

COFFS HARBOUR CITY COUNCIL



**DEVELOPMENT SPECIFICATION
DESIGN**

1195 Boundary fences for road reserves

Version 1 01 January 2009

1195 BOUNDARY FENCES FOR ROAD RESERVES

1 SCOPE AND GENERAL

1.1 SCOPE

The work to be executed under this worksection includes setting out, clearing of fence line, supply of material and erection of boundary fencing and gates, in accordance with the Drawings or as directed by the Superintendent.

1.2 QUALITY

Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are given in 0161 *Quality (Construction)*.

1.3 REFERENCED DOCUMENTS

The following documents referred to in this worksection shall be deemed as the latest edition of the Australian Standards, including amendments and supplements.

Worksections

0161 *Quality (Construction)*

0310 *Minor concrete works*

1111 *Clearing and grubbing*

1192 *Signposting*

Standards

AS 1289	Methods of testing soils for engineering purposes
AS 1289.5.4.1	Soil compaction and density tests—Compaction control test—Dry density ratio, moisture variation and moisture ratio
AS 1725	Chain-link fabric security fencing and gates
AS 1742	Manual of uniform traffic control devices
AS 1742.2	Traffic control devices for general use
AS 2423	Coated steel wire fencing products for terrestrial, aquatic and general use

2 MATERIALS

2.1 GENERAL

All materials shall be supplied by the Contractor and shall be of dimensions, manufacture and quality in accordance with the requirements of this worksection and all galvanized wire fencing products shall conform to AS 2423.

For each type of material to be supplied, the Contractor shall submit to the Superintendent for approval the source, manufacturer, and also the type if applicable.

No materials shall be used until approved by the Superintendent.

2.2 GALVANIZED POSTS AND BRACES

All posts and bracing shall be galvanized iron pipe in accordance with AS 1725. The pipes shall be to the dimensions shown on the Drawings.

All pipe joints shall be welded. All welds shall be satisfactorily cleaned and painted with a cold galvanizing compound to the satisfaction of the Superintendent.

2.3 CHAIN WIRE

Dimensions

Galvanized chain wire mesh, 1,450 mm wide (1830 mm wide for Manproof Fencing) shall be of 3.15 mm diameter wire woven to a 50 × 50 mm square mesh.

The selvedge edges of the chain wire shall be left barbed, and it shall be supplied in lengths of not less than 30 m.

Zinc coating

The zinc coating shall be uniform, continuous, free from imperfections and thoroughly adherent.

The coating shall be applied to the wire before the mesh is woven.

The weight of the zinc coating shall not be less than 290 g/sq m of wire surface.

PVC coating

Where specified, the chain wire shall be coated in black PVC after galvanizing.

2.4 WIRE NETTING

Wire netting shall be standard quality galvanized 1.40 mm diameter wire, 40 mm mesh, 1.05 m wide for normal use and 1.60 mm diameter wire, 50 mm mesh, 0.90 m wide where used in creek crossings.

2.5 GATES

Dimensions and fittings

Gates shall be of galvanized tubular steel construction, 3.6 metres in width by 1.5 metres or 1.2 metres (as specified) in height, and shall be fitted with substantial hinges, catch, drop bolts and locking chains unless otherwise shown on the Drawings or directed by the Superintendent.

Rabbit proofing

Where required, gates shall have stout and well supported rabbit-proof mesh to a height of at least 900 mm above ground level.

2.6 REINFORCED CONCRETE POSTS

Strainer posts

Dimensions: Concrete strainer posts shall be approximately 150×150 square in section and lengths as shown on the Drawings. Each post shall be provided with 12 mm dia holes to suit the spacing of the wires shown on the Drawings for the particular type(s) of fencing to be erected.

Reinforcing steel: The posts shall be reinforced longitudinally with not less than four reinforcing bars each 12 mm diameter. All posts shall have suitable stirrup reinforcement to control diagonal cracking. Longitudinal reinforcement shall have 25 mm minimum cover. End cover on reinforcement shall be 25 mm.

Concrete strength: The concrete shall have a minimum 28 day compressive strength of 20 MPa.

