

DESIGNING YOUR SHADE STRUCTURE FOR COMFORT



INTRODUCTION

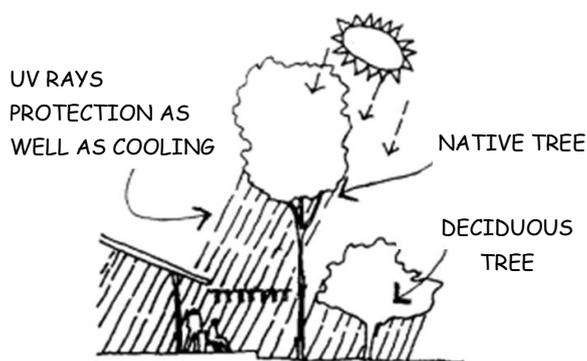
To provide comfortable shaded outdoor areas, it may be necessary to adapt or modify to the surrounding area.

The general principles in designing shade for comfort include:

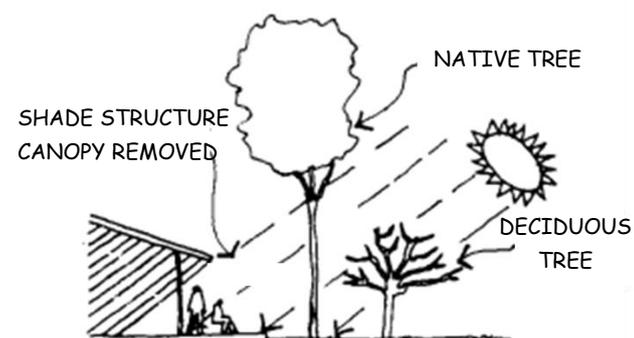
- The sun's warmth and light in winter for thermal comfort.
- Cooling in the summer months.
- Shading walls and paved areas to increase summer comfort levels.
- Cross ventilation in summer months to relieve excessive humidity and prevent overheating of spaces.
- Exclusion of wind in the winter months.
- In many locations, shade structures must be able to withstand strong winds.

SUN'S WARMTH AND LIGHT IN WINTER

Deciduous trees and other plants provide shade in summer and allow warmth and light to penetrate when they lose their foliage in winter as shown below.



SUMMER MONTHS - SHADE STRUCTURE AND TREES TOGETHER ADD SHADE OVER REQUIRED PERIOD



WINTER MONTHS - SUN'S ANGLE, LOSS OF FOLIAGE ON DECIDUOUS TREE & SHADE CANOPY REMOVAL ALLOWS WARMTH & LIGHT TO PENETRATE THE AREA

The removal of the shade structure canopy in winter is accomplished in two ways, namely:

- The shade structure is adjustable, e.g. with a retractable awning, the canopy is extended outwards when shade is needed and retracted when not.

Summer Months



Winter Months



- The shade structure allows the temporary removal of the canopy, e.g. with a shade sail structure, the sail (the canopy) is in place during the summer months and removed from the structure during the winter months.

So, where space permits, try to locate your shaded area at a location that the shade structure will provide good summer shade and will not increase the winter shade.

COOLING IN THE SUMMER MONTHS

- The shaded space should, where possible, be located and designed to capture prevailing winds in the summer months.
- If the shade structure is permanent in nature (such as an out-building), providing shade at their openings will help cool the indoor space.
- Similarly, attaching shade structures to buildings will provide shade adjacent to the building wall and will cool the building's indoor space. In addition, this type of shade structure reduces direct and indirect UV rays that would otherwise reflect and scatter off wall surfaces adversely influencing the comfort of your outdoor summer shaded space.



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SHADING WALLS AND PAVED AREAS

- When walls and paved areas are exposed to the sun, they gain and store heat. Heat that is then re-radiated increasing the surrounding area temperature.
- So, shading walls and paved areas with vegetation, for example, heating of these surfaces can be significantly reduced thus increasing comfort levels.
- In addition, walls and paved areas exposed to the sun reflect the bright sunlight, causing uncomfortable glare and increasing the perception of heat. Shading such surfaces will therefore also increase the comfort levels of outdoor spaces.

