Construction Specification for Civil Works

C273 - Landscaping

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REVISIONS: C273 - LANDSCAPING

REVISIONS	CLAUSES AMENDED	AMENDMENT DETAILS	DATE
1		Original Issue	20/05/2019
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GENERAL

C273.01 SCOPE

The work to be executed under this Specification consists of:

(a) The vegetation of cut and fill batters, median areas, pathways, verges, open drains and other areas within the site. Vegetation includes the initial surface preparation, topsoiling, fertilising, sowing of seed and may include surface protection work, hydroseeding, hydromulching and straw mulching.

(b) The supply of plants, planting at locations as shown on the approved design drawings, fertilising, mulching, staking, watering and maintenance of plants.

Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in *CQC-Quality Control Requirements Sub-Annexure B12.*

Quality

C273.02 DEFINITIONS

The Works – Defined as follows:

The Works

- **Developer Infrastructure Works** - work includes subdivisions and any public infrastructure work associated with an approved Development in the TRC local government area requiring a construction certificate.
- **Contracted Works –** infrastructure work undertaken by a Principal Contractor or subcontractor formally appointed by TRC and supervised by TRC.
- **Internal Works** - infrastructure work undertaken by TRC's day labour workforce.

Constructor – Defined as the organisation responsible for construction of the Works and the Principal Contractor as defined in the *Work Health and Safety Act 2011*.

Constructor

TRC Representative – Defined as follows:

TRC Representative

- **Developer Infrastructure Works** – Nominated TRC officer(s) for the approved Development.
- **For Contracted Works –** the Superintendent.
- **For Internal Works –** TRC Asset Owner

Constructor's Representative – Defined as follows:

Constructor's Representative

- **Contracted Works** – the Principal Contractor's nominated representative as per the relevant contract.
- **Internal Works** – TRC officer responsible for delivery.

Developer's Representative– Defined as the person or organisation appointed by the Developer to administer the Constructor responsible for the delivery of **Developer Infrastructure Works**.

Developer's Representative

C273.03 REFERENCE DOCUMENTS

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

Where not otherwise specified in the relevant Specifications or the approved design drawings, the Constructor shall use the latest versions of the Reference documentation, including amendments and supplements, listed in the Specifications at the time of the Works approval.

Currency

(a) Tamworth Regional Council (TRC) Specifications

C211 - Control of Erosion and Sedimentation.

C213- - Earthworks.

CQC - Quality Control Requirements.

(b) Australian Standards

References in this Specification or on the approved design drawings to Australian Standards are noted by their prefix AS or AS/NZS.

AS 1160 - Bitumen emulsion for construction and maintenance of pavements.

AS 2507 - The storage and handling of pesticides.

AS 4419 - Soils for landscaping and garden use.

AS 4454 - Composts, soil conditioners and mulches.

AS 4843 - Synthetic weed blocking fabric.

(c) Other Publications

TRC Engineering Design Minimum Standards for Subdivisions and Developments.

VEGETATION OF SLOPES AND DRAINS

C273.04 EXECUTION AND TIMING OF WORK

Constructor's Responsibility

In association with the work to be executed under this Specification, the Constructor shall implement effective erosion and sedimentation control measures in accordance *C211 – Control of Erosion and Sedimentation*.

Vegetation

The work to be completed includes the vegetation of cut and fill batters, pathway verges, median areas, open drains and other areas within the site. Vegetation includes the initial surface preparation, topsoiling, fertilising and either sowing of seed or turfing as shown on the approved design drawings.

Exposed Ground

Exposed ground shall be vegetated before the area exceeds one hectare or lesser area in compliance with Tamworth Regional Council (TRC) requirements.

C273.05 MATERIALS

(a) Topsoil

Quality

The Constructor shall use topsoil stockpiled on site in accordance with *C213 – Earthworks*. Where imported topsoil is required, it shall comply with AS 4419 and shall:

- be of a friable, porous nature;
- be free of weeds and weed seeds, bulbs, corms and vegetable propagules;
- contain no refuse or materials toxic to plant growth or human health;
- contain no stumps, roots, clay lumps or stones larger than 50mm in size;
- have an organic content of at least 3% by mass;
- have a pH neither less than 5.5 nor more than 7.5; and
- have a soluble salt content not exceeding 0.06% by mass.

