3.2 FENCING

Tennis court fencing performs a number of functions:

- Retaining balls inside the court
- Dividing court playing areas
- Providing safety and security
- Windbreak support
- Signage display
- Safe child management within a contained area

Whilst fencing provides functionality to tennis courts, it can also be provided in a variety of ways to suit budgets, intended use, the local environment and site-specific conditions.

This section delivers detail on the following topics:

Primary audience

This section has primarily been designed for:

- Local Government
- Architects, planners, developers, designers and builders.

Definitions

Backstays – Outrigger additional structural support for fence.

Chain wire mesh – Diamond pattern woven fencing fabric.

Chamfered fence – Fence corners cut back at 45 degrees to provide angled corners.

Corner / end / intermediate posts and top/bottom rail – Fence structural elements.

Deep footing – Foundation type that transfers loads not near to the surface.

Divider fences – Soft mesh or solid fencing located between courts to retain balls in play.

Footings – Mass of concrete poured to support fence posts.

Galvanise – Coating iron or steel with a protective layer of zinc to prevent rusting.

Invert / concrete spoon drain / trench grate – Drainage infrastructure.

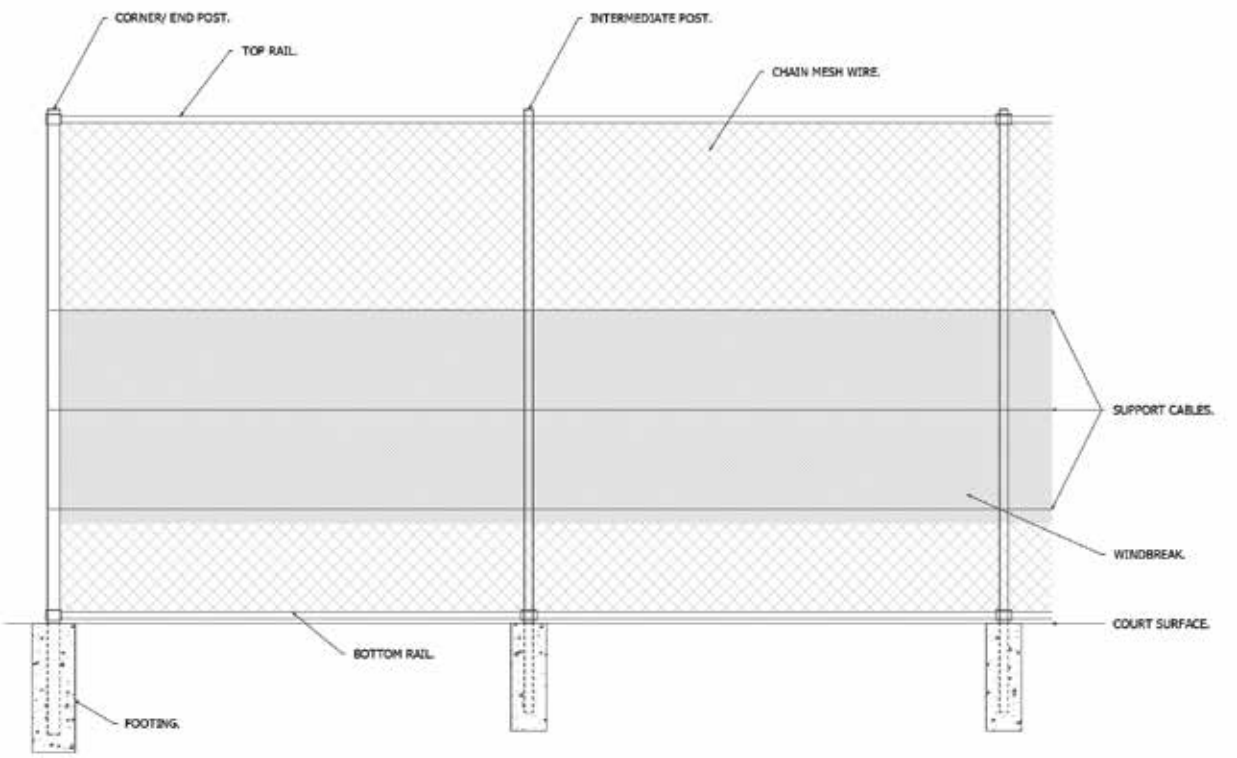
Pile – Deep foundation type which is a vertical structural element, typically driven or drilled.

Truncated fence – Transitioning of full height fence to lower height fence to improve spectator visibility.

Windbreak – Typically shade cloth used to protect field of play from high winds.

Figure 3.2.1 Example tennis court fence depicts the layout and location of a typical tennis court fence and shows the location of key components of the structural design. These definitions are used regularly throughout this section.

