



**ACT**  
Government

# CONCRETE KERBS & OPEN DRAINS 06A

MUNICIPAL  
INFRASTRUCTURE  
TECHNICAL  
SPECIFICATION  
**06 - CONCRETE KERBS  
FOOTPATHS &  
MINOR WORKS**

Transport Canberra and  
City Services

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# 1 CONCRETE KERBS AND OPEN DRAINS

## 1.1 General

### 1.1.1 Responsibilities

#### 1.1.1.1 Objectives

Requirement: Provide all types of open drains including unlined and lined open drains, kerb or gutter and rock filled wire mattresses and gabions, as documented.

### 1.1.2 Cross references

General: The following documents are related to this Specification.

#### 1.1.2.1 ACT Legislation

Work Health and Safety Act

#### 1.1.2.2 Specifications

Requirement: Conform to the following:

MITS 00	Preliminaries
MITS 01	Roadwork
MITS 02	Earthworks
MITS 03	Underground services
MITS 04	Flexible pavement construction
MITS 06B	Concrete paths, driveways, medians
MITS 10	Concrete works
MITS 09	Landscape

#### 1.1.2.3 Design standards

General: The following Design Standards are related to this Specification:

MIS 03	Pavement design
MIS 08	Stormwater

### 1.1.3 Referenced documents

General: The following documents are incorporated into this Specification by reference.

#### 1.1.3.1 Standards

##### Australian standards

AS 1141	Methods for sampling and testing aggregates
AS 1141.22	Wet/dry strength variation
AS 1289	Methods of testing soils for engineering purposes
AS 1289.3	Soil classification tests
AS 1289.3.1.1	Determination of the liquid limit of a soil - Four point Casagrande method
AS 1289.3.3.1	Calculation of the plasticity index of a soil
AS 1289.3.4.1	Determination of the linear shrinkage of a soil - Standard method
AS 1289.5	Soil compaction and density tests
AS 1289.5.4.1	Soil compaction and density tests – Compaction control test – Dry density ratio, moisture variation and moisture ratio
AS 1289.5.6.1	Soil compaction and density tests – Compaction control test – Density index method for a cohesionless material
AS 2001	Methods of test for textiles - Physical tests
AS 2001.2.3.2	Determination of maximum force using the grab method
AS 2758	Aggregates and rock for engineering purposes
AS 2758.4	Aggregate for gabion baskets and wire mattresses
AS 2876	Concrete kerbs and channels (gutters) – Manually or machine placed
AS3706	Geotextiles - Methods of test
AS 3706.3	Determination of Tearing Strength - Trapezoidal Method
AS 3706.4	Determination of Burst Strength - California Bearing Ratio (CBR) Plunger Method
AS 3706.9	Determination of Permittivity AS/NZS 4534: 2006 Zinc and zinc/aluminium-alloy coatings on steel wire

#### 1.1.3.2 Other publications

Proprietary products: To *TCCS Products previously considered for use list*

##### Austrroads

AGPT	Austrroads Guide to Pavement Technology
AGPT04G	Part 4G: Geotextiles and geogrids
ASTM A975	Standard specification for double-twisted hexagonal mesh gabions and revet mattresses (metallic coated steel wire or metallic coated steel wire and PVC coatings)

## 1.1.4 Interpretation

### 1.1.4.1 Abbreviations

General: For the purposes of this Specification the following abbreviations apply:

<b>CRM:</b>	Coordinated Reference Mark
<b>KO:</b>	Kerb Only
<b>KG:</b>	Kerb and Gutter
<b>MLBK:</b>	Modified Layback Kerb
<b>MK:</b>	Mountable Kerb
<b>MKG:</b>	Mountable Kerb and Gutter
<b>MS:</b>	Mower Strip
<b>OCI:</b>	Open Channel Invert
<b>TCCS:</b>	Territory and Municipal Services, ACT Government, and its successors.

### 1.1.4.2 Definitions

General: For the purpose of this Specification, the definitions of terms used to define the components of the road reserve are in conformance with *AS 1348, Glossary of Austroads Terms* and *AGRD03*, the definitions given below also apply:

**Island slot:** An at grade path crossing through a median, as defined in *ACTSD -0515-0516*.

**Kerb and gutter:** Includes all forms of concrete gutters, inverts, concrete edging, mountable kerbs and barrier kerbing.

**Kerb laybacks:** Kerb ramps and Vehicle crossings.

**Kerb ramp:** A layback section of kerb connecting the road pavement to a path, as defined in *ACTSD -0515-0516*.

**Vehicle crossing:** A layback section of kerb connecting the road pavement to a driveway, as defined in *ACTSD -0701-0704*.

## 1.1.5 Hold points and witness points

### 1.1.5.1 Notice

General: Give written notice to the Authorised person so that the documented inspection and submissions may be made to the **Hold point table** and the **Witness point table**.

