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Government

FENCES AND BARRIERS 08A

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INFRASTRUCTURE
TECHNICAL
SPECIFICATION
08 - INCIDENTAL WORKS

Transport Canberra and
City Services

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1 FENCES AND BARRIERS

1.1 General

1.1.1 Responsibilities

1.1.1.1 General

Requirement: Provide fences and barriers for road reserves, 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	Traffic Management
MITS 02	Earthworks
MITS 10	Concrete works

1.1.3 Referenced documents

1.1.3.1 Standards

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

Australian standards

AS 1074	Steel tubes and tubulars for ordinary service
AS 1111	ISO Metric hexagon bolts and screws – Product grade C
AS 1112	ISO Metric hexagon nuts
AS/NZS 1163	Cold formed structural steel hollow sections
AS 1214	Hot-dip galvanized coatings on threaded fasteners (ISO metric coarse thread series)
AS 1237	Plain washers for metric bolts, screws and nuts for general
AS 1237.1	General plan
AS 1237.2	Tolerances
AS 1289	Methods of testing soils for engineering purposes
AS 1289.5.6.1	Soil compaction and density tests - Compaction control test - Density index method for a cohesionless material

AS/NZS 1390	Cup head bolts with ISO metric coarse pitch threads
AS 1604	Specification for preservative treatment
AS 1720	Timber structures
AS 1720.2	Timber properties
AS 1725	Chain-link fabric security fencing and gates
AS 1725.1	Security fences and gates – General requirements
AS 1725.2	Tennis court fencing – Commercial
AS 1725.3	Tennis court fencing – Private/residential
AS 1725.4	Cricket net fencing enclosures
AS 1725.5	Sports ground fencing – General requirements.
AS 1742	Manual of uniform traffic control devices
AS 1742.2	Traffic control devices for general use
AS 2082	Timber – Hardwood – Visually stress-graded for structural purposes
AS 2423	Coated steel wire fencing products for terrestrial, aquatic and general use
AS 2858	Timber – Softwood – Visually stress-graded for structural purposes
AS 3600	Concrete structures
AS/NZS 3750.9	Paints for steel structures – Organic zinc-rich primer
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 4792	Hot-dip galvanized (zinc) coatings on ferrous hollow sections applied by a continuous or a specialised process

1.1.4 Standards

1.1.4.1 General

Security fences and gates: To *AS1725.1*.

Tennis courts: To *AS 1725.2* and *AS 1725.3*.

Cricket court: To *AS 1725.4*.

Sports ground: To *AS 1725.5*.

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

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 – on site activities**.

Table 8A-1 Hold point table

Item	Clause title	Requirement	Notice for inspection	Release by
Execution				
8A.1	Establishment - General	Confirm approval for access and work on adjacent property	One week before commencing site work	Authorised Person
8A.2	Establishment - Connection to existing fences	Connection proposal of existing and new fencing	One week before next activity	Authorised Person
8A.3	Erection of posts - Depth of posts	Method of installing and proposed type of posts to be used	One week before manufacture or order	Authorised Person

Table 8A-2 Witness point table – on site activities

Item	Clause title	Requirement	Notice for inspection
Materials			
8A.1	Steel posts - Fence posts	Welding sites to be cleaned and painted	Progressive
Execution			
8A.2	Erection of Wires – Installation	Approval for any proprietary fasteners	One week before manufacture or order

1.2 Materials

1.2.1 Barriers

1.2.1.1 General

Full and partial barrier fences: To *ACTSD-0906 and 0907*.

Cycleway rails: To *ACTSD-0525*.

1.2.2 Steel posts

1.2.2.1 Steel tubes

Standard: To *AS 1725.1* and *AS/NZS 1163* and galvanized to *AS/NZS 4792*.

Type: Medium-quality pipe tube grade (C250L0) to the dimensions as shown on the drawings.

1.2.2.2 Fence posts

Standard: To *AS 1725.1*.