Figure 3.2.1
Example tennis court fence



Standards

Australian Standard AS1725.2 Tennis Court Fencing – Commercial provides recommendations for fencing heights, materials, post and rail sizes and installation for tennis facilities.

This Standard covers general fencing conditions but does not consider project specific conditions, such as poor or unique ground conditions, shade cloth and signage and therefore should be used as a guide only.

As stated in the standards preface:

'The objective of this Standard is to establish minimum requirements for chain link fabric fence materials and workmanship for commercial tennis court fences, in order to ensure satisfactory service by the fence for the purchaser and assist manufacturers and installation contractors by eliminating unnecessary minor variations in purchasers' requirements.'

Australian Standards can be purchased online via the Standards Australia – Search and Buy a Standard website: Standards Australia Online

An engineering design for fencing at tennis venues should always be undertaken by a qualified Structural Engineer.

Image 3.2.1
Tennis fencing

KEY HIGHLIGHTS

What you need to know

- An engineering design for fencing should always be undertaken by a qualified Structural Engineer.
- All baseline fences should be installed to 3.6m or 3.0m in height to ensure compliance with Australian Standards and to retain balls within the court enclosure.
- Fencing and any associated posts and backstays must be located outside the minimum ITF court run-off's and not impact on Total Playing Area (TPA) of a court.
- Design of court fencing must be designed to allow for site specific wind loads, particularly if windbreaks or sponsor signage is fixed to the fence.

3.2.1
FENCING PLANNING AND DESIGN

Traditionally, tennis court perimeter fences have been fully enclosed rectangular enclosures. However, alternative fencing arrangements can also be considered to suit venue specific infrastructure conditions and components such as:

- Increased spectator viewing opportunities
- Existing facility aesthetics
- Community accessibility options
- Specified project budgets.

The following key elements should be considered when planning fencing for a tennis venue and are detailed within this section:

- Fully enclosed or open fencing
- Truncated or half fences
- Chamfered fence corners
- Windbreaks and signage
- Divider fences and netting
- Access and maintenance gates.

The intended use and required level of access (e.g. open community facilities, Book a Court technology), will ultimately guide the type of fencing requirements and level of security and accessibility.

Fully enclosed fencing

A fully enclosed venue will control public access ensuring it is protected from unsolicited use. This will assist prolonging the durability of the court playing surface and regulate bookings, for example using Book a Court technology. Without an onsite operator or booking system in place, this type of fencing negatively impact usage opportunities through restricting ease of access.

Open venue fencing

Open venues provide access to the community and encourage both formal and informal use. The lower level of control over these sites can lead to increased maintenance requirements due to factors including improper use and vandalism.

Truncated and half fences

Reduced side fencing **(Figure 3.2.2)** provides enhanced spectator visibility of a court. Referred to as truncated and half fences, these designs can be utilised between courts and along the sides of courts. Half fences can provide cost savings to the venue development of renewal due the reduced amount of required materials. This option provides many of the functionalities required however does not provide full security as can easily be scaled.

Further points that can be disadvantages for both open and reduced fencing are:

- Protection for keeping the ball within the court enclosure
- Options for windbreak material.

Figure 3.2.2
Truncated fence diagram

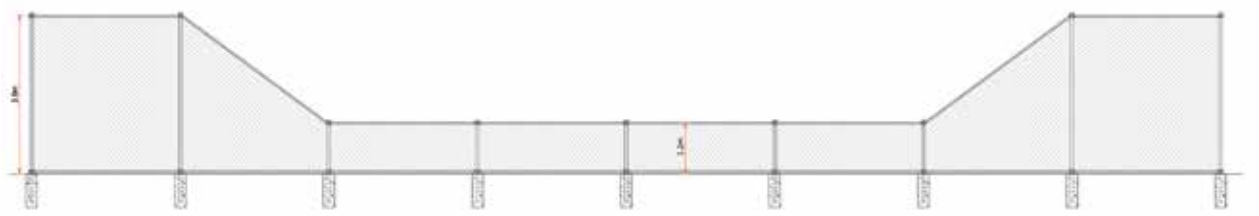


Image 3.2.2
Truncated tennis court

Chamfered fence corners

Chamfered fence corners are designed so that rectangular fencing corners are cut back at 45 degrees (**Figure 3.2.3**) to provide angled corners. Chamfered fence corners deliver the following benefits:

- More aesthetically pleasing
- Provide additional opportunities for spectator viewing at court corners
- Assist in directing the ball back to the baseline playing area
- Provide an opportunity for a gate entrance at the court corner
- Provide opportunity for lighting to be located outside the court enclosure in the corners.

