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Overall Description

ShadeZone is a fabric architecture product line, of various custom and standard structures, designed to provide shelter from the hot sun and ultraviolet radiation. The completed ShadeZone product consists of a strong metal frame structure that fits whatever footprint the customer requires, and a canopy top made of durable, fitted, knitted mesh fabric cloth. The unique mesh cloth allows the warm air to rise through the fabric, cooling the shaded area. The post and sail ShadeZone does not have a structured top, but consists of tensioned sails of knitted mesh fabric cloth. Each structure utilizes standard parts allowing for fast, simple installation. The unique cable design allows for quick removal of the top. Standard sizes are available, but a custom design can be provided to meet the customer's requirements. This product design does meet all local and state building codes.

Detailed specifications of the ShadeZone system are listed below:

A. DESIGN CRITERIA

ShadeZone structures are designed to provide:

1. Shelter and protection from heat and UV radiation
2. Limited (about 80%) rain blockage in shade units and 100% for waterproof units
3. 100% hail protection
4. Visual enhancement for properties, fields and surrounding buildings
5. An attractive, functional and permanent structure which complies with any local building code
6. Not only standard units, but custom sizes and shapes to visually incorporate the structure into the surrounding environment



Since ShadeZone structures are usually located in open areas, and since the attached canopy can be susceptible to high winds, ShadeZone structures are designed to withstand wind pressures in excess of wind speeds specified by building codes. Other type loads are also considered during the design of each structure, but dead load and wind loads are the main factors applied to the design of each structure.



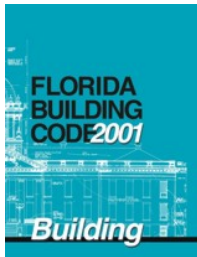
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B. ENGINEERING CODES

ShadeZone structures are engineered to meet any local building codes. They are primarily designed to comply with Florida Local Code, since it is one of the most stringent of the building codes.

2001 Florida Building Code. (with revisions effective September 24th, 2002)
Parameters based on ASCE 7-98



Dead Loads: The weights of all construction materials incorporated into the structure. Attached accessories are also in this category.

Live Loads: Live loads on a roof are those produced “(1) during maintenance by workers, equipment and materials; and (2) during the life of the structure by movable objects such as planters and by people.” (ASCE 7-98). Live loads are not applicable to fabric structures.

Wind Loads: According to the September 24th Plenary Session of the Florida Building Commission, structures such as fabric awnings and fabric covered frameworks may be designed and engineered using the criteria adopted by South Florida Building Code, making the canopy removable if wind exceeds speeds of 90 MPH (3 second gust wind speed by ASCE 7-98).

ShadeZone structures are engineered to withstand 90 MPH with the canopy, and any local specified basic wind speed (varies depending on the geographical region), without the canopy.

Frameworks are analyzed using the analytical procedure for open buildings and other structures stated by ASCE 7-98. Method 3 with wind tunnel procedure has also been used to corroborate analytical procedures.

Snow Loads: Snow loads are considered for any structures designed for installation where snow is likely.



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C. STRUCTURAL STEEL AND CONCRETE DESIGN



Using RAM Advanced Structural Analysis Software the frame, with all real dimensions and canopy top, is analyzed utilizing generated dead loads and calculated wind forces. To perform the design and optimization processes, either AISC-Allowable Stress Design for Steel Construction or AISC-Load Resistance Factor Design are used, performing load combinations required by any Code.

In the case of Concrete Design, ACI-318 99 is used to analyze any concrete portion of the structure, which would consist of the foundation or pedestals.

D. STEEL SPECIFICATIONS

All standard parts used to build ShadeZone structures are made with galvanized Flo-Coat® steel manufactured per ASTM-A500, with yield strengths from 40,000 psi to 50,000 psi depending on the pipe sizes.



When different sizes and shapes are required, all steel, including plates and other types of connectors, is manufactured to comply with ASTM-A36.

