SECTION C

EARTHWORKS

INDEX TO CLAUSES

SECTION C

EARTHWORKS

C.1 DESCRIPTION

For the whole distance specified, the roads shall be formed, reformed, graded, boxed, trimmed and drained, as indicated by the accompanying plans and sections and as hereinafter specified. The work includes excavation to the specified depths and widths, filling to the required heights and widths, and constructing table drains, side drains, and catch drains within the boundaries of the road.

This section also covers the cutting, filling, shaping and compaction of allotments and reserves as indicated by the accompanying plans and as hereinafter specified.

C.2 CONFORMITY WITH DRAWINGS

All earthworks shall be finished to reasonable smooth and uniform surfaces. All road earthworks shall conform within the following limits to the lines, grades and cross-sections shown on the drawings.

Formation Level

The finished surfaces shall not vary more than 25 mm above or below the specified levels, and no point in the general surface shall vary more than 10 mm either from a 3 metre straight edge laid parallel to the centre-line of the road or from a template placed at right angles to the centre-line.

Subgrade Width

The subgrade width shall not be less than the specified width nor more than 150mm greater than the specified width.

Formation Width

The widths measured on each side from the specified centre-line to the toes of cut batters and/or the tops of fill batters shall not be less than the widths specified, and no portion of cut batters shall encroach within these widths.

Batter Slopes

At all levels the average plane of the batters shall not be steeper than the slope specified, and no point on the completed batter shall vary from the average plane more than 150 mm in the case of cut batters in earth or 300 mm in the case of cut batters in rock or in the case of fill batters.

C.2 CONFORMITY WITH DRAWINGS (cont'd)

Batter Line

Except with the approval of the Superintendent, cut batters shall be constructed so that the top of the batter is not more than 600 mm outside the planned batter line in the case of batters less than 3 metres high or 20 percent of the batter height in the case of higher batters.

Similarly, fill batters shall be constructed so that the toe of the batter is not more than 1.2 metres outside the planned batter line or 20 percent of the batter height, in the case of higher batters.

Notwithstanding the above, in built-up areas and on sections where the width of road reserve is restricted the Superintendent may direct that batters be constructed so that the tops of cut batters are not more than 300 mm outside the planned batter line.

Where kerbing and channelling is to be constructed the Contractor shall excavate the road pavement bed to the underside of road pavement for the full width to provide a clear 500 mm space behind kerbs on each side of the road bed.

C.3 EXCAVATION

Excavation of roadways, allotments or reserves shall consist of excavation, removal and satisfactory disposal of all materials from within the limits of the works, and all excavation shaping and sloping for the construction, preparation and completion of the design surface, the subgrade, shoulders, batters, side drains, intersections or reserves, approaches and private entrances as directed to the required alignments, grade and cross section shown on the plans or established by the Superintendent.

Material excavated shall be used where directed on the works of this contract, and the Contractor at the Contractor's expense, if any, shall dispose of the surplus.

Soil shall not be stockpiled until the proposed stockpile site as been reviewed by the Superintendent.

All suitable surface soil in cuttings shall be first excavated and set aside. This material shall be used for resoiling of the nature strips as specified.

Areas to be filled shall be first stripped of surface soil to a minimum depth of 100 mm or greater where necessary, to ensure that sufficient suitable surface soil is available for resoiling of nature strips.

C.3 EXCAVATION (cont'd)

Where insufficient suitable surface soil has been set aside the Contractor shall import the necessary material at the Contractor's expense.

No excavation shall be made below the required levels unless ordered by the Superintendent.

In excavation, ground shall not be disturbed by ploughing or scarifying below formation levels indicated on cross sectional plans.

All filling shall consist of material approved by the Superintendent and shall be built up and compacted in horizontal layers not exceeding 200 mm loose thickness. Each layer shall be compacted as specified before additional filling is added.

All rock or boulders encountered shall be excavated at least down to the finished surface of the subgrade. Any resulting depressions shall be backfilled with material that has been approved by the Superintendent, compacted as specified and drained to suitable outfalls, or in the case of isolated boulders, with compacted material similar to the surrounding natural material.

