



WESTERN AUSTRALIA SPECIFICATION

211

CONTROL OF EROSION AND SEDIMENTATION

Amendment Record for this Specification Part

This Specification is Council's edition of the AUS-SPEC generic specification part and includes Council's primary amendments.

Details are provided below outlining the clauses amended from the Council edition of this AUS-SPEC Specification Part. The clause numbering and context of each clause are preserved. New clauses are added towards the rear of the specification part as special requirements clauses. Project specific additional script is shown in the specification as italic font.

The amendment code indicated below is 'A' for additional script 'M' for modification to script and 'O' for omission of script. An additional code 'P' is included when the amendment is project specific.

Amendment Sequence No.	Key Topic addressed in amendment	Clause No.	Amendment Code	Author Initials	Amendment Date
<i>EXAMPLE 1</i>	<i>Provision for acceptance of nonconformance with deduction in Payment</i>	<i>XYZ.00</i>	<i>AP</i>	<i>KP</i>	<i>2/6/97</i>

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**SPECIFICATION 211
CONTROL OF EROSION AND SEDIMENTATION**

GENERAL

211.01 SCOPE

1. The work to be executed under this Specification consists of the construction of structures and the implementation of measures to control erosion and sedimentation. These may be temporary or permanent.
2. The Contractor shall plan and carry out the whole of the Works to avoid erosion and sedimentation of the site, surrounding country, watercourses, waterbodies and wetlands in compliance with the requirements of the Environmental Protection Act 1986, Waterways Conservation Act, Water and Rivers Act, Right in Water and Irrigation Act, Country Water Area Supply Act, Soil and Land Conservation Act and Council's Adopted Policies where available.
3. All measures for erosion and sedimentation control shall be designed, installed and maintained by the Contractor in such a manner so as not to present a potential hazard to any person or property.

211.02 REFERENCE DOCUMENTS

1. Documents referenced in this Specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated.

***Documents
Standards
Test Methods***

(a) Council Specifications

- 212 - Clearing and Grubbing
- 213 - Earthworks
- 273 - Landscaping
- 224 - Open Drains

(b) WA State Legislation

- Environmental Protection Act 1986
- Waterways Conservation Act
- Water and Rivers Act
- Right in Water and Irrigation Act
- Country Water Area Supply Act
- Soil and Land Conservation Act

(c) Other

- Water and Rivers Commission
- Urban Erosion and Sediment Control: Field Guide 1992
- Institute of Public Works Engineering Australia (IPWEA) – Local Government
- Salinity Management Handbook (Draft, July 2001)

211.03 EROSION AND SEDIMENTATION CONTROL PLAN

1. For consideration of erosion and sedimentation control measures, the site shall be divided into sections based on the catchment area draining to each permanent drainage structure in the works. In addition to the area bounded by the road reserve, the

Site Sections

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sections shall include:

- (a) access and haulage tracks,
- (b) borrow pits, stockpile areas and
- (c) compound areas, such as Contractor's facilities and concrete batching areas.

2. At least seven days before the natural surface is disturbed on each of these sections, the Contractor shall submit to the Superintendent an Erosion and Sedimentation Control Plan for that section. This Plan shall be superimposed on half-sized drainage drawings of the works and shall be detailed for each catchment area of the works. This action constitutes a **HOLD POINT**. The Superintendent's approval of the submitted Erosion and Sedimentation Control Plan is required prior to the release of the hold point.

Section Plan

HP

3. The Plan shall consist of scale diagrams indicating:

**Plan
Inclusions**

- (a) features of the site including contours and drainage paths,
- (b) relevant construction details of all erosion and sedimentation control structures,
- (c) all permanent and temporary erosion and sedimentation control measures, including the control measures to be implemented in advance of, or in conjunction with, clearing and grubbing operations as required under the Specification for CLEARING AND GRUBBING.
- (d) an order of works based upon construction and stabilisation of all culverts and surface drainage works at the earliest practical stage, and
- (e) proposed time schedules for construction of structures and implementation of measures to control erosion and sedimentation.

4. The Water and Rivers Commission publication Urban Erosion and Sediment Control: Field Guide provides guidance on typical permanent and temporary erosion and sedimentation control measures which may be required and guidance in the preparation of an Erosion and Sedimentation Control Plan.