E. CONCRETE SPECIFICATIONS

Concrete work shall be executed in accordance with ACI-318 99 with a minimum of 2,500 psi 28-day strength.

F. REINFORCED CONCRETE SPECIFICATIONS

In addition to compliance with concrete specifications, reinforcing steel shall meet 60,000 psi ASTM-A42 and shall be placed in accordance with ACI Detailing Manuals. Steel Anchor Bolts shall comply with a minimum of ASTM-A36.



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G. FABRICS

Shade Cloth:

Coolaroo® Commercial 95.

This knitted shade cloth is fabricated in Australia. Specifically developed to produce a very strong and stable outdoor fabric for use in tension structures and shade awnings, it offers a great combination of maximum UV protection plus the strength and durability to ensure a maintenance free, long-term performance.

Tested to perform to NFPA 701 (Flame Resistance), ASTM E 136 (Combustibility) and ASTM E 108 (Exterior Exposure) tests.

Water Proof Materials:

There are hundreds of different water-proof fabric materials on the market. The following two are primarily used by BPI.

Sunbrella®.



Sunbrella® is 100% solution-dyed acrylic fabric. The name Sunbrella® is synonymous with the finest outdoor fabric in the world. Sunbrella® withstands sun, wind and rain while remaining beautiful for years. Sunbrella® fabric is not waterproof; it is *water repellent*. This means that during the finishing process a water repellent finish is applied to the fabric. Normal wear and usage (including cleaning) will reduce the effectiveness of this finish. Color charts and fabric specifications can be provided upon request.



PS A.D.R.

Another waterproof material used by BPI is a vinyl product called *Naizil® PS A.D.R.*, a high tenacity polyester fabric, 1100 dtex, coated with PVC and provided with a C12 flame retardant certification. The treated coating is specifically designed to withstand both the continuous exposure to UV Radiation and inclement weather. Total impermeability is guaranteed.

Color charts and fabric specifications can be provided upon request.



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H. CABLE

All steel cable conforms to ASTM-A 603, Zinc Coated Steel Structural Wire Rope. The 7 x 7 construction offers lower elongation, making it a good cable for fixed tension loads. The nominal diameter is 0.25 inches, with a nominal breaking strength of 7,000 lbs. per Spec. No. RRW-410D.

I. HARDWARE

All bolts and fasteners comply with ASTM A307 Carbon Steel with 60,000 psi tensile strength for pinned connections, and all moment connections will utilize ASTM A490 150 ksi tensile strength bolts. All fasteners are corrosion treated.

J. THREAD

Fiber type: Polyester, extra heavy T-400. Twisted Multifilament (STX).

K. SEWING

Protective webbing is utilized to reinforce and cover all corners, at the attaching points, and at the ends of hems. BPI utilizes a finished edge fold for hems and overlapping seams for joining panels.

L. WARRANTY

The BPI limited warranty includes:

- The structural integrity of steel components is warranted for 20 years.
- All painted surfaces are warranted for 12 months.
- Fabric Tops are warranted for 10 years against UV degradation.

A warranty document with the details of the limited warranty is available upon request.



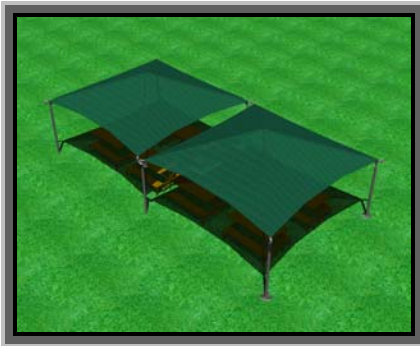
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M. STYLES.