Excavation operations shall be so conducted that material outside the limits of the batters will not be disturbed. The Contractor at the Contractor's expense shall remove all slips and falls of insecure masses of material outside the specified batters due to lack of precaution on the part of the Contractor.

All table drains in cutting shall be constructed as shown on the plans. On the outside of curves in cutting, and the depth of the table drain shall be increased sufficiently to maintain continuous fall. Table drains shall be evenly graded without lodgement or obstruction, and shall be diverted as indicated on the plans or directed by the Superintendent into side drains or culverts, such diversion drains being made with continuous fall.

C.4 REMOVAL OF SOFT AREAS OR UNSUITABLE MATERIAL

Where authorised in writing by the Superintendent, soft, wet or unstable areas or depths below the designed levels of the subgrade which exist or develop during construction, shall be excavated and replaced with approved stable materials in layers not exceeding 200 mm loose thickness, compacted as hereinafter specified. The Contractor will be paid an extra for such excavation and backfilling at a rate as specified on the tender form. Where there is not relevant rate, the Superintendent will value the work in accordance with the Provisions of Clause 40 of AS.2124.

C.4 REMOVAL OF SOFT AREAS OR UNSUITABLE MATERIAL (cont'd)

Soft, wet or unstable areas 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 as above by the Contractor at the Contractor's expense.

C.5 FILLING

Fill construction shall include the preparation of all areas upon which fills are to be constructed, the preparation, selection and supply of materials, the formation and compaction of the fill and the disposal of unsuitable material.

Material to be used for fill construction shall consist of materials approved by the Superintendent, free from logs, stumps and weeds, or other perishable matter.

Should the Superintendent so direct, the Contractor shall prevent fill materials from escaping beyond the embankment limits by the erection of rock, boulder, or earth barriers at the toe of the embankment or by other suitable methods.

Materials within 300 mm of bridge abutments, retaining walls or wing walls shall consist of selected permeable gravel or crushed rock, carefully packed in courses and connected to suitable drainage outfalls. All such filling shall have a liquid limit not greater than 40 and the product of the liquid limit and the percentage passing the 0.425 mm AS sieve shall not exceed 600. Non-cohesive filling with plasticity index of less than 6 shall only be used with the written approval of the Superintendent, and in accordance with such conditions as he may require to protect the filling from erosion.

Areas upon which fills will be constructed shall first be cleared and grubbed, as specified. All existing road pavements within 1 metre of the designed levels of the subgrade shall be scarified to a depth of at least 150mm.

The total width on which filling is to be placed shall then be compacted to produce the density specified in Clause C.9. The cost of doing this work shall be included in the price for earthworks, and no additional allowance will be made thereafter.

Where fills are to be constructed on hillsides or against existing fills, or where new fills are constructed part width at a time, the slopes which are steeper than 1 vertically to 3 horizontally shall be continuously benched for a horizontal width of 2 metres as the work is brought up in layers. Except for the first cut, each bench so cut shall begin at the intersection of the original ground, old or new fill and the vertical side of the previous bench. Benches shall be sloped inwards and the inside edge of the bench shall be adequately drained. Material cut out from these benches shall be recompacted along with the new fill at the Contractor's expense.

SECTION C

EARTHWORKS

C.6 PLACING OF FILLING

All fills shall be constructed in layers of uniform thickness and leach layer shall be compacted, as specified herein except where fills are to be constructed across low, swampy ground which will not support the weight of construction equipment. In this case the lower part of the fill may be constructed by dumping successive loads in a uniformly-distributed layer of a thickness not greater than that necessary to support the equipment while placing subsequent layers, after which the remainder of the fill shall be constructed in layers and compacted as specified in Clause C.9.