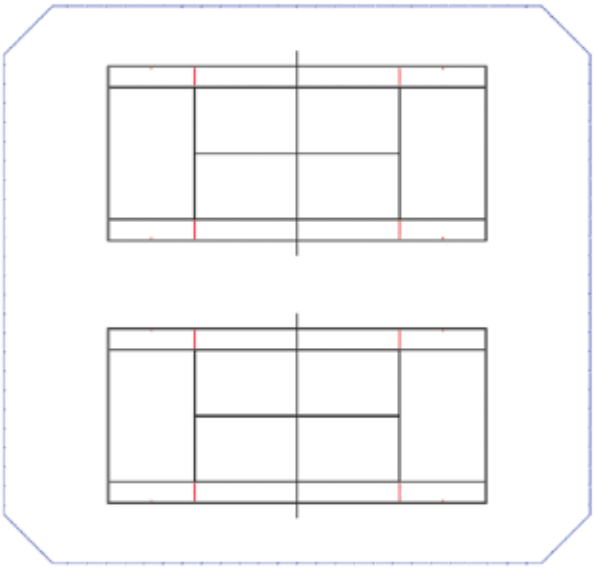
The chamfered corner should not have a width greater than 2.5m to ensure minimal obstruction to the court run off zone.

Windbreaks and signage

Windbreaks are installed to fencing surrounding courts exposed to higher wind levels, intended to divert the wind passage up and over the court. Windbreak material is typically shade cloth and is fixed to the perimeter fence.

Installation windbreaks and signage provide additional loading through the fence structure. Posts and footings must be designed by a qualified structural engineer to allow for the additional stresses of the wind loads.

Figure 3.2.3
Chamfered fence diagram



DISCLAIMER

The use of chamfered court fence corners reduces the run-off of the court total playing area in the corners. For facilities that will host events that require officials inside the court Total Playing Area, ensure Tennis Australia are consulted during the design phase to determine suitability of the use of chamfered court fence corners.

Image 3.2.3
Windbreak

Windbreaks on fences act as wind sails and as such translate high forces directly onto fence posts and rails. Different wind loadings apply across Australia depending on the location. The design of fencing with windbreaks must be completed by a qualified structural engineer.

If sponsorship is proposed on your windbreak you may need to consult with your local council to determine if planning permission is required.

Dividing fences and netting

Where two or more courts are provided adjacent to one another, a dividing fence is recommended to prevent balls rolling between courts.

Standard chain mesh solid fencing or retractable soft netting curtains could be utilised to divide courts. Either option should be designed with appropriate access points between the courts. Soft netting can reduce chances of player injuries from running into dividing fences.

For both options, the correct run-off to side fence is required (refer to Section 3.1 Courts). Due to the soft netting potentially being susceptible to billowing, it is recommended that additional side run-off be considered.

Soft court dividing netting is an ideal solution for multi-use facilities and has the capacity to increase flexibility, particularly for coaching activities.

Access and maintenance gates

Access to the tennis venue and their courts should be provided for:

- Users of all ability
- Maintenance vehicles
- Emergency vehicles.

It is important to have gates installed in appropriate locations around the venue to ensure ease of access.

The following table provides recommendations for the widths and heights of access gates for various purpose

Table 3.2.1
Gate access dimensions

Gate type	Recommended dimensions
Universal Access*	1.35m (w) x 2.1m (h)
Maintenance / Emergency Access	3.0m (w) x 3.0m (min.) (h)

* At grade access (i.e. free of vertical obstruction) for users is essential to providing seamless and unimpeded access entry to court enclosures. Where applicable, each court should have at least one at grade access point.

To achieve a fully accessible gated entry point onto a court, a seamless and obstacle free transition across the surface should be provided. Common forms of drainage infrastructure that may impede court access include:

- Trench grates
- Inverted concrete drains
- Shallow concrete spoon drains.

Accessibility issues with these drainage types can be avoided by constructing using a minimal invert depth **(Figure 3.2.4).**

Access gates should be located off center to avoid umpires chairs and other central supporting infrastructure.