**Table 6A-1 Hold point table**

Item	Clause title	Requirement	Notice for inspection	Release by
<b>Materials</b>				
6A.1	Concrete - General	NATA compliance certificates for concrete and constituents	5 working days before ordering	Authorised Person
6A.2	Proprietary Products - General	Submit proprietary products and manufacturers instructions	5 working days before ordering	Authorised Person
6A.3	Wire mattresses - General	Compliance certificates for proposed wire mattress	5 working days before ordering	Authorised Person
6A.4	Gabions - General	Compliance certificates for proposed Gabions	5 working days before ordering	Authorised Person
6A.5	Rock fill material – General	NATA compliance certificates and rock fill sample for proposed rock fill material	5 working days before ordering	Authorised Person
6A.6	Stone pitching material - General	NATA compliance certificates and stone sample for proposed rock fill material	5 working days before ordering	Authorised Person
6A.7	Geotextile - Properties	NATA compliance certificates, sample and manufacturer's instructions.	5 working days before ordering	Authorised Person
<b>Execution</b>				
6A.8	Lining - Concrete lining	Approval for extent of lining, subsurface drainage, jointing and bedding requirements, as marked out onsite.	2 working days before concreting.	Authorised Person
6A.9	Lining – Stone Pitching	Approval for extent of stone pitching, subsurface drainage and bedding requirements, as marked out onsite.	2 working days before commencing stone pitching.	Authorised Person
6A.10	Kerb and gutter - Foundation	Approval for shape and compaction of foundation material	1 working day before forming	Authorised Person

**Table 6A-2 Witness point table**

Item	Clause title	Requirement	Notice for inspection
Execution			
<b>6A.1</b>	Open drains - Excavation	Unsuitable material removal and disposal to <i>MITS 02B Bulk earthworks</i>	Progressive
<b>6A.2</b>	Open drains - Excavation	Spoil site locations to <i>MITS 02B Bulk earthworks</i>	Prior to placement
<b>6A.3</b>	Open drains - Construction	Grade and compaction of open drains	Progressive
<b>6A.4</b>	Open drains - Types	Construct channels preserving the existing stream bed outside the limits of excavation	Progressive
<b>6A.5</b>	Lining - General	Proprietary matting installed to manufacturers recommendations	Progressive
<b>6A.6</b>	Lining - Stone pitching	Stone placement as setout onsite	1 working day before concreting.
<b>6A.7</b>	Backfilling and reinstatement - Backfill behind kerbs	Backfilling timing, material and compaction	1 working day prior to backfilling
<b>6A.8</b>	Backfilling and reinstatement - Pavement backfill	Backfill adjacent new gutter material and location	3 working days prior to works
<b>6A.9</b>	Rock filled wire mattresses and gabions - Erection	Inspection of rockfill material and filling method	Progressive



## 1.2 Materials

### 1.2.1 Concrete

#### 1.2.1.1 General

Standard: To AS 2876

Specification: Concrete properties and delivery, reinforcement, formwork, placing, compaction, finishing, curing and protection to conform to *MITS 10 Concrete works*.

Concrete strength grade: Unless noted otherwise, conform to the following:

- > Slip formed kerb: N25.
- > Cast-in-situ concrete or other lining of open drains: N25.
- > Kerb ramps: N32.
- > Vehicle crossings: N32.

Documentation: Submit NATA registered Compliance Certificates for all constituents of the mix as verification of the mix suitability.

This is a **WITNESS POINT**.

### 1.2.2 Crusher dust

#### 1.2.2.1 General

Crusher dust for kerbs: Unless noted otherwise, conform to the following:

- > Liquid Limit  $\leq 35\%$  to AS 1289.3.1.1.
- > Plasticity Index:  $\leq 12\%$  to AS 1289.3.3.1.
- > Linear Shrinkage:  $\leq 6\%$  to AS 1289.3.4.1.

### 1.2.3 Proprietary products

#### 1.2.3.1 General

General: Conform to the manufacturer's instructions.

Approval: To the *TCCS Products previously considered for use list*.

Submit: For approval the type of product proposed.

This is a **HOLD POINT**.

### 1.2.4 Wire mattresses

#### 1.2.4.1 General

Standard: To ASTM A975.

Submit: For approval the type of mattress proposed.

This is a **HOLD POINT**.

Dimension: Unless otherwise shown on the Drawings. 6m × 2m × 230mm. Cut to suit areas if required.

Diaphragms: Divide mattress into cells not exceeding 1m centres.

Forming diaphragms: Folding the base layer of a mattress, provided that the bottom of each of the diaphragm halves is securely tied together so that the transmission of tensile forces in the mesh of the base layer is not impeded.

Mattress material: Flexible woven heavily galvanized wire to *ASTM A975*.

Mesh size: 60 x 80mm.

Galvanizing: Coating mass for round wire Class W10 to *AS/NZS 4534*.

Body wire: 2.0mm minimum core diameter for mattresses less than 350mm thick. Mattresses between 350mm and 550mm minimum core diameter of mesh must be 2.4mm.