Unless otherwise specified the loose thickness of each layer shall not exceed 200 mm except where rocky material containing by volume 25% or more of material which will not break down significantly during compaction and which is too large to be compacted in layers 200 mm thick is used. Such rocky material shall be confined to the lower layers of fills as far as is practical and at least 200 mm below subgrade level, and below the finished surface of verges and batters. Unless otherwise specified, the loose thickness of layers of rocky material shall not exceed 500 mm and the size of the material shall not exceed 80% of the loose thickness of the layer.

The Contractor shall construct all embankments so that after shrinkage and settlement and at the time of acceptance of the project they shall have the required grade, width and cross-section at all points.

C.7 FILLING OF ALLOTMENTS

Where filling on allotments is less then 300 mm for clayey soils and 600 mm for sandy soils, fill should be rolled with at least 6 passes of a suitably sized roller.

Where filling on allotments is more than 300 mm for clayey soils and 600 mm for sandy soils, the fill should be placed and compacted in a controlled manner so as to satisfy table 5.1 of AS.2870.1 - 1988.

The Contractor shall engage a geotechnical testing authority registered with the National Association of Testing Authorities (NATA) to carry out appropriate field compaction tests to ensure that the fill is placed in accordance with AS.3798 - 1990. The frequency of testing shall not be less than specified in Table 8 of AS.3798-1990.

On the completion of filling the geotechnical testing authority shall provide a report setting out the inspections, sampling and testing carried out, and the locations of results thereof. The geotechnical testing authority shall also provide a report expressing an opinion that the works comply with the requirements of the specifications and drawings and that the filled area is suitable for the intended use.

C.7 FILLING OF ALLOTMENTS (cont'd)

Two copies of results and the fill report shall be forwarded to the Mornington Peninsula Shire Council at the completion of the works.

C.8 COMPACTION PLANT

The Contractor shall provide and operate sufficient rollers of suitable type to compact subgrade in accordance with Clause C.9.

C.9 COMPACTION OF EARTHWORKS

Compaction of earthworks shall include the compaction of the subgrade in cuttings, the compaction of areas upon which fills are to be placed, and the compaction of all fill material to the standards indicated hereunder:

(a) The top 150mm of the subgrade in cuttings shall be compacted to produce a dry density not less than 95% of the maximum value obtained in the Standard Compaction Test, in accordance with AS 1289 5.1.1. - 1993.

(b) Areas upon which fills are to be place shall be compacted to produce a dry density not less than 95% of the maximum value obtained in the Standard Compaction Test, in accordance with AS 1289 5.1.1. - 1993.

(c) All fill material shall be compacted to produce a dry density not less than 95% of the maximum value obtained in the Standard Compaction Test, in accordance with AS 1289 5.1.1. - 1993.

The Contractor shall carry out testing at a frequency as specified in Clause C.10.

Compaction of earthworks shall be carried out at a moisture-content appropriate to the compacting equipment being used between 85% - 125% of the optimum moisture-content found in the above test.

Construction equipment and traffic shall not be allowed on the subgrade or fill while it is in a wet condition. Material, which has become excessively wet shall be dried or removed from the site and replaced by material of suitable moisture-content for compaction at the Contractor's expense.

Filling over and around pipes, culverts, bridges and other structures shall be compacted in such a manner that will avoid unbalanced loading and that will not cause movement or place undue strain on any structures.

C.9 COMPACTION OF EARTHWORKS (cont'd)

The formation shall receive a final shaping with grading machine, supplemented with handwork where necessary, to ensure a smooth surface and uniform cross sections. When final shaping is complete, the surface of the subgrade shall conform accurately to the line, grade and cross section shown on the plans, and no roots, sod or other deleterious matter or stones which would fail to pass a 75mm ring shall be in the top 150mm of the subgrade.

C.10 MINIMUM TESTING REQUIREMENTS

The work shall be tested in lots, a lot consisting of a single layer of work which represents an area equivalent to one days production.

For work to be tested for compliance with Table C.10.1 the number of tests per lot shall be a minimum of six (6).