Figure 3.2.4
Spoon drain (invert depth view)

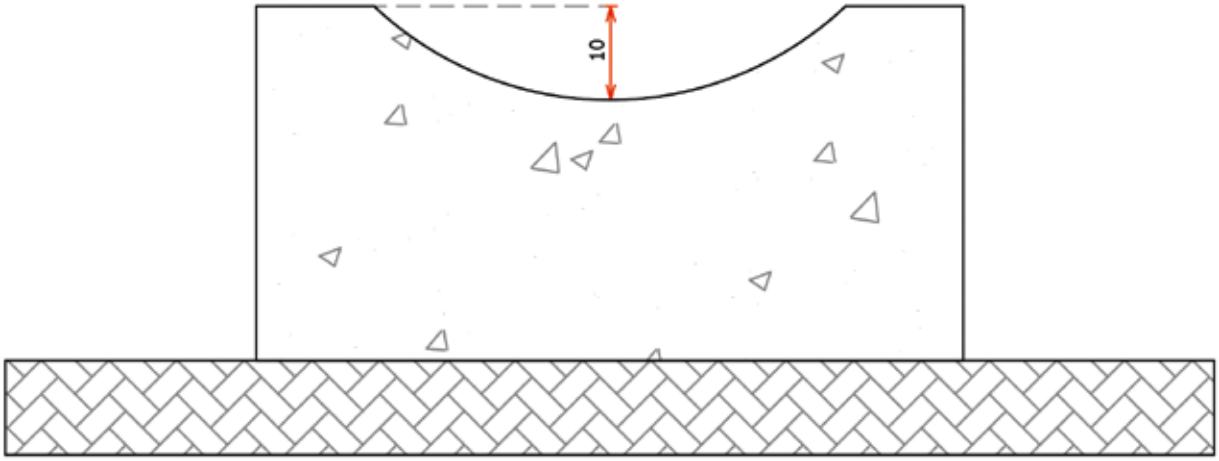


Figure 3.2.5
Universal access gate diagram

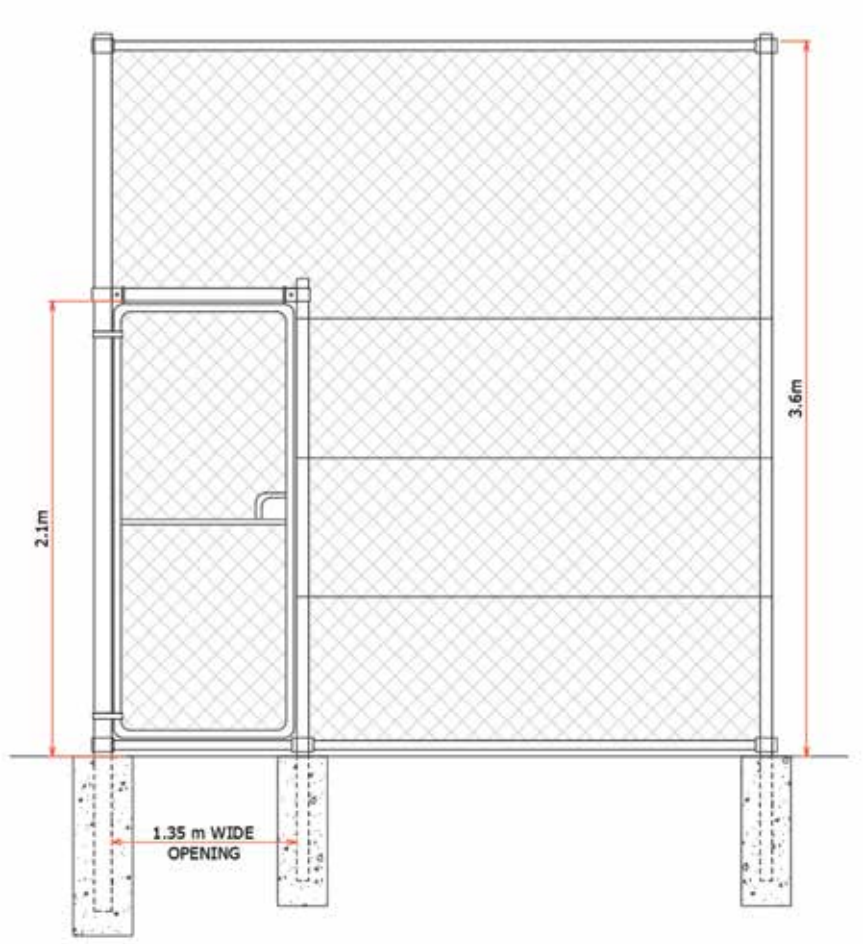
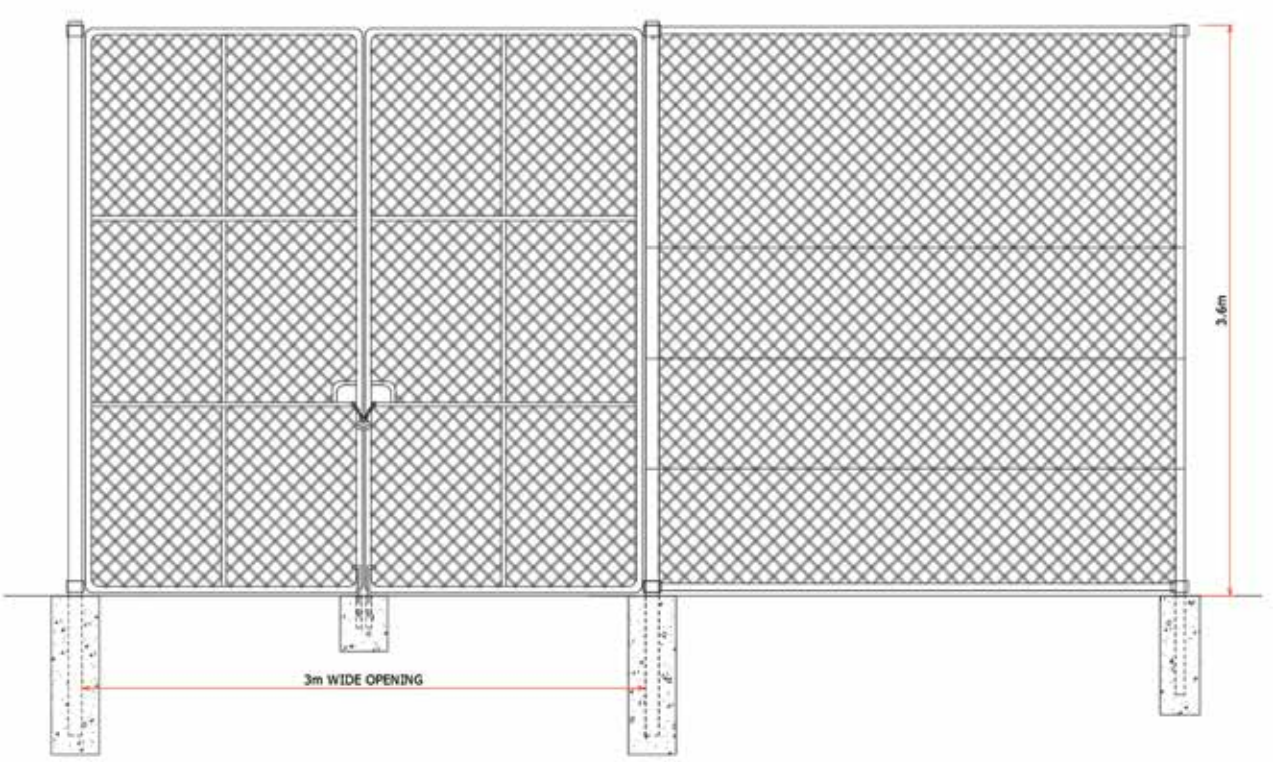