PVC wire coating: 0.4mm required as shown on the Drawings.

Selvedge wire: 2.4mm minimum core diameter selvedge wire for mattresses less than 350mm thick. Mattresses between 350mm and 550mm minimum galvanized selvedge wire diameter must be 3.0mm.

Selvedge properties: Make sure the mesh does not unravel and that the strength of the connection between the selvedge wire and the mesh  $\geq$  the breaking strength of the mesh.

Lacing wire: 2.2mm minimum core diameter.

## **1.2.5 Gabions**

### **1.2.5.1 General**

Standard: To *ASTM A975*.

Submit: For approval the type of gabions proposed.

This is a **HOLD POINT**.

Dimension: As shown on the Drawings.

Diaphragms: Divide gabion into cells not greater than the width of the gabion plus 100mm.

Material: Flexible woven heavily galvanized wire to *ASTM A975*.

Mesh size: 80 x 100mm nominal.

Galvanizing: Coating mass for round wire Class W10 to *AS/NZS 4534*.

Body wire: 2.7mm minimum core diameter.

PVC wire coating: 0.4mm required as shown on the Drawings.

Selvedge wire: 3.4mm minimum core diameter.

Selvedge properties: Make sure the mesh does not unravel and that the strength of the connection between the selvedge wire and the mesh  $\geq$  the breaking strength of the mesh.

Lacing wire: 2.2mm minimum core diameter.

Rigid weld mesh gabions: Acceptable alternative to double twist mesh gabions, subject to the requirements of the design and this Specification.

## **1.2.6 Lacing and connecting wire**

### **1.2.6.1 General**

Standard: To *ASTM A975*.

Minimum diameter: 2.2mm.

Alternative fasteners: 'C' clips conforming to *ASTM A975* may be used if approved by the Authorised Person.

## **1.2.7 Rock fill material**

### **1.2.7.1 General**

Standard: To *AS 2758.4*.

Rock quality: Clean, dense, durable hard rock. No rock shall be from a source known to have acid leaching or staining problems associated with the breakdown of iron pyrites (FeS<sub>2</sub>).

Wet strength: > 100kN to *AS 1141.22*.

Wet / dry strength variation: < 35% to *AS 1141.22*.

Submit: For approval rock material sample and NATA certificates of compliance of the proposed rock fill material.

This is a **HOLD POINT**.

Particle sizes for wire mattresses: Between 75mm and two-thirds of the mattress thickness, or 250mm, whichever is the lesser.

Particle size for gabions: Between 100mm and 250mm and preferably not greater than 200mm.

## **1.2.8 Stone pitching**

### **1.2.8.1 General**

Material: Sound durable rock not less than 100mm thick. Stone for pitching shall be spalls or boulders with a minimum face dimension of 200mm and at least one face dimension of 300mm. The minimum thickness of any stone measured normal to the pitched surface shall be the nominal thickness of the pitching. No rock shall be from a source known to have acid leaching or staining problems associated with the breakdown of iron pyrites (FeS<sub>2</sub>).

Point load strength: > 1 MPa to AS 1141.22.

Wet strength: > 100kN to AS 1141.22.

Wet / dry strength variation: < 45% to AS 1141.22.

Submit: For approval rock material sample and NATA certificates of compliance of the proposed stone pitching material.

This is a **HOLD POINT**.

## **1.2.9 Stone faced concrete**

### **1.2.10 Weep holes**

#### **1.2.10.1 General**

Material: DN50 uPVC pipe.

Drainage plug: For each weephole, provide a drainage plug comprising 2kg of 7mm drainage aggregate wrapped in geotextile, embedded into the bedding material prior to placement of either the concrete blinding layer or stones.

### **1.2.11 Rip rap**

#### **1.2.11.1 General**

Nominal size: Sound durable rock in the nominal size range 100 to 300mm. Up to 10% may be in the nominal size range 75 to 100mm nominal size.

Shape: Rocks shall have regular surfaces with angular edges. The percentage of rock with smooth and curved faces shall not exceed 20%.

## 1.2.12 Geotextile

### 1.2.12.1 Properties

Type: As shown on the Drawings.

Minimum material properties: Filter fabric shall be a non woven type with the following properties:

- > Elongation:  $\geq 30\%$  to *AS3706.4*
- > Grab Strength:  $> 900\text{N}$  to *AS 2001.2.3 Method B*
- > Tear Strength:  $> 350\text{N}$  to *AS 3706.3*.
- > Filtration: flow rate  $\geq 50$  litres/m<sup>2</sup>/second and permittivity  $\geq 0.5$  / second to *AS 3706.9*.

Submit: For approval the proposed geotextile material and NATA certificates of compliance. Submit a sample of the fabric, the manufacturer information and installation instructions.

This is a **HOLD POINT**.

Classification: Properties, functions, design and construction requirements to *AGPT04G*.