Intermediate posts

Intermediate Posts shall generally conform to the requirements for Strainer Posts, except that the longitudinal reinforcing bars may be 9 mm dia.

2.7 PRESTRESSED CONCRETE POSTS

Strainer posts

Tendons: At least four longitudinal high carbon deformed high tensile strands (or equivalent) of 5 mm diameter, shall be provided. The strands shall be tensioned to a stress of 800 MPa minimum prior to placing concrete. Cross sectional dimensions of the posts shall be as shown on the Drawings.

Concrete: Concrete shall have a minimum compressive strength of 32 MPa at 24 hours.

Grooves for wire: In lieu of holes for wires, grooves may be provided to suit the spacing of the wires shown on the appropriate Drawings for the particular types of fencing to be erected.

The grooves shall be at least 5 mm deep and 5 mm wide at the surface of the post.

Intermediate posts

Intermediate posts and strainer stays shall generally conform to the requirements for Strainer Posts except that two only high tensile, high carbon deformed strands shall be required.

Cross sectional dimensions shall be as shown on the Drawings.

2.8 STEEL POSTS (RURAL FENCING)

Steel posts shall be 'STAR' pattern. Posts shall be drilled to suit the spacing of the wires shown on the Drawing(s), and shall be black varnished or galvanized.

The total weight of 30 posts each 1.65 m long shall be at least one (1) tonne.

2.9 GALVANIZED PIPE POSTS (RURAL FENCING)

Galvanized pipe posts shall be used where shown on the Drawings.

The pipes shall be of the dimensions shown on the Drawings and shall be of first grade quality in accordance with AS 1725.

2.10 WIRES

Plain wire

Plain wire shall be standard galvanized drawn annealed steel wire of diameters shown on the Drawings.

High tensile plain wire

High Tensile wire shall be galvanized and of diameters shown on the Drawings.

Barbed wire

Barbed wire including barbs shall be 2.5 mm diameter galvanized drawn annealed steel wire, with clusters of four barbs spaced at 90 mm maximum.

Alternatively barbed wire may be of 1.6 mm diameter high tensile steel wire, with clusters of barbs spaced at 90 mm maximum.

Cable wire

Type and dimensions

Cable wire shall consist of three pairs of 2 × 3.15 mm galvanized iron wire tightly twisted around posts and located as shown in the Drawings.

Tie wire

The wire shall be 2 mm diameter galvanized wire.

2.11 CONCRETE BACKFILLING

All concrete backfilling of post holes specified on the Drawings shall be of minimum 20 MPa 28 day compressive strength and shall conform to the requirements of 0310 *Minor concrete works*.

3 CONSTRUCTION

3.1 GENERAL

Construction Priority

Boundary fencing shall be erected prior to the commencement of other work on a particular section of the work, unless directed otherwise by the Superintendent.

Quality

All fencing shall be erected in a workmanlike manner, and when completed shall be sound, strong and of neat appearance.

Clearing

For a clear width of one metre on either side of the fence line, and for the full length of the line, all logs, boulders, stumps, roots, undergrowth and rubbish shall be removed and disposed of by the contractor in accordance with 1111 *Clearing and grubbing*.

Trees within this area shall be removed only as directed by the Superintendent and approved by Council.

Trees retained

If trees on or adjacent to the fence line are to be retained the arrangement of the fencing at the trees shall be as directed by the Superintendent.

Trees on fence line

Wire shall not be strained around or against any trees to be left in the fence line, and strainer posts are to be provided on both sides of each tree.

Uniform grade

Where minor irregularities occur in the ground the vertical alignment of the fence shall not follow these irregularities, but shall be aligned to a uniform grade between definite changes in the natural slope of the ground.

Survey pegs

All survey pegs shall be left undisturbed and the post spacing shall be altered slightly where necessary to avoid pegs.

Stock proof

The Contractor shall maintain the fencing at all times in a condition secure against the ingress or egress of stock, and shall take such precautions as are necessary to prevent people or stock from stepping into holes excavated for the construction of fencing.