Imported Topsoil Supplier and Test Results

The Constructor shall submit to the TRC Representative name(s) of the proposed topsoil supplier/s inclusive of the test results demonstrating compliance with the above at least ten (10) working days prior to delivery to the Works site.

(b) Herbicide

Herbicide used shall be a glyphosate based herbicide listed in **Annexure C273A** and in accordance with TRC's pesticide notification program.

(c) Seed

Seed Type and Supplier

All seed used shall be of the species and varieties listed in **Annexure C273A** and shall be sown at the application rates specified therein. The Constructor shall submit to the TRC Representative the name/s of the proposed seed supplier(s) at least ten (10) working days prior to application at the Works site.

Lead Time for Native Seed

The Constructor's attention is drawn to the lead time that may be required to procure some native seed species. The native seed shall be delivered to the site in separate lots for each species and variety, clearly labelled to show species, variety and weight.

Certification

All seed must be accompanied by a "Certificate of Authenticity" which shall be furnished by the Constructor to the TRC Representative upon request at any stage of the work. Grass and clover seed shall be pre-packed commercially with an accompanying certificate of germination.

Storage

The Constructor shall not take possession of the seed more than seven (7) days before sowing is to occur. The seed shall be stored in clean, air tight containers and kept away from direct sunlight. It shall not be exposed to the elements at any stage during storage.

Constructor's Cost

The Constructor shall replace at his own expense any exotic seed batch found not true to type.

(d) Turf

Turf shall consist of 25mm depth of dense, well rooted, vigorous grass growth with 25mm depth of topsoil. The type of grass turf to be used shall be selected from **Annexure C273A** and in accordance with the approved design drawings. Unless specified, Kikuyu grass shall not be used. Turf shall be free of weeds, soil pests and diseases. The turf shall be supplied as rolls in long lengths of uniform width, not less than 300mm, and shall be in sound unbroken condition.

(e) Fertiliser

Type

Fertiliser shall be an organic type listed in **Annexure C273A** with Nitrogen: Phosphorus: Potassium (N:P:K) ratios of 8:3.6:2.

(f) Vegetable Mulch

Composition

Vegetable mulch used in hydromulching shall consist of straw, chaff, wood fibre, paper pulp or similar material all finely shredded to a maximum dimension of 10 mm. Meadow hay or weeds shall not be used and paper pulp if used shall not exceed 50% by mass of the total mulch.

(g) Water

Quality

Water used shall be potable and fit for purpose.

(h) Binder

The binder used in hydromulching and strawmulching shall be Grade ASS, slow setting anionic bitumen emulsion, complying with AS 1160.

(i) Wetting Agent

The soil wetting agent added in hydromulching or hydroseeding shall be listed in **Annexure C273A** and applied at the application rate specified therein.

(j) Pesticide

Pesticide used shall be a liquid or powder appropriate for the pest and in accordance with TRC's pesticide notification program. The storage and handling of pesticides shall be in accordance with AS 2507.

C273.06 VEGETATION OF SLOPES 3 TO 1 OR FLATTER

(a) Preparation of Surface

Herbicide Treatment

Slopes shall be sprayed with herbicide applied at the rate specified in **Annexure C273A** to kill weed infestation. Sprayed areas shall remain undisturbed for fourteen (14) days.

Preparation

The surface shall then be tyned to a depth of 200 mm to produce a loose surface and all large stones, rubbish and other materials that may hinder germination shall be removed before topsoiling.

(b) Topsoiling

Application

Topsoil shall be uniformly applied to provide an average compacted thickness of 50mm with a minimum compacted thickness of 30mm at any location. The topsoiled area shall be cultivated to a depth of 50mm to provide a roughened surface with soil lumps

not exceeding 50mm dimension.

(c) Mixing of Seed

Notice

The Constructor shall give the TRC Representative notice at least two (2) working days before each sowing operation. Seed shall be sown on the day of mixing with pesticide.

