS Sieve) = less than or equal to 600

20.6.4 Compaction of Fill

During compaction the moisture content of the approved fill material shall be maintained within the range 85% to 110% of the optimum moisture content as determined by the Standard Compactive Test in accordance with AS1289.

(a) Fill Within 300mm of Pavement

Approved fill within 300mm of underside of pavement shall be spread in layers not exceeding 200mm (loose) and compacted with a heavy vibratory roller to not less than 98% of the maximum dry density as determined by the Standard Compaction Test in accordance with AS1289.

(b) Fill at Depths Greater Than 300mm Below Pavement

Approved fill at depths greater than 300mm below underside of pavement shall be spread in layers not exceeding 200mm (loose) and compacted with a heavy vibratory roller to not less than 95% of the maximum dry density as determined by the Standard Compaction Test in accordance with AS1289.

(c) Low Permeability Layer Below Agricultural Pipe Drains

The layer of fill immediately below agricultural pipe drains shall be material of low permeability as defined in Section 35 (Table 35.2.1).

20.6.5 Ground Vibration Limitations at Existing Structures

Construction methods for the Works in the vicinity of existing buildings, structures and underground services, shall be adopted which will control ground vibrations to acceptable levels. Vibration levels shall be measured by the Contractor immediately adjacent to the existing building, structure or underground service affected.

The Contractor shall use measuring equipment capable of providing a direct reading of the maximum instantaneous peak particle velocity which is the vector sum of the three orthogonal ground vibration components detected by a geophone with transducers oriented along three mutually perpendicular axes. The equipment shall have a frequency response in the range 5 to 250 Hz with a dynamic response sufficient for the vibration levels to be measured (usually in the range 0.1 to 50 $mm.sec^{-1}$) with a maximum absolute error of ±10% for any reading within the frequency response range.

The Contractor shall adopt construction methods that maintain the measured peak particle velocities at a level that will not cause damage to adjacent buildings, structures or services.

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

20.6.6 Borrow Material Sources Nominated by Contractor

Borrow material sources shall be limited to the quantity of material necessary to complete the Works under the Contract and will not be permitted where sufficient suitable material from within the limits of site excavation is available.

Where borrow material is required to complete the Works under the Contract it may be obtained from one or more sources.

Prior to commencing delivery, the Contractor shall submit to the Superintendent for review test results of proposed borrow materials. No material shall be borrowed from within the road reserve unless agreed to by the Superintendent. Where borrow excavation is necessary because of the Contractor’s negligence or use of inappropriate methods, the borrow excavation shall be carried out by the Contractor and no additional payment will be made for this work.

20.7 EXCAVATIONS – PITS AND TRENCHES - SHORING REQUIREMENTS

20.7.1 General

The Contractor shall properly timber and shore, or use an approved shielding and jacking system to support, all excavations so as to ensure the safe working of the excavation and to prevent any building or other structures, road or road surfaces, over and adjacent to the line of the Works from settling, cracking, being shaken, slipping or from falling in. Such shoring shall prevent any portion of the floors, sides, roofs and end faces of excavations beyond the exact cross-sections and dimensions determined, from slipping, falling, running in or being forced through joints and open spaces in the timbering.

The Contractor shall be held entirely responsible for the strength and safety of all timbering or shoring and shall maintain same until the completion of the work to the satisfaction of the Superintendent. The Contractor shall have sufficient quantity of timber and shoring materials

constantly on hand for bracing, sheeting and shoring in order to be available for use immediately in case of accident or emergency.

20.7.2 Regulations

Timbering of excavations and safety precautions shall comply with all applicable Victorian State Acts of Parliament and the Code of Practice for Safety Precautions in Trenching operations, and in accordance with this specification. In all underground workings the Contractor shall take precautions and procedures as required by the Mines Act 1958, the Mines (Trenches) Regulations 1982 and the Code of Practice No.8 – Safety Precautions in Trenching Operations

20.7.3 Notifications

In addition to complying with the requirements of the Mines Act 1958 and the Code of Practice for Safety Precautions in Trenching Operations, and relevant subordinate regulations, the Contractor shall provide to the Superintendent at least seven days prior to commencing the excavation of any trench (or pit) which will be 1.5 m or more in depth, the name of the nominated supervisor of the trench, a copy of the Notice of Intention to Commence Excavation Operations in Trenches, Shafts and Tunnels and where applicable a copy of the Confined Space Permit to Work.

Complete details of the proposed method of construction, including the proposed measures for the protection of employees from the possible hazard of moving ground shall be detailed.

20.7.4 Cost of Securing Excavations

The rate shown against any item in the Schedules of Prices which includes excavation in open trench or shallow shafts shall include all the costs of materials and labour for securing excavations in accordance with this specification.

20.7.5 Materials for Shoring

On all excavation work an adequate supply of timber of suitable quality and dimensions or other suitable material for use as shoring shall be provided and used where necessary to prevent injury to any persons employed from a fall or dislodgment of earth, rock or other material forming the side of or adjacent to any excavation or earthwork.

20.7.6 Use of Shoring

The timber or material provided as required above shall be used to adequately support against collapse the sides of every excavation or other opening in the ground 1.5m or more in depth in which workers are required to work unless the sides of the excavation are self supporting by virtue of an angle of the slope of the sides or the stability of material under all conditions of operation.

20.7.7 Strength of Shoring Materials

All shoring, bracing and sheet piling shall be of sound material and of adequate strength having regard to the magnitude of the Work, the character of the soil or material in which the excavation is made and any additional loading caused by the method of work.

20.7.8 Erection of Shoring

The erection of shoring, bracing and sheet piling shall be carried out under the direct supervision of a competent person and such shoring, bracing and sheet piling shall at all times be maintained in good and safer order and condition.

The Superintendent may require the Contractor to submit for examination information in writing on the details of such shoring, bracing or sheet piling.

20.7.9 Protection of Structures from Collapse

No excavation or earthwork which is likely to reduce the security or stability of any part of any structure whether temporary or permanent, so as to endanger any person employed, shall be commenced or continued unless adequate precautions are taken to prevent such occurrence.

All measures are to be taken before and during the progress of the Works to prevent danger to any person employed from collapse of the structure or the fall of any part thereof.

20.7.10 Protection of Excavations & Other Openings

Every accessible part of an excavation or other opening in the ground on or in connection with construction work shall be securely and adequately protected so as to safeguard any person from falling or sustaining injury.

20.7.11 Placing of Materials

Material shall not be placed or stacked near the edge of any excavation or other opening in the ground in a manner likely to endanger persons working therein. The minimum clear horizontal distance between such material and the edge of any excavation shall be equal to the depth of the excavation.

20.7.12 Use & Positioning of Machinery and Equipment

Except as otherwise provided by this Specification, no hoisting appliance, power-driven equipment or other heavy object shall be placed or moved near the edge of any excavation where a collapse of the side of the excavation or other opening may occur unless the side of such excavation or opening has been adequately supported to resist the extra pressure due to such superimposed loads.

20.7.13 Safe Access and Egress

In every excavation or other opening in the ground wherein persons are working or will be required to work, safe access and egress shall be provided.

Where such excavation or other opening is in the form of a trench or pit safe means of access and egress shall be provided at least every 30 metres along the trench or pit.

20.7.14 Placing or Withdrawing Sheet Piling or Shoring

A hoisting appliance or other equipment shall not be used for placing or withdrawing sheet piling or shoring unless such hoisting appliance or other equipment has been designed for that purpose or measures have been taken to ensure that such appliance or other equipment is not subjected to loads greater than those for which it was intended.

All timbering and shoring shall be withdrawn as backfilling proceeds except in the following cases.

i) Any permanent timbering planking etc., forming part of the permanent Works in any excavation shall be left in place;

ii) Where the Superintendent orders the timbering to remain in position because, in the Superintendent's opinion, the withdrawing of same is impracticable or would endanger the safety of the Works, building, structures, street, and other surfaces over and adjacent to the line of the Works; and

iii) Where the Superintendent permits the Contractor to allow the timbering or shoring to remain in position.

Where the Contactor is ordered or permitted to leave timbering in position in open excavations such timber shall be cut off at a depth of at least 600 mm below finished surface level. The Contractor shall make allowance in the Tender Price, and shall bear the cost, for any timber left in place in accordance with the above cases.

20.7.15 Shoring for Excavation with Sloping Side

When the sloping side of an excavation, at an angle not exceeding the angle of repose of the soil, does not extend to the bottom of the excavation, shoring shall be provided in conformity with this section of the Specification. Such shoring shall extend not less than 300 mm above the bottom of the slope. Boards shall be placed behind the shoring, where necessary, to prevent material sliding into the excavation.

20.7.16 Additional Loads

Shoring, bracing or sheet piling shall not be used to support scaffolding or any other superimposed loads unless such shoring, bracing or sheet piling has been designed or reinforced to withstand the additional loads.

20.7.17 Movement or Alteration to be Authorised

No person shall interfere with, move or alter in any way, any shoring, bracing, sheet piling, barricade, guard rail or thing which has been provided in connection with construction of the Works unless the person carrying out or in charge of the Works authorises such moving or altering.

20.7.18 Shafts, Wells and Tunnels

i) Every shaft and well shall be securely cased, lined or otherwise made safe.

ii) Every drive and tunnel shall be securely protected and made safe for persons employed therein.

iii) All entrances between the bottom of every shaft and the poppet head pulley wheel shall be securely fenced, including any entrances from an elevated platform.

iv) Any fence or cover may be temporarily removed, in order to facilitate work in progress, if proper precautions are taken.

SECTION 25 - SHAPING, GRADING & TOPSOILING

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	No amendments
REV. 3	May 2003	25.1, 25.7, 25.8.
REV. 2	March 2003	25.9
REV. 1	February 2003	25.5, 25.6,
Revision No.	Date	Affected Clause

SECTION 25 - SHAPING, GRADING AND TOPSOILING – OPEN SPACES & ALLOTMENTS

25.1 DESCRIPTION

This section covers the requirements for the preparation and construction of earthworks on allotments and public open space on subdivisions and other development being carried out in accordance with the requirements of a Town Planning Permit.

Section 25 shall be read in conjunction with Section 20 – Earthworks. Note shall be taken of:

Sub-clause 20.1.5	Embankment Treatment
Sub-clause 20.1.6	Erosion Control
Sub-clause 20.1.7	Silt Fences
Sub-clause 20.1.8	Driveways in Cut

25.2 REGRADING

The allotments, including the uneven surfaces from the previous use of the property shall be smoothed, graded and shaped to an even surface free from depressions in which water may pond and shall be graded such that a minimum fall of 1 in 150 towards the drainage outlet is achieved. The surface of excavations and fillings shall be finished parallel to the finished surface level to allow for the depth of topsoil surfacing as specified.

Where shown on the drawings, allotment areas shall be formed by cutting and filling as required, to bring them to the levels and/or grades shown on the drawings.

25.3 FILLING AND TOPSOILING

During the above operations the Contractor shall take all the necessary precautions to ensure the conservation of topsoil, as required under Sub-clause 1.10 of this specification.

The filling and topsoiling of allotments (other than nature strips) and batters shall be carried out as described below for the different cases:

i)	Top 150mm to finished surface is material inferior to the stockpiled topsoil.	Excavate an additional 150mm and replace with topsoil. Surplus spoil to be disposed of as specified.
ii)	Top 150mm to finished surface is similar or superior to stockpiled topsoil.	No further action.
iii)	Filling required is less than 300mm depth.	Regulate surface to design levels with stockpiled topsoil.
iv)	Filling required is 300mm depth or greater.	Strip existing vegetation/root zone and topsoil and fill with approved material as specified. Top with 150mm depth stockpiled topsoil.

Topsoil, which is not required for specified minimum topsoil surfacing, may be spread over vacant allotments, from which any grass or similar vegetation has been removed, with the approval of and as directed by the Superintendent.

Filling on allotments is to be clean filling free of stone exceeding 150mm in dimension approved by the Superintendent and is to be compacted in layers in accordance with AS3798-1996.

25.4 PROTECTION OF TREES

The Contractor shall take all the necessary precautions to ensure the protection of vegetation, as required under Sub-clauses 1.8 and 10.3 of this specification, during the above operations.

25.5 HAND FINISHING

Any existing allotments and/or batters shall be finished in a timely manner, as specified, by hand when weather or restrictive access conditions prevent the use of plant. Under no circumstances shall an extension of the Contract be granted when shaping, grading and topsoiling such areas by hand is required.

25.6 DEWATERING, DESLUDGING & FILLING DAMS & WATERHOLES

The Contractor shall inspect the site prior to tendering and determine whether any dams or waterholes exist on the site.

The Contractor shall be responsible for the effective removal and conveying of all water and sludge from such storage areas in such a manner as not to cause any nuisance or injury to property or persons.

The Contractor shall fill any dams and waterholes with approved material from the excavations, spread and compacted in layers not exceeding 200mm as specified for filling and in accordance with AS 3798-1996.