Figure 3.2.6
Vehicle access gate diagram



3.2.2 FENCING DESIGN AND CONSTRUCTION

Tennis court fencing must be designed considering site specific conditions, these include:

Ground conditions

The loads applied to the tennis court fencing are required to be counteracted by the fence post footing. The depth and diameter of the footings are dictated by the ability of the existing ground to retain the forces applied.

Wind loads

Wind loads refers to the load applied to the fence by wind gusts. Each site will have different wind loads and must be designed to allow for the site specific conditions. Wind loads are detailed further in this section.

Facility management

The type of management model in place at a venue will guide the selection of court fencing that is required. For example, an open venue is likely to have reduced fence heights, and a closed venue will usually consist of lockable 3.6m high fencing.

Spatial availability

The available space around the courts will impact fencing solutions; use of backstays should not be considered if the spatial availability is low.

Facility support infrastructure

The fence, associated footings and backstays need to be coordinated in conjunction with the relevant supporting infrastructure, e.g. storm water drainage and lighting electrical supply.

Image 3.2.4
Fencing

General requirements of tennis court fencing include:

Fence height

Tennis Australia recommended that a preferred height of 3.6m be met in club environments and elsewhere, wherever possible. For community facilities, 3.0m high fencing would also be suitable to allow for cost savings.