Guidance

5. In known salt affected areas, the Contractor shall seek advice from the relevant land and water resource authority to ensure that its Erosion and Sedimentation Control Plan conforms with the current salinity prevention measures outlined in the IPWEA publication, Local Government Salinity Management Handbook.

**Salinity
Prevention**

6. Release of the hold point approving the Erosion and Sedimentation Control Plan as submitted shall not relieve the Contractor of the full responsibility to provide whatever measures are required for effective erosion and sedimentation control at all times.

**Contractor's
Responsibility**

7. The Contractor shall adhere to the approved Erosion and Sedimentation Control Plan. The Contractor shall submit a revised Erosion and Sedimentation Control Plan for approval by the Superintendent seven days in advance of an intended variation from the approved plan.

**Adherence to
Plan**

8. The cost of preparing, submitting and revising the Erosion and Sedimentation Control Plan shall be borne by the Contractor.

**Contractor's
Cost**

211.04 EROSION AND SEDIMENTATION CONTROL MEASURES

1. Erosion and sedimentation control measures shall include, but shall not be limited to, the following:

Scope

- (a) The installation of permanent drainage structures before the removal of topsoil and commencement of earthworks for formation within the catchment area of each structure.
- (b) The prompt completion of all permanent and temporary drainage works, once commenced, to minimise the period of exposure of disturbed areas.
- (c) The stabilisation of diversion and catch drains to divert uncontaminated runoff from outside the site, clear of the site. Catch drains shall be installed and lined, as approved by the Superintendent, before the adjacent ground is disturbed and the excavation is commenced.
- (d) The passage of uncontaminated water through the site without mixing with contaminated runoff from the site.
- (e) The provision of contour and diversion drains across exposed areas before, during and immediately after clearing and the re-establishment and maintenance of these drains during soil removal and earthworks operations.
- (f) The provision of sediment filtering or sediment traps, in advance of and in conjunction with earthworks operations, to prevent contaminated water leaving the site.
- (g) The restoration of the above drainage and sedimentation control works on a day to day basis to ensure that no disturbed area is left without adequate means of containment and treatment of contaminated water.
- (h) The limitation of areas of erodible material exposed at any time to those areas being actively worked. Any area that is not approved by the Superintendent for clearing or disturbance by the Contractor's activities shall be clearly marked, fenced off or otherwise appropriately protected against any such disturbance.
- (i) The minimisation of sediment loss during construction of embankments by means such as temporary or reverse superelevations during fill placement, constructing berms along the edge of the formation leading to temporary batter flumes and short term sediment traps.
- (j) The progressive revegetation of the site, in accordance with the Specification for LANDSCAPING, as work proceeds.
- (k) All stockpile sites shall be situated in areas approved for such use by the Superintendent. A 5m buffer zone shall exist between stockpile sites and any stream or flow path. All stockpiles shall be adequately protected from erosion and contamination of the surrounding area by use of the measures approved in the Erosion and Sedimentation Control Plan.
- (l) Access and exit areas shall include shake-down or other methods approved by the Superintendent for the removal of soil materials from motor vehicles.

2. All permanent and temporary erosion and sedimentation control measures shall be constructed in accordance with the construction details in the Erosion and Sedimentation Control Plan and the details as shown on the Drawings

PERMANENT EROSION AND SEDIMENTATION CONTROL

211.05 EARTHWORKS FOR PERMANENT EROSION AND SEDIMENTATION CONTROL BASINS

1. Earthworks for permanent erosion and sedimentation control basins shall be constructed to the planned levels and dimensions shown on the Drawings or such levels

***Planned
Levels***

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and dimensions as determined by the Superintendent.

2. The entire storage and embankment foundation area of permanent erosion and sedimentation control basins shall be cleared in accordance with the Specification for CLEARING AND GRUBBING and shall be stripped of topsoil and any unsuitable material under embankments removed in accordance with the Specification for EARTHWORKS.

**Site
Preparation**

3. The embankments shall be constructed in accordance with the Specification for EARTHWORKS.

**Compaction
Requirements**

4. Where payment for embankment construction is on a Schedule of Rates basis, at least three days before construction of the embankment the Contractor shall provide the Superintendent with survey information which will be sufficient to subsequently measure the volume of the constructed embankment.

