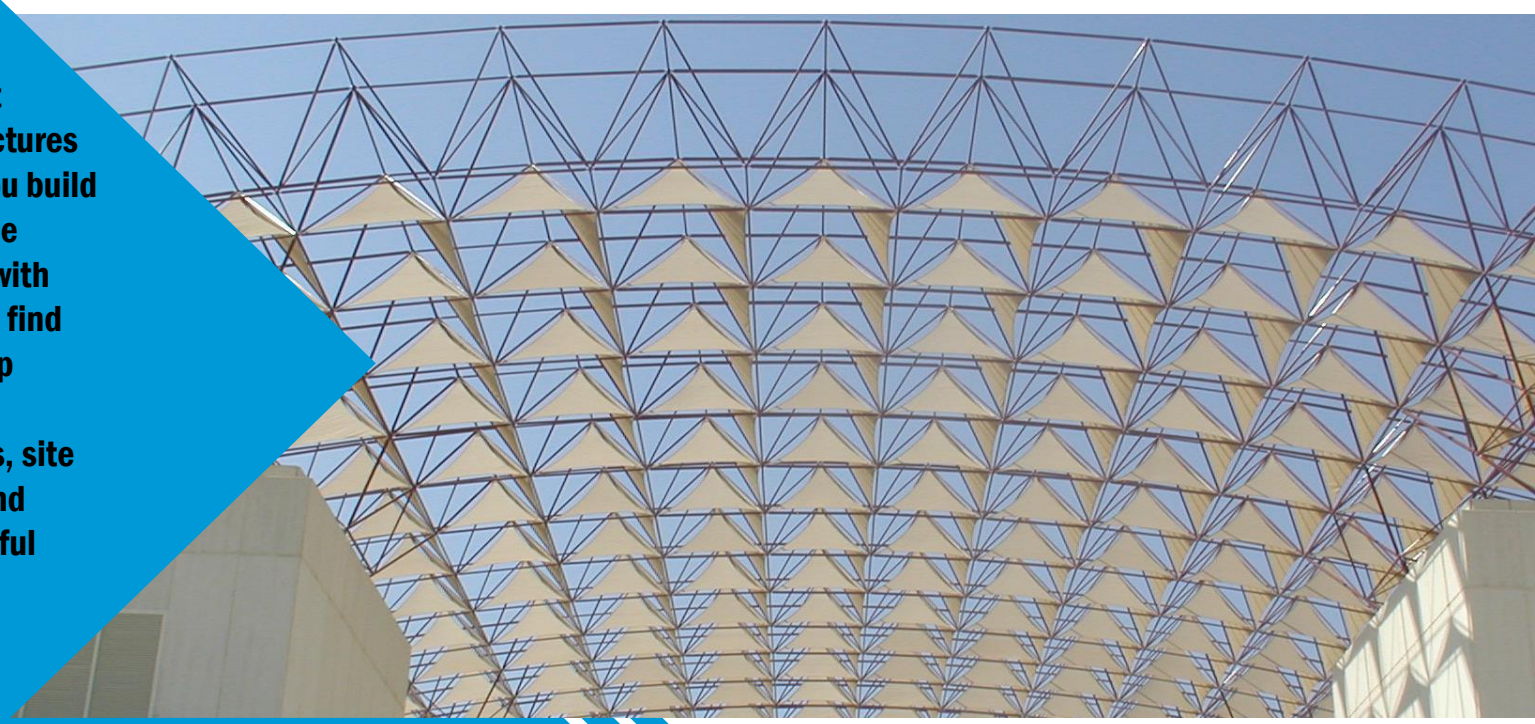
Shade Structure Basics

Presented by: Marc Shellshear, IFM, MFC
General Manager
Value Vinyls, 301 E. Trinity Blvd., Grand Prairie, TX 75050
marc@valuevinyls.com, www.valuevinyls.com

VALUEvinyls
STRUCTURE FABRICS

Presentation Overview

- What is hdpe, why is it different, framed structures versus sails, how do you build a sail, tools of the trade
- Sales tools – working with architects, how do you find them?, how do you help them?, specifications, fabrication techniques, site inspections, pitfalls and hidden expenses, helpful forms and information



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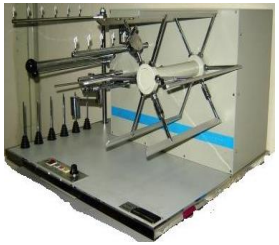
Typical Lab Main Equipment

MFI Tester
Melt Flow Indexer
(Polymer Testing Machine)



Denier Test
(Determines Count and Strength of Various Fibers and Yarns)

Yarn Strength
(Tensile Strength and Elongation of Yarn)

Color Deference
(Color Consistency Testing)

Fabric Tensile
(Tensile, Compression, Shear, and Peel)

Cover Factor
(Shade Factor)

GSM Test
(Measures the Weight)

QUV Tester
(Accelerated Weatherometer, mimics Sunlight, Rain and Dew)

Typical Testing and Certifications

ASTM E84
NFPA 701 Type 1
NFPA 701 Type 2
Greenguard Certified
California State Fire Marshall Approved CA 1237.1 Title 19CAFM
CPSIA Section 101 (a)(2)
CPSIA Section 108
Prop 65 Compliance

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Why Build A Shade Structure

- Up to 20% Heat Reduction – allows heat to escape
- Helps prevent sunburns, sun stroke, heat exhaustion and skin cancer
- Shields over 90% of harmful UV rays
- Aesthetic Appeal – attracts attention
- Unlimited Design Options
- Cost Effective Alternative to Conventional Building Systems
- Protects & preserves assets, people, cars, and buildings

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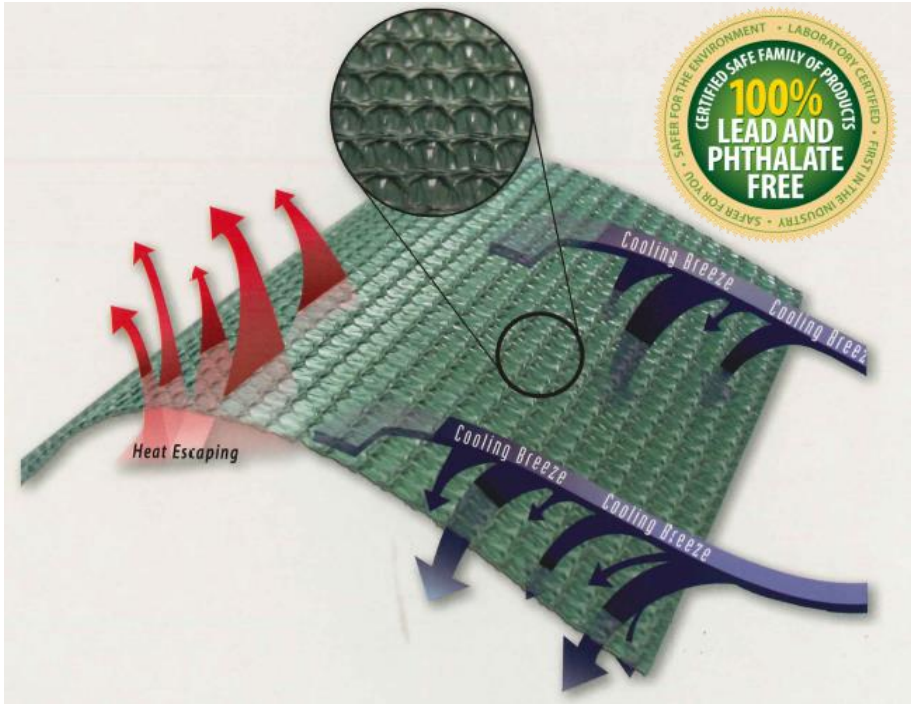
Types of HDPE Fabric
Tape/Tape, Mono/Tape, Mono/Mono