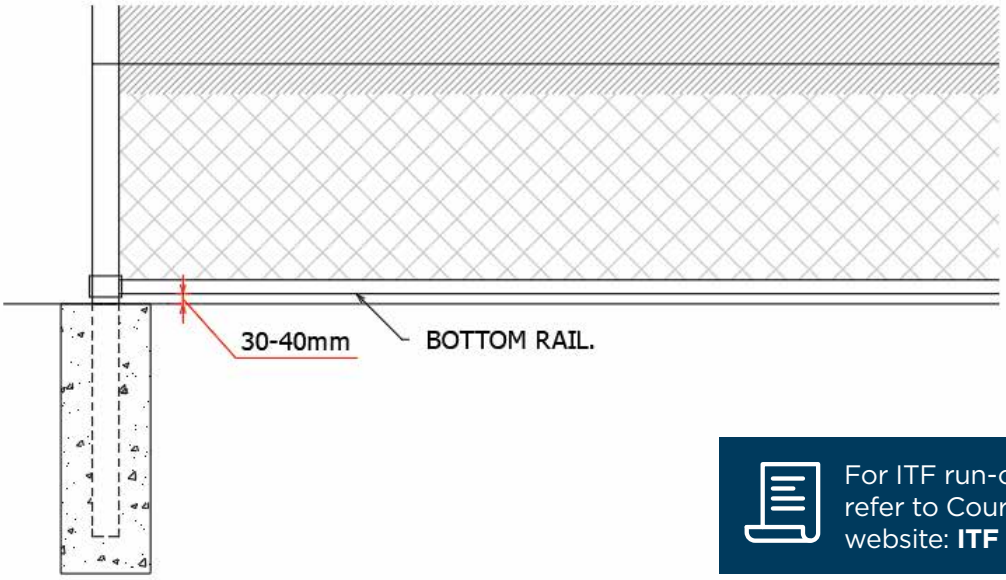
It is recommended that the height of the bottom fence rail be no greater than the diameter of a tennis ball (i.e. 65mm) from the finished surface level (refer to **Figure 3.2.7**).

Run-offs

When designing fencing, it is important to consider the International Tennis Federation (ITF) run-off requirements (refer to **Section 3.1.1 Court Orientation, Layout and Geometry**).

For player safety, the ITF run-offs must be measured to all fence posts and rails, ensuring there are no other fixed obstructions between the Principal Playing Area (PPA) and fencing structures

Figure 3.2.7
Fence bottom rail dimension diagram



For ITF run-off requirements, refer to Courts section or the ITF website: **ITF Court Dimensions**

Fence materials

Fencing structures should be designed with materials that suit local conditions to prolong the life of the fencing. For example, heavy galvanized fencing should be considered for facilities close to the ocean.

Australian Standard AS1725.2 for Fencing provides an overview of the options available for chain link fabric fence materials.

Chain mesh should be fixed to the internal side of the fence post and rails (i.e. court side) to minimise obstructions from the fence uprights to players.

Wind loads

If windbreaks or signage material are to be installed on fencing structures, it is necessary to understand the local wind rating, and the type and size of material to be installed on the fence. A structural engineer will consider these factors when designing fences and draw on the relevant Australian Standards and the outlined wind load factors across the various parts of Australia.

Windbreaks are typically installed at around 600mm from the top and bottom of the fence. Assuming the fence is 3.6m high and the windbreak mesh is 2.4m high **(Figure 3.2.8 Windbreak dimensions).**

It is necessary to consider the likelihood of future wind break or signage infrastructure when sizing fence posts.