Before filling is commenced, the whole of the area to be filled shall be stripped as specified. The Contractor shall notify the Superintendent to determine if the exposed subgrade is suitable to commence filling upon.

The Contractor shall at all times during the progress of the Works, construct and maintain such temporary drains, pumps and other equipment necessary to protect the filling.

25.7 RECORDING OF FILLING IN ALLOTMENT AREAS

All works are to be completed and reported to 'Level 1 Reporting' in accordance with the requirements of AS 3798-1996.

The actual extent of any filling done during construction shall be suitably recorded for incorporation into "As Constructed" plans.

The profile of the excavated areas of dams and other areas excavated below the original natural surface in allotment areas to be filled is to be recorded by a Licensed Surveyor prior to the placement of filling.

The cost of land survey relating to the profile and filling of dams will be borne by the party nominated in the Contract.

25.8 COMPACTION TESTING OF FILLING IN ALLOTMENT AREAS

Filling on allotments is to be compacted to a dry density of not less than 95% Australian Standard Maximum Dry Density in layers not exceeding 200mm loose thickness.

The location(s) of compaction testing of filling in allotment areas to be undertaken shall be at the discretion of the Superintendent, and when so directed, by the Director Infrastructure & Technology .

The actual soil testing shall be carried out under the direct supervision of a member of the National Association of Testing Authorities (NATA) and a copy of the results shall be submitted to the Superintendent as soon as practicable.

All testing shall be undertaken during the progress of the Works in accordance with the requirements of AS 3798 - 1996. The cost of this testing shall be borne by the party nominated in the Contract.

25.9 DRAINAGE OF THE EARTHWORKS

Earthworks shall be kept clear of water at all times. If during construction the work cannot be self drained then the earthworks shall be arranged so that all water will flow to one or more points, from which it shall be drained away by gravity or removed by pumping.

25.10 DISPOSAL OF SPOIL

Excavated material, which is not required for filling replacement, shall be disposed off site by the Contractor in a manner as required under the Contract or directed by the Superintendent.

The Contractor shall take all the necessary precautions to ensure the conservation of topsoil, as required under Sub-clause 1.10 of this specification.

SECTION 30 - CONCRETE

REV. 7	January 2011	No amendments
REV. 6	August 2003	30.19.2
REV. 5	July 2003	30.18.10
REV. 4	June 2003	No amendments
REV. 3	May 2003	30.18.(9,10), 30.19.(7,8,9,10,11).
REV. 2	March 2003	30.3, 30.4, 30.18, 30.19
REV. 1	February 2003	30.(1, 3, 4; 8; 10; 17, 18, 19, 20)
Revision No.	Date	Affected Clause

SECTION 30 - CONCRETE

30.1 GENERAL

This section specifies the materials and workmanship for concrete and cement products used in drainage works, kerbing, kerbs and channels, footpath paving, pram and vehicular crossings, and elsewhere in the Contract.

All of the Works shall be constructed to the lines, levels and details shown on the Drawings and shall be straight between changes of direction and shall be done evenly between changes of grade.

Where shown on the Drawings or directed by the Superintendent, horizontal and vertical curves shall be built at all changes of direction or grade. The kerb height, cross section or slope and direction of the Works shall only be varied to provide proper approaches to pram crossings, vehicular crossings, pit inlets and the like.

30.2 STANDARDS

The current editions of the following Australian Standards shall form part of this Specification for supply of all labour and materials:

AS 3600	Concrete structures
AS 3972	Portland and blended cements
AS 1316	Masonry cement
AS 2758	(Part 1) Aggregates and rock for Engineering purposes
AS 1141	Methods for sampling and testing aggregates
AS 1379	Specification for Supply of Concrete
AS 1012	Methods of testing concrete
AS 3610	Formwork for Concrete
AS 4671	Steel Reinforcing Materials
AS 2701	Methods of sampling and testing mortar for masonry constructions

30.3 READY MIXED CONCRETE

All concrete used in this Contract shall be ready-mixed concrete ordered, produced and delivered in accordance with AS 1379-Specification for Supply of Concrete.

Ready mixed concrete shall only be supplied from a source approved by the Superintendent.

Mixed-on-site concrete shall not be used without specific approval of the Superintendent.

In accordance with AS1379 the Contractor shall be responsible for the design of the concrete mix, and the following performance specifications shall be achieved.

i) The slump of the concrete at the time and place of delivery shall be appropriate to the method of handling and placing but shall not be greater than 80mm nor less than 40mm without the approval of the Superintendent.

ii) The nominal maximum size of the aggregate shall be 20mm.

iii) The characteristic compressive strength F'c at 28 days shall be 25Mpa when tested in accordance with Australian Standard Specification AS1012 Part 7 and Part 9.

iv) No further water shall be added to the mix after it leaves the mixing plant.

For the purpose of this Specification where referred to in AS1379 the "Manufacturer" shall be regarded as a "Subcontractor" of the Contractor and the Contractor's responsibility under the General Conditions shall apply.

30.4 STRENGTH

All concrete shall have a minimum compressive strength 17MPa at 7 days, with a minimum of 25MPa at 28 days unless otherwise stated on Council's Standard Details or on contract drawings.

30.5 ADMIXTURES

Chemical admixtures shall not be used in the concrete mix without the approval of the Superintendent.

30.6 INSPECTION SAMPLING & TESTING

In accordance with AS 1379, the Contractor shall carry out the inspection sampling and testing.

The specified manufacturer's certificate shall be furnished for each truckload.

Tests shall be carried out on a standard 200mm high x 100mm dia cylinder samples, cured and tested in accordance with AS 1012 - Methods of Testing Concrete.

Capping and testing shall be cast for each test. If the specified seven day strength is not attained, the second cylinder shall be tested at 28 days and if the specified strength is still not attained, the Contractor shall remove the whole of the concrete of that batch from the job and replace same at the Contractor's own expense.

The result of the compressive strength tests as specified for 28 days shall be supplied to the Superintendent within 7 days of testing. The cost of the testing shall be at the expense of the Contractor.

30.7 CEMENT MORTAR

Cement mortar shall be supplied, stored, measured and mixed in accordance with AS 2701.

Unless otherwise specified for use in this Contract the mix proportions by volume shall be 1 part cement to 2 parts sand.

30.8 INSPECTION BY THE SUPERINTENDENT

The Contractor shall give reasonable notice to the Superintendent and the Director Infrastructure & Technology when inspections are specified.

HP No works shall proceed or be covered up under this section until the following items have been inspected and approval to proceed has been granted:

i) **Jointing and saw cutting patterns determined.**

ii) **Compacted foundation.**

iii) **Formwork fixed in place braced and coated with form oil or other approved release agent.**

iv) **Reinforcement fixed in position.**

v) **Connections, fixtures, blockouts and other necessary work prior to pouring concrete.**

30.9 FORMWORK GENERAL

The design, fabrication, erection and stripping of formwork shall be carried out in accordance with AS 1509 and AS 1510 Part 1 Formwork, and shall be the responsibility of the Contractor. For the purpose of this Specification the “Superintendent” referred to in AS 1509 and AS 1410 shall be the Superintendent.

The Superintendent must check all forms and levels before concrete is placed. Notwithstanding this the Contractor shall be solely responsible for the sufficiency and accuracy of the forms.

The forms shall be to the shapes, lines and dimensions required to construct the Works to the Drawings. Forms shall be properly supported and braced to maintain position during and after the placing of concrete.

Approved release agents shall be used on the forms to obtain easy stripping and desired finish.

The forms shall not be stripped until the concrete has hardened and obtained sufficient strength to support its own weight and any construction loads without injury to the concrete. Except for slip formed concrete, in no case shall the forms be removed before 12 hours after placing of the concrete. Due consideration shall be given to the decrease in the rate of hardening in cold weather.

30.10 FOUNDATION BEDDING UNDER CONCRETE

Bedding under concrete work shall consist of Class 2 fine crushed rock of 20mm nominal size or other material as may be approved by the Superintendent. Bedding material is to be spread and compacted to the thickness as shown on the Drawings, by hand ramming, rolling with a vibrating roller or as directed.

Any soft patches shall be removed and made good with bedding material as above. Immediately prior to placing of concrete the bedding shall be thoroughly wetted with a hose having a spray nozzle, until it will not absorb further moisture. There shall be no pools of water on the base.

30.11 TRANSPORTATION AND PLACING OF CONCRETE

Concrete shall be transported and placed generally in accordance with AS 3600.

Concrete shall be placed as near as practicable to its final position and at such a rate as will avoid segregation.

30.12 CONCRETE COMPACTION

After placement the concrete shall be thoroughly compacted as appropriate using an immersion vibrator or vibrating screed under the direction of the Superintendent or by other approved means. The concrete shall be thoroughly worked around embedded fixtures and into the corners of forms. Compaction by internal vibration shall be so controlled that segregation of materials will not occur. If, in an inaccessible portion of work, spading, rodding, or internal vibration is impractical, the concrete shall be compacted by lightly hammering or vibrating of forms.

30.13 JOINTS IN CONCRETE

Joints shall be provided where shown on the drawings or where specified or directed by the Superintendent. Concrete placing shall be carried on continuously from joint to joint. Wherever the work of placing concrete is likely to be delayed until the concrete has taken its initial set, a construction joint shall be formed.

The location of construction joints shall be planned in advance and shall made only where approved by the Superintendent. These joints shall be perpendicular to the principal lines of stress and in general shall be located at points of minimum shear.

In the absence of any details on the drawings jointing shall conform to current recommendations published by the Cement and Concrete Association.

30.14 NEW MASS CONCRETE AGAINST OLD

30.14.1 Non-Structural Mass Concrete Construction

Before placing new concrete on or against concrete, which has set, the forms shall be re-tightened and the surface of the set concrete shall be roughened as required by the Superintendent.

Set concrete shall be thoroughly cleaned of foreign matter, laitance, and loose or porous material and the joining surface saturated with water. The surface shall then be covered with a thin coat of stiff neat cement to bond and concreting shall then proceed immediately.

No work shall be stopped or temporarily discontinued within 300mm of the top on any finished surface, or during pouring the base of pits or cover slabs.

30.14.2 Non Structural Paving Construction

Before placing new concrete against concrete which has set the proposed jointing method shall be provided to and approved by the Superintendent. All vehicle crossing construction shall be tied to adjustment kerb and channel using dowels as specified.

30.15 TEMPERATURE CONSTRAINTS ON CONCRETE POUR

No concrete shall be poured without special precautions and the Superintendent's approval if the air temperature is below 5 degrees Celsius or above 30 degrees Celsius.

30.16 CURING

Concrete and rendering shall be cured generally in accordance with AS3600 so as to prevent excessive loss of moisture from the surface for at least 7 days continuously following the time of placing; or in hot weather for longer periods as the Superintendent may direct.

Curing shall be accomplished by one or more of the following methods:

i) Covering with hessian or similar material maintained in a wet condition.
ii) Covering with an impermeable membrane after spraying the concrete with water.
iii) Coating with an approved curing compound.

The occurrence of shrinkage cracking deemed unacceptable by the Superintendent shall be regarded as defective work.

No traffic shall be permitted on the new work for at least seven days.

30.17 DEFECTIVE MATERIALS OR NON-COMPLYING WORK

The Contractor is responsible for the supply and construction of the concrete works as specified.

Failure of the work to comply with the specified supply, placing, accuracy, compaction, finish and curing of concrete or adequacy of the forms shall be dealt with as defective work under the General Conditions of Contract.

Approvals by the Superintendent to various stages of the Works shall not relieve the Contractor of the responsibility for the Works to comply with the Specification.

30.18 KERB AND CHANNEL CONSTRUCTION

30.18.1 Foundation

The kerb and channel shall be constructed upon the approved sub-base pavement course prepared as specified and as detailed on the Drawings.

Unless otherwise shown on the drawings, where thinner pavements are proposed and the sub-base does not project under the kerb and channel, a separate bedding shall be constructed consisting of 100 mm compacted thickness of 20 mm nominal size Class 2 F.C.R. and laid on a compacted subgrade prepared as specified for road pavement.

The foundation shall extend 200 mm outside the limit of the kerb and channel unless otherwise shown on the drawings.

The foundation shall be sprayed with clean water to a damp but not wet state prior to placing the concrete.

30.18.2 Formwork

Forms shall be designed to suit the section of channel and kerb and shall be capable of being removed without injury to the concrete. Timber lagging used in formwork shall be perfectly straight, sound, dressed softwood, free from twists and warps. Alternatively, suitable steel sections may be used. The Superintendent may reject damaged or unsuitable formwork, and all rejected materials shall be removed from the Site of the Works.

Before use, and as may be necessary to ensure non-adhesion of mortar, all forms shall be cleaned and greased, oiled or soaped.

The forms are to be set in position, true to line and grade, held rigidly in position by a sufficient number of pins and braced so as to prevent movement under the pressure of the concrete. There shall be sufficient forms to provide for them to be set for the full length of the section or for 75 metres, whichever is the lesser in advance of concrete placing, and to provide for the concrete to remain at least 12 hours in the forms before they are removed.