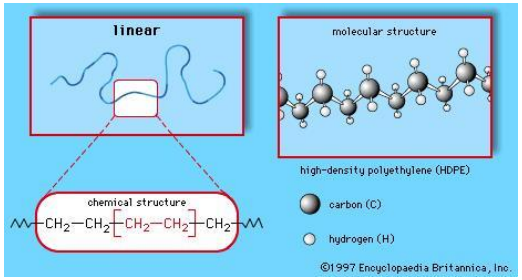
- **Knitted HDPE fabric:**
  - **good outdoor lifespan (fabrics carry warranties ranging from 5-15yrs), leading position in the world.**
  - **Quality fabric will retain vibrant color for many years with unique production know-how.**
  - **fabric breathes, heat escapes upwards , creating cooler areas beneath.**
  - **very strong strength**
  - **blocks UV rays**
  - **HDPE is 100% recyclable, lead and phthalate free, friendly for environment.**



Profile of multifilament yarn

Profile of monofilament yarn

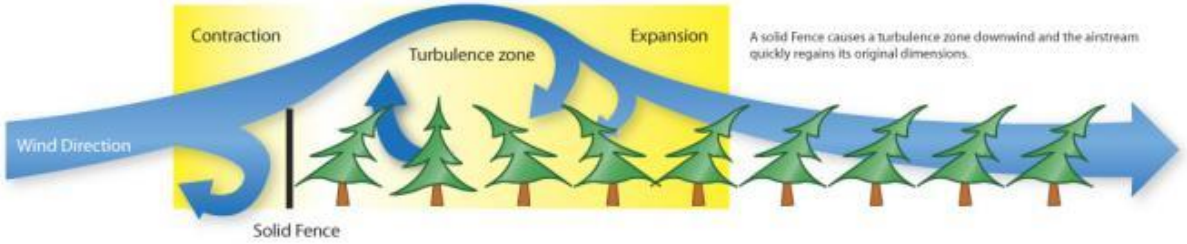
Profile of tape yarn



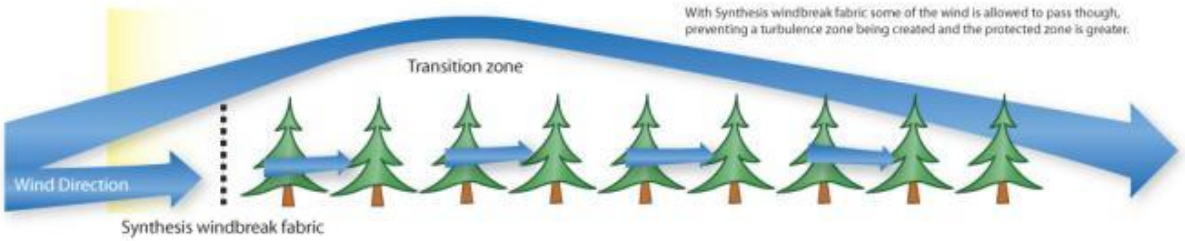
HDPE was originally used for Horticulture and Protection

HDPE has also been used for Wind Breaks

Without windbreaks fruit is damaged



With a solid fence some fruit will be damaged from wind



With a windbreak wind is managed and fruit won't be damaged from wind

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Wind Break Examples

HDPE Extrusion to Tape or Mono

Profile of tape yarn

Mono/Tape Yarn Warping to Beam

Beam to Warp Knitting Process

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Heat Setting by Stenter

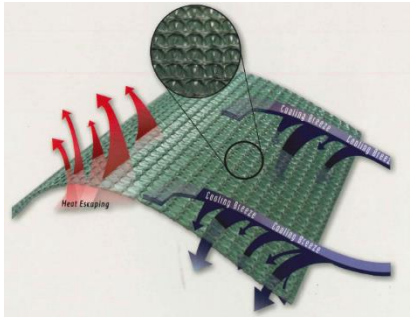
Knitted Fabric Versus Woven Fabric (Dimensionally Unstable versus Dimensionally Stable)

T-Shirt Circular Knit
(Example of Knitted Fabric)

Cotton Oxford Dress Shirt Woven
(Example of Woven Fabric)

What Is Knitted HDPE Fabric in Layman's Terms

The most common HDPE fabric is a Mono/Tape HDPE configuration. The mono yarns are extruded HDPE monofilament. The easiest thing to relate to extruded HDPE monofilament is fishing line. The tape yarns are an HDPE Film. The easiest thing to relate to HDPE Film are the bags you get from the grocery store. In the most basic description if you slit the bags into strips and knitted that with fishing line you would have a Mono/Tape HDPE knitted fabric. Monofilament yarns have memory and will return to their original shape, tape yarns do not have memory and will stretch and stay that way.



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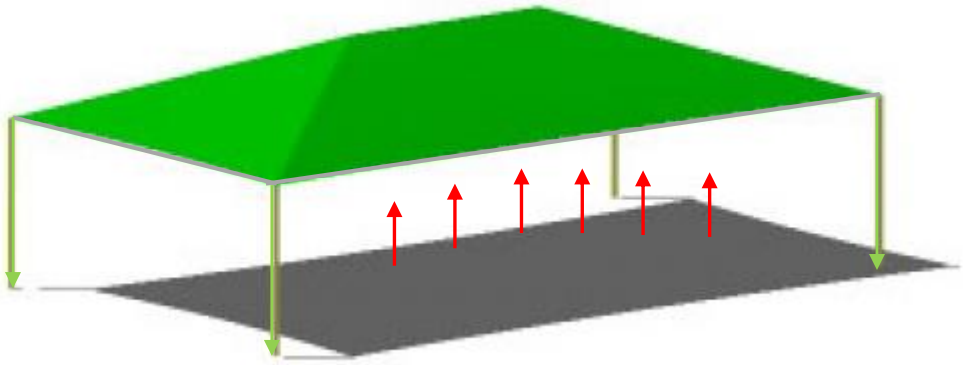
Framed Structures Versus Shade Sails

Wind is generally the enemy of shade structures, uplift is generally the controlling factor

Working with a framed structure the load is imposed on the fabric, that then is transferred through the frame and into to the perimeter cable, that is then transferred to the columns and then down into the footings

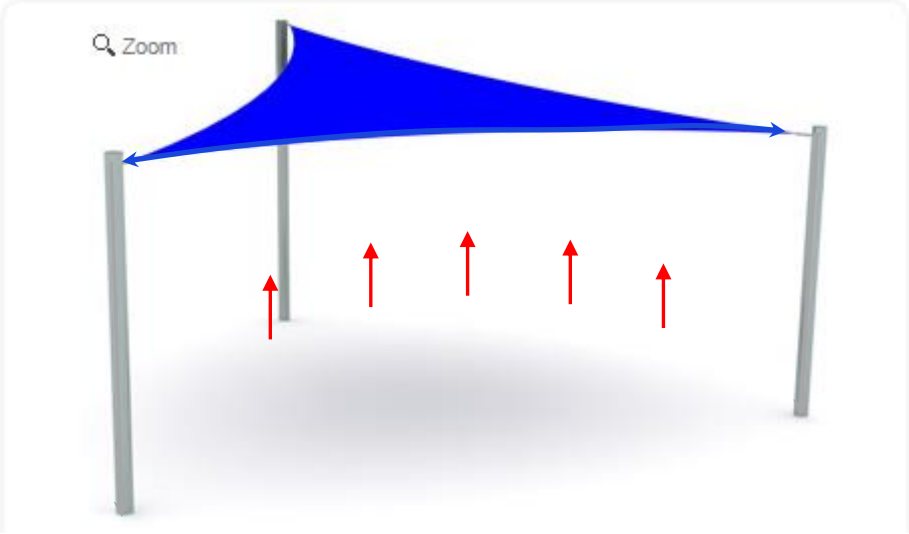
Framed units experience much more equilateral loading versus sails



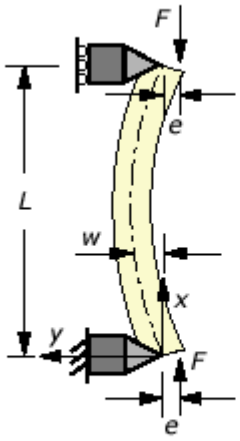
Framed Structures Versus Shade Sails

Wind is generally the enemy of shade structures, uplift is generally the controlling factor