Figure 3.2.8
Windbreak dimensions

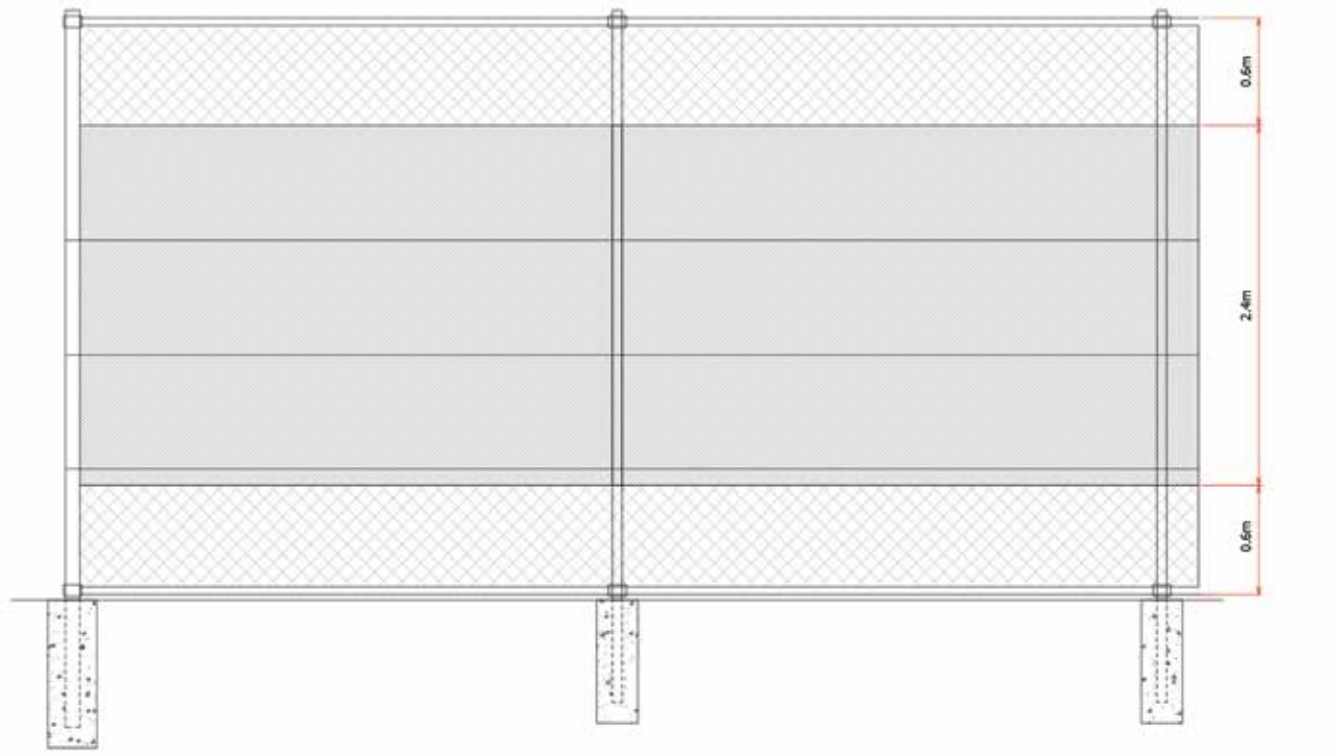


Image 3.2.5 Windbreak

Image 3.2.6 & 3.2.7 Incorrect backstay placement

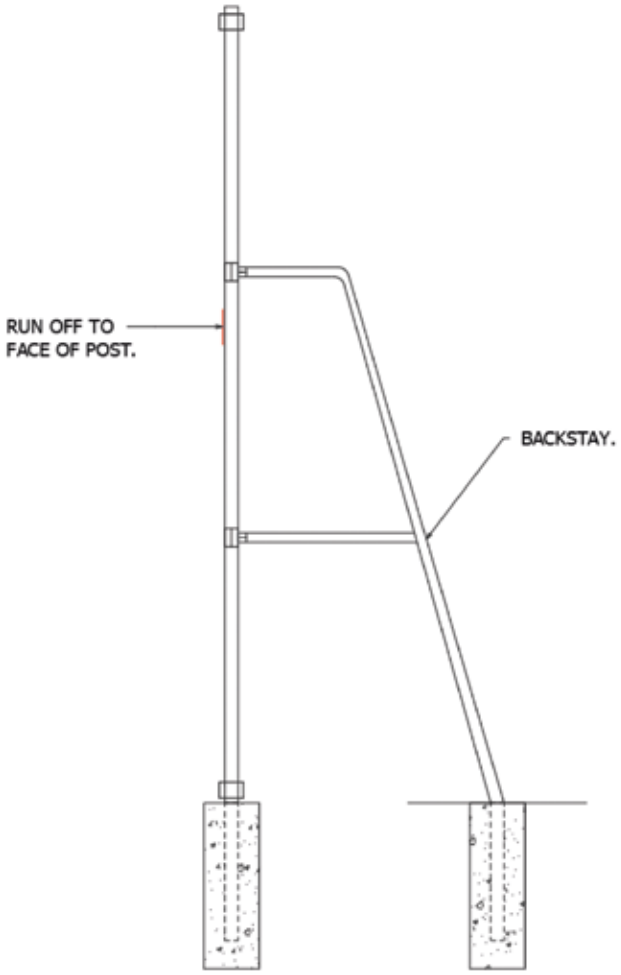
Backstays

The primary role of a backstay is to provide lateral stability to the fence lines, also assisting to keep the diameter of the fence posts down.

Fence backstays impact on the adjacent area of the fence line. If these areas are walkways and need to be obstacle free, the fence posts can be designed to have a greater post diameter and wall thickness to eliminate the need for backstays.

Backstays should never be positioned in an adjacent court enclosures or impact on the Total Playing Area (TPA) of another court.

Figure 3.2.9
Backstay diagram



Supporting infrastructure can be integrated into a fencing structure, however a sufficient run-off space must be maintained for player safety.

3.2.3 SUPPORTING INFRASTRUCTURE

It is important to consider the interfaces between the fence structure and supporting infrastructure (e.g. light towers) when designing fencing.