Specification: Material type and minimum mass requirements as shown on the Drawings.

Quality: Free of any flaws, stabilised against UV radiation, rot proof, chemically stable, low water absorbency. Filaments must resist delamination and maintain their relative dimensional stability.

Robustness and strength: Conform to the following:

- > Classifications for robustness and strength cited in *AGPT04G*.
- > Select material based on tests and subgrade conditions for the relevant location/function.

### 1.2.12.2 Storage

Storage: Under protective cover or wrapped with a waterproof, opaque UV protective sheeting to avoid any damage prior to installation. Store to conform to manufacturers recommendations.

Damage: Must not be stored directly on the ground or in any manner that adversely affect the material by heat, dirt or damage.

Label: Make sure the geotextile material is clearly labelled showing manufacturer, type and batch number.

## 1.3 Execution

### 1.3.1 Provision for traffic

#### 1.3.1.1 General

Requirement: Conform to *MITS 01 Traffic Management*.

### 1.3.2 Site establishment

#### 1.3.2.1 Survey

Requirement: Confirm site surface and benchmarks. Conform to *MITS 00 Preliminaries*.

### 1.3.3 Open drains

#### 1.3.3.1 Excavation

Clear: To *MITS 02A Clearing and grubbing*, strip topsoil and any unsuitable material.

Excavate: To the dimensions shown on the Drawings or where not shown to minimum depth of 300 mm and minimum waterway area 0.2m<sup>2</sup>.

Cross section: V-shaped or trapezoidal unless otherwise shown on Drawings.

Batter slope: As shown on the Drawings or not steeper than 1V:4H.

Unsuitable material: Notify the Authorised Person of any unsuitable material and seek a direction for removal. Dispose of the unsuitable material as approved or directed. Replace unsuitable material to *MITS 02B Bulk earthworks*.

This is a **WITNESS POINT**.

Surplus material: Use the excavated material in the works or remove to spoil stockpiles as directed.

This is a **WITNESS POINT**.

#### 1.3.3.2 Embankment

Construct: General Fill to *MITS 02B Bulk earthworks*.

Revegetation: To *MITS 09 Landscape*.

#### 1.3.3.3 Construction

Trimming: To a uniform surface free of irregularities.

Surfaces to be lined: Compact to 95% standard compaction to *MITS 02B Bulk earthworks* unless noted otherwise.

Open drains: Grade to make sure of free flow of water and minimum grade of 0.5%.

This is a **WITNESS POINT**.

#### **1.3.3.4 Types**

Cut-off drains, minor diversion and contour drains: Construct before the adjacent roadway.

Location of cut-off drains: Unless noted otherwise, provide > 2m above the tops of cuttings or > 2m along the toes of embankments.

Table drains, swales and depressed medians: Construct as part of earthworks.

Channels: Excavate inlet, outlet and diversion channels as shown on the Drawings and, unless noted otherwise, extend to join the existing stream bed, avoiding disturbance in stream flow. Preserve the existing stream bed outside the limits of the excavation.

This is a **WITNESS POINT**.

### **1.3.4 Lining**

#### **1.3.4.1 General**

Timing: Within 7 days of shaping and compacting the foundation.

Proprietary Items: Install approved proprietary matting to conform to the manufacturer's instructions.

This is a **WITNESS POINT**.

#### **1.3.4.2 Organic fibre mat and vegetation**

Conform to: *MITS 09 Landscape*.

#### **1.3.4.3 Concrete lining**

Concrete: Minimum compacted thickness 100mm measured at right angles to the surface of the lining.

Method: Cast-in-situ or sprayed concrete to conform to *MITS 10 Concrete works*.

Weepholes: Provide weepholes in locations shown on the Drawings, at 2m spacing in non-horizontal elements and as directed.

This is a **HOLD POINT**.

Top of finished lining: True to line and of uniform width, free from humps, sags or other irregularities.

Tolerances: Conform to the following limits:

- > Finished levels of lining surface: Within  $\pm 10$ mm of design levels.
- > Surface deviation: Not more than 5mm from a 3m straightedge parallel to the direction of flow, except at kerb laybacks, grade changes or curves, or at grated sumps requiring channel depression.

Contraction joints: Conform to the following:

- > Width: 5mm minimum and 15mm maximum.
- > Depth: 20mm minimum.
- > Intervals: Every 3m of lining.

Expansion joints: Conform to the following:

- > Width: Nominal 15mm.
- > Depth: Full thickness of the concrete lining.
- > Intervals: 15m maximum.
- > Material: Approved preformed jointing material.

#### **1.3.4.4 Stone pitching**

General: Where shown on the Drawings construct stone faces properly bedded on approved loam or sand and mortared to present a uniform surface.

Preparation: Trimmed surface of excavated open drains to a depth of 150mm before stone pitching.