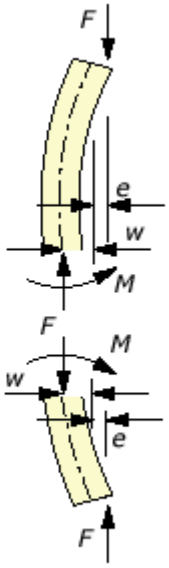
Working with a sail structure the load is point loaded at the attachment to the column, the columns is susceptible to excessive bending moment and overturning moment at the base of the column so insuring the proper column size and footing size becomes critical

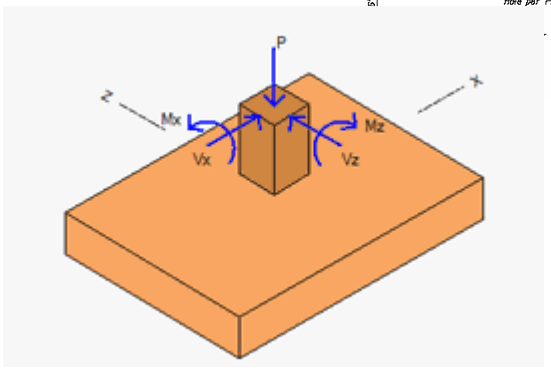


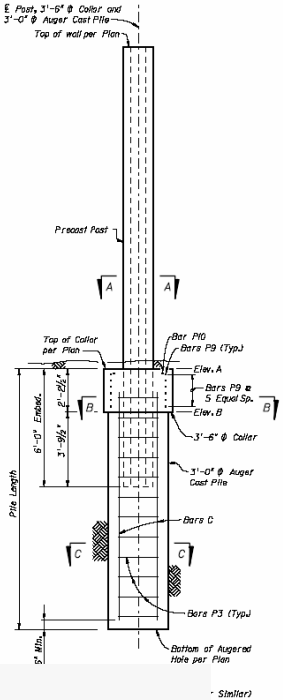
Bending & Overturning Moment on the Columns

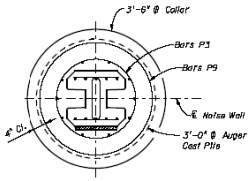


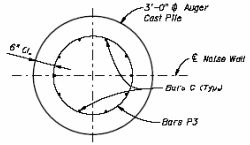
Simply supported column subjected to eccentric axial load F



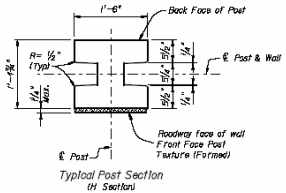




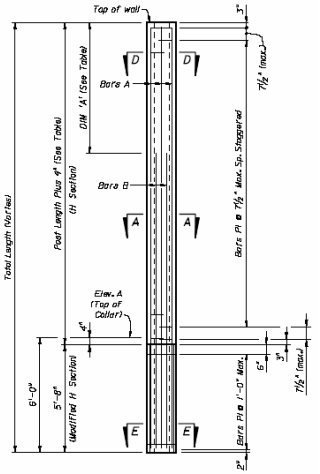


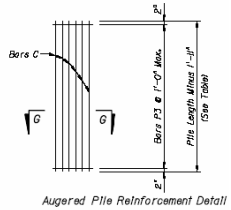


NOTES
For Post and Pile Lengths See Standard Index No. 1508.
For Table of Reinforcing Steel Sizes and Dim 'A' See Standard Index No. 1508.
For Precast Collar Option See Standard Index No. 1507, Drawing 2 of 5.

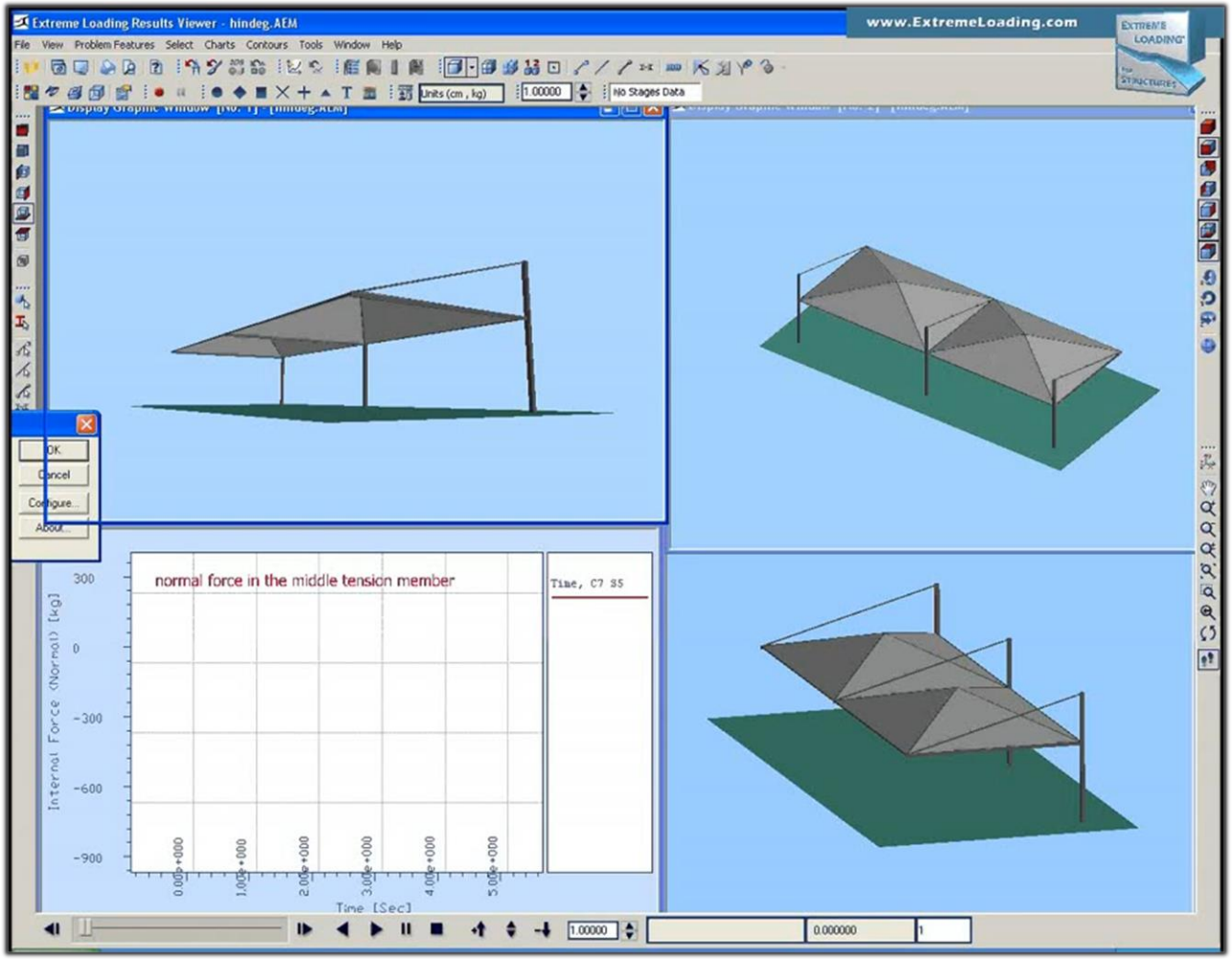


Typical Post Section (H Section)

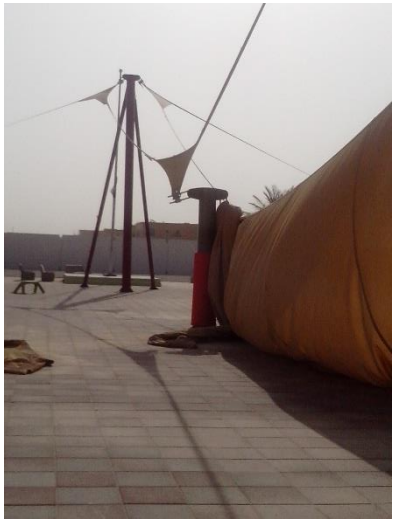




Shade Structure Failures



Structure Failures



Flutter Effect

Designing a Shade Sail

- **Biggest issues with shade sails**
  - **We wish we would have put more twist in it (rule of 6)**
  - **We wish we would have made it bigger (rule of catenary curve)**
  - **It doesn't shade where we wanted it to (design considerations)**