Face boards of kerbing only may be removed to permit surfacing as specified. All curves must be timbered in full, together with at least 8 metres of the tangential straight at each end of the curve, before any concrete is placed.

30.18.3 Templates (Dummy or Contraction Joints)

The contractor shall provide 5 mm thick steel templates cut to the specified section, hung by lugs to the forms, for the purposes of correctly forming the shape of the section. The templates shall be made such that they maintain the channel bed profile and ensure the specified thickness of concrete and also create a contraction joint at their location.

Templates shall be spaced to form bays of three (3) metres except at changes of grade where length of bays shall be 1.5 metres. As each bay is poured and completed, the templates shall be moved on to successive bays. The shape of these templates shall simulate the profile of the kerb and channel as shown on the Standard Detail Drawings, and shall also be such as not to completely cut through the kerb and channel.

30.18.4 Placing

Concrete shall be placed in forms immediately after arriving on site. Concrete is to be well spread against forms, rammed with approved tampers into forms and screeded on steel templates cut to profile and finished to a smooth surface.

On grades exceeding 3% work is to proceed up the gradient so as to prevent creeping of concrete.

30.18.5 Rendering

Exposed faces of the work shall be rendered to produce a neat appearance of uniform colour.

Rendering shall be applied immediately after the body of the concrete is laid, but under no circumstance must the time between laying the concrete and applying the rendering exceed 45 minutes. The thickness of the rendering shall not exceed 7 millimetres.

The mortar mix shall be 1 part Portland Cement: 2 parts washed concrete sand: 1 part screened bluestone dust.

Moulding and chamfering of angles as shown in Drawings, is to be done with proper trowels made for the purpose. Dummy or contraction joints in kerbing and channelling shall be made by withdrawing templates and by facing and trowelling so as to form an unbroken surface. The joint is then to be accurately marked by a small jointing tool.

All concrete kerb and channel shall be trowelled to a smooth glass like impervious finish with a steel float and to be free from all imperfections. Excessive trowelling of the surface is to be avoided.

30.18.6 Machine Extrusion or Slip Form Construction

Where an extrusion or slip form machine is used the grade and alignment of the section to be extruded shall be established by an offset guideline set by the Contractor. The forming portion of the machine shall be readily adjustable vertically during the forward motion of the machine to maintain the specified grade regardless of surface irregularities in the bedding. A gauge or pointer shall be attached to the machine in such a manner that a continuous comparison can be made between the section being placed and the grade and alignment set by the guideline.

Concrete slump shall be such that the extruded section does not deform from the specified shape as the machine progresses. Generally slump of 10 – 15mm is to be used. Zero slump concrete is not acceptable.

Concrete shall be fed to the machine at a uniform rate. The machine shall be operated so as to produce a compacted mass of concrete to the satisfaction of the Superintendent.

Extruded kerb and channel shall be rendered as for normal formed kerb and channel.

30.18.7 Layback for Vehicle & Pram Crossings

Where vehicle crossings and pram crossings are shown on the drawings to be provided, layback sections shall be constructed in accordance with the Drawings concurrently with kerb and channel construction.

30.18.8 House Drain Connections

Where stormwater drains are not provided, openings through the barrier type kerbs will be made opposite existing house drains on and in the low side of all allotments and/or in such positions as the Superintendent may direct. Such openings will be made with Galvanised or P.V.C. rectangular cross section kerb entry adaptors with suitable section for connection to 100 mm dia. house drain. The opening shall be neatly rounded off to facilitate stormwater discharge into the channel.
The invert of holes shall be level and at the same level as the invert of the channel.

30.18.9 Pavement Abutting Kerb and Channel

Kerbs and channels shall be properly backed up and the concrete cured at least 7 days prior to construction of any abutting pavement courses.

30.18.10 Backing Up

As the machine placement of the kerb and channel proceeds (or as the forms are removed), the kerb shall be backed up. Backing up of kerb shall be in place before commencing placement of pavement in front of kerb.

Backing up shall not commence less than 4 clear days after placement of concrete (either by slip form machine or in formwork).

The Contractor shall take necessary action to prevent scouring of the material under the kerb and damage to the kerb concrete prior to backing up.

Special care shall be taken to compact the backfill behind the kerb to prevent water passing from the channel into the backfill prior to service conduits and house drains being connected.

Backup shall be placed behind kerb from underside of pavement to 100mm below finished surface level as shown on Standard Detail Drawings. Backup material shall be Low Permeability material placed in layers not exceeding 150mm thick. Each layer shall be compacted to not less than 95% of the maximum dry density as determined by the Standard Compaction Test in accordance with AS1289.

30.18.11 Tidying Up

All rubbish and waste material shall be removed day by day as the work proceeds and the Works shall be kept clean and tidy. When the pavement has been constructed, the channels shall be swept clean and all rubbish, surplus or waste materials shall be removed from the site.

30.19 FOOTPATH, PRAM CROSSINGS AND VEHICULAR CROSSINGS

30.19.1 Subgrade Preparation

Cutting, filling and compaction of subgrade shall be carried out in accordance with this specification and the drawings. The subgrade for the footpath, pram crossing and vehicle crossings shall be accurately trimmed to template and level. The Contractor is to ensure that the specified thicknesses for bedding and concreting are achieved.

30.19.2 Crushed Rock Foundation Bedding

After subgrade preparation a foundation bedding of FCR shall be provided for 100mm beyond the finished width of the paving. The depth of bedding material shall be as described in the Standard Drawings. Bedding depth tolerances shall be – 10mm and + 50mm. Depth outside these tolerances will require further subgrade preparation

Bedding shall be evenly spread, watered and compacted with approved equipment and shall have a minimum relative compaction of 95% Australian Modified dry density.

HP The Superintendent shall approve the bedding before any concrete is placed.

Soft sections in the formation shall be excavated and filled with crushed rock or other filling approved by the Superintendent.

30.19.3 Formwork

The edge forms shall be set true to line and level with the transverse forms set at right angles to the longitudinal forms.

The practices in relation to formwork shall be observed as specified under Subclause 30.9 - Formwork General.

30.19.4 Expansion Joints

Expansion joints shall also be provided in footpaths at intersections.

Expansion joints shall be formed by providing a layer of “Spandex” or other approved material between adjoining bays adjacent to corner splay.

All joints are to comply with Standard Drawing SD309.

At least 24 hours shall elapse between the placing of the bays on either side of the joint.

The Superintendent may delete any expansion joints he considers unnecessary.

30.19.5 Placing of Concrete

The concrete shall be placed in the forms immediately it arrives on Site and shall be well spaded and rammed with approved tampers or an approved vibrating screed and shall be screeded off on the templates or adjacent finished slabs until a true surface is obtained.

30.19.6 Pavement Thickness

Footpath and pram crossings shall be constructed in accordance with Standard Detail Drawing SD304.

Domestic vehicular crossings shall be constructed as shown on Standard Detail Drawings SD401, SD404 and SD405).

Heavy duty vehicular crossings (including industrial and right of way crossings) shall be constructed as shown on the Standard Detail Drawing SD402.

30.19.7 Footpath Crossfall

Footpaths shall fall from back to front with a gradient of not less than 1 in 40 and a maximum gradient not to exceed 1 in 30.

Tolerances for 1.5 metre footpath width: Minimum crossfall 38mm.
Maximum crossfall 50mm.

30.19.8 Surface Finish

The surface shall be rendered with a coat of rendering 7mm thick consisting of one part of clean sand, one part of stone dust and one part of cement or the use of driers as directed. The driers shall consist of 2 parts clean stone dust and one part cement. The surface of the render or driers shall be steel trowelled to produce a smooth, matt, non-skid hard surface, free from stone pockets, depressions or projections. Excessive trowelling of the surface is to be avoided. The whole surface shall be lightly broomed with a fine hair broom.

The footpath margins shall be neatly tooled off to a radius of 6 mm and both sides of all joints shall be edged with a special tool for a width of 40 mm. The edge of the 40mm tooled width shall be near to flush with the footpath surface and shall not be indented to form a lip or tripping hazard.

The finish of the footpath, including the 40mm tooled edged, shall be a broom finish to the approval of the Superintendent.

30.19.9 Weakened Plane Joints

Weakened plane joints 5mm wide and 25mm deep shall be constructed right angles to the side forms at 1.5 metre intervals and at all service access pits unless otherwise required by the Superintendent.

a) Tooled Joints

These joints shall be formed perfectly straight using the following tools: -

1. Cutter:

Made from two pieces M.S. flat 25 x 5 mm x 1.35 metre welded together to form a "T" section. Alternatively an equivalent M.S. rolled "T" may be used. Handles shall be provided for removal from concrete. This cutter shall be placed in position immediately after striking off, and removed immediately prior to final finishing.

2. Grooving Tool:

To be similar in construction to the normal 75 mm wide grooving tool, but with a grooving blade 25mm deep. This tool shall be used in the final finishing of the joint.

The Contractor shall take care to ensure that the lip of the grooving tool does not penetrate the surface of the concrete and produce a lip beside the groove. The surface of the tooled groove is to be flush with the footpath surface with broom finish extended to the edge of the groove.

b) Saw Cut Joints

Alternatively 5 mm wide x 25mm deep joints may be cut using a diamond blade or similar approximately 24 hours after the footpath has been poured.

c) Location of Joints

Bays at vehicular crossings shall be made equal in length. Where house drains or other services pass under the footpath, bays shall extend a minimum of 300 mm beyond the edge of trench. Where joints are provided at service access pits the spacing between joints shall be adjusted to avoid, wherever possible, bays less than 1.5m in length.

30.19.10 Expansion Joints

Expansion joints consisting of an approved composite cork pad in one piece with the top edge taped, shall be inserted for the full depth of the concrete. Concrete shall be finished flush with top of the pad and tape removed after 24 hours curing. No jointing tool shall be used along the edge of the pad. Expansion joints shall be provided:

(a) On the outside of the thickened sections at vehicular crossings.

(b) So as to cut the footpath into lengths of not more than 20 metres between expansion joints.

(c) At each intersection as shown on the drawings or Standard Detail Drawing (SD304).

(d) At each break in concreting lasting more than half an hour and at the close of a days work except at private crossings, or where directed by the Superintendent.

(e) Longitudinal joints in full width footpath midway between kerb and building line.

(f) Around all manholes, service pits, poles, valve boxes, fire hydrants and the like as directed by the Superintendent.

30.19.11 Reinforcing

D500SL72 reinforcement or as otherwise specified shall be placed in all right of way crossings and 50 mm cover to reinforcement from top surface shall be provided. All reinforcement shall be supported on bar chairs with a maximum spacing of 1m centres or a grid of 1m centres in each direction for reinforcement fabric. Fabric shall lap at least 225mm.

30.20 BUFFER STRIPS

Where bituminous sealing terminates at the temporary limit of the Works or against an existing unsealed section of road, a 200mm wide 300mm deep concrete buffer strip and agricultural drain shall be laid as indicated on the Standard Detail Drawing (SD309).

After curing of the concrete, excavation adjacent to an unsealed section of pavement shall be backfilled with Class 2 fine crushed rock and compacted to the Superintendent's satisfaction.

30.21 PATTERN PAVING

Unless otherwise shown on the drawings patten paving shall be "Faux Brick" or approved equivalent. Concrete shall conform with the relevant clauses of this specification and the manufacturers recommendation. The minimum thicknesses shall be that shown on the drawings. 30MPa strength concrete shall be used for all pattern paved concrete.

30.21.1 Pattern Type and Depth

Unless otherwise shown on the drawings, pattern shall be imprinted according to the manufacturer's recommendations. A header course imprint shall be applied to all free edges and at construction joints. The pattern shall be imprinted after finishing the concrete surface as specified in Section 30.19.6

30.21.2 Colouring

Unless otherwise shown on the drawings colour shall be "brick red". The dosage rate shall be as recommended by the manufacturer to achieve a deep rich coloured concrete.
The Contractor shall control the placing of coloured concrete to ensure that adjoining areas of plain concrete are not stained with the coloured concrete.

30.21.3 Sealing

As soon as the finishing operation is completed, two coats of a suitable correctly formulated liquid curing compound sealer shall be applied to the surface of concrete to ensure adequate sealing.

30.22 OTHER REINFORCED CONCRETE PAVEMENTS

Reinforced concrete pavements, other than specified in Section 30 of this specification, shall be constructed in accordance with VicRoads Standard Specifications for Roadworks – Concrete Pavements – Sections 501, 502, 503, 520, and 521 (the latest issue of each applicable section).