Subsurface drainage: Provide continuous subsoil drains to *MIT 031 Subsurface drainage*. Connect subsoil drains to weepholes. Provide weepholes in locations shown on the Drawings, at 2m centres in non-horizontal elements and as directed. Stagger rows of weepholes. The lowest row of weepholes shall finish at the toe of stone pitching.

This is a **HOLD POINT**.

Bedding: For stone pitching on slopes of 1 to 1 or greater, stones shall be embedded into a minimum 50mm thick concrete blinding layer of characteristic compressive strength of 20MPa at 28 days. Stones on slopes less than 1 to 1.5, shall be firmly bedded and based on compacted earth. The stones shall be based at a depth of 75mm below the adjacent designed finished surface, at the foot of the pitching.

The exposed surface of each stone: Approximately flat and not less than 0.05m<sup>2</sup> in area.

Spaces between adjacent stones or blocks: 20mm maximum width, stones shall be random coursed.

This is a **WITNESS POINT**.

Mortar: Voids between stones or blocks and bedding and between adjacent stones or blocks must be filled with mortar to *MIT 10 Concrete works*. At the surfaces mortar must be raked to a depth of 12 mm in the joints between adjacent stones or blocks.

Tolerances: Construct within 50 mm of the design level at any point provided that there is a continuous downgrade in the direction of flow at not less than 0.5% at any point.

Trench crossings: Where the stone pitching is constructed over service trenches, confirm clearance from utility authority prior to construction.

Finish: The finished pitching shall have a neat, clean surface free from mortar droppings. The top of the pitching shall be finished to an even grade or vertical curve, variations along the back edge being filled in with mortar, so as to produce a surface suitable for use as a mowing strip.



#### **1.3.4.5 Rip Rap**

Preparation: Trim subgrade to remove sharp level changes and drops.

Geotextile: Place geotextile on the trimmed subgrade immediately prior to rock placement, where shown on the Drawings.

Rock placement: Place rock, by hand if necessary, so that the rock mass is well inter-locked and there are no loose rocks. Rocks shall be placed to achieve maximum density by packing as closely as possible.

Rock subgrade: Notify the Authorised Person of rock subgrades below Rip Rap. The Authorised Person may direct the Rip Rap to be omitted.

#### **1.3.4.6 Batter drains**

Material: Half round precast nestable concrete units ("Half pipe") as shown on the Drawings.

Install: The units in a carefully excavated and template controlled trench to form an even top edge +0mm to □50mm from the batter line at the underside of topsoil.

Backfill and compact: Backfill over-excavation and undulations in the batter line. Compact both sides of the drain over the full length to form a firm shoulder against the top edge of the batter drain.

Taper topsoil: Over a width of 1m to zero thickness at the rim of the drain.

Turf: Both sides of the drain for a minimum width of 600mm to conform to MITS 09 Landscape.

### **1.3.5 Kerb laybacks, kerb and gutter**

#### **1.3.5.1 Foundation**

Material: Subbase material for kerbs shall be consistent with the adjacent pavement design where the road pavement continues under the kerb. In other locations, unless noted otherwise, crusher dust shall be used in accordance with the requirements of this Specification.

Shape and compaction: Before placing any kerbs, shape and compact the foundation material. Unless otherwise detailed, the subbase under kerbs shall be of 75mm compacted thickness. Refer to *ACTSD 0101-0102, ACTSD 0515-0516*.

Relative compaction: Minimum 100% standard compaction except where placed on pavement courses, then to the subbase requirements of the respective pavement course, refer to *MITS 04 Flexible pavement construction*.

This is a **HOLD POINT**.

#### **1.3.5.2 Construction**

Construct: Kerb and/or gutters in fixed forms, by extrusion or by slip forming to *AS 2876*.

#### **1.3.5.3 Finish**

Finish true to line: The top and face of the finished kerb and gutter or kerb layback.

Top surface: Uniform width, free from humps, sags and other irregularities.

Type: Steel float finish or as otherwise shown on Drawings.

#### **1.3.5.4 Tolerances**

Finished levels of gutter surface: Within  $\pm 10$ mm of design levels.

Surface deviation of kerb face and gutter surface:  $\pm 5$ mm from the edge of a 3m straightedge, except at kerb laybacks, grade changes or curves, or at grated sumps requiring gutter depression.

#### **1.3.5.5 Joints**

Contraction joints: Unless shown otherwise on the Drawings, conform to the following:

- > Width: 5mm minimum and 15mm maximum.
- > Interval and depth: Every 3m of gutter length for a minimum of 50% of cross sectional area of concrete.
- > Tooling: 20mm in depth to form a neat groove of 5mm minimum width.

Expansion joints: Provide where the gutter abuts against pits, retaining walls, at tangent points before and after curves, and at both sides of kerb laybacks for vehicular or pedestrian access. Unless shown otherwise on the Drawings, conform to the following:

- > Width: Nominal 15mm.
- > Depth: Full depth of kerb and gutter.
- > Maximum intervals: 15m.