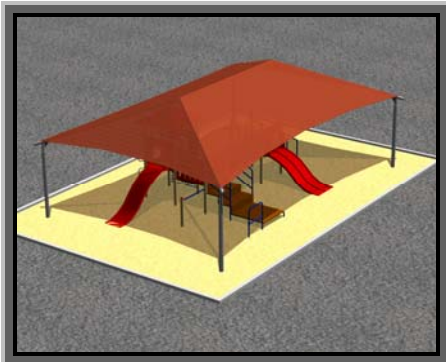
Simple Geometrical Shapes.

Pyramid (Square)



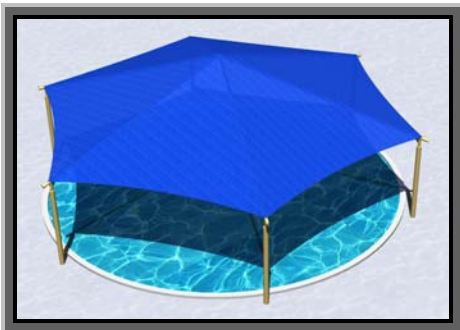
The Single Unit consists of four post and four rafters run from each post to the center crosspiece. The vertical angle on the rafter connector is fixed. The height of the center peak point varies depending on the size of the unit. Any configuration can be made joining these units together. Only square areas can be covered with these units.

Hip (Rectangle)



The most versatile shape available, the Single Unit consists of four posts and four rafters run from each post to the ridge connector in a horizontal fixed angle. The two ridge connectors are then joined by a ridge pipe. The vertical angle on the rafter connector is fixed. The height of the ridge pipe varies depending on the width of the unit. Any configuration can be made joining these units together. Any rectangular area can be covered with these units.

Hexagon and Octagon



The Hexagon is a unique symmetrical shape, consisting of six posts and six rafters run from each post to the center crosspiece in a horizontal fixed angle. The vertical angle on the rafter connector is fixed. The height of the crosspiece varies depending on the size of the unit. It is not common to join them together; however, any side by side configuration is possible. This design is ideal for covering circular areas. The Octagon is essentially the same shape with the addition of two more posts and rafters.



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Cantilevers.

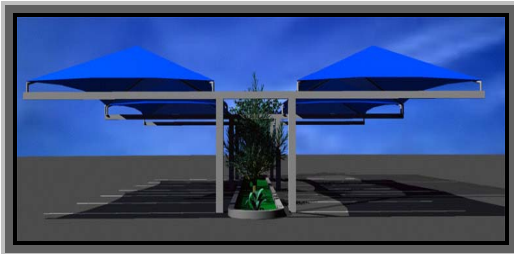
Even though cantilevers are not a specific shape variation, they are an alternative when the number of posts is a concern. The use of a cantilever arm attached to only one or two posts avoids the use of an extra post to support the structural frames. Cantilevers require larger posts and footings, causing them to be slightly more expensive.

Full Cantilever.



Full cantilevered structures are those where only one post is utilized to support the entire side of the structure. Posts and footers are larger than those utilized to support the frame, with one post in each side. The size of the arm is also larger, but the use of bracings or trusses help to minimize the size. Highly utilized in the parking industry to avoid front posts that could block the vehicles accesses.

Partial Cantilever.



In long spans, where the size of both post and arm would increase considerably, the aid of a second post is sometimes necessary. Partial cantilevers can be created in any position, varying only the distance between posts as required. The cantilever effect is still created.

Local Cantilever.



This type of cantilever is a full cantilever but only utilized to support one side of the structure. The post location can be altered and replaced with a cantilever to avoid physical obstructions.

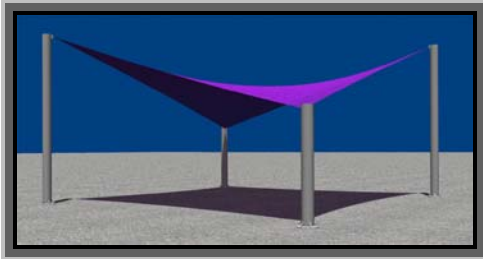


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Tensioned Spatial Shapes.