SECTION 35 - STORMWATER DRAINS AND CONDUITS

REV. 7	January 2011	35.2.1.2
REV. 6	August 2003	35.1.13, 35.2.1.1
REV. 5	July 2003	35.1.7.(2, 3)
REV. 4	June 2003	No amendments
REV. 3	May 2003	35.1.4, 35 7.(2, 3, 6)
REV. 2	March 2003	35.1(1,4, 7, 17), 35.2(1,2)
REV. 1	February 2003	35.1(1,3,5,6,7,13,14,17), 35.2(1,2)
Revision No.	Date	Affected Clause

SECTION 35 - STORMWATER DRAINS AND CONDUITS

35.1 UNDERGROUND STORMWATER DRAINS

35.1.1 General

This section specifies the supply of labour plant and materials for the construction of all stormwater drains (including culverts) and associated works, subsoil drains and service conduits.

35.1.2 Standards

The current editions of the following Australian Standards shall form part of this Specification for supply of all labour and materials.

AS3725	Loads on buried concrete pipes.
AS1342	Precast concrete drainage pipes.
AS1597	Precast reinforced concrete box culverts.
AS1646	Rubber joint rings for water supply, sewerage and drainage purposes.
CA33	Code of recommended practice for concrete pipe laying design.
AS3500	National Plumbing and Drainage Code.
AS2566	Plastics Pipe laying Design.

35.1.3 Concrete

All concrete used in the Works shall comply with Section 30 - Concrete of this Specification.

35.1.4 Pipes

35.1.4.1 Types

All underground drains shall be supplied by the Contractor in Class 2 reinforced concrete pipes (R.C.P.) unless otherwise specified and approved by Council.

The use of UPVC (Heavy Duty Sewer Grade) and polyethylene pipes (Class 400) will be permitted, but only under conditions specifically authorised by the Director Infrastructure & Technology .

35.1.4.2 Joints

All concrete pipes up to and including 600mm in diameter shall be spigot and socket type with rubber ring joints otherwise stated on the drawings. Deviation at the joints used in such pipes shall not exceed the manufacture's specification. All other pipes may be interlocking flush joints type, unless otherwise specified.

35.1.5 Excavation

35.1.5.1 Requirements

The excavation for drains, junction pits and side entry pits shall be taken out to the exact lines, levels, gradings and cross-sections shown on the Drawings or as may be directed by the Superintendent.

All trenches for pipe drains shall not be less than the dimensions shown on the Council's Standard Detail Drawings.

All trenches for drains shall be located centrally about the centreline of the drain. The bottom of the trench shall be trimmed accurately to line and grade.

35.1.5.2 Rock

All rock encountered in excavation works shall be removed to a depth of not less than 75 mm from the bottom of the pipe. Any resulting depressions shall be backfilled with 20 mm Class 2 compacted crushed rock.

Unless specifically noted otherwise in the schedule the Contractor shall allow in his tender for any rock or any other materials met within the excavation.

35.1.5.2 Shoring

The Contractor shall provide all materials and labour for shoring up trenches in accordance with the Section 20 (Excavations) of this Specification.

35.1.5.4 Excess Excavation

The Contractor shall be fully responsible for any damage caused through the sides of excavation and trenches collapsing.
Any excess in width of the excavation, that is outside the limits of easements, shall be made good with approved materials, if in the opinion of the Superintendent this is necessary.

35.1.5.4.1 Payment

Any excess in the excavation below the required depth shall be made good with approved compacted bedding material at the Contractor's expense.

Any excess in width of excavation that requires a superior pipe Class or improved bedding type or concrete bedding shall be at the expense of the Contractor.

35.1.5.5 Soft Base

Any soft or yielding material encountered at the bottom of the trenches shall be, where directed in writing by the Superintendent, excavated to a sound bottom and replaced with approved material.

Payment will be made only for the actual, authorised excavation and backfill. Any soft areas caused by Contractor's negligence or improper methods shall be rectified at the Contractor's expense.

35.1.6 Bedding, Laying and Jointing of Pipes

35.1.6.1 Bedding

All pipes shall be laid on an evenly graded bed of 20 mm nominal size Class 2 F.C.R. compacted by hand ramming or as directed to minimum 75 mm compacted thickness or other approved bedding.

35.1.6.2 Inspection

HP **No pipes shall be laid in the trenches until the foundation bed has been inspected and approved by the Superintendent.**

35.1.6.3 Laying

The Contractor shall lay and joint accurately all pipelines shown on the Drawings, true to line, level and gradient.

The Contractor shall be particularly careful to lay all pipes with the top in its correct position as indicated by the manufacturer.

Unless otherwise specified or approved by the Superintendent, laying of all pipes shall commence at the downstream end.

The socket shall face upstream and the barrel shall bear evenly for its full length on the bedding material. Care shall be taken that no lips or projecting surfaces occur at the interior surface at the joints.

Unless otherwise directed by the Superintendent the Contractor shall complete the laying of pipes between adjacent pits before placing any backfill.

35.1.6.4 Conformity with the Drawings and Tolerances

All pipes shall be laid true to line and level as shown on the drawings within the following tolerances:-

(i) Alignment – (Horizontal)

The drain pipeline shall be laid so that the departure at any point from its true alignment in plan shall not exceed 50mm.

(ii) Level – (Vertical)

The drain invert at any structure shall not depart from its level as determined from the information given on the drawings by more than 10 mm.

The invert of each pipe length shall not deviate from the design gradient of the drain by more than 5 mm for 1200 mm lengths or 10 mm for 2400 mm lengths and shall not hold water at any joint.

(iii) Location

a. Pipeline laid within easement:

All easement drains shall be laid at a centreline offset of constant dimension from the property line, unless otherwise shown on the drawings. The location shall not vary from the position indicated on the drawings by more than 100mm.

b. Pipeline laid behind kerb:

All drains laid behind kerb within the road reserve shall be laid at the offsets as shown on the Standard Detail Drawings. The location shall not vary from the position indicated on the drawings by more than 50mm closer to or 100mm away from the back of kerb line.

35.1.6.5 Spigot & Socket Joints

Rubber Ring R.C.P. shall be jointed by pushing the spigot with the ring in place into the socket for its full depth.

35.1.7 Backfilling Pipe Trenches

35.1.7.1 Inspection

HP No backfilling of trenches shall be carried out until the pipe laying has been inspected and approved by the Superintendent. Backfilling shall be done in three stages, each one of which shall be inspected and approved before proceeding to the next stage.

Unless shown otherwise on the drawings or on Council's Standard Details, backfilling shall be in accordance with AS3798-1996

35.1.7.2 Within Road Reserve (not under pavement or kerb)

Material for backfilling around pipe and 100 mm above top of pipe shall be nominal 30mm Class 3 FCR. The remainder of the trench to 100mm below finished surface shall be backfilled with the best excavated material available on site. The layers of backfilling in each backfilling stage shall not exceed 150mm loose in Stages 1 and 2 and 225mm loose in Stage 3.

Stage 1. To Springing Line of Pipe.

Class 3 FCR (nominal 30mm) material shall be carefully placed round the pipe and thoroughly compacted by mechanical means with a piston type rammer or other approved method. Water shall be added as necessary and as directed by the Superintendent to bring the material to its optimum moisture content before compacting.

Stage 2. To 100mm Above Top of Pipe
(Or to the underside of agricultural pipe trench or within 45^{o} influence lines, whichever is greater)

The material used shall be the best excavated material available. If the material to be used is very dry it shall be watered to assist compaction.

Each layer shall also be thoroughly compacted by mechanical means such as vibrating roller or piston type rammer.

The material in Stage 2 shall be laid either:

- to the underside of the agricultural pipe trench, or
- to a height where 45^{o} influence line intersects the wall of the trench,

whichever is greater.

Where pipe is at back of kerb the filling for Stage 2 and backup behind kerb shall be in accordance with Sub-clause 30.18.10.

Stage 3. To Finished Surface Level.

The material used in Stage 3 shall be the best available excavated material on site. It may contain small quantities of hard lumps and small pieces of stone (not exceeding 40mm), but not within 100 mm of the finished surface. Each layer shall be compacted with vibrating rollers or piston type rammers to the approval of the Superintendent.

The top 100mm to finished surface shall be topsoil stripped from excavated areas. The topsoil layer shall be lightly compacted (one or two passes) to the approval of the Superintendent.

35.1.7.3 Pavement or Kerbing Area

Where any stormwater drain is laid in such a position that it will be:

- underneath any pavement, kerbing and/or channelling, or
- where the line of drain crosses any proposed roadway, or
- where 45^{o} influence line from the underside of pavement intersects the wall of the trench,

then the pipe trench shall be backfilled with 30 mm nominal size Class 3 FCR as for Clause 35.1.7.2 Stage 1 (above).

The material from 100mm above the pipe to the underside of pavement shall be Low Permeability Class 4 FCR compacted with a heavy vibratory roller to not less than 98% of the maximum dry density as determined by the Standard Compaction Test in accordance with AS1289.

Backup behind kerb and channel shall be carried out in accordance with Sub-clause 30.18.10.

35.1.7.4 Around Pits

The kerbing side of any pit shall be backfilled as in 35.7.3 above. The remaining three sides shall be backfilled as required for trenches.

35.1.7.5 Within Easements

Stage 1. To Springing Line of Pipe.

The material to be used shall be 20mm class 2 FCR or other granular material approved by the Superintendent. The material shall be carefully placed around the pipe in 75 mm layers and thoroughly rammed with an approved hand rammer (flat end of crowbar).

Stage 2. To 225 mm above Top of Pipe.

The material used shall be the best available from the excavation trench. No stones of any kind over 18mm shall be placed within this layer. Layers shall be 150mm loose maximum. Compaction shall be by approved hand rammers (75mm x 75mm timber).

Stage 3. To Top of Trench.

The material shall be that excavated from the trench, placed in 150mm layers and well rammed into place. Construction machinery shall be used for compaction when 375mm of cover has been placed over the top of pipe.

35.1.7.6 Topsoiling Trenches

Where the line of drainage is to be within the naturestrip, reserves or allotment areas, the following minimum depths of topsoil shall be provided to complete the backfilling to finished surface levels:

- 100mm of topsoil in naturestrips
- 150mm of topsoil in reserves or allotment areas.

In easement and in reserves, along the line of the backfilled trench topsoil shall be neatly mounded above the level of the finished surface to a height equivalent to one twelfth of the depth of the trench.

If the Contractor has not set aside topsoil for this purpose, approved locally sourced topsoil shall be supplied and delivered at the Contractor's own expense.

35.1.7.7 Drainage Line Maintenance

Drainage lines shall be continuously maintained during the Works to the end of the Defects Liability Period. Any settlement, washouts, blockages, debris etc. shall be immediately made good.

35.1.8 Box Culverts

Box culvert laying and backfilling shall be carried out as for pipes. Box culvert top sections shall be set on cement mortar (1 part cement to 2 parts sand) and joints between sections grouted with cement mortar of the same composition.

35.1.8.1 Agricultural Pipe Connections at Box Culvert Pits

Agricultural pipe connections of to box culvert pits shall be made past the end of the box culvert sections and into the side of the pit, in a manner approved by the Superintendent.

35.1.9 Provision for Drain Extension

Where shown on the Drawings, or as directed by the Superintendent, the Contractor shall provide a circular penetration in a pit where future drains are to be connected. The penetration shall be formed to permit the future drain of size specified to be inserted with the correct invert level. The penetration shall be plugged with red gum planks or by an approved method.

In certain circumstances, the Superintendent may direct the Contractor to provide one (1) short length of pipe laid to grade with socket end up stream, for future drain extension.

35.1.10 Property Inlets (to Easements Drains)

Property inlets to easement drains for each allotment shall be supplied and constructed where shown on the Drawings and as detailed in Council's standard drawing. The level of the end pipe shall be not greater than that shown on the drawing or the minimum cover requirement of 200mm clear.

35.1.11 House Drains (Property Connection in Roads)

The Contractor shall provide and lay house drains across the nature strip to each allotment as shown on the Drawings. The position of each house drain shall be marked into the face of the kerb with metal stamp having 50mm high letters "HD". All pipes to be used shall comply with the relevant Australian Standard as specified below:

PIPE MATERIAL	CLASS	DIAMETER	JOINT TYPE	ABSOLUTE MINIMUM GRADE
R.C.P. A.S. 1342	Class 2	100 mm	Spigot & Socket	1 in 100
P.V.C. A.S. 1477	Heavy Duty Sewer	100mm	Spigot & Socket	1 in 100

The Contractor shall provide and lay one 100 mm diameter drain pipe to each vacant allotment draining to the kerb and channel or underground drain as shown on the drawings.

Pipes shall be laid a straight line at uniform grades as set out above at approximately right angles to the kerb and shall extend at least 300 mm into the property and be capped off.

The invert level of the end pipe where shown on the drawings shall be not greater than that specified or the minimum cover requirement of 200 mm clear.

All joints shall be filled with cement mortar made up of three (3) parts of sand to one (1) part of cement.

The connections to the underground drainage shall be made as shown on Council's Standard Detail Drawings. Where connection to the kerb is specified an opening shall be cast in the kerb to accommodate a rectangular entry adaptor from the house drain.