Weakened plane: Provide shrinkage control joints shall by making a cut 3mm wide for at least one quarter of the depth of the kerb. Arises shall be tooled to a suitable radius. Spacing shall not exceed 3m.

Joints adjacent to concrete pavement: If kerbs and/or gutters are cast adjacent to a concrete pavement, continue the contraction, construction and expansion joints documented for the concrete base across the kerb and/or gutter.

Mower strips and edging:

- > Weakened plane joints shall be 3mm wide, cut vertically through the concrete at right angles to the direction of work. Arises shall be tooled to a suitable radius. Spacing shall not exceed 3m.
- > Expansion joints: Provide adjacent to structures or paving, at changes in cross-section, at tangent points before and after curves. Spacing shall not exceed 15m.

Machine extruded kerb: Joints shall be formed in a manner which does not cause damage to the adjacent concrete during cutting.

Rigid pavements: Where kerbing is laid as part of or adjacent to rigid pavements, joints of the same type shall align between kerb and pavement.

#### **1.3.5.6 Stormwater outlets**

General: Reconnect and extend all existing kerb stormwater outlets through the kerb to match the existing type and size of pipe to *ACTSD-0804*.

Pipes: Conform to *MITSD 03 Underground services*.

#### **1.3.5.7 Kerb laybacks**

Vehicle crossings: Meet the laybacks as shown on the Drawings, *ACTSD-0102* or reinstate to match existing materials. Construct vehicle crossings as detailed at the time of constructing kerbs.

Kerb ramps: Meet the laybacks as shown on the Drawings, *ACTSD-0515-0516* or reinstate to match existing materials. Construct whole kerb ramp as detailed at the time of constructing kerbs.

#### **1.3.5.8 Kerb marking**

Coordinated Reference Marks: CRM Castings shall be placed in the kerb prior to the initial set. Drawings provided by the Authorised Person will show the locations of the CRM's as approved by the Surveyor-General. The castings shall be placed at least 1m from kerb expansion joints with the inscription facing the paved road and the nipple top 5mm below the top of the kerb, as shown in *the ACTPLA standard drawings MISC825 Sheets 2 and 3*. The castings shall be obtained by the Contractor from the Principal's appointed Registered Surveyor.

Service marks: Where service conduits pass under kerb lines provide cast in place signage prior to the initial set of the concrete or indicator plates attached with epoxy and drive pins, in accordance with the service authority requirements.

#### **1.3.5.9 Tolerances**

General: Finished concrete shall be within 10mm of the specified alignment and level at all locations. There shall be no areas where water will pool.

### **1.3.6 Backfilling and reinstatement**

#### **1.3.6.1 Backfill behind kerbs**

Timing: Not earlier than 3 days after concreting, backfill and reinstate the spaces on both sides of the kerb and/or gutter to conform to the Drawings, or as directed.

Backfill: General fill compacted to *MITS 02B Bulk earthworks*, unless noted otherwise.

Topsoil: Minimum 75mm thickness to *MITS 09 Landscape*.

Surface treatment: Free draining and free from undulations and trip hazards, finish flush with the back of kerb.

This is a **WITNESS POINT**.

#### **1.3.6.2 Pavement backfill**

Backfill: Unless noted otherwise, where existing road pavement has been disturbed, the pavement shall be trimmed back to a straight undisturbed edge between 150 and 300mm from and parallel to the new kerb or gutter for the full depth of kerb section. Backfill with asphaltic concrete rammed solid using suitable tampers.

This is a **WITNESS POINT**.

#### **1.3.6.3 Grated sumps**

Reconstruct: The top of grated sumps or adjust precast units to suit new kerb and gutter profile.

Adjustment: Demolish and reconstruct sumps to *MITS 03D Drainage structures*.

## **1.3.7 Rock filled wire mattresses and gabions**

### **1.3.7.1 Foundations**

Finished level of excavation: Prior to installation of rock filled wire mattress or gabion trim so the mattresses finish flush with the surrounding ground.

Shape and compaction: Not less than 95% for standard compactive effort to AS 1289.5.4.1 to form a uniform channel cross-section prior to installation of mattresses.

### **1.3.7.2 Geotextile**

General: Before laying out the wire mattresses or gabions, place geotextile between the wire cage and the material being protected as shown on the Drawings.

Jointing: Minimum overlap shall be 500mm. Sewing or other methods of jointing are not permitted.

### **1.3.7.3 Assembly**

Prior to assembly: Open the wire mesh out flat on the ground and stretch it to remove all kinks and bends.

Gabion boxes: Individually assemble by raising the sides, ends and diaphragms; make sure all creases are in the correct position and that all four sides and the diaphragms are even.

Lace: The four corners first and then the edges of internal diaphragms to the sides.

Lacing and twisting: Commence the lacing by twisting the end of the lacing wire around the selvedge(s) then pass it around the two edges being joined using alternate single and double loops through each mesh in turn and tie it off securely at the bottom.