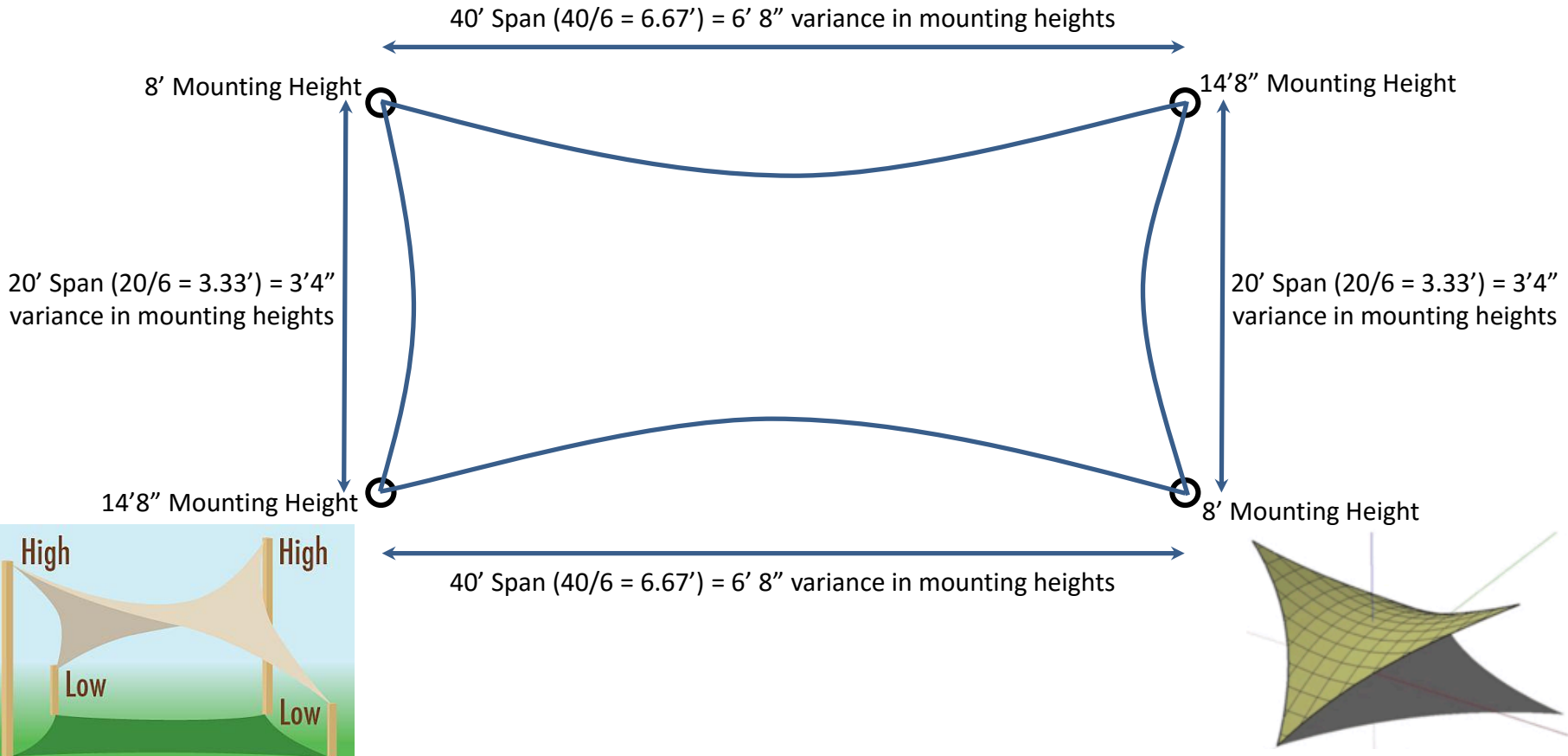
Too Flat (Not enough twist susceptible to flutter and failure)

Didn't account for catenary so beautiful but very little shade

Didn't account for N, S, E, W exposure and high points

Rule of 6 (Applies to Shade Sails with more than 3 Points)

Rule of 6 Explained

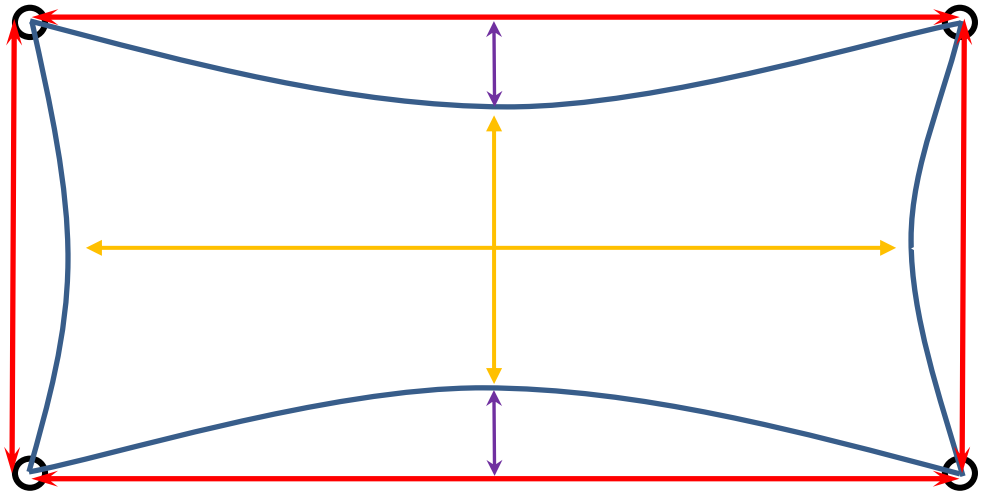


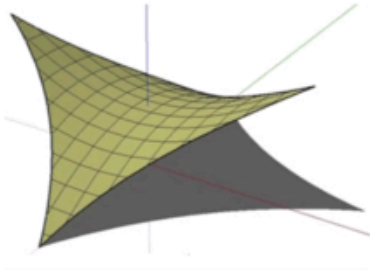
Calculating Catenary Curve Using Biaxial Stretch Test Data

Calculating Catenary Curve (Based on Monotec 370)

Inch	Decimal of a Foot
1 inch	0.0833
2 inches	0.167
3 inches	0.250
4 inches	0.333
5 inches	0.417
6 inches	0.500
7 inches	0.583
8 inches	0.667
9 inches	0.750
10 inches	0.833
11 inches	0.917
12 inches	1.000

40’ Span (40 *.05 = 2.0’ of catenary on this side – 2’0”)





20’ Span (20 * .05 = 1.0’of catenary on this side –)

20’ Span (20 * .05 = 1.0’of catenary on this side –)

40’ Span (40 *.05 = 2.0’ of catenary on this side – 2’0”)

20’ x 40’ Hypar Sail is actually 16’0” x 38’0” at the smallest point

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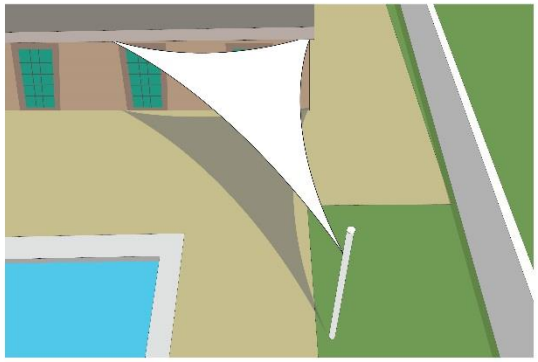
Design Considerations

Design Considerations

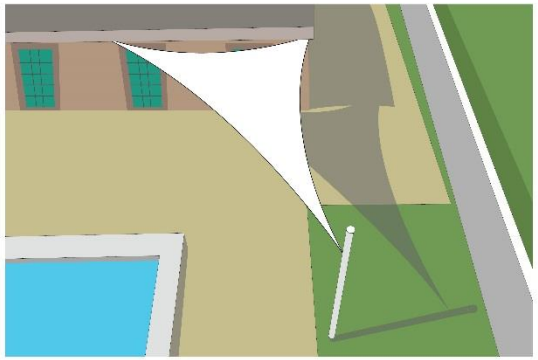
- What is the construction of the building you are attaching to? Most buildings are not designed for the loads imposed by a sail and will require reinforcement and or a column to support the load. A 30’ sail with a 70 mph wind can develop 2.5 to 3.0 kips easily which is a tremendous force on the building.
- What time of day does the area you are trying to shade get the most sun and what is the directional exposure? If you were to have all day sun (Southern exposure) the sail size and catenary curves become very important. A small increase in size can make a huge difference in shade.
- Based on the directional exposure determining the high point can also become a critical factor.
- Google Earth is a free program that does a good job of showing how the sun moves over a building.
- Google Sketch Up and Blender also have tools for doing sun studies that work extremely well and are easy to use.