No house drain is to be connected to the kerb without the specific approval of the Director Infrastructure & Technology .

35.1.12 Drainage During Progress of the Works

The Contractor shall make proper provision and take all necessary precautions for the diversion of flood and drainage waters and the proper discharging of same during the progress of the Works in accordance with an approved Site Management Plan.

The Contractor shall not obstruct the gutter or channel of any street, but may divert the flow where necessary using all proper measures to provide for the free passage of surface water along the gutters or channels. The entry of existing pits may be partially obstructed by the use of silt barriers as approved in the Site Management Plan by the Council.

35.1.13 Pits

(a) Existing Pits (Redundant)

Existing pits that are no longer required shall be removed or broken back to a depth not less than 600mm below the finished surface of the subgrade. Remaining pipe openings shall be sealed with concrete. Any remnants of pits shall be backfilled with impervious material and compacted to a density ratio of not less than 95%. The calculation of density ratio shall be based on Standard compactive effort.

(b) New Pits

Pits shall be constructed in concrete to dimensions and thickness, and covers and lintels provided all as shown on the pit details on the Drawings, and as detailed in the Pit Schedule. Pits shall be poured with properly constructed internal and external forms.

Pit floors shall be constructed on a 75mm consolidated thickness of 20 mm Class 2 crushed rock as specified. The bottom of the pit shall be constructed in the manner shown on the Drawings such that the pit will be self-cleansing and the top of the pit shall be constructed to take the specified pit covers.

Grated pits shall be constructed in accordance with Australian Standard 3996-1992 Metal access covers, road grates & frames.

The ends of pipes at pits shall be rounded off to avoid obstruction to the flow of water. The invert of any pit shall be flush with the pipe invert and shaped to conform with it for at least 1/3 of the pipe diameter above the invert, unless otherwise shown on the Drawings. Rendering or topping of pit bottoms shall not be used without the Superintendent's approval.

All pits shall be provided with two (2) agricultural pipe inlets where shown on Standard Detail Drawings to drain ground water from outside the pipe drains.

The Contractor shall supply and place in position all pit covers and grates, as specified or detailed on the drawings.

Where shown on the drawings reinforcement shall be fixed and approved to the satisfaction of the Superintendent prior to the ordering and delivery of concrete. During construction concrete shall be compacted, by the use of immersion vibrators, to the satisfaction of the Superintendent.

35.1.14 Step Irons

Step irons shall be built into all pits over 1.0m deep. These shall be made from mild steel rods bent to form a tread and galvanised as shown on VicRoads standard drawing 'Step Irons' (SD1041) .

Alternatively, approved prefabricated hardened plastic type step irons may be used.

The first step shall be no more than 300 mm from the bottom of the pit, with 300 mm spacing between subsequent stepirons to the top.

All step Irons shall be cast in place, or affixed in precast sockets, or affixed in holes drilled concrete walls using an approved waterproof epoxy adhesive applied to the full depth of embedment.

Drilling of pit walls for the installation of step irons shall be carried out using a suitable masonry bit with rotary percussion drill to give a neat cylindrical hole full depth of embedment. The use of jackhammers for this purpose shall not be permitted.

35.1.15 Anchor Blocks

Where pipes are to be laid at grades steeper than 1 to 10 the Contractor shall provide anchor blocks every 10.0 metres and at 5 metres intervals where pipe grade exceeds 1 in 7. Anchor blocks shall be constructed as shown on the Standard Detail Drawing (SD 214) as applicable.

35.1.16 Connections to Melbourne Water Main Drains

Where connections to a Melbourne Water main drain or waterway are specified on the drawings the Contractor shall arrange with the Melbourne Water, District Superintendent for that Authority to approve the connection and inspect the work required.

35.1.17 Agricultural Drains

Unless otherwise specified agricultural pipes shall be 100mm diameter class 400 perforated polyethylene pipe (to AS2439).

Agricultural drains are to be laid to the falls shown on drawings. The gradient shall in all cases be greater than 1 in 200.

Agricultural drains are to be connected to a drainage pit, or flush out pit (where provided) and neatly mortared in. The upstream end the agricultural drain is to be connected into the upstream pit to enable flushing of the agricultural pipe. The flushing section of pipe connecting to the pit is to be a short length of PVC pipe sealed with a PVC screw cap. The flushing connection for the agricultural pipe is to be located at a level which is above that of any agricultural pipe draining into the pit.

HP Backfilling shall not commence until approval for laying of the pipes is given by the Superintendent.

a) Road Pavement, Kerb and Channel

Agricultural pipe drains shall be laid where indicated on drawings and as shown on Standard Detail Drawings.

Agricultural pipe trenches which pass beneath any pavement shall be backfilled with 'no fines' concrete up to the underside of pavement level. The 'no fines' concrete shall be carefully placed to avoid any displacement of the pipes. The top of the 'no fines' concrete shall be compacted with a vibratory plate compactor.

b) Park and Reserve Areas

Unless shown otherwise on drawings or directed by the Superintendent, agricultural pipes shall have a minimum depth to invert of 450mm below finished surface.

Agricultural pipe drains in park and reserve areas shall have the trench backfilled to within 300mm on the finished surface with 7 mm nominal size screenings free from dust and excessive fine materials.

The layer above the top of screenings to 100mm below finished surface shall be backfilled with approved fill compacted to the approval of the Superintendent.

The top 100mm shall be top soil stripped from areas to be excavated, lightly compacted to the approval of the Superintendent.

35.2 SERVICE TRENCHES AND CONDUITS

35.2.1 Service Conduits

35.2.1.1 Road Conduits

The Contractor shall supply and lay conduits for services under the roadway as shown on the Standard Detail Drawing and at locations shown on drawings.

a. Residential Subdivisions

Service conduits for gas and water to residential allotments shall be 50 mm diameter Class 12 PVC unless otherwise shown. Conduits for use by other authorities shall be as shown on the drawings.

b. Industrial/commercial subdivisions

Water and Gas conduits in industrial/commercial subdivisions shall be as follows:

- Water supply/fire service- 225mm
- Gas Service - 100mm

These conduits shall be Class 12 PVC, unless otherwise shown. Conduits for use by other authorities in industrial/commercial subdivisions shall be as shown on the drawings.

Conduits shall be laid at right angles to the road centreline unless otherwise shown and shall be graded evenly from end to end in lengths with a grade of at least 1 in 100 uniform fall to an existing or proposed water main or gas main unless otherwise directed. Spacing of conduits shall be 50 mm apart.

The ends of service conduits shall be plugged with a screwed cap, wooden discs or other approved material to prevent entry of soil and other material. The conduit shall be perfectly water tight throughout.

The minimum cover above a conduit laid below the subgrade shall be 150mm and not less than 525mm from top of kerb and conduits shall extend for a minimum of 600mm behind Backs of Kerb.. Where a capping layer is used the minimum depth to the top of conduit below the capping layer shall be 100mm.

HP **Backfilling of trenches shall not commence until approval of the laying of the conduit is given by the Superintendent.**

Backfill material shall be either Class 2 fine crushed rock containing 1% cement by volume or low permeability Class 4 fine crushed rock as defined in Table 35.2.1, compacted to 95% Australian Modified dry density in layers of 150 mm maximum loose thickness.

Table 35.2.1

Test	Test Value Class 4
Liquid Limit % (max)	40
Plasticity Index (range)	10 -20
California Bearing Ratio (%) (min) (+)	15
PI x % passing 0.425 mm AS Sieve (max)	600

(+) Value applicable to material passing 19.0 mm sieve: initially at optimum moisture content and 98% of maximum dry density as determined by test using Modified compactive effort, but then soaked for 4 days prior to the CBR test.

Adapted from VicRoads Section 812 – Table 812.051

The position of conduits shall be clearly marked on the face of the kerb using the symbols detailed on the Drawings. The markings shall be as follows:-

Conduit for water service	-	W, (50 mm high)
Conduit for gas service	-	G, (50 mm high)
Conduit for telephone service	-	T, (50 mm high)
Conduit for electricity service	-	E, (50 mm high)
Conduit for Council communications	-	C, (50 mm high)

It is the responsibility of the Contractor to ensure that the kerbs are marked accurately and neatly.

HP **The ends of conduits shall be left exposed for inspection by the Superintendent after the kerbs have been marked.**

If a kerb marking is inaccurate or otherwise unsatisfactory, the bay/s of kerb and channel containing the marking shall be removed and replaced at the Contractor's expense.

35.2.1.2 Telecommunications (Optic Fibre) Conduit

Conduits, associated fittings, caps, haul rope and installation are to be provided in accordance with AS/NZS 2032, ACIF C524, AS/ACIF S008, AS/ACIF S009 and manufacturers' recommendations.

Conduits shall be white, stamped "communications" and comply with AS/ACIF S008:2006, ACIF C524:2004 and the following:-

Nominal Diameter	OD	Wall	Bore	Effective Length	Socket Length	Bend Radius Minimum
mm	mm	mm	mm	metres	mm	mm
20	19.7	1.8	16.1	4	16	400
25	24.7	1.8	21.1	4	20	500
32(35 Tel)	31.7	2.1	27.5	4	25	640
50	49.7	2.8	44.1	4	40	1000
100	114.1	4.5	105.1	6	99	N/A
150	160.0	6.3	147.4	6	124	N/A

Attention is drawn to the fact that the nominal sizes of conduits 20 to 63 refer to outside diameter, whereas sizes 65 to 150 refer to approximate internal diameter.

The Contractor shall lay communications conduits as specified in Clause 35.2.1.1, Road Conduits.

Conduit ends shall be perpendicular to the pit wall and be terminated with bell mouth ends flush with the internal pit wall. Conduit to conduit and flanged entry connections shall be free of sharp edges, glued and sealed to prevent ingress of water, gas or silt.

Conduits shall be constructed with a minimum cover below finished surface of 450 mm in naturestrips and 600 mm beneath road pavement or shared driveways.

'COMMUNICATIONS' identification tape 100mm width shall placed above all conduits at a depth of 300 mm below final ground level.

Each conduit shall be provided with white coloured 4 mm Nylon haul rope

PVC caps shall be installed to all conduit ends not terminating at a pit including property lead-ins.

Pits within unpaved naturestrips shall be medium density polyethylene telecommunications pits with medium duty concrete lids having corrugated plastic gaskets under the lids. Pit covers shall not encroach into footpaths and be located 1 metre clear of kerb ramps and vehicular crossings.

35.2.1.3 Footpath Conduits

Property "service drop" conduits shall be located 6.0m offset from a side boundary with 150mm clearance to property (house) drainage connection lines and other conduits for gas and water services.

Property "service drop" conduits shall terminate 500 mm inside the property boundary and the conduit positions shall be accurately and neatly marked on the front of the footpath in the manner outlined in Clause 35.2.1.1, Road Conduits.

SECTION 38 – STABILIZED SUB-BASE PAVEMENT LAYERS

REV. 7	January 2011	38.1
REV 6	August 2003	No amendments
REV. 5	July 2003	No amendments
Rev. 4	June 2003	Section 38 added
Revision No.	Date	Affected Clause

SECTION 38 – STABILIZED SUB-BASE PAVEMENT LAYERS

38.1 DESCRIPTION

This section covers the requirements of materials and construction for lime and lime/cement stabilized sub-base pavement layers.

- The requirements relate only to preparation of soil, quality of lime, spreading and mixing and compaction of the stabilized layer(s) that are shown on construction plans as being a pavement layer approved by Council. This section does not apply to the use of stabilizing agents in the treatment or replacement of soft subgrades.
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38.2 STANDARDS

- Materials for stabilized sub-base pavement layers shall be in accordance with VicRoads Standard Specifications for Roadworks:
-
    - Section 290 - Materials and Construction for Lime Stabilized Sub-base Pavement Layers.
    - Section 307 – In situ Stabilization of Pavements with Cementitious Binders.

38.3 SCHEDULE OF DETAILS

Compacted thickness of stabilized layer (VicRoads Section 290, Clause 290.03) shall not exceed 150mm.

Schedules of details in accordance with VicRoads Section 290.10 and Section 307.16 shall be submitted to the Manager Engineering Services. The work shall not be undertaken until the pavement design, incorporating the proposed stabilized layer(s) and the schedules of details, have been approved by the Manager Engineering Services.

SECTION 40 - CRUSHED ROCK FOR BASE AND SUB-BASE PAVEMENT

REV. 7	January 2011	No amendments
REV 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	No amendments
REV. 3	May 2003	No amendments
REV. 2	March 2003	No amendments
REV. 1	February 2003	40.1
Revision No.	Date	Affected Clause

SECTION 40 - CRUSHED ROCK FOR BASE AND SUB-BASE PAVEMENT

40.1 DESCRIPTION

This section covers the requirements of Crushed Rock and Plant Mixed Wet-Mix Crushed Rock (PMWMCR) for:

Classes 1 and 2 base	20 mm and 40 mm nominal size	produced from igneous or metamorphic source rock
Class 3 subbase	20 mm, 40 mm and 75mm nominal size	

The requirements relate to quality of source rock and properties of the product.