Ends: Turn the ends of all lacing wires to the inside of the box on completion of each lacing operation.

### **1.3.7.4 Erection**

Conform to the following:

- > Only assembled boxes or groups of boxes must be positioned in the structure.
- > Secure the end to either the completed work or by galvanized star pickets driven into the ground at 1m spacing.
- > Firmly embed the star pickets into the ground by minimum 900mm.
- > Star pickets to be at least the height of the box.
- > Place boxes in the structure lacing securely the proceeding one along all common corners and diaphragms.

Stretching for gabion boxes: Using a pull lift of at least 1 tonne capacity, firmly secured to the free end of the assembled gabion boxes. Whilst under tension, securely lace the gabion boxes along all edges and at diaphragm points to all adjacent boxes.

This is a **WITNESS POINT**.

Mattresses: Adjust the position of the diaphragms so that the sides hinge up on the thicker wire woven in the mesh.

### **1.3.7.5 Filling**

Gabion boxes: Conform to the following:

- > Fill whilst the gabion boxes are under tension.
- > Place the rocks at the front face and other exposed faces by hand to produce a neat face free of excessive bulges, depressions and voids.
- > Internal bracing wires 4 per m<sup>3</sup> at 330mm centres to prevent distortion.
- > Face bracing wires 4 per m<sup>2</sup> of face.
- > Mechanical filling equipment may be used with caution to protect any PVC or galvanized coatings from abrasion.
- > Release the tension on the gabion boxes only when fully laced so as to prevent any slackening.
- > Mattresses:
  - > Mechanical filling equipment may be used with caution to protect any PVC or galvanized coatings from abrasion and to maintain the shape of the gabion boxes.
  - > Redistribute the filling materials by hand to make sure that all diaphragm compartments are fully filled to produce a neat and level top surface.
  - > Overfill by 25 to 50mm to allow for subsequent settlement.

### **1.3.7.6 Final lacing**

Close and lace lids: As soon as practicable after filling particularly if there is a storm or flood expected. Stretch lids tightly over the filling and lace down securely.

## **1.4 Completion**

### **1.4.1 Submissions**

Work as Executed Records: To *MITS 00B Quality Requirements*.

## 2 MEASUREMENT AND PAYMENT

### 2.1 Measurement

#### 2.1.1.1 General

Payments made to the Schedule of Rates: To *MITIS 00 Preliminaries*, this Specification, the Drawings and **Pay Items**.

#### 2.1.1.2 Methodology

General: The following methodology will be applied for measurement and payment:

- > Allow for all work, materials, testing and quality assurance requirements in each Pay Item.
- > Temporary erosion and sedimentation control measures: To *MITIS 00C Control of erosion and sedimentation*.
- > Sprayed concrete lining of open drains: To *MITIS 10 Concrete works*.
- > Cast-in-situ concrete or other lining of open drains: Paid under this Specification and not *MITIS 10 Concrete works*.
- > Organic fibre matting: To *MITIS 09 Landscape*.
- > Miscellaneous minor concrete work not included in the pay items in this Specification: To *MITIS 10 Concrete works*.
- > Topsoiling and turfing to sides of batter drains: To *MITIS 09 Landscape*.
- > Supply and compaction of subbase and preparation of subgrade to this Specification, where the works are not adjacent to a road pavement (e.g. mowing strips, gabions).
- > Bulk earthworks for open drains: To *MITIS 02B Bulk earthworks*.
- > Kerbs:
  - > Supply and compaction of subbase to *MITIS 04 Flexible pavement construction* and preparation of subgrade to *MITIS 02 Earthworks*, where the road pavement extends under the kerb.
  - > Kerb transitions are to be measured as part of the relevant kerb type length with the length of kerb through the transition split equally between the kerb types each side of the transition. No extra over rate is provided for kerb transitions.

Concrete payment rates: The following methodology will be applied for measurement and payment:

- > Payment: At the scheduled rates provided the concrete meets the strength requirements as documented.

