Physical Shade Structures

Shade provided by shelters

Consider the following when deciding on your shade structure design:

Siting

(Where to locate the shade structure)

- Locate the structure to cast shade where it is needed. Give consideration to the time of day and time of year that shade is most required.
- Existing ground vegetation near the structure may help lower the temperature of the immediate surrounds.
- Well placed vegetation situated on the northern, western and south-western sides are effective for limiting scattered UVR (Ultraviolet Radiation)
- A structure surrounded by less reflective surfaces will generally stay cooler (eg. grass rather than concrete).
- Consider how people use the space and the time of day most people use it. Make sure to site the structure to maximise its usage.

Orientation

(How to angle the structure for maximum benefit)

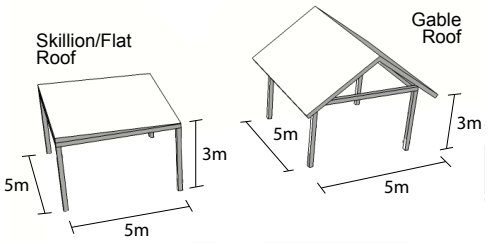
- Align the structure where possible to provide maximum shade during peak UV periods (typically 10am – 3pm from September to the end of April). Consider the siting (see above) and time of year.
- A rectangular structure orientated east-west will predominantly shade the southern side the most.
- The height of the roof above ground level will affect where the shade is cast.
- Where possible, orient open sides of the structure towards any incoming breezes.
- Be mindful of where winter shadows will fall to avoid shading key infrastructure at times when sun exposure is encouraged.

Type

(Selecting the best form of shade structure)

- Generally, the larger the roof area, the more shade provided.
- Square or rectangular forms will generally provide the most shade economy. Narrow or unusual shaped structures can be less effective.
- Opaque (solid) materials provide greater shade and radiation protection than translucent (partially see-through) ones.
- Light colours reflect radiation more effectively than dark colours. Consider using a light coloured roof to reduce heat under the structure.
- Additional design elements such as eaves or slatted sides can increase the shade provided by the structure.

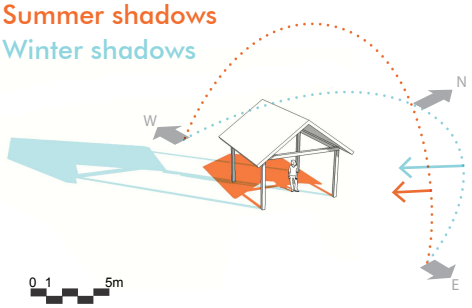
Shade from Gable & Flat Roof/Skillion Structures



The diagrams below are based on a 25m² roof area (notionally a 5 x 5m gable roof). A flat or skillion roof of the same area will have a similar shade effect. The coloured arcs show movement of the sun throughout the day from east to west.

9 am

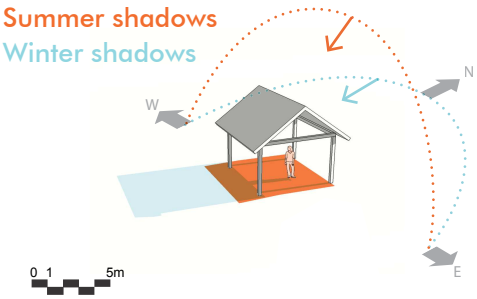
Summer shadows
Winter shadows



Approx. 26m² shade (summer)

12 pm

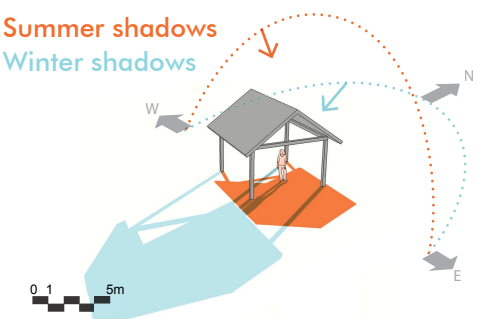
Summer shadows
Winter shadows



Approx. 25m² shade (Summer)