The classes and nominal sizes shall be as specified in the Works Specification and/or the drawings.

40.2 STANDARDS

Materials for Crushed Rock and Plant Mixed Wet-Mix Crushed Rock (PMWMCR) shall be in accordance with VicRoads Standard Specifications for Roadworks:

Sections 170 - Examination and Testing of Materials and Work (Supply Contracts Only),
Section 801 - Source Rock for the Production of Crushed Rock and Aggregates and
Section 812 – Crushed Rock and Plant Mixed Wet-Mix Crushed Rock for Base and Subbase Pavement, (current issues).

40.3 MINIMUM TESTING REQUIREMENTS

Unless otherwise directed by the Superintendent, the Contractor shall carry out the following checks on the crushed rock in accordance with current test methods and procedures used by the Road Construction Authority and AS3798-1966.

Test	Minimum Frequency of Testing
Sand Equivalent[+]	One per 300 tonnes or part thereof
Grading	One per 300 tonnes or part thereof
Unsound Rock	One per 300 tonnes or part thereof
Moisture Content - Crushed Rock - PMWMCR	 One each day One each day - one per 200 tonnes or part thereof
Plasticity Index	One per 20,000 tonnes or part thereof
California Bearing Ratio	Prior to the commencement of work and when in the opinion of the Superintendent the nature of the material has changed significantly.
Degradation Factor - Crusher Fines (imported)	One per day
[+] Not applicable to Class 3 subbase.	

SECTION 45 - CEMENT TREATED CRUSHED ROCK

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	No amendments
REV. 3	May 2003	No amendments
REV. 2	March 2003	No amendments
REV. 1	February 2003	No amendments
Revision No.	Date	Affected Clause

SECTION 45 - CEMENT TREATED CRUSHED ROCK

45.1 DESCRIPTION

This section covers the requirements for cement treated Class 3 crushed rock, size 20mm and 40mm nominal, for base and subbase pavement, produced from source rock of any type. The requirements relate to quality of source rock, and properties of the product.

The nominal sizes shall be as specified in the special clauses and/or the drawings and/or the schedule.

45.2 STANDARDS

Materials for Cement Treated Crushed Rock shall be in accordance with VicRoads Standard Specifications for Roadworks:

Sections 170 - Examination and Testing of Materials and Work (Supply Contracts Only),
Sections 815 – Cementitiously Treated Crushed Rock for Subbase Pavement and
Sections 821 – Aggregate for Sprayed Bituminous Surfacing (current issues).

45.3 MINIMUM TESTING REQUIREMENTS

The Contractor shall test the Cement Treated Crushed Rock at a frequency which is sufficient to ensure that all material supplied under the Contract complies with the specified requirements. The frequency shall not be less than that shown in Table 45.3.1.

The Superintendent may agree to a lower frequency of testing 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 45.3.1 - Minimum Frequency of Testing

Test	Minimum Frequency of Testing
Grading	One per 300 tonne or part thereof
Unsound Rock	One per 300 tonne or part thereof
Cement Content	One per 100 tonne or part thereof
Moisture Content	One per 100 tonne or part thereof
Plasticity Index	One per 20,000 tonne or part thereof
Degradation Factor - Crushed Fines (imported)	One per day

SECTION 50 - GRAVEL, SAND AND SOFT OR RIPPED ROCK

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	No amendments
REV. 3	May 2003	No amendments
REV. 2	March 2003	50.3
REV. 1	February 2003	50.3.1
Revision No.	Date	Affected Clause

SECTION 50 - GRAVEL, SAND AND SOFT OR RIPPED ROCK

50.1 DESCRIPTION

This section covers the requirements for gravel, sand and soft or ripped rock, including mixtures thereof and materials to be broken to size on the roadbed.

50.2 STANDARDS

Materials for Gravel, Sand and Soft or Ripped Rock shall be in accordance with VicRoads Standard Specifications:

Section 170 - Examination and Testing of Materials and Work (Supply Contracts Only),
Section 811 – Gravel Sand and Soft or Ripped Rock for Base and Subbase Pavement
Section 832 – Sands for Sprayed Bituminous Surfacing
(current issue).

50.3 PHYSICAL PROPERTIES AND GRADING – SUBGRADE IMPROVEMENT

The subgrade improvement material used for capping purposes, such as 'Craigeburn Clay' shall consist of durable particles and binder. It shall be free of vegetable matter and lumps or balls of clay or other deleterious matter.

When tested in accordance with the appropriate test methods, material shall meet the following specification:

50.3.1 Properties

Physical Properties			Limits of Grading (% Passing) After Compaction Sieve Size AS (mm)			Plasticity Index x % passing 0.425 mm after compaction (max.)	Plasticity Index (max) After Compaction
CBR (min) (%)	Swell (max) (%)	Permeability (max) m/s	75.0	4.75	0.075	1000	25
7	1	5×10^{-9}	100	50 - 80	10 - 40		

Note:

CBR and Swell values are to be determined on specimens obtained from fraction of material passing 19.0mm sieve, compacted at optimum moisture content and 98% of maximum dry density as determined by test using Standard Compactive effort, and soaked for 4 days prior to testing for CBR and Swell.

The Permeability value is to be determined on specimens obtained from that fraction of material which passes a 19.0mm AS sieve, compacted at optimum moisture content and 98% of maximum dry density as determined by testing using Standard Compactive effort as for CBR and Swell.

50.3.2 Grading Requirements

The Contractor shall submit a sample, the grading of which complies within the limits of the grading requirements in Table 50.3.2.

Following approval of the sample, the Contractor will be given a set of grading limits based on the approved sample but within the limits set out in the following table of grading requirements:

Table 50.3.2 - Grading Requirements (percentage passing by mass)

Sieve Size - AS Sieve (mm)										
150	75	37.5	26.5	19	13.2	9.5	4.75	2.36	0.425	0.075
100	100 to 95	-------- Limits to be supplied -------- (% passing by mass)								25.0

Approval of the sample shall not constitute approval of all material from the source of supply. All material shall comply with the grading limits determined from the sample and with all other requirements of the specification.

50.3.3 Sample Size

Prior to the commencement of work, and on request at other times during the Contract, the Contractor shall prepare samples of each material and make them available to the Superintendent. The size of the sample shall be related to the maximum particle size of the material:

Table 50. 3.3 – Sample Size for Testing

Maximum Particle Size	Sample Size
75 mm or less	25 kg
Greater than 75 mm	50 kg

The Contractor shall not proceed, or continue, with placement of the material until tests on the sample have been performed and approval of the Superintendent given to proceed.

50.3.4 Testing of Sample

All tests shall be conducted in accordance with the VicRoads current standards.

Table 50.3.4 - Sample Testing Methods

Test	Test Method
Securing Bulk Samples	300
Mechanical Analysis	302
Sand Equivalent	306
Moisture Content	315-317
California Bearing Ratio	330
Liquid Limit	332
Plasticity Index	335
Texas Ball Mill	341

50.4 MINIMUM TESTING REQUIREMENTS

The Contractor shall test the material at a frequency which is sufficient to ensure that all material supplied under the Contract complies with the specified requirements as indicated in the Works Specification for this Contract.

SECTION 55 - FLEXIBLE PAVEMENT CONSTRUCTION

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	No amendments
REV. 3	May 2003	No amendments
REV. 2	March 2003	No amendments
REV. 1	February 2003	No amendments
Revision No.	Date	Affected Clause

SECTION 55 FLEXIBLE PAVEMENT CONSTRUCTION

55.1 DESCRIPTION

This section covers the requirements for the use of Gravel, Sand, Soft or Ripped Rock, Crushed Rock or Crushed Concrete pavement materials, for the construction of pavement courses (including shoulders).

55.2 STANDARDS

All work for flexible pavements construction shall be in accordance with VicRoads Standard Specifications for Roadworks:

Section 304 – Flexible Pavement Construction,
Section 306 - Construction of Cementitiously Treated Subbase Pavement
Section 310 – Preparation of Pavement for Sprayed Bituminous Surfacing
Section 322 - Site Wet-Mixing of Crushed Rock, and
Section 323 – Cartage of Site Mixed Wet-Mix Crushed Rock
(current issues).

55.3 MINIMUM TESTING REQUIREMENTS

For the purposes of this Contract this Subclause 55.3 shall replace VicRoads Standard Specifications for Roadworks – Flexible Pavements, Sections 304.08.

The Contractor shall carry out testing at a frequency which is sufficient to ensure that work performed under the Contract complies with the specified requirements but which is not less than that shown in Table 55.3.1.

*****Table 55.3.1 - Minimum Frequency of Testing for Compaction**
(This Table replaces Table 304.081)

Material	Acceptable lot size	Percentage of lots to be tested (minimum)		
		Scale A	Scale B	Scale C
Base	*	70	50	30
Sub Base	*	50	50	30
Lower Sub Base	*	30	30	*

***** On discretion of the Superintendent.

The Contractor shall initially test every lot for acceptance in accordance with the requirements of the Specification. Testing of every lot shall continue until three consecutive lots of like material or work have achieved the specified standard when tested for the first time. The Contractor may reduce the frequency of testing to the minimum testing requirements specified after satisfying the above requirement.

If the Contractor has satisfied the above requirement and is testing lots at the minimum frequency and any lot fails to achieve the specified standard, the Contractor shall test all subsequent lots until three consecutive lots of like material or work have achieved the specified standard, at which time the frequency of testing may again be reduced to the minimum requirement.

For the purposes of this sub-clause, acceptance of compaction for small areas as defined in Section 15 will not be regarded as satisfying the initial testing requirements stated above.

55.4 PROTECTION OF COMPACTED LAYERS

For the purposes of this Contract this Subclause 55.4 shall replace VicRoads Standard Specifications for Roadworks – Flexible Pavements, Sections 304.09.

The surface of any compacted layer shall be kept moist, in good order and condition, well drained and free from contamination until any subsequent pavement work under the Contract is commenced or the Council accepts and takes responsibility for that part of the Works.

Council will, following inclement weather, undertake further proof rolling to ascertain whether the pavement layer has in fact been affected in accordance with Section 15.

55.5 GRADING OF PAVEMENT MATERIAL AFTER COMPACTION

Material shall comply with the relevant grading requirements of VicRoads Standard Specifications for Roadworks – Flexible Pavements, Sections 304.10, Table 304.103, as described in the Works Specification of this Contract.

55.6 REQUIREMENTS FOR TESTING AND ACCEPTANCE OF COMPACTION

Testing and acceptance shall comply with the relevant requirements of VicRoads Standard Specifications for Roadworks – Flexible Pavements, Sections 304.07(a), Table 304.11, as described in the Works Specification of this Contract.

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SECTION 60 - PRIMING, PRIMER SEALING AND SEALING.

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	No amendments
REV. 3	May 2003	No amendments
REV. 2	March 2003	No amendments
REV. 1	February 2003	60.1.6.1, 60.2.6b)
Revision No.	Date	Affected Clause

SECTION 60 - PRIMING, PRIMERSEALING AND SEALING

60.1 PRIMING

60.1.1 General

This section covers the requirements for spray priming of crushed rock prior to the laying of any asphalt where included in the Works Specification and/or the drawings.

60.1.2 Standards

All material supply and work for priming treatments shall comply with the following:

VicRoads Standard Specifications - Section 408 – Sprayed Seal Treatments (current issue)
AS 2157 Cutback Bitumen
AS 2341 Methods of Testing Bitumen and Related Roadmaking Products

60.1.3 Cutback Bitumen

Priming of the Crushed Rock shall be carried out with Cutback Bitumen complying with AS 2157 Grade AMC 'O', unless otherwise approved by the Superintendent.

60.1.4 Preparation of Surface

All dust, clay, silt and other deleterious material shall be removed from the pavement surface. The Contractor will sweep the pavement with a mechanical broom, if so directed by the Superintendent.

60.1.5 Payment Approval

Priming shall be carried out only after approval of the Fine Crushed Rock surface by the Superintendent. The Contractor shall give the Superintendent at least two working days notice of the intention to commence priming. The Contractor shall only carry out priming in the presence of the Superintendent.

60.1.6 Spraying Procedure

60.1.6.1 Measurement and Application

Priming shall only be carried out using positive displacement equipment. Compressed air displacement equipment will not be permitted.

Measurement and application rates shall be as per the design submitted and in accordance with VicRoads Standard Specifications - Section 408 and Table 408.141

60.1.6.2 Weather Conditions for Spraying

Spraying shall not be carried out when the air temperature is less than 15 degrees C.

Spraying shall also be deferred if rain is expected before an application will have time to be completely absorbed.

60.1.6.3 Spraying Temperature

The primer shall be sprayed at a temperature of between 134 degrees C and 185 degrees C.

60.1.6.4 Application Rate

The nominal application rate shall be between 0.8 and 1.0 litres per square metre as directed by the Superintendent.