(d) Incorporation of Pesticide

Mixing

Immediately before sowing, all grass and native seed shall be treated with pesticide. The Constructor shall supply and spread a suitable pesticide in accordance with the manufacturer's minimum application rate**.**

(e) Sowing

Seeder

Sowing shall be carried out with an appropriate mechanical seeder. Where practicable, passes shall follow finished surface contours. Seed shall be sown at a depth of 5mm or shall be raked or harrowed to provide 5mm cover.

Sowing Rate

Seed and fertiliser shall be evenly distributed over the areas to be sown at the rates specified in **Annexure C273A**. Fertiliser shall be applied concurrently with the seeding operation.

(f) Turfing

Placing

Turf shall be placed on the prepared topsoiled surface. Runs of turf shall butt hard against each other and be placed perpendicular to the direction of water flow. Turf seams shall then be top dressed with topsoil.

Topdressing

Between four (4) and six (6) weeks after placement, the turf shall be lightly top dressed with topsoil to correct any undulations or unevenness in the established turf.

(g) Watering

Watering

The Constructor shall water areas to be sown to a moist condition and shall rewater areas to a moist condition without surface runoff on a daily basis for a minimum of fourteen (14) days after sowing, or as otherwise directed by the TRC Representative, to promote and maintain growth.

Constructor's Cost

Any vegetation not fit for purpose following the Maintenance Bond period as defined in the TRC Engineering Design Minimum Standards for Subdivisions and Developments is to be replaced at the Constructor's cost.

C273.07 VEGETATION OF SLOPES STEEPER THAN 3 TO 1

(a) General

Method

Where shown on the approved design drawings or directed by the TRC Representative, slopes shall be vegetated by one of the following methods:

(i) Topsoiling and hydromulching;

(ii) Topsoiling, hydroseeding and straw mulching;

(iii) Hydroseeding.

(b) Preparation of Surface

Herbicide Treatment

Weeds shall be killed by spraying with herbicides as specified under Clause C273.05(a).

Preparation

No more than seven (7) days before seeding, all loose material shall be removed from fill batters and cut batters, which are not stepped, by dragging a heavy steel chain of minimum weight of 30 kilograms per metre of length or by other methods approved by the TRC Representative.

(c) Topsoiling

Application

Where batters have been stepped, the steps shall be loosely filled with topsoil. Elsewhere, topsoil shall be uniformly applied to provide an average thickness of 50mm with a minimum compacted thickness of 30mm at any location

(d) Hydromulching or Hydroseeding

Application Rate

The hydromulch or hydroseed shall comprise the materials shown in Table C273.1. The materials shall be applied at the application rates shown in Table C273.1.

Watering

Dry surfaces shall be watered by a fine spray before the application of the hydromulch.

Treatment of Seed

The mixing and treatment of seed shall be carried out in accordance with Clause C273.06(c).

Pesticide

During preparation of the hydromulch or hydroseed slurry, liquid form pesticide shall be added to the storage tank, to facilitate surface application, at a rate of 5 litres of pesticide to the equivalent volume of hydromulch or hydroseed slurry to be spread on one (1) hectare of surface in accordance with Table C273.1.

Equipment

Storage tanks, containers and equipment to be used in hydromulching or hydroseeding of slopes shall be clean and free of contamination from previous operations.

Uniform Mix

A slurry mixture shall be produced by addition of the specified materials in the tank and agitated to maintain a uniform consistency during application. It shall be applied uniformly over the whole surface.

Weather Conditions

Hydromulch or hydroseed shall not be applied under the following weather conditions at the site:

- when temperature is higher than 35 degrees Celsius;
- when wind exceeds 15 km/h;
- where, in the opinion of the TRC Representative, the surface is too wet; or
- during rain periods or when rain appears imminent.

Application rates shall be in accordance with Table C273.1

Material	Application Rate per Hectare	
	Hydromulching	Hydroseeding
Vegetable Mulch (kg)	2,500	Nil
Water (litre)	35,000	20,000
Binder (litre)	700	Nil
Fertiliser	Refer **Annexure C273A**	
Seed	Refer **Annexure C273A**	
Wetting Agent (litre)	35	20
Pesticide (litre)	5	5

Table C273.1 - Materials and Application Rates

(e) Straw Mulching

Method

The mulch to be applied after hydroseeding shall comprise a matrix of straw and an anionic slow setting bitumen emulsion binder. Meadow hay shall not be used. The straw mulch shall be uniformly applied by a suitable blower unit at a rate of 250 bales (each of 20 kilograms) of straw per hectare of surface. The bitumen emulsion shall be incorporated as a spray into the air stream of the mulch blower at a rate of not less than 2,500 litres of bitumen emulsion per hectare of surface. The finished straw mat shall have a minimum thickness of 20mm at any location.