3 pm

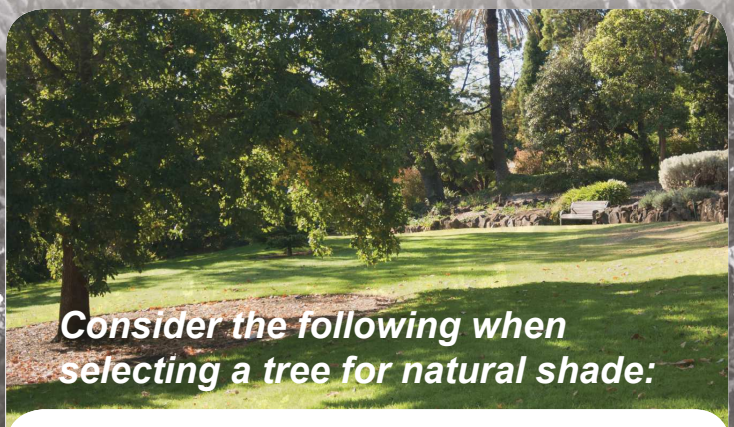
Summer shadows
Winter shadows



Approx. 26m² shade (Summer)

Natural Shade

Shade provided by planting trees



Species selection

(What characteristics to consider when selecting trees)

- A medium height tree will provide the best shade (7-15m height).
- Denser foliage (leaves) creates a more solid barrier to radiation.
- A larger canopy generally provides a greater area of shade.
- For maximum shade protection, select broad leafed species. Some species have thin leaves that do not always provide the best shade canopy.
- Deciduous trees will provide adequate shade in summer and let light through in winter.
- Native & indigenous species are generally evergreen and will not lose their leaves.
- Fast growing species can provide shade in a shorter time or consider planting advanced trees where possible.

Siting

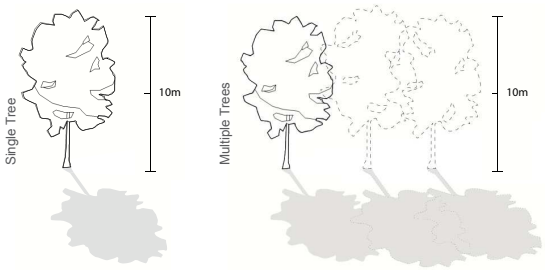
(Location and spacing of trees)

- Generally planting to the North-West of where you require the shade will provide the most benefit from midday through to sunset when direct solar radiation is most damaging.
- Planting to the West of where you require the shade will help later in the afternoon when the sun is lower on the horizon.
- Denser planting will generally provide more continuous shade (number of trees and proximity to each other) however tree growth may be restricted.
- Wider spacing of trees will generally allow trees to fill out more over time, providing more generous canopies.

Other species selection and planting notes

- Consult your council's horticulturalist/landscape architect, or local nursery/tree supplier, to determine the best tree species for the chosen location, conditions and requirements.

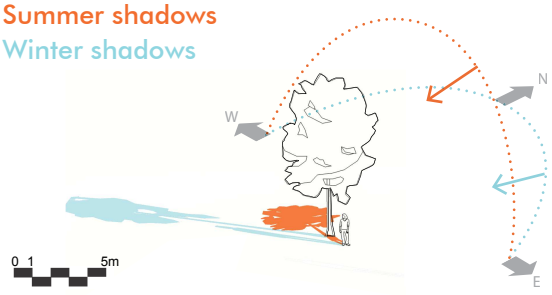
Shade from Trees



Multiple trees with overlapping canopies can provide more continuous shade.
The diagrams below depict an established, 10m tall tree and the resulting shade effect. The coloured arcs show movement of the sun throughout the day from east to west.

9 am

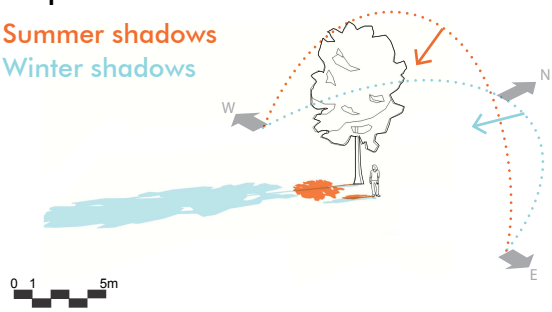
Summer shadows
Winter shadows



Area of shadow cast will vary by tree selection.

12 pm

Summer shadows
Winter shadows



Area of shadow cast will vary by tree selection.

3 pm

Summer shadows
Winter shadows

Area of shadow cast will vary by tree selection.