Where the application rate is not nominated in the Contract the Director Infrastructure & Technologymay authorise a different application rate.

60.1.6.5 Protection From Traffic

No traffic shall be permitted on the primed surface until 24 hours after the complete absorption of the primer. After that time, and at the responsibility of the Contractor, the primed surface may be opened for traffic until being prepared for asphalt surfacing.

In locations requiring the passage of traffic or where directed by the Superintendent, primed surfaces shall be gritted. At least two hours shall elapse between application of primer and grit unless otherwise directed.

60.1.6.6 Asphalt Surface (Timing)

No asphalt base course shall be placed on the primed surface until a period of at least four (4) days has elapsed or, having regard to the weather, such longer period as may be directed by the Superintendent.

60.2 PRIMERSEALING AND SEALING

60.2.1 General

This section covers the requirements for primer-sealing and sealing. The requirements relate to supply of bituminous materials, preliminary work, cleaning of the surface to be treated, and supply, delivery and application of bituminous materials and aggregates. Types of work and materials and nominal rates of application shall be as specified in the Works Specification for this Contract.

60.2.2 Standards

All material supply and work for priming, primer-sealing and sealing surface treatments shall be in accordance with VicRoads Standard Specifications for Roadworks – Sprayed Seal Treatments, Sections 408, 802, 831 and 832 (current issue of each).

60.2.3 Aggregate

Aggregate shall be supplied by the Contractor. The aggregate supplied by the Contractor shall comply with VicRoads Standard Specification Section 831 - Aggregate for Sprayed Bituminous Surfacing.

60.2.4 Sand

Sand shall be supplied by the Contractor. The sand supplied by the Contractor shall comply with VicRoads Standard Specification Section 832 - Sands for Sprayed Bituminous Surfacing.

60.2.5 Pre-coating of Aggregate

For sealing, aggregate that has not previously been pre-coated with cutback bitumen, shall be pre-coated with material as specified. Adhesion agent shall be added to the aggregate pre-coating material if specified or directed by the Superintendent.

Such pre-coating shall be carried out during the loading operation so that each aggregate particle is uniformly coated.

60.2.6 Conditions for Spraying

(a) Pavement

The surface on which primer or binder is to be applied shall be dry. The surface on which primer-binder is to be applied shall be damp.

(b) Ambient Temperature

Unless otherwise approved by the Superintendent, spraying shall not be carried out when the air temperature is less than that specified in Table 60.2.6.1, except that:

(i) primer-sealing may be carried out when the air temperature is between 5°C and 15°C if work is so arranged that the aggregate is applied to the primer binder within ten minutes of spraying;

(ii) sealing with high binder content CRS emulsions may be carried out when the air temperature is not less than 8°C.

Table 60.2.6.1

Type of Work	Air Temperature °C (minimum)
Primer-sealing	15
Sealing	15

60.2.7 Spraying and Covering

(a) General

Work shall not proceed until there is sufficient material, suitable plant and personnel on site to carry out the work as specified.

(b) Spraying of Bituminous Material

Bituminous material shall be sprayed uniformly to the specified areas using a sprayer to produce a film of material of consistent application over the road surface at the design rate of application.
The work shall be so planned as to minimise spraying by hand and hand spraying in the wheel paths shall be avoided.

Each sprayer run shall overlap any adjacent run by 50 mm to 100 mm.

Except where the surface to be primed abuts an existing edging, structure or bituminous surface, the primer shall be applied at least 100 mm wider than the width of the proposed seal.

Spraying of any load of primer-binder or binder shall not commence unless sufficient aggregates to cover the area to be sprayed is at the work site in trucks.

The work shall be carried out in such a manner as to minimise the number of cold joints in the work. Unless otherwise specified, all joints shall be located at the traffic lane lines or the centre of a traffic lane.

Traffic shall be stopped while spraying is in progress. Unless otherwise specified, traffic shall not be stopped for more than 15 minutes while material is being sprayed and covered.

(c) Papering and Other Protection

The Contractor shall lay paper at the start and finish of each sprayer run to ensure a clean cut-on and cut-off. The paper shall be Kraft 215 g/m² or an equivalent.

Edgings, raised pavement markers, adjoining structures and drainage pit covers and sections of roadway not required to be treated shall be protected from splash and all necessary precautions shall be taken to protect traffic and parked vehicles from airborne bituminous material.

For primer-sealing and sealing, paper used for cut-ons, cut-offs and protection of edgings and structures shall be held in place by weighting down with small quantities of aggregate from the same stockpile as used for the work.

At the cessation of work each day, the Contractor shall remove from the site all paper and other protective materials.

(d) Loading of Aggregates

Aggregates shall be screened to remove undersize material as part of the loading operation. The size of wire screens to be used to remove undersize material are:

(i) Size 16 aggregate or larger - 9.0 mm

(ii) Size 10 and Size 14 aggregate - 6.3 mm

(iii) Size 5 and size 7 aggregate - 3.15 mm

(iv) Sand - No screen required.

The Contractor shall be responsible for replacing or cleaning aggregate contaminated as a result of the Contractor's operations, and if conditions of the stack site permit, for windrowing and winning any excess material left on stack site floors.

Aggregate shall be pre-coated in accordance with Clause 60.2.5

(e) Spreading of Aggregates

Spreading of aggregates shall be carried out using aggregate spreaders. All binder or primer-binder shall be fully covered with aggregate within 20 minutes of spraying.

Aggregates shall be spread at the design application rate to evenly cover the film of bituminous material in a uniform mat. Any aggregate spilt on areas to be treated, shall be removed prior to further spraying over such areas.

(f) Gritting of Primed Surfaces

In locations requiring the passage of traffic or where directed by the Superintendent, primed surfaces shall be gritted. At least two hours shall elapse between application of primer and grit unless otherwise directed.

(g) Rolling

Rolling shall be carried out with self propelled pneumatic tyred multi-wheeled rollers weighing not less than 6.5 tonnes with the rear wheels offset relative to the front wheels to give overlapping tyre paths.

Rolling shall commence immediately after the aggregates have been spread and shall continue uniformly over the whole area until at least 95% of aggregate particles are bedded down into the binder or primer-binder to the satisfaction of the Superintendent. Any areas of binder not adequately covered after initial spreading shall be covered during the rolling process by additional

spreading or drag brooming as specified in Clause 60.2.7(h) to the satisfaction of the Superintendent.

Rolling shall be carried out such that every 4000 m² of seal/primer-seal receives a minimum continuous rolling of four roller hours within two hours of the binder being sprayed.

(h) Drag Brooming

When size 10 or smaller aggregates are used, drag brooming shall be done in conjunction with rolling to ensure that a uniform distribution of aggregates is achieved.

60.2.8 Removal of Excess Aggregate

The Contractor shall remove the excess aggregate from the pavement, pits, kerb and channel and concrete paving by brooming off on to the unsealed shoulder or by use of a suction cleaner. If a suction cleaner is used, it shall remove aggregate by suction only.

Excess aggregate shall not be removed until the aggregate has properly bedded down into the binder by either trafficking or additional rolling. Removal shall take place between 6 hours to 48 hours after being sealed or primer-sealed, unless otherwise specified.

No more than 40 loose stones in any square metre of pavement shall remain after the removal of excess aggregate.

Any damage done to the seal due to the removal of excess aggregate shall be repaired by the Contractor at no cost to Principal.

60.2.9 Supervision

The Contractor shall afford the Superintendent every facility to check rates of application, temperatures and quantities and to take samples.

60.2.10 Testing and Acceptance

(a) Samples

When requested by the Superintendent at any time during the Contract, the Contractor shall provide up to three one litre samples of each bituminous material required under the Contract.

(b) Tests

The Contractor shall provide certification of specification compliance for each delivery of primer, primer-binder or binder supplied to the work site.

All tests shall be conducted in accordance with VicRoads relevant test method and Codes of Practice.

(c) Inspection

Prior to the Contractor leaving the site; the Works shall be jointly inspected by the Superintendent and the Contractor's representative. During the inspection the parties shall identify any defects in the Works requiring immediate rectification so as to avoid rapid deterioration of the road surface or danger to road users.

(d) Acceptance of Work

Further to the provisions of VicRoads Standard Specifications for Roadworks Clause 408.12 and Clause 30 of the General Conditions of Contract, the work shall be assessed in accordance with VicRoads Standard Specifications for Roadworks – Sprayed Seal Treatments - Tables 408.121, 408.122 and 408.123.

60.2.11 Schedule of Details

The schedule of details for sprayed seal pavement construction in this Contract shall be in accordance with VicRoads Standard Specifications for Roadworks – Sprayed Seal Treatments – Table 408.141 - Schedule of Details, as indicated in the Works Specification for this Contract.

60.2.12 Stack Site Locations

The schedule of stack site locations for this Contract shall be in accordance with VicRoads Standard Specifications for Roadworks – Sprayed Seal Treatments – Table 408.142 – Stack site Locations, as indicated in the Works Specification for this Contract.

SECTION 65 - HOT MIX ASPHALT

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	No amendments
REV. 3	May 2003	No amendments
REV. 2	March 2003	No amendments
REV. 1	February 2003	65.2
Revision No.	Date	Affected Clause

SECTION 65 - HOT MIX ASPHALT

65.1 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 and 20. The requirements relate to quality of materials, mix design, supply and placing of the asphalt.

65.2 STANDARDS

Requirements for the manufacture and placing of hot mix asphalt shall be in accordance with VicRoads Standard Specifications for Roadworks – Hot Mix Asphalt , Sections 407 (current issue).

65.3 ASPHALT REQUIREMENTS

Asphalt requirements shall be as specified in VicRoads Standard Specifications for Roadworks – Hot Mix Asphalt, Sections 407.

SECTION 75 - NATURE STRIPS

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	75.2, 75.5, 75.6, 75.7, 75.8.
REV. 3	May 2003	75.1, 75.3, 75.5, 75.6.
REV. 2	March 2003	No amendments
REV. 1	February 2003	75.1, 75.3, 75.5
Revision No.	Date	Affected Clause

SECTION 75 : NATURE STRIPS

75.1 EXTENT

Nature strips shall mean all the areas within the Road Reserve and those areas nominated on the drawings which are not to be paved with concrete, asphalt or other paving material under terms of this Contract.

Nature strips shall have a minimum covering of 100mm of loam top soil.

75.2 STAGES OF CONSTRUCTION OF NATURE STRIPS

The work of construction, maintenance and completion of nature strips falls into several stages with certain work required in each stage namely:

a) Preliminary formation (for reconstruction works and adjacent to existing occupation).

b) During construction stage (for reconstruction works and adjacent to existing occupation).

c) Final construction of nature strips (for all works).

75.3 PRELIMINARY FORMATION

The formation includes all work required to bring the top surface of the nature strips to the final level although not necessarily with nature strip material as specified below, and this work shall be paid for as part of the formation item.

Therefore as the other work of this Contract proceeds the Contractor shall carry out sufficient grading and surfacing of the nature strips to:

a) Provide and maintain suitable and safe vehicle and pedestrian access to all adjoining properties to the satisfaction of the Superintendent.

b) Ensure satisfactory drainage such that no water discharges onto Private Land.

In this sub-clause the expression surfacing means placing a sufficient quantity of loamy or sandy material approved by the Superintendent to any place or places which the Superintendent considers cannot be safely and comfortably traversed owing to the presence of clayey, sticky, slippery or otherwise unstable material.

75.4 DURING CONSTRUCTION STAGE

While other parts of the work are being constructed the Contractor shall maintain the nature strips in a safe passable and drainable condition. If he intends to use the material then in the nature strips as the final material the Contractor shall take steps to keep the material in such a condition that it shall comply with the requirements specified below.

75.5 FINAL CONSTRUCTION OF NATURE STRIPS

HP Prior to topsoiling of nature strips earthworks shall comply with the requirements of Section 20 – 'Earthworks' and Section 35 - 'Stormwater Drains and Conduits' of this specification.

a) When all other Works of this Contract have been completed or, in the case of several streets in one contract, when sufficient length has in the opinion of the Superintendent been completed, the Contractor shall grade and finish the nature strips accurately to the levels, grades and sections shown on the drawings.

b) The shape, compaction and finish of nature strips shall be in accordance with this specification and the drawings and to the satisfaction of the Superintendent. The finished surface of the nature strips shall a raked surface free of lumps and clods of earth in excess of 25mm in diameter. The surface shall be such that property owners will be able to easily mow any grass growth on a unimproved nature strip with a conventional domestic rotary power lawn mower.

The finish of the nature strip shall also be such that the property owner can undertake establishment of lawn without further work other than minor manual surface preparation such as raking and light topdressing.

c) If the soil in the nature strip areas or any portion of those areas does not comply with the requirements of this specification the Contractor shall remove all such soil and replace it with the requirements of this specification.

d) Unless in the opinion of the Superintendent the soil in the nature strips or that being placed thereon contains sufficient moisture for satisfactory compaction the Contractor shall water the same prior to the final compaction.