Type: Medium – quality.

Splicing: Any splicing required must be butt welded and located in the concrete not less than 150mm below ground level.

Welding: Clean and paint all welding with a cold galvanizing compound (zinc rich paint).

This is a **WITNESS POINT**.

Post extensions: To *AS 1725.1* for barbed wire attachment.

Connections: If connections are not welded and are subjected to movement, protect the galvanized coatings from scratching caused by the connecting members.

Top caps: Fit each post with a galvanized steel cap to prevent the ingress of water.

1.2.2.3 Star posts (Rural fencing)

Type: 'STAR' pattern ('Y' bar section) drilled to suit the spacing of the wires shown on the drawing(s).

Protection: Black varnished or hot-dip galvanized to *AS/NZS 4680*.

Total weight: Total weight of 290 posts each 1.65m long must be at least one (1) tonne.

1.2.2.4 Pipe rail for pipe rail fencing

Standard: To AS 1725.1.

Type:

- > Nominal diameter: 32mm.
- > Outside diameter: 42.4mm
- > Alternatively, as shown on the drawings.

Joints: Only permitted for continuous top rail fencing greater than 6000mm intervals. Tight fitting internal swagged or external sleeve joints or screwed and socket joints or butted together centrally over post within the fitting.

1.2.2.5 Strainer posts

Standard: To AS 1074 and galvanized to AS/NZS 4680.

Type: Medium grade tube.

Dimensions:

- > Minimum diameter: 150mm.
- > Minimum wall thickness: 4mm.
- > Submit any alternate sizing.

Holes: Provide a set of 12mm holes to suit the spacing of the wires shown on the drawings.

1.2.2.6 Intermediate posts

Standard: To AS 1074 and galvanized to AS 4680.

Type: Medium grade tube.

Dimensions:

- > Minimum diameter: 150mm.
- > Minimum wall thickness: 4mm.
- > Submit any alternate sizing.

1.2.3 Chain wire and wire netting

1.2.3.1 General

Standard: To AS 1725.1 and AS 2423.

Zinc coating: Uniform, continuous, free from imperfections, thoroughly adherent and applied to the wire before the mesh is woven.

Weight: Zinc coating weight \geq 290g/m² of wire surface.

PVC-U coating: Coated in black PVC-U after galvanizing where specified.

1.2.3.2 Wire netting standard use

Type: 105 x 4 x 1.4 (1.05m wide, 40mm mesh, 1.40mm diameter wire) unless documented elsewhere.

1.2.3.3 Chain wire

Type: 15m/1800 x 50 x 3.15/W10Z/HG/KK/HD (rolled length, width, pitch, diameter, metallic coating grade, protective coating system code, seldge type, service duty) unless documented elsewhere.

1.2.4 Gates

1.2.4.1 General

Standard: To AS 1725.1 and hot-dip galvanized to AS/NZS 4680.

Type: Galvanized tubular steel 3.6m wide, 1.5m or 1.2m (as documented to match the height of the fence) in height.

Fittings: Substantial hinges, catch, drop bolts and locking chains unless otherwise shown on the drawings or as directed.

Joints: Fully welded fillet welds, minimum 6mm exposed surface width and cleaned.

1.2.5 Reinforced concrete posts

1.2.5.1 Precast strainer posts

Standard: To AS 3600.

Dimensions: 150 x 150mm square in section and heights as shown on the drawings.

Holes in posts: 12mm diameter holes to suit the spacing of the wires shown on the drawings.

Reinforcing steel: Reinforce longitudinally with at least 4 bars of 12mm diameter, also suitable stirrup reinforcement to control diagonal cracking. As shown on the drawings.

Cover: Longitudinal reinforcement minimum cover = 20mm. End cover on reinforcement = 20mm.

Concrete strength: Minimum 28 day compressive strength of 32MPa.

1.2.5.2 Precast intermediate posts

Dimensions: 100 x 100mm square section and heights shown on drawings.