Backfilling of old holes

Where old fencing is to be replaced by new fencing, all holes left after removal of the old fencing shall be backfilled and rammed firmly in layers of maximum depth 150 mm.

Contractor’s responsibility

The Contractor shall be held responsible for any loss, damage, or injury to buildings, goods, crops, livestock, property of any kind or persons due to negligence on the Contractor’s part.

3.2 CHAIN LINK FENCING

Erection of posts

Concrete foundation: All posts shall be erected vertically and set in concrete foundations approximately 250 mm diameter and 600 mm deep except for end, corner, strainer and gate posts which shall be set in concrete blocks approximately 250 mm diameter and 900 mm deep unless otherwise shown on the Drawings.

Concrete shall have a minimum compressive strength of 20 MPa at 28 days and shall conform to the requirements of 0310 *Minor concrete works*.

Weather caps: Galvanized weather caps shall be fitted to all galvanized posts.

Strainer posts: Strainer posts shall be used at ends of fencing, angles, intersections with other fencing, gates and at intermediate points. Distances between strainer posts shall not exceed 120 metres.

Erection of wire

Fasten and strain: All wire shall be spaced as shown in the Drawings.

Wire shall be securely fastened and strained to an even tension between strainer posts.

Chain wire mesh: Where specified, or shown on the Drawings, chain wire mesh shall be erected on the outside of the posts and fastened with two turns of the wire to each cable wire on both sides of each post and at intervals of not more than 900 mm between posts and to each post midway between cable wires.

3.3 STOCK-PROOF FENCING

Erection of posts

Method: All posts shall be erected vertically. Reinforced concrete posts shall be erected in neatly cut holes sunk in earth, or in rock where this is encountered.

Steel posts, except where placed in rock, shall be driven with suitable driving equipment, care being taken not to damage the tops of the posts during driving.

Driving prestressed posts: Where prestressed posts are proposed to be used, they shall be either erected as for reinforced concrete posts or shall be driven. Where driven, the Contractor shall use a suitable post driver which shall be equipped with two sets of guiding rollers, to hold the post vertical and in position during driving.

Protection cap: A steel cap with a plywood cushion shall be used to protect the top of the post during driving.

Removal of posts due to construction issues: If the post cannot be driven for the full depth specified, or if it becomes significantly damaged, or cannot be driven vertically, it shall be removed. The same post if undamaged, or a new post, shall be erected as described for reinforced concrete posts.

Posts shall be sunk to the depths shown in Table 3.1.

Table 3.1 Post depth in Ground

Type of Post	Depth	
	Earth	Rock
Concrete Corner posts & strain posts	900	*600

Concrete intermediate posts	600	*450
Steel posts	450	450
* Permitted only in cases where posts of the correct length are provided (see below), otherwise the depth of sinking shall be the same as for earth.		

Variations to post length: Cutting of concrete posts will not be permitted, and in order to take advantage of the lesser depth of sinking permitted in rock, it will be necessary to use posts manufactured in lengths to suit the depth of sinking. Where rock is encountered, steel posts shall be sunk in drill holes of sufficient diameter to permit them to be refilled with cement mortar consisting of one part of cement to two parts of clean sand.

Backfilling at intermediate posts: Earth shall be backfilled around intermediate posts in layers of maximum depth 150 mm for the full depth of the hole and up to ground level. The relative compaction of the rammed material shall be not less than that of the original undisturbed ground.

Mortar backfill: Where concrete posts are placed in rock, the space around the posts shall be tightly filled with cement mortar consisting of one part of cement to two parts of sand, or concrete where this is available.

Strainer posts: Strainer posts shall be used at ends of fencing, angles, intersections with other fencing, gates and at intermediate points. These posts shall be backfilled with approved concrete to their full depth.

Spacing of posts: Distances between strainer posts shall not exceed 120 m in the case of fencing using steel intermediate posts, and 90 m in the case of fencing for the retention of cattle (for which only concrete posts are permitted).

Junctions with existing fencing shall be made in an approved manner.