Hypar.



The Hypar is a simple tensioned fabric created shape as a rectangle or a square. By elevating two opposite corners, a different and attractive look is created. The larger the difference between post heights, the more impressive this tension structure looks from the distance.

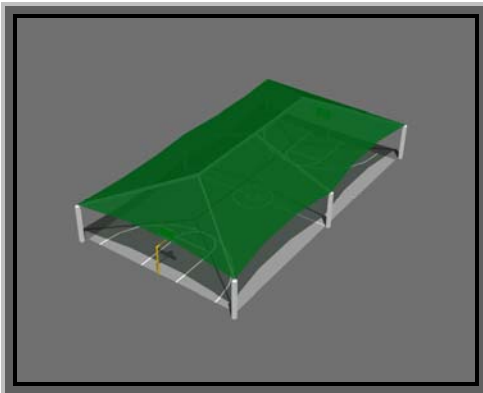
Conical.



This tent look is created by the tension applied to the fabric via the center crosspiece and the cable attached to the posts running through the hems at the perimeter. Almost any shape can be adopted: square, rectangular and even circular. This design is widely used for pavilion tops and display areas.

Other Shapes and Applications.

Extended Size.



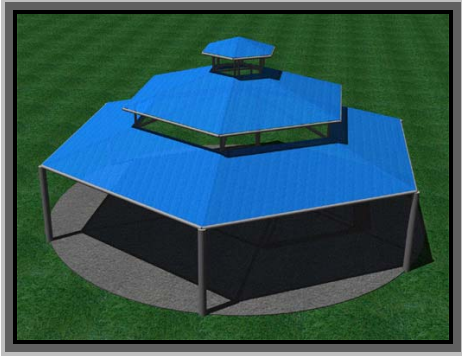
Though simple in shape, it is not an ordinary or simple structure. It is a larger version of the hip design, but it can span almost any length and width. With no center posts, it is ideal for covering broader areas, such as large courts and big playground areas. The engineering and design of these structures requires more attention, especially for the connection points.



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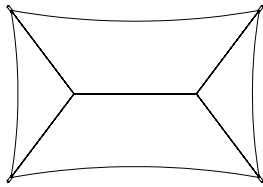
Pavilions.



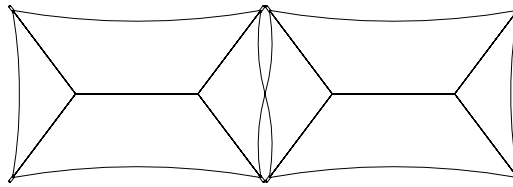
Fabric Structures are so versatile that any shape and size can be adopted. Shapes such as the "Pagoda" style can be designed and built to cover any area. Pavilions can be built for almost half the price of conventional solid roofing, with the advantage of no maintenance and easy replacement of the fabric top at minimal cost.

N. OTHER CONFIGURATIONS.

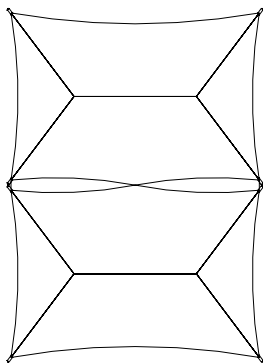
When using simple geometrical units, any combination can be constructed by placing them one next to the other. They can be joined side by side, back to back, in any desired number in each direction. They can involve separate tops or one single top extended to cover the desired area without any gaps. Here are some basic examples:



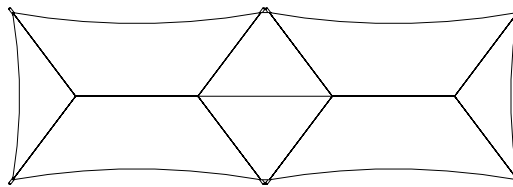
Single



Side by Side Joined



Back to Back Joined



Extended