Book a Court access

Book a Court is an integrated gate access and online software booking system. The Book a Court gate access technology may be installed at tennis venues to provide easy access to courts for community use. Refer to **Section 3.2.5 Gate access technology** for additional information on the integrated access system.

Book a Court access gates require communication and 240V power cables between the equipment enclosure and the gates.

Fence post footings

The installation of fence post footings should be coordinated with the construction of court perimeter infrastructure, for example concrete edge strips, spoon drains and lighting infrastructure.

Guidelines during construction phase of fence post footings includes:

- ✓ Coordinate the pouring of the concrete footings with the perimeter infrastructure.
- ✓ Ensure the footing hole is free of debris and organic material.
- ✓ When pouring post footings ensure to agitate concrete around the posts.
- ✗ Do not use rapid set concrete.
- ✗ Do not allow water to sit on the footing during concrete curing time.
- ✗ Do not attach rails to the posts until the concrete curing period is complete (approximately 28 days).

Fence posts and rails

Fence posts and rails should be connected using prefabricated connection systems or site welded rigid connections to ensure long term durability.

The installation of the fence rails shall be one of the last items constructed as once they are up they act as a barrier which may impact other construction activities.

Guidelines during planning and construction of fence posts and rails includes:

- ✓ Review fence shop-drawings prior to works being ordered.
- ✓ Ensure all posts and rails are galvanised off-site.
- ✓ Use proprietary fence connections where applicable.
- ✓ Ensure fence uprights do not become a trip or movement hazard.
- ✗ Do not attach rails to posts until the footing concrete curing period is complete (approximately 28 days).
- ✗ Do not galvanise the posts and rails on-site; all galvanising should occur prior to onsite delivery.
- ✗ Do not use dented or damaged posts and rails.

Fence chain mesh

The installation of fencing chain mesh should ideally be completed once the court pavement works have been completed.

Guidelines during planning and construction of fence chain mesh includes:

- ✓ Mesh should be located on the inside of the fence posts and rails.
- ✓ Chain mesh ties should be knotted facing externally to the fence line.
- ✓ PVC coated chain link mesh should be used if the budget allows.
- ✓ Mesh should be pulled tight across the fence frame.
- ✓ Mesh joints should be located at fence posts.
- ✗ Do not use dented or damaged mesh.

Gates

Gates installation needs to consider both access and impact on court use.

Guidelines include:

- ✓ Locations provide the least amount of impact on court use
- ✓ Universal access width (1.35m – or as close as achievable)
- ✓ At grade access (i.e. free of vertical obstruction)
- ✓ Outward swing or inward swing that does not damage surface or interfere with play area
- ✓ Easy to operate gate opener at a height of 900mm

Where gates are positioned directly on the court enclosure they should open outwards and consist of a strike plate that prevents swinging onto courts as could be an obstruction to players and drop-bolts may damage court surface.

3.2.4 FENCE MAINTENANCE

To ensure the longevity of tennis court fences, ongoing maintenance works should be undertaken.

As with all infrastructure components of a tennis venue, routine maintenance and repair of fencing is required. Maintenance of tennis court fencing typically includes:

- Repairing holes in chain wire mesh
- Repairing tears in windbreaks
- Repairing broken or bent posts
- Lubricating gate hinges and bolts
- Re-tensioning chain wire mesh and cable wires.

Maintenance repairs

Chain wire mesh

The strength of the chain wire mesh relies on the continuity of the mesh with any breaks or dents reducing the overall integrity.

Depending on the extent of damage there are two typical options for repair:

- Locally repair the damage with additional wiring or overlapped mesh
- Replace the extent of the damaged mesh between adjoining fence posts.

Tears in windbreak

Similar to chain wire mesh repair, the strength of the windbreak mesh relies on the continuity of the mesh. Any tears or holes reduces the overall integrity of the windbreak

Depending on the extent of damage there are two typical options for repair:

- Locally repair the damage by sewing in a patch
- Replace the extent of the damaged mesh between the adjoining fence posts.

Image 3.2.8
Damaged chain wire mesh

Broken or dented posts

Damage to fence posts will reduce the structural integrity of the posts. Over time, this damage could result in failure of the overall fencing structure.

All damage to posts should be assessed by a structural engineer to determine the extent of damage and possible requirement of post replacement and need for installation of additional stability reinforcements (i.e. backstays).

Gate hinge and bolt lubrication

Maintaining hinge and bolt lubrication helps to protect the steel work galvanising. The galvanising layer will assist in preventing the steel work from rusting.

Re-tensioning of chain wire mesh and cable wire

To prevent sagging in the chain wire mesh ongoing re-tensioning of the chain mesh and cable wire will help extend the serviceability of the chain wire mesh.