Erection of wires

Fastening and straining: All wire shall be placed as shown on the Drawings. Wires shall be securely fastened and strained to an even tension between strainer posts with an approved wire strainer. Where barbed wire is to be used, it shall be tied in position at the top of intermediate posts, and where additional barbed wires are called for they shall be secured to the sides of the posts as shown on the Drawings.

Barbed wire: Where concrete posts are used and the barbed wires are secured either to the tops or sides of the posts by tie wire, the tie wire shall be stretched tight and shall fit snugly against the sides of the posts to prevent movement of the barbed wire.

Prestressed posts: Where prestressed posts are used, wires shall be securely tied so that they seat firmly in the grooves.

Wire joints: All joints in wires shall be as shown on the Drawings.

3.4 RABBIT-PROOF FENCING

Netting position

Wire netting shall be erected on the side of the fence remote from the roadway in the case of road reserve boundary fences.

In other cases netting shall be erected on the side of which the Superintendent shall direct.

Lap/Trench

The netting shall be erected so that there is a 200 mm lap laid on the ground surface, or trenched 215 mm into the ground as shown on the Drawings for the type of fence to be erected.

Fixing of netting

Netting shall be tied with tie wire or fixing clips approved by the Superintendent.

Straining and tying

The netting shall be loosely tied to fence wires then carefully strained without disturbing or breaking the mesh, and shall then be tied to the wires immediately on each side of the post and at intervals not exceeding 1 m.

Additional netting

At each strainer post strut, additional netting shall be attached to the fence adjacent to the strainer post, to a height of 450 mm above the strut.

3.5 CROSSING OF WATERCOURSES AND DEPRESSIONS

Marsupial proof

The crossing of all watercourses and depressions, shall be made secure by longer posts, suitably strutted as directed by the Superintendent.

Additional cable wire and chain wire/wire netting shall be provided as necessary to make the fence stock proof.

Floodwater

The fence shall allow the passage of floodwater without the accumulation of debris. If directed by the Superintendent, flood gates shall be provided in accordance with **Flood gates**.

3.6 CONNECTIONS TO EXISTING FENCES

Existing cross fences shall be connected to the new fence using a strainer post with braces in each direction of strain (including cross fence) and the wires in both fences properly fastened to the post.

3.7 FLOOD GATES

General

Suitable provision for the passage of flood waters past the fence shall be made at all watercourses.

In all cases flood gates shall be of the type indicated on the Drawings, or as directed by the Superintendent, and shall be erected so as to prevent the accumulation of flood debris, while remaining stock-proof or rabbit-proof.

Small watercourses

Flood gates, in accordance with the Drawings, shall be provided in small gullies at the locations indicated on the Drawings or as directed by the Superintendent.

The opening of each flood gate shall provide a waterway area at least twice that of the culvert opposite to which it is placed, or as otherwise directed by the Superintendent.

Large gullies and creeks

Location: Flood gates, in accordance with the Drawings, shall be provided in gullies and creeks at the locations indicated on the Drawings, or as directed by the Superintendent.

Construction detail: A 9 mm galvanized wire rope shall be carried over the gully in one span, threaded through a strainer post and tied back to an anchor at an adjacent concrete intermediate post.

Turnbuckles are to be provided at each end to tension the wire rope. Netting shall be suspended from the wire rope and shall be overlapped and securely tied. The netting shall be of sufficient length to lie on the ground for a distance of not less than 1.0 m on the downstream side.

Netting ballast: Ballast, of sound timber securely tied to the netting, shall be provided at the downstream end of the netting.

Construction requirements: The sides of the gully shall be trimmed, as necessary, to ensure that the flood gate shall be stock-proof or rabbit-proof. The flood gate shall have sufficient movement of the suspended portion under the flow of flood waters to prevent damage to the fence and the accumulation of debris against it. Each strainer post shall be stayed in three directions, as shown on the Drawings.

3.8 ERECTION OF GATES

Swing away from road

Where gates are specified or shown on the Drawings, they shall be erected so that they swing away from the road.

Double gates shall be supplied if directed by the Superintendent, otherwise a single gate only shall be supplied.

Level surface

At the location of gates the surface shall be levelled and shall be nearly horizontal. The area where the gates swing shall be similarly levelled.