**Contractor to
Provide
Survey
Information**

211.06 INLETS, SPILLWAYS AND LOW FLOW OUTLETS FOR SEDIMENTATION CONTROL BASINS AND SEDIMENT TRAPS

1. Inlets and spillways shall be constructed using rock filled woven galvanised steel mattresses and geotextile as shown on the Drawings or as directed by the Superintendent. The rock filled mattresses shall be installed in accordance with the requirements for rock filled wire mattress and geotextile in the Specification for OPEN DRAINS.

**Rock
Mattresses**

2. A low flow outlet consisting of a 150mm diameter plastic pipe shall be installed as shown in the Drawings. No extra payment shall be made for this work which shall be regarded as part of the construction of the sedimentation control basin.

**Plastic Pipe
Outlet**

211.07 DROP INLET SEDIMENT CONTROL

1. Permanent drop inlet sediment traps and inlet control banks shall be constructed on completion of gully pits as indicated on the Drawings. These permanent drop inlet sediment traps and inlet control banks are additional to the temporary sedimentation control measures that may be required under Clause 211.10 during construction of the gully pits.

**Permanent
Traps**

2. The drop inlet sediment traps are intended to remove sediment from the surface flow before it enters the drainage system. The inlet control banks shall be constructed as required to prevent the surface flows bypassing the gully pits.

Purpose

3. The drop inlet sediment traps shall be constructed as shown on the Drawings. The associated inlet control banks shall consist of at least two courses of sandbags containing a 10:1 sand/cement mix. The bags shall be keyed at least 25mm into the surface, dampened sufficiently to ensure hydration of the cement and tamped lightly to provide mechanical interlock between adjacent bags.

Control Banks

211.08 CLEANING SEDIMENTATION CONTROL STRUCTURES

1. The Contractor shall clean out permanent sedimentation control structures, cleaning out whenever the accumulated sediment has reduced the capacity of the structure by 50 per cent or more, or whenever the sediment has built up to a point where it is less than 300mm below the spillway crest. All permanent sedimentation control structures shall be cleaned out by the Contractor prior to Practical Completion of the Works.

**Contractor's
Responsibility**

2. Accumulated sediment shall be removed from permanent sedimentation control structures in such a manner as not to damage the structures. The sediment removed shall be removed to a nominated soil stockpile site or disposed of in such locations that the sediment will not be conveyed back into the construction areas or into watercourses.

**Removal of
Sediment**

The Contractor shall provide and maintain suitable access to permanent sedimentation control structures to allow cleaning out in all weather conditions.

TEMPORARY EROSION AND SEDIMENTATION CONTROL

211.09 GENERAL

- 1. The Contractor shall ensure that effective erosion and sedimentation control is provided at all times during the Contract. **Contractor's Responsibility**
- 2. Runoff from all areas where the natural surface is disturbed by construction, including access roads, depot and stockpile sites, shall be free of pollutants as defined in the Water and Rivers Act before it is either dispersed to stable areas or directed to natural watercourses. The Contractor shall be responsible for all temporary erosion and sedimentation control measures required for this purpose. **Pollutant Free**
- 3. The Contractor shall provide and maintain slopes, crowns and drains on all excavations and embankments to ensure satisfactory drainage at all times. Water shall not be allowed to pond on the works unless such ponding is part of an approved Erosion and Sedimentation Control Plan. **Maintenance by Contractor**

211.10 TEMPORARY DRAINS

- 1. Runoff from areas exposed during the work shall be controlled by construction of temporary contour drains and/or temporary diversion drains. Generally, a temporary contour drain or temporary diversion drain takes the form of a channel constructed across a slope with a ridge on its lower side. They may require progressive implementation and frequent alteration as the work progresses. **Control of Runoff**
- 2. Contour drains, which follow points on the natural surface of approximately the same elevation, shall be provided immediately after a construction site is cleared to intercept and divert runoff from the site to nearby stable areas at non-erosive velocities. Contour drains shall be formed with a grade of neither less than 1 per cent nor more than 1.5 per cent and shall be spaced at intervals of neither less than 20m nor more than 50m, depending on the erodibility of the exposed soil. Contour drains shall be constructed as shown on the Drawings. **Contour Drains**
- 3. Diversion drains shall be provided across haul roads and access tracks when such roads and access tracks are identified as constituting an erosion hazard due to their steepness, soil erodibility or potential for concentrating runoff flow. Diversion drains shall be formed to intercept and divert runoff from the road or track to stable outlets. Spacing of diversion drains shall not be greater than that required to maintain runoff at non-erosive velocities. **Diversion Drains**