Design Considerations

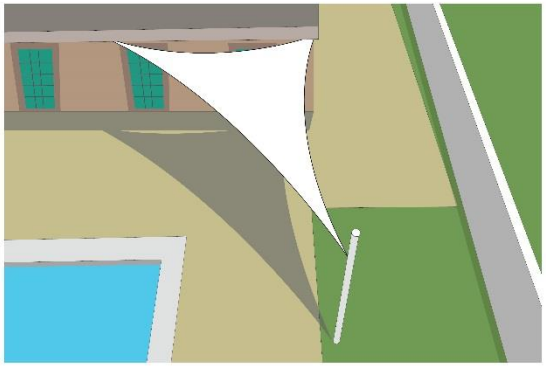
Sails always have high points knowing where N, S, E, W are is critical to making sure the sail provides shade where shade is needed



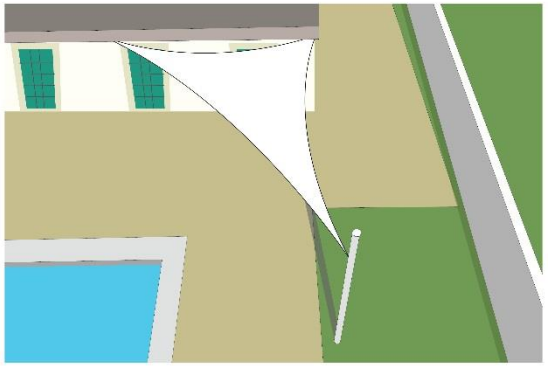
Southern Exposure Noon



Southern Exposure 3:30



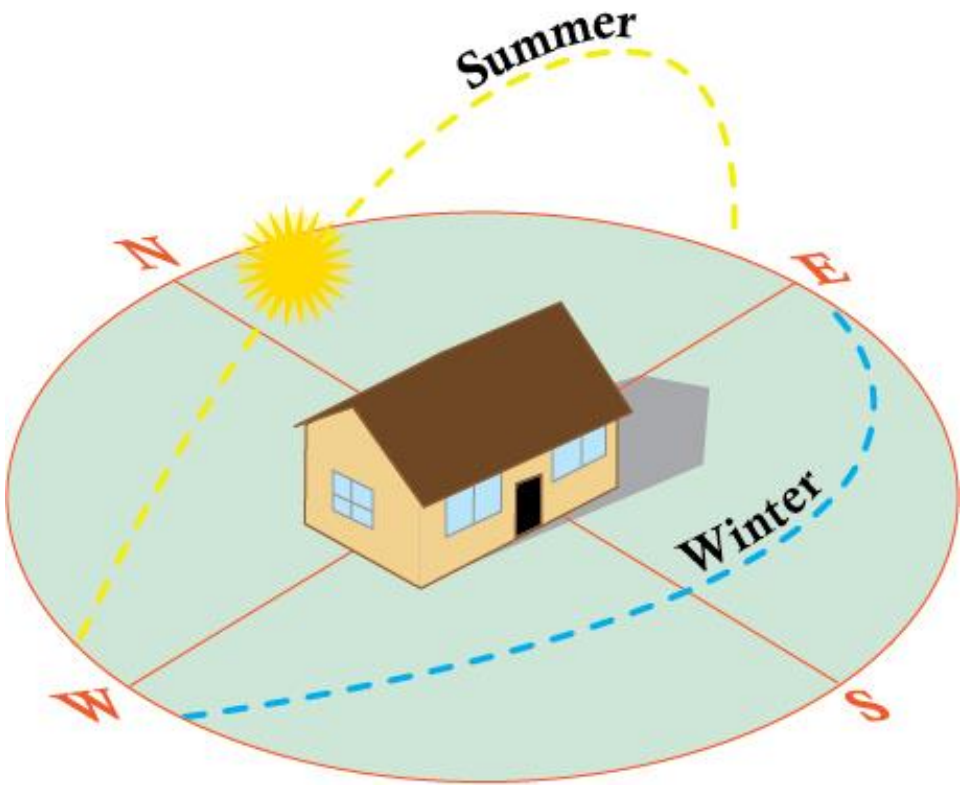
Western Exposure Noon



Western Exposure 3:30

Design Considerations

Remember the solstice also plays a role in where the sun is depending on the time of year



Design Considerations

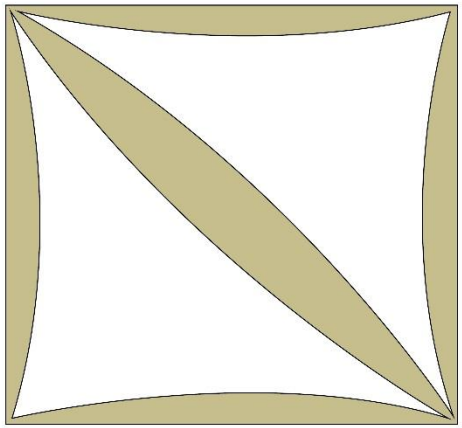
3-Point (Triangle), 4-Point (Hypar), or more complex design, what works best?

- **Triangles are the least efficient shapes as they always have a high point , combined with the catenary curves don't provide a lot of shade. If a triangle sail is desired then you should consider overlapping multiple triangles to compensate for the catenary curves and high and low points**

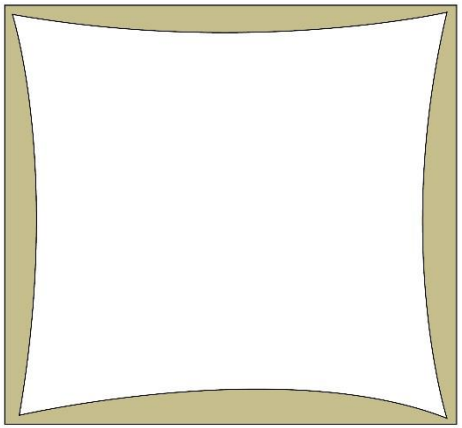
- **Hypars provide approximately 20% more shade than a triangle and are just as aesthetically appealing.**

Design Considerations

Example is a 20’ x 20’ space, a 4-Point (Hypar) provides 66 more square feet of shade versus two triangles. A triangle is always a flat plane. It has shape but no twist like a Hypar. Fabric in a flat plane is always more susceptible to flutter which as we discussed causes mechanical breakdown of the fabric and possibly the hardware and or columns.



272 square feet of shade



338 square feet of shade

Design Considerations

A triangle is always a flat plane. It has shape but no twist.

Side View of Triangle (3-Point) Sail

Top View of Triangle (3-Point) Sail

Design Considerations

A hypar is a multi plane, it has shape and twist.