(f) Watering

Watering

The Constructor shall water treated areas in order to promote and maintain growth as specified under Clause C273.06(g).

C273.08 VEGETATION OF NON-CONCRETE OPEN DRAINS

(a) Preparation of Surface

Profile and Topsoil

The Constructor shall ensure that the excavation of open drains to the specified profiles is followed by the vegetation of the surface within seven (7) days as specified in this Clause. Topsoil shall be spread to provide an average compacted thickness of 50mm with a minimum compacted thickness of 30mm at any location.

(b) Sowing

Procedure

Before sowing, the surface shall be watered. Seed and fertiliser shall then be applied uniformly at the rates specified in **Annexure C273A** by one of the following procedures:

(i) Mechanical sowing.

(ii) Hydromulching or hydroseeding.

(iii) By hand.

(c) Surface Protection

Methods

Where shown on the approved design drawings or directed by the TRC Representative, one of the following protective treatments shall be applied immediately to all or part of the sown surface.

(i) Spraying with Bitumen Emulsion

Application Rate

An anionic slow setting bitumen emulsion, conforming with Grade ASS of AS 1160, shall be sprayed over the surface at a rate of one (1) litre of bitumen emulsion per square metre of surface.

(ii) Lining with Organic Fibre Mat

Laying

The channel surface shall be lined with an organic fibre mat listed in **Annexure C273A**. The runs of matting shall be laid along the direction of water flow. The matting shall be laid loosely on the soil surface and not stretched.

Anchorage

The upstream end of the matting shall be slotted into a trench 150mm wide by 150mm deep and pinned to the base of the trench at 200mm centres. The trench shall be backfilled with soil and compacted by foot.

Pins

The pins shall be `U' shaped, 4mm gauge wire, 50mm wide and 150mm long legs.

Lapping

Adjacent runs of matting shall be overlapped 100mm with the higher run lapped over the lower run. The matting shall be pinned along the sides of each run at 500mm centres and along the middle of each run at 1m centres. End overlaps shall be 150mm wide with the higher run end lapped over the start of the lower run and pinned at 200mm centres.

(iii) Turfing

Quality

Turf shall be as specified under Clause C273.054(d).

Placing

Runs of turf shall butt hard against each other and be placed perpendicular to the direction of water flow in the drain, and pinned into position at 500mm centres.

Topdressing

Seams of turf shall be top dressed with topsoil.

(d) Watering

The Constructor shall water treated areas in order to promote and maintain growth as specified under Clause C273.06(g).

LANDSCAPE PLANTING

C273.09 EXECUTION AND TIMING OF WORK

Extent of Work

The work to be executed includes the ground preparation, the supply of plants, planting at the locations as shown on the approved design drawings, fertilising, mulching, staking, watering and maintenance of plants.

Notice of Commencement

The Constructor shall give the TRC Representative a minimum notice of two (2) working days prior to the commencement of planting. Landscape planting shall not be carried out in extreme weather conditions (above 35^{o}C or below 10^{o}C).

C273.10 MATERIALS

(a) Topsoil

Topsoil shall comply with the requirements of Clause C273.05(a).

(b) Herbicide/Weed Blocking Fabric

Herbicide shall comply with the requirements of Clause C273.054(b).

Synthetic weed blocking fabric shall comply with AS 4843.

(c) Fertiliser

Quality

Fertiliser shall be a slow-release type in pellet form, listed in **Annexure C273A**, with a nine (9) months' release period and having Nitrogen:Phosphorus: Potassium (N:P:K) ratios of 6.3 : 1.8 : 2.8.

(d) Mulch

Quality

All mulches used for landscape planting shall consist of organic material complying with the requirements of AS 4454. Mulch shall be composted or pasteurized as indicated in **Annexure C273A**. The use of other materials as ground cover shall be as indicated on the approved design drawings.