## 2.2 Pay items

**Table 6A-3 Pay items table**

Item No	Pay items	Unit of measurement	Schedule rate scope
<b>6A.1</b>	Concrete lining of open drains	m <sup>2</sup> of concrete in place, measured perpendicular to the batter surface	All activities associated with surface preparation, supply and placing of formwork, reinforcement, concrete and weepholes, jointing and curing. A separate pay item shall be included in the Contract for each lining thickness: 6A.1.1 100mm 6A.1.2 150mm 6A.1.3 200mm
<b>6A.2</b>	Stone pitching of open drains	m <sup>2</sup> of stone pitching in place, measured perpendicular to the batter surface.	All activities associated with surface preparation, installation and compaction of foundation and bedding, supply and placing of stone formwork, reinforcement, mortar and weepholes, final trimming and mortar jointing.
<b>6A.3</b>	Batter drains	Linear metre along the length of the drain.	All activities associated with supply of the units, surface preparation, installation, jointing, backfilling and compaction.
<b>6A.4</b>	Rip Rap	m <sup>2</sup> of rip rap measured from the top area of the completed work including the area folded into the trench, measured perpendicular to the batter surface.	All activities associated with: <ul style="list-style-type: none"> <li>• Trimming and compaction of foundations.</li> <li>• Supply and placement of geotextile material, where specified.</li> <li>• Supply and placing of the rock.</li> </ul>
<b>6A.5</b>	Kerbs	Linear metre measured along the length of the nominal kerb line including vehicle crossings, sumps, Kerb ramps and other kerb laybacks.	All activities associated with: <ul style="list-style-type: none"> <li>• Surface preparation, forming, concreting and curing.</li> <li>• Compaction of foundations and supply and compaction of subbase not associated with road pavements.</li> <li>• Transition between kerb types.</li> <li>• Expansion and contraction joints.</li> <li>• Backfilling and compaction adjacent to the completed kerb.</li> <li>• Supply and installation of kerb markings.</li> </ul> A separate pay item shall be included for each type of kerb. 6A.5.1 KG 6A.5.2 KO 6A.5.3 MK 6A.5.4 MKG 6A.5.5 MLBK 6A.5.6 OCI

Item No	Pay items	Unit of measurement	Schedule rate scope
<b>6A.6</b>	Kerb reinforcement	Linear metre measured along the length of the nominal kerb line including vehicle crossings, sumps, Kerb ramps and other kerb laybacks.	<p>All activities extra over Kerbs associated with supply and placement of reinforcing steel, where specified in the Drawings, for each type of kerb.</p> <p>6A.6.1 KG  6A.6.2 KO  6A.6.3 MK  6A.6.4 MKG  6A.6.5 MLBK  6A.6.6 OCI</p>
<b>6A.7</b>	Kerb ramps	Number	<p>All activities extra over Kerbs associated with construction of kerb ramps, including:</p> <ul style="list-style-type: none"> <li>• Surface preparation, forming, concreting, finishing and curing.</li> <li>• Compaction of foundations and supply and compaction of subbase not associated with road pavements.</li> <li>• Transition between kerb types.</li> <li>• Expansion and contraction joints.</li> <li>• Backfilling and compaction adjacent to the completed kerb ramp.</li> </ul> <p>A separate pay item shall be included for each path width.</p> <p>6A.7.1 1.5m path  6A.7.2 2.0m path  6A.7.3 2.5m path  6A.7.4 3.0m path</p>
<b>6A.8</b>	Vehicle crossings	Number	<p>All activities extra over Kerbs associated with construction of vehicle crossings, including:</p> <ul style="list-style-type: none"> <li>• Surface preparation, forming, concreting, finishing and curing.</li> <li>• Reinforcement where specified.</li> <li>• Compaction of foundations and supply and compaction of subbase not associated with road pavements.</li> <li>• Transition between kerb types.</li> <li>• Expansion and contraction joints.</li> <li>• Backfilling and compaction adjacent to the completed vehicle crossing.</li> </ul> <p>A separate pay item shall be included for each width (measured at the back of kerb) and type.</p> <p>6A.8.1 5m unreinforced  6A.8.2 10m unreinforced  6A.8.3 7.5m reinforced  6A.8.4 11m reinforced  Etc...</p>



Item No	Pay items	Unit of measurement	Schedule rate scope
<b>6A.9</b>	Remove existing concrete kerb	Linear metre measured along the length of the nominal kerb line.	All activities associated with the saw cutting of the kerbing irrespective of depth, removal of kerb including reinforcement, underlying pavement courses, vehicle crossings and kerb ramps, legal disposal of waste materials offsite and all disposal fees.
<b>6A.10</b>	Rock filled gabions	m <sup>3</sup> of rock filling measured insitu.	All activities associated with: <ul style="list-style-type: none"> <li>• Trimming and compaction of foundations.</li> <li>• Supply and placement of geotextile material.</li> <li>• Supply and assembly of the gabions</li> <li>• Supply and placing of the rock fill in the gabions.</li> <li>• Final lacing and finishing.</li> </ul>
<b>6A.11</b>	Rock filled wire mattresses	m <sup>2</sup> of rock filled mattress measured from the top area of the mattress including the area folded into the trench, measured perpendicular to the batter surface.	All activities associated with: <ul style="list-style-type: none"> <li>• Trimming and compaction of foundations.</li> <li>• Supply and placement of geotextile material, star pickets and ties.</li> <li>• Supply and assembly of the wire mattresses.</li> <li>• Supply and placing of the rock fill.</li> <li>• Final lacing and finishing.</li> </ul> A separate pay item shall be included in the Contract for each mattress thickness: <ul style="list-style-type: none"> <li>6A.11.1 170mm</li> <li>6A.11.2 230mm</li> <li>6A.11.3 300mm</li> <li>6A.11.4 500mm</li> <li>6A.11.5 1,000mm</li> </ul>



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