Hanging

The gates shall be hung as indicated in the Drawings.

3.9 REMOVAL OF EXISTING FENCING

Location

Where required, existing fencing is to be removed as shown on the Drawings.

Contractor's responsibility

No fencing is to be removed if there is a risk of egress or ingress of stock.

If the existing fence is a rabbit-proof fence, then the contractor shall ensure that at night and weekends and other such times when work is not in hand that the whole of the fence is maintained in a rabbit-proof condition, even if temporary fencing is required. No extra payment will be made for this requirement.

Old material

All material removed in demolishing existing fencing shall be disposed by the Contractor as provided by **Removal and disposal of surplus material and rubbish**.

3.10 REMOVAL AND DISPOSAL OF SURPLUS MATERIAL AND RUBBISH

Contractor's responsibility

All surplus material, offcuts, timber, roots and other debris resulting from the fencing contract shall be removed or otherwise disposed of to the satisfaction of the Superintendent.

Fire damage

The Contractor shall be responsible for any damage which may result from the lighting of fires associated with the work.

3.11 CATTLE GRIDS

Specification

Where shown on the Drawings, or as directed by the Superintendent, cattle grids shall be erected in accordance with the Drawings.

Bedding

The cattle grid shall be evenly bedded on a continuous layer of compacted sand or other granular material approved by the Superintendent.

The bedding material shall be compacted so that the relative compaction as determined by AS 1289.5.4.1 is not less than 95%.

Raised abutments

Cattle grids shall be installed on raised abutments with approach ramps where possible.

Alternatively, a cattle grid may be placed over an excavated pit, in which case adequate drainage shall be provided.

Crossfall

Crossfall for single lane cattle grids shall be level and for two lane cattle grids each section shall have a crossfall conforming to the crossfall of the approach road.

Extent of work

The cattle grid construction shall include all activities associated with the cattle grid including any adjustments to the fencing as shown on the Drawings.

Advance signposting, in accordance with AS 1742.2, shall be provided on each approach to the cattle grid in accordance with 1192 *Signposting*

4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

Payment shall be made for all the activities associated with completing the work detailed in this Worksection on a schedule of rates basis in accordance with Pay items 1195.1 to 1195.4 inclusive.

If any item for which a quantity of work is listed in the Schedule of Rates has not been priced by the Contractor, it shall be understood that due allowance has been made in the prices of other items for the cost of the activity which has not been priced.

A lump sum price for any of these items shall not be accepted.

Clearing and grubbing is measured and paid in accordance with this worksection and not 1111 *Clearing and grubbing*.

Concrete backfilling and blocks are measured and paid in accordance with this worksection and not 0310 *Minor concrete works*.

Cattle grid signposting is measured and paid in accordance with this worksection and not 1192 *Signposting*

4.2 PAY ITEMS

1195.1 Supply and erection of boundary fencing

The unit of measurement shall be the linear metre of fencing, chain link, stock-proof or rabbit-proof, measured on site.

Separate pay items shall be shown for each type of fence specified.

The schedule rate under this Pay Item shall include the supply of all materials, the clearing of site, and all activities associated with the erection of the fence, including the levelling of mounds (if required), concreting, the provision of crossings for watercourses and depressions as necessary, flood gates as necessary and the connection of the new fence to existing fence where required.

The schedule rate shall also cover all types of excavation material encountered during construction work, both earth and rock and the removal and disposal of surplus material and rubbish.

1195.2 Supply & erection of boundary fence gates

The unit of measurement shall be 'each' gate erected.

The schedule rate shall include the supply of all material and all activities associated with the erection of each gate.

1195.3 Supply & installation of cattle grid

The unit of measurement shall be 'each' cattle grid installed.

The schedule rate shall include the supply of the cattle grid together with all activities associated with the construction of the cattle grid including bedding, approach ramps, wings, drainage, adjustment to fencing and the provision of signs.

1195.4 Removal of existing fence

The unit of measurement shall be the linear metre of fencing removed as measured on site.

The schedule rate shall include all activities associated with the demolition and disposal of the existing fence.