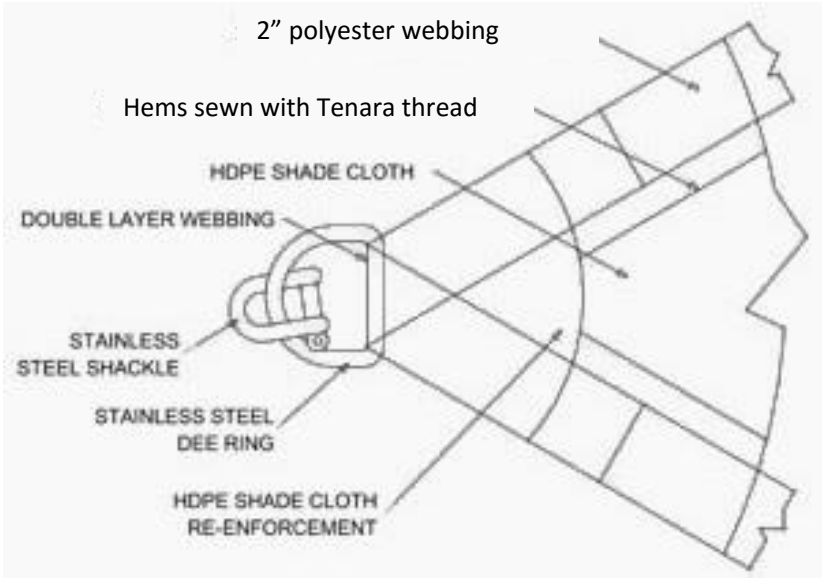
Side View of Hypar (4-Point) Sail

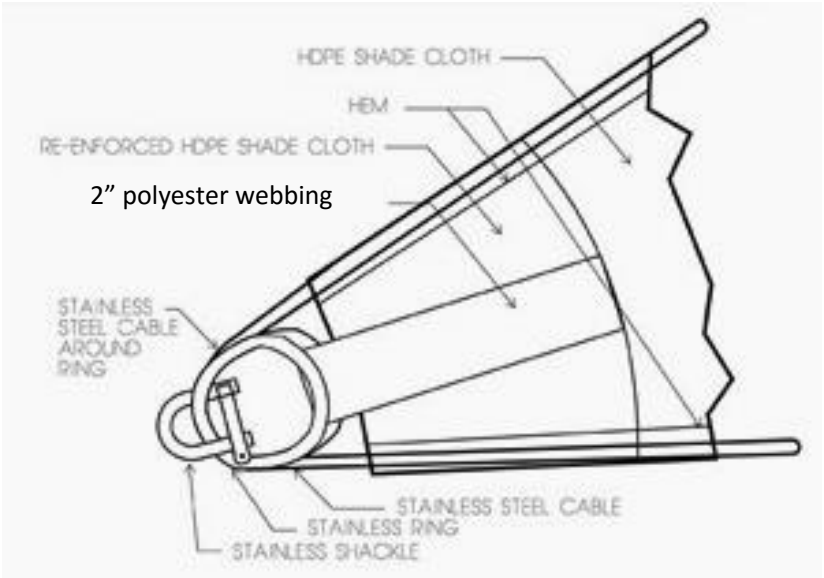
Top View of Hypar (4-Point) Sail

Design Considerations

Large pieces of fabric require double curvature to get more equal loading and avoid fabric, hardware, and or structural failure

Shade Sail Corner Details





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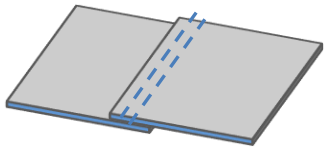
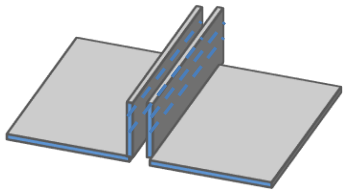
Seaming Details

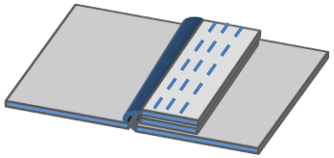
Traditional Seaming Methods



Standard Lap Seam

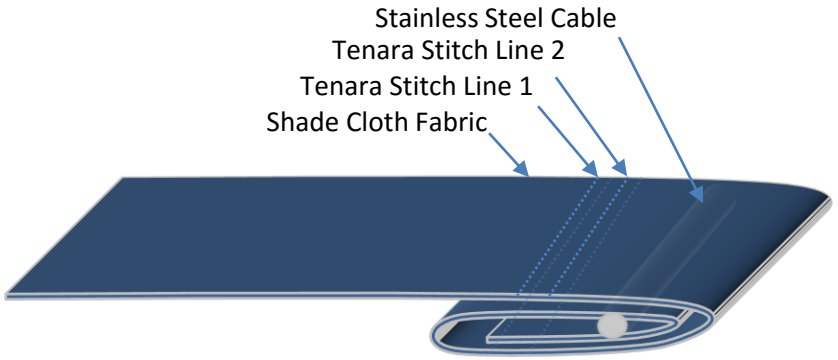


Standing Seam

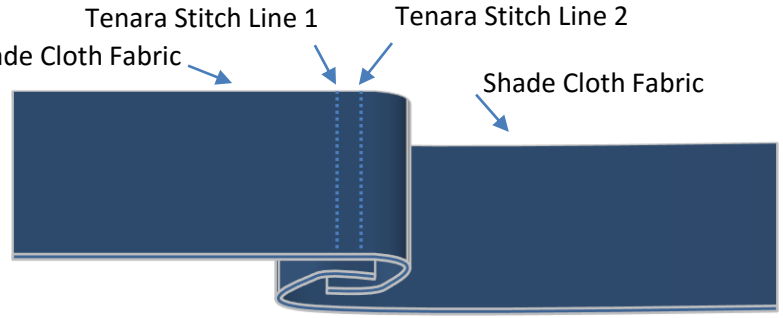


Standing Seam Folded Flat

Preferred Seaming Methods



Cable Pocket Detail



Feld Seam for joining panels

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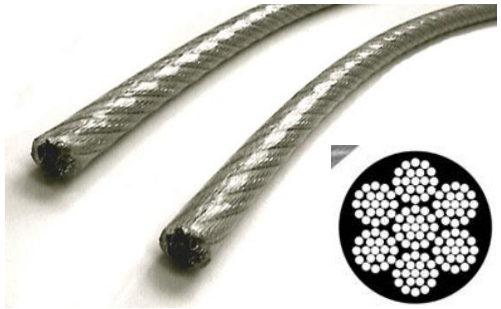
Cable Options

Stainless Steel 7x19 Stranded Cable

Advantages: Long lasting, good strength to weight ratio, corrosion resistant
Disadvantages: Cost, weaker than galvanized

Galvanized Steel 7x19 Stranded Cable

Advantages: Long lasting, great strength to weight ratio, low corrosion
Disadvantages: Can rust in harsh conditions, aesthetics



Vinyl Coated Steel 7x19 Stranded Cable

Advantages: Long lasting, good strength to weight ratio, depending on type of cable can be low corrosion or corrosion resistant
Disadvantages: Cost, can become pliable in extreme heat and adhere to the HDPE fabric causing wear and rubbing

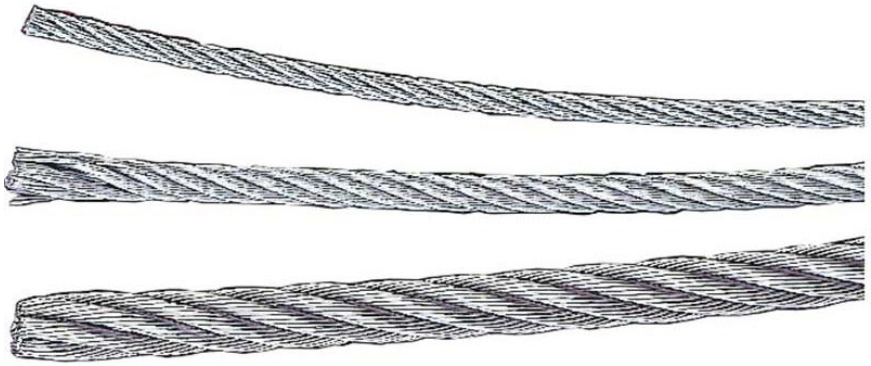
Cable Options

Recommended Cable Sizes

¼” (6.5mm) – Okay in spans up to 20’ (6 M)

3/8” (9.5mm) – Okay in spans up to 35’ (10 M)

½” (13mm) – Okay in spans up to 50’ + (15 M)



Hardware Options

Galvanized – Lowest cost, good in non-harsh environments, less susceptible to galling, highest strength solution, aesthetically not appealing

Stainless – **304** is the most common grade of stainless steel however this grade is 18/8 (18% chromium, 8% nickel) and is susceptible to corrosion and galling. **Type 316** (18% chromium, 14% nickel) is the second most common and is generally referred to as marine grade due to its high corrosion resistance. Stainless steel is always more susceptible to galling and is weaker than galvanized steel but maintains a more aesthetic appearance and is highly corrosion resistant.