Sample

A 10kg sample of mulch proposed by the Constructor shall be submitted for approval to the TRC Representative at least ten (10) working days before its intended use. The mulch subsequently used shall be consistent in every respect with the sample approved by the TRC Representative.

(e) Plant Material

Source

The Constructor shall obtain all plants from a nursery located in an area having a similar climate to Works site.

Quality

There shall be no substitution of any species without the TRC Representative's approval. All plant material shall be true to species and sizes. Plants shall be healthy, of good form, not soft or forced and with large robust root systems. They shall not be rootbound and shall be free from disease and insect pests. All container soil mix shall contain between 20% and 25% clay by volume. Trees shall have a single leading shoot. For hardening off purposes, all plants shall be delivered to a site within the locality of the site at least twenty (20) working days before planting out. Plant root systems shall be maintained moist at all times with particular attention being paid to watering during the on-site period before and during planting. Plant stock shall be classified as indicated in Table C273.2, and planted in accordance with the approved design drawings.

	Type or Stock				
	50mm Tube	**Gro-Tube**	**Semi Advanced**	**Advanced Stock**	**Super Advanced**
Plant Container: dia (mm)	50	75	150	200	300
depth (mm)	75	100	150	200	300
Plant Height (mm) (leaf & stem)	200 min 300 max	300 min 400 max	300 min 400 max	300 min 500 max	500 min 750 max
Planting Holes: side dia (mm)	200	200	300	400	600
depth (mm)	200	200	300	400	600
Number of Fertilizer Pellets	2	3	5	5	7

Table C273.2 - Plant Stock

(f) Stakes

Size

All stakes shall be 50mm square by 1,500mm long hardwood and sharpened at one end.

C273.11 PLANTING

(a) Mass Planting in Mulched Bed

Herbicide/ Weed Blocking Treatment

The area to be planted shall be sprayed with herbicide, as specified under Clause C273.06(a). Sprayed areas shall remain undisturbed for ten (10) working days. Alternatively, where approved by the TRC Representative, a synthetic weed blocking fabric shall be applied to the area to be planted.

Surface Preparation

The surface shall be ripped at 500mm centres to a depth of 300mm and the top 200mm of the planting bed broken up by cultivation to a maximum size of 50mm. Mulch, 100mm thick, shall be spread over the planting bed. After removal of the localised mulch, planting holes shall be excavated to the dimensions and depths as shown in Table C273.2 and the material removed.

Fertilizer Pellets

The specified number of fertilizer pellets as shown in Table C273.2 shall be placed beside the rootball of each plant.

Backfill and Staking

The planting hole shall be backfilled with topsoil complying with Clause C273.05(a) and care taken to avoid mixing mulch with topsoil. A stake shall be driven 300mm deep and 200mm clear of each 'Advanced' and 'Super Advanced' size stock and the stock tied to it by a strip of 50mm wide hessian webbing.

Watering and Mulching

Each backfilled hole shall receive a minimum of 10 litres of water before the mulch is respread over the disturbed area. The mulch shall be left just clear of the plant stem.

(b) Individual Planting

Planting Holes

A planting area 600mm dia. or square shall be loosened to a depth of 400mm. Planting holes shall be excavated to dimensions and depths as shown in Table C273.2 and the material spread evenly around each hole.

Fertilizer Pellets

The specified number of fertiliser pellets, as shown in Table C273.2, shall be placed beside the rootball of each plant.

Backfill and Staking

The planting hole shall be backfilled with topsoil complying with Clause C273.05(a) and compacted by foot up to surface level. A stake shall be driven 300mm deep and 200mm clear of each 'Advanced' and 'Super Advanced' size stock and the stock tied to it by a strip of 50mm wide hessian webbing.

Each backfilled hole shall receive 50 litres of water.

Watering

Weed infestation for a distance of 800 mm surrounding each proposed planting shall be killed by spraying with a herbicide as specified in Clause C273.06(a). All due care shall be taken to avoid damage caused by contact between herbicide and the plant by means of spray drift etc. Alternatively, where approved by the TRC Representative, a synthetic weed blocking fabric shall be applied to the 800mm area surrounding each proposed planting.