Table C.10.1

Fill material placed anywhere in earthworks, and the top 150mm of areas under fill where specified.	Not less than 95.0	Accept lot
	93.5 to 94.9	Re-roll as agreed with the Superintendent
	Less than 93.5	Reject Lot

C.11 TEST ROLLING

The Contractor shall submit to the Superintendent for review a test rolling procedure to be used where specified or directed. The procedure submitted by the Contractor shall include details of when test rolling will be undertaken, the method of preparing an area for test rolling and the extent of test rolling.

Areas upon which fills are to be constructed, all layers of filling, and material within 150 mm of subgrade level in cuts, shall be compacted so as to be capable of withstanding test rolling, with a smooth steel wheeled roller or pneumatic tyred roller each complying with the requirements of Clause C.8 and ballasted to comply with the following:

(a) Steel wheeled - not less than 12 tonne mass with a load intensity on the rear wheels of not less than 6 tonne per metre width.

C.11 TEST ROLLING (cont'd)

(b) Pneumatic tyred - not less than 4.5 tonne per tyre with tyres inflated to 700kPa.

The moisture content of the compacted material being test rolled shall be as specified in Clause C.9. Each layer should be test rolled immediately following completion of compaction but if test rolled at some latter date the surface shall be watered and given not less than eight coverages of the testing roller by the Contractor before test rolling commences.

Test Rolling shall be undertaken in accordance with the accepted procedure in the presence of the Superintendent.

Compliance with the test rolling requirements shall be when an area withstands test rolling without visible deformation or springing.

C.12 BORROW EXCAVATION

Borrow excavation will not be permitted where suitable roadway excavation is available.

Unless otherwise specified, the Contractor shall make arrangements for borrow excavation required to satisfactorily complete the work specified.

The Contractor shall submit with his tender details of borrow areas and samples of the material to be obtained from each area. The Superintendent may prohibit the use of any materials, and may require that particular materials be used in particular locations.

Borrow pits will not be permitted in the road reserve, but the Superintendent may approve material being obtained from within the road reserve as follows:

(a) by uniform widening of the formation in cutting;

(b) by uniform flattening of cut batters;

(c) by uniform grading of selected areas within the road reserve.

C.13 DISPOSAL OF SURPLUS SOIL

Soil and spoil not required for the works in this contract shall be the property of the Contractor. The Contractor is responsible for the removal from the site and disposal of surplus soil and spoil.

SECTION C

EARTHWORKS

C.14 PAVEMENT BED

HP The pavement subgrade shall be inspected and approved prior to the placing of any road pavement material.

The Superintendent may direct that test rolling of the subgrade take place as specified.

C.15 POISONING OR STERILISING - REFER TO ADDENDUM

C.16 TOPSOILING OF BATTERS

Unless otherwise specified, all unpaved cut and fill areas within the limits of the batters, including roundings, and any other area disturbed by the Contractor's operations, but excluding cut batters in rock and the subgrade, shall be topsoiled to the following compacted thicknesses measured normal to the slope:

(a) batters 2 to 1 or steeper - 50 mm;

(b) all other areas - 75 mm.

After placing, the topsoil shall be lightly compacted. Topsoiled batters shall be left roughened to reduce rilling.

All stockpile sites shall be left in a neat, well graded state on completion of topsoiling.

C.17 BATTERS FOR ROAD FORMATION WORKS

Batter slopes in filling and cutting shall be generally 1.5 to 1, except where otherwise directed or specified. All batters, in cut and fill, shall be neatly trimmed to approval. The table drains and upper edges of embankments shall be ranged in lines, strictly in conformity with the centre line of formation.

Where batter thatching is used behind rollover kerb and channel, the toe of such batters shall not be closer to the back of kerb than 1.2 metres.

Cut and fill batters less than 600 mm in height shall be uniformly graded, to meet the natural surface along the property boundary where clearing permits, or at a slope not steeper than 1 in 5.

Protection works as specified herein shall be carried out on all batters steeper than 1 in 3 or as directed by the Superintendent, as soon as practicable after completion of earthworks.