Chrome Plated Brass – This is generally used in high corrosive environments and is very expensive. It does overcome the galling issue and is extremely strong however is generally cost prohibitive unless it is a large project.

Sales Tools - Working with Architects

- **What compliments your core business and how can you find new avenues of growth?**

  There are a variety of ways to seek out new potential avenues of growth for both your core business and shade business. One of the best places to start is architects both traditional architects and landscape architects.

Sales Tool Specifications

SECTION 123456

PRE-ENGINEERED FABRIC SAIL STRUCTURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. A single TX licensed shade structure contractor shall be responsible for the design, wet stamped engineering drawings, permitting, fabrication, supply and installation of the work specified herein. The intent of this specification is to have only one shade contractor be responsible for all the above functions.

1.3 SUBMITTALS

1.3.1 With Bid Submittals:

A. Provide proof of installed reference sites with structures for similar scope of project and installation that are engineered to IBC 2012 specifications. Include in reference list structures meeting the following size and criteria with install dates and project locations: 3 - 20' x 20' x 20'with 3 posts.

B. Successful Contractor to provide a minimum of 15 fabric samples to demonstrate fabric color range and powder coat color selections. Also provide letter of authorization from fabric manufacturer for use of the specified fabric.

C. Provide proof of all quality assurance items including;

1. A list of at least 3 reference projects in Houston, TX that have been installed a minimum of 3 years.

1.4 QUALITY ASSURANCE

A. Requirements of manufacturer and Contractor, contractor must provide proof of certifications:

1. Have been in continuous operation as a professional fabric manufacturer for a minimum of 8 years prior to this contract.

2. Hold a valid contractor's license for a minimum of 3 years.

3. Welder Qualifications: The personnel manufacturing the metal awning frames must be certified welders.

4. Provide written welding procedure specifications.

5. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where project is located and who is experienced in providing engineering services for installing fabric structures similar to those indicated from this project and with a record of successful in service performance.

6. Have a current Los Angeles City Approved Fabricator's license.

7. OSHA 10 Hour Construction Industry Certified Training.

Sales Tools – Site Inspection

Definition

A site plan is a map of your site. Site plans are commonly drawn "to scale" which means that all of the real life dimensions are reduced to the same degree. Scales can vary, depending on the size of your site and the size of your paper. A typical scale for a small site might be 1 inch equals 1 foot.

For permitting purposes, there may be a need for a specific, sealed site plan to scale as required by the city. To do this, it is imperative that they have accurate information regarding the site. This usually requires As-built drawings that show all measurements of the property and underground utilities. However, they must also have accurate measurements from the salesperson of where the structure needs to be placed.

The installation crews also need a site plan. Without a precise site plan, they may install the structure in the wrong location or hit underground utilities that could have been avoided. This type of site plan does not have to be done professionally always and can sometimes be completed by the salesperson.

Measuring a Site Plan & Photos

When you go out to a site take measurements and notes, do a "rough draft" don't make your rough draft the actual site plan MAKE IT NEAT.

1. Measure the length and width of the lot, or the portion of the lot you want to work on.
2. Locate important existing features such as buildings, sidewalks, streets, fences, etc. and mark them on your plan.

This is especially important when measuring a playground, so you know exactly how the playground measures and where it is located on the site.

3. Locate natural features, such as trees, large rocks, and water and mark them on your plan.
4. Always find north. Marking north on your plan is helpful to installers when trying to layout.

Later sit down with your notes and draw your site plan (using graph paper may be helpful). First draw the outside edges, or boundaries, of the site. Then put in the other features you noticed, such as buildings, sidewalks, trees and fences.
Take photos of the area that way installation knows exactly what the area looks like, they have a view of all the existing features.

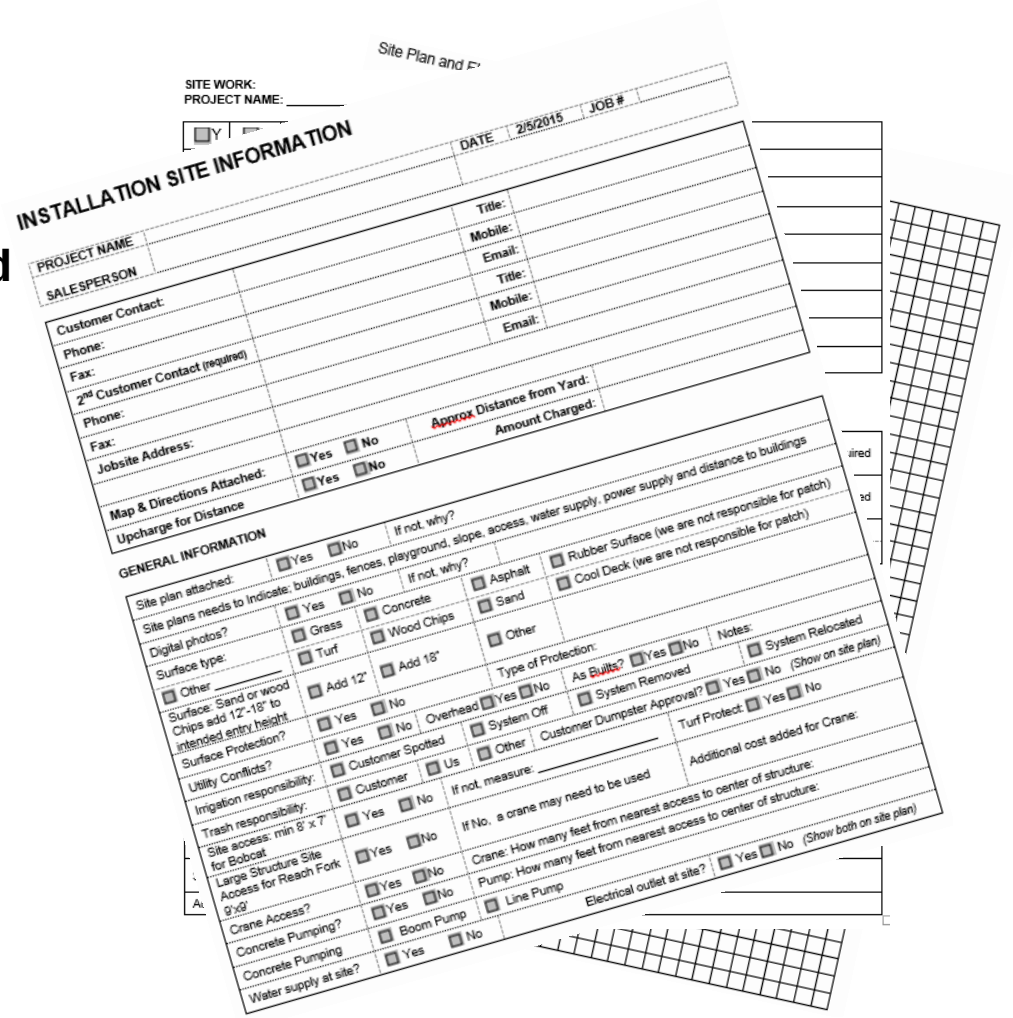
Sales Tools – Site Inspection

Photos of the job site help give the installers a visual of what the site looks like prior to getting there.
Any obstacles such as fencing, buildings, trees, and ground covering to look out for should have a picture. The area where the unit is to be placed should have a picture. Utilizing orange cones to identify where the uprights will be located. Any existing damages prior to the installer arriving should have pictures. Any details the customer requested for you to look out for should have a picture and be noted on an install form.