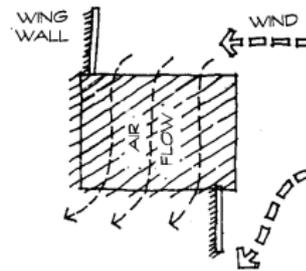
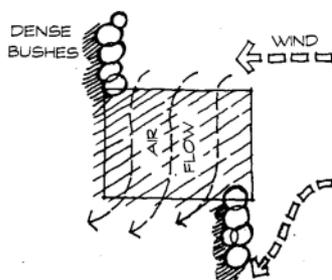
Example of Shaded Walkways:



CROSS VENTILATION IN SUMMER MONTHS

- Cross-ventilation provides relief from excessive humidity and prevents overheating of spaces in summer.
- So, where possible, locate the shade structure for maximum exposure to cooling breezes or, with more permanent shade structures orient the openings towards the direction of the cool breeze.
- Where neither of the above is possible i.e. the location of the shaded structure is fixed, take measures to channel the wind and change its direction to pass through the shaded structure.

The various ways to channel the wind or encourage cross-ventilation include the use of dense bushes or the erection of a wing walls as shown below.



Where the environment is not conducive to cross-ventilation, the design of shade structures should avoid canopies made from solid materials. This is because the build-up of hot air under the canopy rises and the solid canopy prevents it from escaping. The temperature in the shade structure therefore increases to uncomfortable levels.

It's preferably therefore to use canopies that are made from a porous material that allows the hot air to escape. The most common material used in shade structures to achieve this desired effect is shade cloth. Shade cloth, when purchased from reputable suppliers, is UV stabilised and provides protection against the sun's harmful UV rays while at the same time, allowing hot air to escape keeping the shaded area cool.

Shade sails that use shade cloth, are emerging as one of the most common types of shade system both for high usage commercial outdoor areas and for home garden entertainment areas.

High Usage Commercial Outdoor Area:



Home Garden Entertainment Area:



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By clicking on the link below, you can see a video that provides an explanation of how the shade cloth protects you from the sun's harmful rays while at the same time keeping the shaded area cooler than its surroundings.

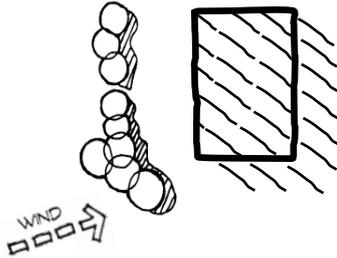
https://www.youtube.com/watch?v=-Kw1oIA5_B0

EXCLUSION OF WIND IN WINTER MONTHS

- At the same time as looking at how to encourage cross-ventilation in the shade structure during the summer months, consideration should also be given in excluding wind during the cooler months.
- In this case, observe the direction of the unwanted wind and provide suitable wind breaks.

Wind breaks can take the form of natural or built screens adjacent to the area that needs protection.

Natural Wind Breakers:



Built Screens:



SHADE STRUCTURES AND WIND

- In many locations, shade structures must be able to withstand strong winds.
- The design of the shade structure and materials used should be well suited to withstand high winds

With built shade structures such as shade sails:

- The technological advancement in the shade cloth industry has significantly increased the strength of

shade cloth manufactured by reputable companies.

- Because of this strength, significant forces are transferred from the sail to the structure when the sail moves in the wind.
- Where such forces are not designed for, the possibility of catastrophic failure is significantly increased.

Wobbly supports, moving foundations, weak attachments and any other under-designed structural components can result in catastrophic failure and therefore need to be avoided at all costs.

Shade structures should therefore be properly engineered.

While this document has highlighted some of the environmental considerations when designing shade for comfort; seeking the advice of a reputable shade structure supplier is ultimately the sure way, to ensure a truly comfortable and safe shaded area for your required outdoor activities.

Acknowledgements:

Greenwood JS, Soulos GP, Thomas ND. *Under Cover: Guidelines for shade planning and design.* Sydney: Cancer Council NSW and NSW Health Department; 1998.

Adapted for New Zealand use by the Cancer Society of New Zealand, 2000

Authors:

JS Greenwood – B.Sc (Arch), B.Arch (Hons), A.R.A.I.A. Principal, Shelter Strategies Shade Planners and Consultants

GP Soulos and ND Thomas – NSW Cancer Council
Adapted for New Zealand use by Penny St John, John Greenwood and Belinda McLean

For more information or help contact us at:

Tel: +357 26 910625

Email: shadeports.plus@cytanet.com.cy