Reinforcing steel: Longitudinal reinforcing bars may be 9mm diameter.

Similar: Cover, concrete strength and holes as for strainer posts.

1.2.6 Prestressed concrete posts

1.2.6.1 Strainer posts

Tendons: Provide at least 2 high tensile tendons tensioned to conform to the drawings.

Cover: At least 20mm minimum longitudinal cover.

Cross section: Rectangular section 150 x 100mm or as shown on the drawings.

Concrete: Minimum 28 day compressive strength of 32MPa.

Grooves for wire: At least 5mm deep and 5mm wide at the surface of the post and to suit the spacing of the wires shown on the drawings.

1.2.6.2 Intermediate posts

Tendons: Provide a single high tensile tendon tensioned to conform to the drawings.

Cross section: 100 x 60mm rectangular.

Grooves: At least 5mm deep and 10mm wide at the surface of the post and to suit the wires shown on the drawings.

1.2.7 Treated timber posts and braces

1.2.7.1 General

Hardwood: To AS 2082.

Sawn timber: To AS 2858 and AS 1720.2 Grade F5.

Treatment: To AS 1604 hazard class H4, containing no mixtures or compounds of the elements chromium and arsenic.

1.2.8 Wires

1.2.8.1 Plain wire

Standard: To AS 2423.

Type: Low tensile fencing wire (Class W02 or greater, with coating type Z, ZA or E).

Diameters: As shown on the drawings.

1.2.8.2 High tensile plain wire

Standard: To AS 2423.

Type: High tensile fencing (Class W02 or greater, with coating type Z, ZA or E).

1.2.8.3 PVC-U coated wire

Core wire: As per plain or high tensile wire above and as specified on the drawings.

Standard: Apply coating to AS 2423.

1.2.8.4 Barbed wire

Standard: To AS 2423.

Type: Low tensile barbing wire 2.5mm diameter galvanized drawn annealed steel wire (Class W02 or greater with coating type Z, ZA or E), with clusters of four barbs spaced between 75 and 110mm.

Alternative: High tensile barbed wire (Class W02 or greater with coating type Z, ZA or E) of 1.6mm diameter with clusters of barbs spaced between 75 and 110mm.

1.2.8.5 Cable wire

Type: Three pairs of 2 x 3.15mm galvanized iron wire tightly twisted around posts.

Location: As shown in the drawings.

1.2.8.6 Tie wire

Standard: To AS 2423.

Type: Low tensile (Class W02 or greater, with coating type Z, ZA or E) wire, 2mm diameter galvanized wire.

1.2.9 Miscellaneous hardware

1.2.9.1 General

Standards: Conform to the following:

- > Bolts and screws: To AS 1111.
- > Cup head bolts: To AS/NZS 1390.
- > Hexagon nuts: To AS 1112.
- > Plain washers: To AS 1237.1 and AS 1237.2.
- > Hot-dipped Galvanized threaded fasteners: To AS 1214.
- > Type: Commercial grade bolts, nuts and washers.

1.2.10 Concrete backfilling

1.2.10.1 Backfilling

Concrete strength: 20MPa minimum 28 day compressive strength to conform to the requirements of *MITS 10 Concrete works*.

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 Establishment

1.3.3.1 General

Access: Liaise with property owners, Council and Authorised Person to get written approval to access properties for the activities of clearing, fence construction, removal and disposal of materials.

This is a **HOLD POINT**.

Damage: The Contractor will be held responsible for any loss, damage, or injury to: buildings, goods, crops, livestock, property of any kind, or persons due to negligence by the Contractor.

Quality: Erect all fencing in a workmanlike manner, a sound, strong and neat appearance when complete.

Uniform grade: If minor irregularities occur in the ground levels, the vertical alignment of the fence is not to follow these irregularities. The fence must align to a uniform grade between definite changes in the natural slope of the ground.

Survey pegs: Leave all survey pegs undisturbed and adjust the post spacing where necessary to avoid pegs.