If the soil contains too much moisture for satisfactory compaction the final compaction shall be delayed until the excess water has been removed.

75.6 FORMATION PREPARATION

The formation under nature strips (100mm below finished surface) is to be trimmed to levels shown on the drawings and compacted to a dry density of not less than 95% Australian Standard Maximum Dry Density in layers not exceeding 200mm loose thickness.

75.7 MATERIAL REQUIRED

The top 100mm (minimum) of soil in the nature strip shall be of approved locally sourced or insitu loam top soil and shall comply with the following specification:

a) Contains sufficient humus plant foods to render it suitable in the opinion of the Superintendent for the growth and maintenance of grass lawns.

b) Is free of gravel, stones, sticks, tins, iron, wire, roots, noxious weeds, builders' and contractors' scrap refuse and rubbish of all kinds and anything which would be deleterious to the establishment growth and/or maintenance of grass lawns.

The nature strips are an integral part of the formation work in this Contract. The Contractor shall make adequate allowance in the relevant schedule items for all materials, plant and labour necessary for the completion of this section of the Works.

75.8 COMPACTION OF TOPSOIL

Topsoil placed on nature strips shall be slightly over filled, watered in and lightly rolled to conform to design levels shown on the drawings.

SECTION 80 - BEACHING

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	No amendments
REV. 3	May 2003	No amendments
REV. 2	March 2003	No amendments
REV. 1	February 2003	No amendments
Revision No.	Date	Affected Clause

SECTION 80 - BEACHING

80.1 DESCRIPTION

This section covers the requirements for the supply and placing of rock, stone or manufactured block beaching for the protection of batter slopes, drainage channels and culvert endwalls as shown on the drawings.

80.1.1 Standards

All works shall be carried out in accordance with VicRoads Standard Specification - Section 713 – Beaching (current issue)

SECTION 85 - STONE RETAINING WALL WORKS

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	No amendments
REV. 3	May 2003	No amendments
REV. 2	March 2003	No amendments
REV. 1	February 2003	85.3, 85.5
Revision No.	Date	Affected Clause

SECTION 85 - STONE RETAINING WALL WORKS

85.1 DESCRIPTION

The work to be carried out under this Contract shall include the supply of all labour, materials and plant required for the construction of retaining walls as detailed in the drawings and as specified hereinafter.

85.2 MATERIALS

(a) Stone Materials - Stone used in the construction shall be sound and hard bluestone or other approved rock. The stones shall not be smaller than 150mm x 300mm in two dimensions and weigh not less than 5.4kg each.

(b) Concrete Materials

(i) Foundations - Concrete for use in foundations shall comply with the requirements of Section 30 - Concrete.

(ii) Cement Mortar - Cement Mortar for bedding of stones and packing between stones shall consist of 1 part cement, 2 parts screened bluestone dust and 4 parts washed concrete sand.

The mortar shall be mixed on site in an approved mechanical mixer to a consistency producing a slump of not more than 125mm when tested in accordance with AS 1012, Part 3.

85.3 FOUNDATION

A trench shall be excavated to a depth and width sufficient to permit construction of the concrete foundation.

The subgrade shall be approved by the Superintendent prior to the placement of the foundation.

Soft, wet or unstable areas of depths less than 150mm below the designed levels of the subgrade and all soft, wet or unstable areas of depths greater than 150mm which, in the opinion of the Superintendent, have been caused by the Contractor's negligence or improper methods, shall be excavated and replaced with approved stable material spread and compacted at the Contractor's own expense.

The Contractor shall make and secure the excavation so that the safety of the public and of personnel engaged in the Works will not be endangered. The Contractor shall properly shore all excavations where necessary so as to ensure safe working in and around the excavation and to prevent any building and other structures, road or road surface over and adjacent to the line of the Works from settling, cracking, being shaken, slipping or from falling in.

For the duration of the open excavation sufficient and adequate shoring shall be maintained to prevent any portion of the floor, sides, roofs and end faces of excavations beyond the exact cross-sections and dimensions determined on, from slipping, falling, running in through joints and open space in the shoring. The Contractor shall maintain the said shoring, to the satisfaction of the Superintendent, until the completion of the work. The Contractor shall be held entirely responsible for the strength and safety of all shoring.

Concrete for the foundation shall be placed and compacted in accordance with Section 30 - Concrete.

85.4 CONSTRUCTION

The retaining wall shall be constructed one course at a time for the full length. Placement of screenings behind the wall shall progress with each course. The first course of stones shall be set in a cement mortar bed on the concrete foundation. The vertical face between stones shall be filled with cement mortar. The second course of stones shall be constructed on top of the first in a similar manner and this procedure shall be continued until completion of the wall.

If pitchers are being used for construction, the perpendicular joints between courses shall be staggered. If random stones are being used, the larger stones shall be placed in the lower course. Stones of suitable shape and size shall be placed at frequent intervals to act as keys into the bank behind the wall and the top course be of selected spalls.

Stones shall be selected so that the best face is visible. The width of the retaining wall shall be not less than 200mm at the top and the layer of screenings behind the wall shall a minimum width of 150mm extending the full length and height of the wall.

The face of the retaining wall shall be constructed to have a slope of 8 vertically to 1 horizontally (8 in 1) unless otherwise stated and the bank shall be graded from the back of the screenings up to natural surface at a batter of 1 in 3.

Openings for vehicular crossings shall be provided in the wall where shown on the drawings or where directed by the Superintendent.

The retaining wall shall be returned at such openings in the following manner. The top of the wall shall be continued around at the same level and the bottom shall be stepped up until the wall reaches a height of 600mm or until the wall meets the property boundary, whichever is the sooner.

85.5 RELIEF DRAINS

Provision shall be made in the concrete foundation for installation of 100mm diameter UPVC. or R.C. pipe relief drains as shown on the drawings. These drains shall be laid from the foundation to the A.G. trench behind the kerb and channel. The opening in the foundation shall be backfilled with 10mm nominal size screenings.

Relief drains shall be located either on the uphill side of a vehicular access to a property or opposite the downhill side boundary of a property as shown on the drainage or as directed by the Superintendent. The maximum distance between relief drains shall be 17 metres.

SECTION 90 - SIGNS AND GUIDEPOSTS

REV. 7	January 2011	No amendments
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	90.6 added (Guide Posts)
REV. 3	May 2003	No amendments
REV. 2	March 2003	90.4, a,d, 90.5d
REV. 1	February 2003	90.4, a,b,c.
Revision No.	Date	Affected Clause

SECTION 90 - SIGNS AND GUIDEPOSTS

90.1 DESCRIPTION

This section covers the requirements for the handling, storage and erection of signs and sign supports.

90.2 SUPPLY OF MATERIALS

All signs, posts, fittings, other materials, equipment and labour necessary to erect the signs, including cement or concrete for post hole backfill shall be supplied by the Contractor.

The manufacture and packaging of all road signs, both permanent and temporary, which are made with steel or aluminium substrates shall be accordance with VicRoads Standard Specifications for Roadworks – Materials, Sections 860 – Manufacture of Road Signs (current issue).

90.3 CONSTRUCTION TOLERANCES

(a) Foundations

Concrete foundations shall be poured such that the finished surface of foundation is flush with the finished surface at the base of the sign.

(b) Posts

(i) Posts are to be straight and plumb to within a tolerance of 1 in 100.

(ii) Post tops are to be 50± 10 mm below the top edge of the signboard.

(c) Signs

(i) Signs are to be mounted level to within a tolerance of 1 in 100.

(ii) Signs shall be mounted symmetrically on their posts unless shown as offset in the assembly drawings or directed by the Superintendent.

(iii) Where an assembly consists of two or more signs above each other, the signs shall be mounted with the adjacent edges touching unless otherwise shown on the sign assembly drawings.

(iv) The faces of the signs shall present an even surface free from twists, cracks, indentations or any other faults after erection.

90.4 ERECTION OF SIGN POSTS

All signs shall be erected so as to comply with the requirements of AS1742.2 : Manual of Uniform Traffic Control Devices - Traffic Control Devices for General Use and Standard Detail Drawing (SD 801).

Before the erection of posts proceeds, the Superintendent will review and confirm the required positions of all posts and signs.

(a) Steel Posts

Signs to be mounted on two or more posts shall have posts positioned such that the sign face is rotated away from the approaching traffic to avoid specular reflection. Unless otherwise shown on the drawings, posts shall be positioned such that the sign is rotated away from the normal cross section by an amount equal to one tenth of the width of the sign.

Where steel posts are to be mounted in sockets, the Contractor shall supply and fix a 'Gib' key to lock the post to the socket and prevent movement or rotation of the post in the socket.

Hardwood posts specified as frangible shall be set such that the centre of the lower hole of each post is between 50 mm and 125 mm above the finished surface at the base of the post.

(b) Foundations

All posts shall be set in concrete footings to Standard Detail Drawings (SD810)

For 50 mm to 150 mm Nominal Bore steel posts - 300 mm diameter footing

Concrete used in foundations shall conform to the requirements of Section 30.3 and 30.4 of this specification.

(c) Steel Post Sockets

All signs erected on steel posts within concrete pavements or traffic islands shall be mounted in sockets. The sockets shall be installed to the same depth as indicated for the parent post with socket sizes as follows:

Post Size	Socket Size
50 mm Nominal Bore galvanised pipe	65 mm Nominal Bore galvanised pipe

The sockets shall be plugged at the bottom and shall protrude between 20 mm and 30 mm above the finished surface of the concrete foundation.

90.5 SIGN - LOCATION AND ATTACHMENT

(a) The use of 50mm galvanised pipe posts within 5 metres to public lighting utility poles shall be avoided. Where possible, care shall be taken to place street sign blades on public lighting utility poles at intersections.

(b) Street sign blades mounted on public lighting utility poles (90mm diameter) shall be attached with a 90mm extruded aluminium bracket (Artcraft/90/MF bracket or approved equivalent) powder coated to match the colour of the utility pole.

Crimped stainless steel straps shall not be used to attach street sign blades and/or angle brackets to utility poles.

(c) Signs shall be attached to post(s) or structures using manufacturer's recommended type and number of fittings.

When a sign is braced it should be attached to the post at every intersection point between a post and a sign bracing member.

(d) Signs shall be mounted to:

(i) Within a tolerance of ±40 mm of the height specified in the Sign and Post Schedule measured from the bottom of the sign or sign assembly to the lip of the kerb or edge of shoulder nearest the sign unless otherwise indicated in the drawings.

(ii) Within a tolerance of ±100 mm of the pegged sign location or specified location unless otherwise indicated in the drawings.

(e) When a sign is to be mounted on a cut batter having a slope steeper than or equal to 2:1, the mounting height at the shorter post may be reduced providing that:

(i) the uphill corner of the sign is a minimum of 800 mm above the ground at that point;

(ii) the sign at the longer post is 2700 mm minimum above the ground at that point.

(f) Where the drawings indicate that a sign is to be erected so as to face oncoming traffic directly, it shall be mounted on posts which have been rotated in accordance with the requirements of clause 90.05(a), with the exception of signs mounted on structures over traffic lanes.

90.6 GUIDE POSTS

This section covers the requirements for the supply and installation of guide posts.

90.6.1 Standards

Requirements for the supply and installation of guide posts shall be in accordance with VicRoads Standard Specifications for Roadworks – Section 709 - Guide Posts (current issue).

SECTION 95 - PAVEMENT MARKINGS - NEW INSTALLATIONS

REV. 7	January 2011	95.1, 95.2, 95.2.1
REV. 6	August 2003	No amendments
REV. 5	July 2003	No amendments
REV. 4	June 2003	New (As per VicRoads Section 722)
REV. 3	May 2003	No amendments
REV. 2	March 2003	No amendments
REV. 1	February 2003	No amendments
Revision No.	Date	Affected Clause

SECTION 95 PAVEMENT MARKINGS - NEW INSTALLATIONS

95.1 GENERAL

This section covers the requirements for materials and application of pavement markings including:

(a) fixing of both reflective and non-reflective raised pavement markers to asphalt or sealed pavements using epoxy adhesive or hot melt bitumen adhesive;

(b) supply and application of pavement marking paint and glass beads for new installation of longitudinal lines, intersection markings and other markings on the road surface;

(c) supply and application of thermoplastic or cold-applied plastic material and glass beads, and pliant polymer tape for new installations of pavement markings.

95.2 Painted Pavement Markings

The requirements for the supply and application of pavement marking and marker materials for new installations of longitudinal lines, intersection markings and other markings on the road surface shall be in accordance with VicRoads Standard Specifications for Roadworks – Section 722 - Pavement Markings - New Surfacings (current issue).

95.2.1 Asphalt Surfaces

Where pavement markings are to be undertaken on the final or wearing course surface; all pavement markings shall be LongLife (Thermoplastic) Pavement Markings.

Where pavement markings are to be undertaken on any asphalt base course or temporary surface; all pavement markings can be Painted Pavement Markings