Herbicide/ Weed Blocking Treatment

Immediately after planting, mulch 100mm thick, starting just clear of the plant stem, shall be spread over an area of 600mm radius surrounding the plant.

Mulch

C273.12 CARE OF LANDSCAPE PLANTING

The Constructor shall water all plants, from the time of planting, at the rate of 50 to 100 litres per plant every third day for the first twelve (12) weeks.

Watering

Missing plants, dead plants and plants nominated by the TRC Representative as unhealthy shall be replaced by the Constructor. Replacement plants shall be of similar size and quality and of identical species and variety to the plant being replaced. The cost of replacement shall be borne by the Constructor.

Replacement Plants Constructor's Cost

Weed and grass growth in mulched areas shall be killed by treatment with herbicide in accordance with the manufacturer's instructions at monthly intervals during the construction period and contract maintenance period. Contact of the herbicide with the new plants shall be avoided and any damage repaired or damaged plant material replaced by the Constructor at no cost to TRC.

Weed Control

Constructor's Cost

LIMITS AND TOLERANCES

C273.13 SUMMARY OF LIMITS AND TOLERANCES

The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C273.3 below.

Item	Activity	Limits/Tolerances	Spec Clause
1	**Topsoil**		
	a) Organic Content	> 3% by mass	C273.05a
	b) pH	> 5.5 < 7.5	C273.05a
	c) Soluble Salt	< 0.06% by mass	C273.05a
2	**Turf**		
	Turf	Widths >300mm.	C273.05d
3	**Vegetable Mulch**		
	a) Material b) Paper Pulp	maximum size < 10mm < 50% by mass of total mulch	C273.05f C273.05f
4	**Topsoiling**		
	Topsoiling	Minimum compacted thickness at any location of 30mm	C273.06b C273.07c C273.08a
5	**Straw Mulching**		
	a) Straw Mat	Finished thickness > 20mm.	C273.07e
6	**Landscape Planting**		
	a) Temperature	Planting not to be undertaken when temperatures > 35°C or < 10 °C.	C273.09
7	**Mulch**		
	a) Fines	Shall not exceed 5% by volume.	C273.10d
	b) Woodchip	Maximum size < 50mm.	C273.10d
8	**Plant Material**		
	a) Container Soil Mix	Contain > 20% < 25% by volume of clay.	C273.10e

Table C273.3 - Summary of Limits and Tolerances

ANNEXURE C273A – LANDSCAPING MATERIALS

MATERIAL	TYPE	MINIMUM APPLICATION RATE
1. HERBICIDE *	'Roundup'	9 litres/200 litres water/ha
2. SEED		
a) Grass	Hulled Couch	5 kg/ha
	Red Clover (Inoculated)	5 kg/ha
	White Clover (Inoculated)	5 kg/ha
	"Elka" Perennial Rye	5 kg/ha
(b) Native	Acacia dealbata	4 kg/ha
	Acacia buxifolia	1 kg/ha
	Acacia decurrens	1 kg/ha
	Acacia pravissima	1 kg/ha
	Leptospermum petersonii	1 kg/ha
	Hardenbergia violacea	500 g/ha
	Kennedia prostrata	500 g/ha
	Acacia implexa	200 g/ha
	Banksia marginata	200 g/ha
	Bursaria spinosa	200 g/ha
	Callistemon pallidus	200 g/ha
	Dodonaea viscoca	200 g/ha
3. TURF GRASS		
(a) Medians	Couch	Refer to Approved Design Drawings
(b) Verges/Footpaths	Couch	Refer to Approved Design Drawings
(c) Other Areas	Couch	Refer to Approved Design Drawings
4. FERTILISER *		
(a) Vegetation of Slopes/Drains	Dynamic Lifter 'Nitro"	1000 kg/ha
(b) Landscape Planting	'Kokei' pellets	Refer Table C273.2
5. WETTING AGENT *	'Aquasoil'	1 litre/1000 litres of mix water
6. ORGANIC FIBRE MAT *	'Sta-firma' (light grade)	-
7. MULCH	Composted/Pasteurized	100mm thick
* Material shall be as listed or equivalent as approved by TRC.		

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