Stock proof: Maintain the fencing at all times in a condition secure against movement of stock, and take all necessary precautions to prevent people or stock from injury due to fencing activities.

1.3.3.2 Removal of existing fencing

Location: Remove existing fencing as shown on the drawings.

Posts in rock: Seek approval to neatly cut off at ground level.

Backfilling of old holes: Backfill all holes left after removal of old fence and compact firmly in layers of maximum depth 150mm.

1.3.3.3 Temporary fencing

Stock fence: If there is a risk of egress or ingress of stock, do not remove fencing. Seek direction from Authorised Person to supply temporary fencing.

Type: Temporary fencing as documented and shown on the drawings for the new fencing. Use the same erection methods as for the final fencing.

1.3.3.4 Clearing and grubbing

Clearing: To *MITS 02A Clearing and grubbing*.

Trees on fence line: Do not strain wire around or against any trees left in the fence line. Provide strainer posts on both sides of each tree.

1.3.3.5 Connections to existing fences

Submit: A proposal for connection arrangement where new fencing intersects with existing fencing.

This is a **HOLD POINT**.

1.3.4 Erection of posts

1.3.4.1 General

Steep locations: Erect all posts vertically except in unusually steep locations where posts may be erected perpendicular to the surface of the ground.

Concrete for footings and base strips: Crown the top surface at each post to shed water away from the post.

1.3.4.2 Depth of posts

Method: Submit installation method and proposed type of post for approval.

This is a **HOLD POINT**.

Sinking depths: Posts must be sunk or driven to the **Posts depth table**.

Table 8A-3 Posts depth table

Type of post	Depth (mm)	
	Earth	Rock
Concrete strainer posts	900	*600
Concrete intermediate posts	600	*450
Treated timber strainer posts	900	600
Treated timber intermediate posts	600	450
Galvanized steel strainer posts	900	*600
Galvanized steel intermediate posts	600	*450
Other steel posts	450	450

* NOTE Permitted only in cases where posts of the correct length are supplied, otherwise the depth of sinking must be the same as for earth.

Damaged posts: If a post becomes significantly damaged or cannot be driven vertically, remove the post. Erect the same post, if undamaged, or a new post into neatly cut holes backfilled to the full depth with earth (where sunk in earth) or cement mortar or concrete (20MPa) where in rock.

Posts sunk in earth: If posts are not driven into the earth, the diameter of hole must permit sufficient compaction of the backfill. Backfill earth in layers of 150mm maximum depth for the full depth of the hole ensuring the relative compaction of the rammed material equals the original undisturbed ground.

Rock holes: Provide posts erected in rock holes with sufficient diameter to permit tight refilling with cement mortar or concrete.

Diameter: 250mm unless otherwise shown on the drawings.

1.3.4.3 Strainer posts

Locations: Provide strainer posts at ends of fencing, angles, intersections with other fencing, gates and at intermediate points.

Distances between strainer posts: 120 metres maximum.

Bracing in one direction: At the ends of fencing and at gates.

Bracing in two directions: At angles in the fence line, abrupt changes of grade and at intermediate points.

Drawings: Other strainer post arrangements as shown on the drawings.

Bracing: Conform to the following:

Timber posts: Round timber as shown on the drawings.

Other than timber posts: Medium weight galvanized steel tube to dimensions shown on the drawings.

Distance: Between intermediate point strainer posts < 120m except in the case of fencing for the retention of cattle < 90m.

1.3.4.4 Reinforced concrete posts

Foundation: Erect in neatly cut holes sunk in earth, or in rock where this is encountered.

Strainer posts: Backfill to the full depth of the hole with concrete of minimum compressive strength of 20MPa at 28 days to the requirements of *MITS 10 Concrete works*.

Intermediate posts: Backfill to the full depth of the hole with earth, where post is sunk in earth or with cement or concrete (20MPa at 28 days) where the post is sunk in rock.