Shade Sails

Shade provided by membrane structures

Siting & Orientation

(Where to locate the shade sail)

- Refer to Physical Shade Structures for advice on location, orientation, reducing reflective UVR and increasing the use of the space.
- To ensure optimal shade, consider undertaking a shade audit and shadow analysis.
- Post locations need to comply with relevant Australian Standards and should not negatively impact on usability or safety of a space. Cantilevered structures can be a solution in restrictive spaces.
- Some shade sails can be removed in winter, although this can add expense.
- Well placed vegetation situated on the northern, western and south-western sides is effective for limiting scattered UVR.

Common Shade Sail Designs

(How to decide on the right shade sail for maximum benefit)

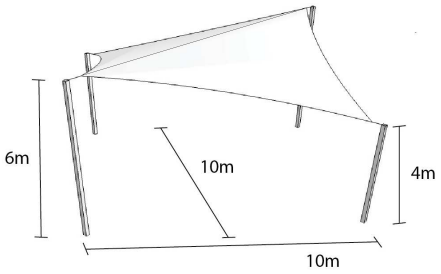
- ***Hypar Design:*** *Diagonally opposite high and low fixing points with tension evenly spread. The most commonly used shade sail design throughout Australia.*
- ***High Point Sail / Conic Shade Sail:*** *High Point in centre of sail moving to lower fixing points on edges of sail.*
- ***Skillion:*** *2 high points with opposite end of sail being 2 lower points. Useful for rain water run off but can be limited visually.*
- ***Multiple Sail Design:*** *Combination of shade sail designs, widely used to gain multiple shade outcomes and striking visual identity.*
- Maintenance costs should be factored into choosing your shade sail design, a cheaper and less effective design may result in higher maintenance costs in the long run.
- Height clearances must be considered to limit conflicts with other structures (eg. surrounding playgrounds), limit vandalism opportunities and address other safety concerns.

Type

(Selecting the best form of shade sail)

- Generally, the larger the shade sail, the more shade provided.
- Typically a 4-post shade sail has 2 high points and 2 low points. Position the lower posts towards the direction of the sun to ensure shade is cast in the area where it is most needed and at the time of day when it is most desired.
- Square or rectangular forms generally provide the greatest shade quality. Triangular, narrow or unusual shaped structures can be less effective.
- Opaque (solid) materials provide greater shade and UVR protection than translucent (partially see-through) ones.
- Light colours reflect more UVR than darker colours. Consider using a light coloured shade sail to reduce heat under the structure. Very light colours can produce glare, especially when placed over or near pale surfaces or around water.
- Use sails sewn with UV stabilized PTFE thread.
- Typical life expectancy of a shade sail structure is 15 years.
- Obtain a structural certificate from the installer. Check with the Municipal Building Surveyor to determine if a building permit is required.

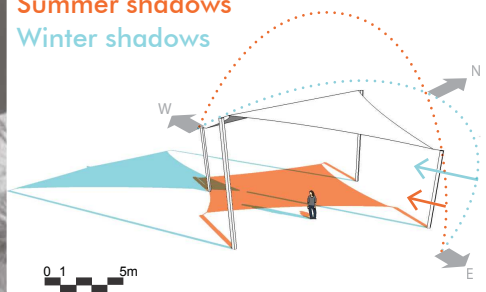
Shade from Shade Sails



The shade sail diagrams below are based on a 100m² shade sail. Minimum height for shade sails is 4m, using Light/Residential duty shadecloth (320-370gsm).

9 am

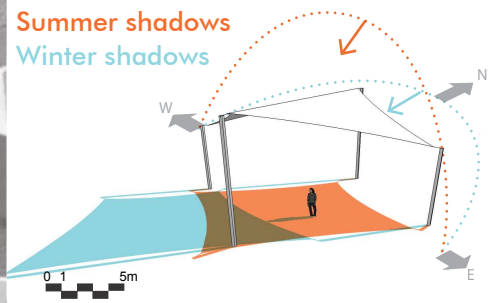
Summer shadows
Winter shadows



Approx. 102m² shade (summer)

12 pm

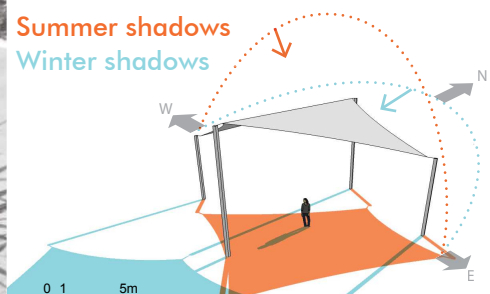
Summer shadows
Winter shadows



Approx. 101m² shade (Summer)

3 pm

Summer shadows
Winter shadows



Approx. 98m² shade (Summer)

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