C.17 BATTERS FOR ROAD FORMATION WORKS (cont'd)

Any irregularities in the batter shall be made good before batter protection is applied. On older batters, where the surface is set hard or is eroded, the surface shall be scarified.

C.18 BATTERS PROTECTION TECHNIQUE

In sandy soils, where specified, cut and fill batters shall be thatched using a 150 mm loose depth of tree mulch, or other approved natural material covered with 1,800 mm by 50 mm by 1 mm galvanised wire netting securely fixed down using 4 mm diameter wire staples (600 mm long) at 450 mm centres both ways.

For unstable batters pins are to be made from 8 mm diameter steel, cut to the appropriate length required to hold the wire netting in tension. The tops of the pins are to be bent to simulate tent peg shape. Tensioning of the wire netting is to be in the horizontal as well as the vertical direction.

The netting shall be laid in vertical strips with the upper end fixed by burying in a trench immediately above the crest of the batter as detailed on Standard Drawing - MP 802.

In clay and other firmer soils the cut and fill batters where specified shall be treated with bitumen emulsion, straw, or hay, fertiliser and grass seed. The straw shall be spread evenly over the batter to a loose depth of 50 mm (0.5 kg per square metre) and sprayed with a mixture of equal parts of bitumen emulsion and water at a rate of 2.75 litres of the mixture per square metre. Where the straw and bitumen are applied to the batter using an approved “mulch-spreader” machine the rate of application of bitumen shall be 0.25 litres per square metre. Grass seed and fertiliser shall be applied as specified in Clause K.4.

A hydro-seeder may be used subject to the Superintendent’s approval.

The Contractor shall ensure that adequate batter protection is achieved and maintained.

SECTION C

EARTHWORKS

C.19 TABLE AND SIDE DRAINS FOR ROAD FORMATIONS

All table drains in cuttings shall be formed using a grader. All drains shall be evenly graded parallel to the centre line of the road, without lodgment or obstruction, and shall be diverted where indicated on the plans, into side drains or culverts, such diversion drains being made with proper fall and not less than 300 mm deep and one metre wide on the surface. Side drains shall be excavated to the widths and depths shown on plans, evenly graded, parallel to the centre line of the formation, and not nearer than one metre to the fence lines, with sides neatly battered as indicated or directed, and diverted into outlet drains or waterways.

If so ordered, the excavated material shall be used in the formation, or banked on the low side of the drain, leaving a 500 mm margin.

C.20 MODIFICATIONS AND/OR ADJUSTMENTS TO INTERSECTIONS

The Superintendent reserves the right to require the details of the type sections to be modified or adjusted, as necessary at intersections, or other such places, and directions given by the Superintendent in such matters must be given immediate effect to by the Contractor.

If in any case such directions necessitate the provision of extra materials or the carrying out of further excavations over and above those necessary otherwise, such will be paid for in accordance with Clause 40 of AS.2124.

C.21 PRIVATE ENTRANCES

All existing entries unless otherwise specified or directed by the Superintendent shall be re-established as detailed on Standard Drawing MP 304 and below.

A ‘driveways profile beam’ as detailed on Standard Drawing MP 307 shall be used to obtain the longitudinal driveway shape.

Should, as result of using the beam, significant changes to the existing driveway levels on private property be required, the Contractor shall contact the property owner and have agreement with the property owner as to the proposed changes involved, prior to commencement. If there is a disagreement to the proposed changes, the details shall be given to the Superintendent by the Contractor for the Superintendent to make a determination.

Private entrance pavement thickness shall be 150mm and driveway width shall match the gateway or shall be a minimum of 3 metres.

Private entrances shall extend from the building line to the back of kerb and shall be constructed of 20 mm class three (3) crushed rock. Surface texture shall be as required for applying a sprayed seal.

C.21 PRIVATE ENTRANCES (cont'd)

Nature strip beside the driveway shall be shaped to match the driveway at a grade suitable to allow mowing – no greater than 1in 5.

Reinstatement of fences and other existing features shall be in accordance with Section A Clauses A.36 and A.38 of this Specification.