Cement mortar: 1 cement: 2 sand.

Cutting: Cutting concrete posts is not permitted. To take advantage of the reduced sinking depth for rock, provide posts manufactured in shorter lengths to suit the depth of sinking.

1.3.4.5 Prestressed concrete posts

Erection: Either as for the reinforced concrete posts or driven in earth using a suitable post driver to hold the post vertical and in position during driving. Driving prestressed posts is not permitted except where shown on the drawings.

Protect whilst driving: Provide a steel cap with a plywood cushion not less than 12mm thick to protect the top of the post during driving.

Cutting: Cutting concrete posts is not permitted. To take advantage of the reduced sinking depth for rock, provide posts manufactured in shorter lengths to suit the depth of sinking.

1.3.4.6 Steel posts

Driving: If not erected in rock, drive steel posts with suitable driving equipment taking care not to damage the tops of the posts during driving.

Damage to protection: Repair any damage to protective coating using an organic zinc-rich primer in conformance with AS 3750.9.

Rock: Erect posts in neatly cut holes and backfill to the full depth of the hole with cement mortar or 20MPa concrete.

1.3.4.7 Treated timber posts

Erect: Similar to reinforced concrete posts or driven in earth using a suitable post driver. Make sure no damage to the post during driving.

Stiff earth: Drive posts in to holes of a diameter 50 mm less than the nominal maximum post diameter. Drive posts with the small diameter end down. If not driven, erect with butt end down.

1.3.5 Erection of wires

1.3.5.1 Installation

Placement: Place all wires as shown on the drawings.

Side fixed wires: Place on the property owners side of the posts.

Fasten and strain: Securely fasten and strain wires to the following nominal tension between strainer posts using a wire strainer and gauge.

Table 8A-4 Table for wire tensions

Wire diameter (mm)	Type	Tension (kN)
4.0	Plain wire	1.8
2.5	H.T Plain wire	1.3
2.5	Barbed wire – L.T	1.3
1.6	Barbed wire – H.T	1.3

Strainer posts: Fix plain and barbed wire at strainer posts as shown on the drawings.

Secure end: Wrap wire at least four times around the tension side of the line.

Top strand: Tie barbed wire in position at the top of reinforced concrete intermediate posts and steel posts as shown on drawings. For timber posts fix to the top of the post using a galvanized staple minimum 40mm long.

Fixing wires: Fix wires to the posts as shown on the drawings or by using proprietary galvanized fastening clips as approved.

This is a **WITNESS POINT**.

Prestressed concrete: Securely fasten wires so that they seat firmly in the grooves provided on the side of the posts.

Tie wire: Stretch tight and fit snugly against the side of the post to prevent movement of the wire. Wrap the ends of the tie wire at least twice around the line wire and neatly cut off. Form all joints in wire as figure-of-eight knots as shown on the drawings.

1.3.6 Erection of netting and chain wire mesh

1.3.6.1 Netting

Side: Erect wire netting on the same side of the fence as the line wire.

Type: As shown on the drawings.

Attachment: Attach to the fence using tie wire or fixing clips. Twist each tie wire twice around the fence wire and neatly cut off the ends.

Straining netting: Loosely tie the netting to the fence wires then carefully strain without distorting or breaking the mesh. Tie to the wires immediately on each side of every post at intervals not exceeding 1.0m.

1.3.6.2 Chain wire mesh

Location: Where documented, or shown on the drawings.

Side: Erect chain wire mesh on the outside of the posts.

Fastened: With two turns of the wire to each cable wire on both sides of each post and at intervals of not more than 900mm between posts and to each post midway between cable wires.

1.3.7 Gates

1.3.7.1 Erection

Swing: Erect gates so that they swing away from the road.

Single gates: Supply single gates unless other wise shown on the drawings or as directed.

Level surface: At the location of gates and swing area, level the surface nearly horizontal.

Hanging: Hang the gates and provide with connections and fittings as documented or shown on the drawings.