211.11 TEMPORARY SEDIMENT TRAPS

- 1. Temporary sediment-trapping devices shall be provided during construction to remove sediment from sediment-laden runoff flowing from areas of 0.5 hectares or more before the runoff enters stormwater drainage systems, natural watercourses or adjacent land. **Sediment Traps**

211.12 BATTER PROTECTION

- 1. The Contractor shall take all necessary action to protect batters from erosion during the Contract. **Contractor's Responsibility**
- 2. Scour of newly-formed fill batters during and after embankment construction shall be minimised by diverting runoff from the formation away from the batter until vegetation **Scour Control**

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is established.

211.13 MAINTENANCE AND INSPECTION

1. The Contractor shall inspect all temporary erosion and sedimentation control works after each rain period and during periods of prolonged rainfall. Any defects revealed by such inspections shall be rectified immediately and these works shall be cleaned, repaired and augmented as required, to ensure effective erosion and sedimentation control thereafter.

***Contractor's
Responsibility***

2. The Contractor shall provide and maintain access from within the road reserve or from other locations acceptable to the Superintendent, for cleaning out sedimentation control works.

Access

211.14 REMOVAL

1. All temporary erosion and sedimentation control works shall be removed by the Contractor when revegetation is established on formerly exposed areas before the end of the Contract. All materials used for the temporary erosion and sedimentation control works shall be removed from the site or otherwise disposed by the Contractor to the satisfaction of the Superintendent.

***Contractor's
Responsibility***

SPECIAL REQUIREMENTS

211.15 RESERVED

211.16 RESERVED

211.17 RESERVED

211.18 RESERVED

211.19 RESERVED

MEASUREMENT AND PAYMENT

211.20 PAY ITEMS

1. Payment shall be made for all the activities associated with completing the work detailed in this Specification on a schedule of rates basis, in accordance with Pay Items 211 (a) to (e) inclusive.
2. A lump sum for any item other than Pay Item 211(a) shall not be accepted.
3. If any item, for which a quantity of work listed in the Schedule of Rates, has not been priced by the Contractor, it shall be understood that due allowance has been made in other items for the cost of the activity which has not been priced.
4. Clearing and grubbing is measured and paid in accordance with the Specification for CLEARING AND GRUBBING.
5. Landscaping works are measured and paid in accordance with the Specification for LANDSCAPING.
6. Topsoil stripping and removal of unsuitable material are measured and paid in accordance with the Specification for EARTHWORKS.

Pay Item 211(a) TEMPORARY EROSION AND SEDIMENTATION CONTROL

1. The unit of measurement shall be a lump sum for the installation, maintenance, inspection and removal of the temporary erosion and sedimentation control measures in accordance with Clauses 211.09 to 211.14 inclusive and the Drawings.

Pay Item 211(b) EARTHWORKS FOR PERMANENT EROSION AND SEDIMENTATION CONTROL BASINS

1. The unit of measurement shall be the cubic metre of compacted volume of embankment constructed in accordance with Clause 211.05 and the Drawings.
2. The volume shall be determined by calculation using the end area method.
3. The schedule rate shall cover the excavation of material from within the sedimentation control basin and embankment construction required under Clause 211.05 and shall be an average rate for all types of materials.
4. The cost of excavating and transporting material for embankment construction and obtained from within cuttings or from borrow shall be included in the schedule rate for General Excavation in the Specification for EARTHWORKS.

Pay Item 211(c) INLETS, SPILLWAYS AND LOW FLOW OUTLETS FOR SEDIMENTATION CONTROL BASINS

1. The unit of measurement shall be the square metre of horizontal surface area of rock filled mattress constructed in accordance with Clause 211.06 and the Drawings.

Pay Item 211(d) DROP INLET SEDIMENT TRAPS AND INLET CONTROL BANKS

1. The unit of measurement shall be 'each' drop inlet sediment trap including inlet control bank constructed in accordance with Clause 211.07 and the Drawings.

Pay Item 211(e) CLEANING OF PERMANENT SEDIMENTATION STRUCTURES

1. The unit of measurement shall be the in-place cubic metre of sediment removed from the structure in accordance with Clause 211.08.

2. The volume of sediment removed shall be determined by survey or by methods approved by the Superintendent.

The schedule quantity is a provisional quantity.