1.4 Completion

1.4.1 Submissions

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

2 MEASUREMENT AND PAYMENT

2.1 Measurement

2.1.1.1 General

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

2.1.1.2 Methodology

The following methodology will be applied for measurement and payment:

- > Allow for all work, materials, testing and quality assurance requirements in each Pay Item.
- > Clearing and grubbing: To *MIT 02B Bulk earthworks*.
- > Concrete backfilling and blocks: To conform to this Specification and not *MIT 10 Concrete works*.
- > Landscape works, where required: To *MIT 09 Landscape*.

2.2 Pay items

Table 8A-5 Pay Items table

Item No	Pay item	Unit of measurement	Schedule of rates scope
8A.1	Rural Fencing	Linear metre of fence constructed	<p>All activities associated with the supply, set-out and installation of all strainers, gate and corner posts, droppers, netting and wire.</p> <p>This pay item includes excavation in all material types, coring if required, backfilling and compacting, concrete footings where required, creek crossings, connection to existing fences and subsequently making good the alignment of the fence.</p> <p>A separate pay item shall be included in the Contract for each fence type. For example;</p> <ul style="list-style-type: none">8A.1.1 Permanent rural fence8A.1.2 Temporary rural fence <p>The rate for Temporary fence shall include provision for the removal of the fence and making good post holes.</p>

Item No	Pay item	Unit of measurement	Schedule of rates scope
8A.2	Gates	Each gate	<p>All activities associated with the supply, set-out and installation of all hardware including, fixing to gate post, fixing netting to gate, installation of sill log and the provision of a clear opening for the full operating arc of the gate.</p> <p>This pay item shall include the supply and erection of the gate, including heavy galvanising of all weld and cut ends of pipe following fabrication. This pay item includes excavation in all material types, coring if required, backfilling and compacting, connection to existing fences and subsequently making good around the gate.</p> <p>A separate pay item shall be included in the Contract for each gate type and width:</p> <p>8A.2.1 Ranger gate (...m Wide) 8A.2.2 Pedestrian access gate (...m Wide)</p>
8A.3	Barrier fences	Linear metres of barrier constructed.	<p>All activities associated with the supply, fabrication, set-out and installation of all hardware including concrete footings. This pay item includes excavation in all material types, coring if required, backfilling and compacting, connection to existing fences and subsequently making good the alignment of the fence.</p> <p>A separate pay item shall be included in the Contract for each fence type:</p> <p>8A.3.1 Partial Barrier Fence 8A.3.2 Full Barrier Fence</p>
8A.4	Cycleway rails	Number of rails constructed	<p>All activities associated with the supply, fabrication, set-out and installation of all hardware including concrete footings and reflective tape.</p> <p>This pay item includes excavation in all material types, coring if required, backfilling and compacting and subsequently making good the alignment of the rail.</p> <p>A separate pay item shall be included in the Contract for each fence type:</p> <p>8A.4.1 Vehicle restriction rail 8A.4.2 Single post cycle rest rail 8A.4.3 Dual post cycle rest rail</p>
8A.5	Log barriers	Linear metres of barrier constructed excluding gaps between barriers	<p>All activities associated with the supply, fabrication, set-out and installation of all hardware including concrete footings. This pay item includes excavation in all material types, backfilling and compacting and subsequently making good the alignment of the barrier.</p>

Item No	Pay item	Unit of measurement	Schedule of rates scope
8A.6	Bollards	Number of bollards constructed	<p>All activities associated with the supply, fabrication, set-out and installation of all hardware including concrete footings, paint and reflective tape.</p> <p>This pay item includes excavation in all material types, coring if required, backfilling and compacting and subsequently making good around the bollard.</p> <p>A separate pay item shall be included in the Contract for each material type and height. For example;</p> <p>8A.6.1 Steel bollard 1.8m</p> <p>8A.6.2 Timber bollard 1.6m</p>



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