IFAI EXPO

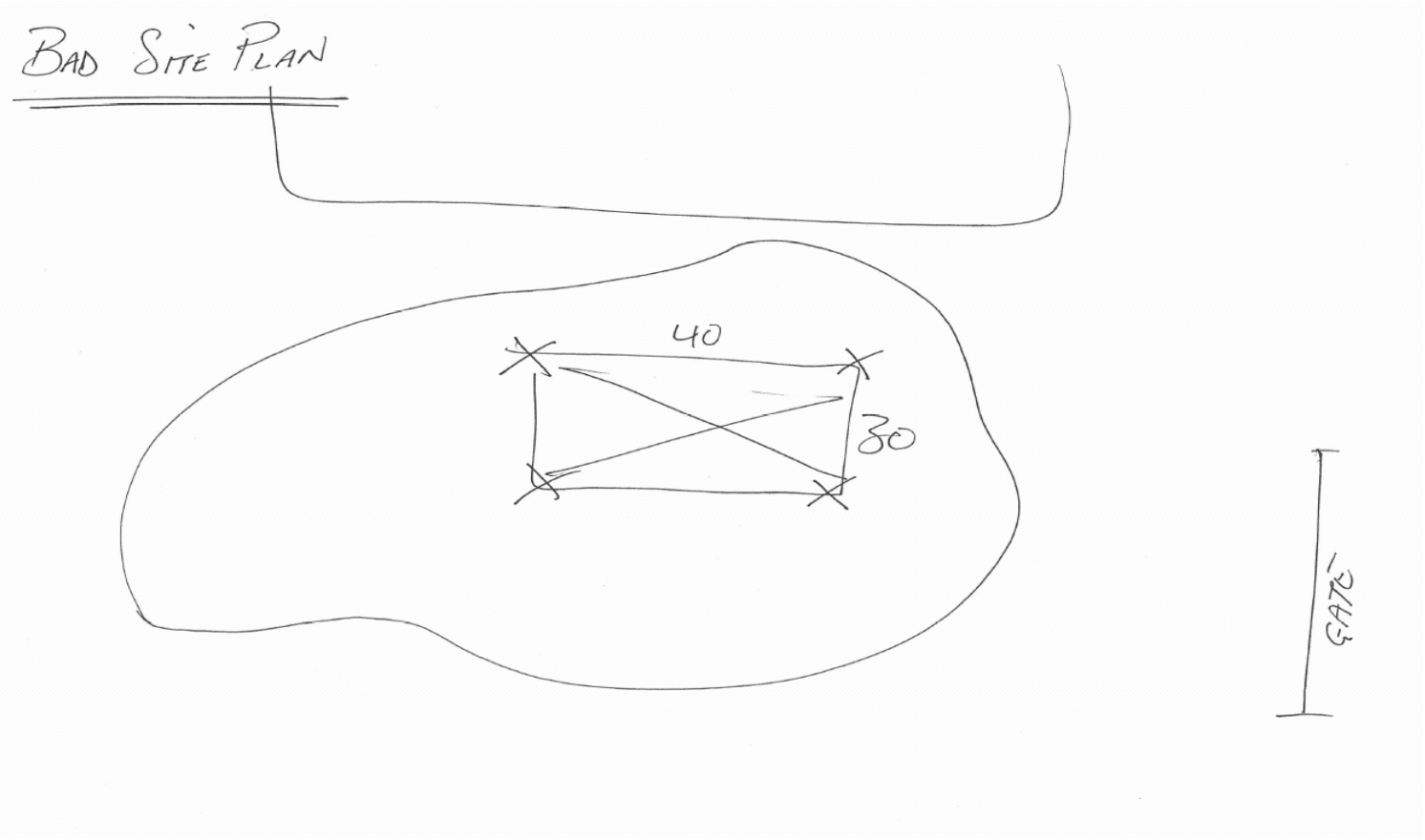
Sales Tools – Site Inspection

- This form is critical to any properly planned installation
- It gives the installers a "tool" for planning and coordinating prior to going out the jobsite
- It is always important to give 2 points of contact for each job just in case someone cannot be reached

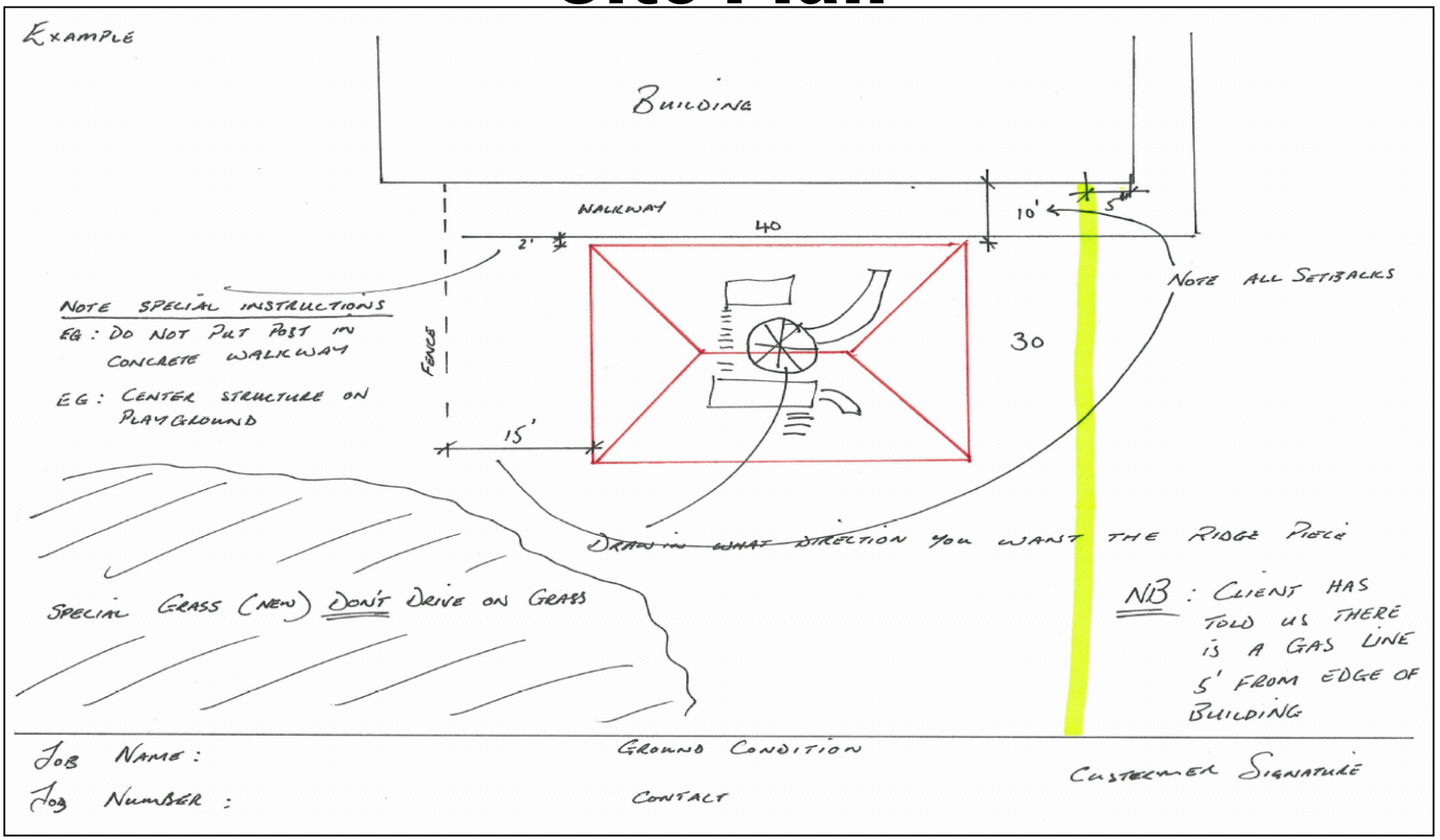


IFAI EXPO

Sales Tools – Site Inspection – Bad Site Plan



Sales Tools – Site Inspection – Good Site Plan



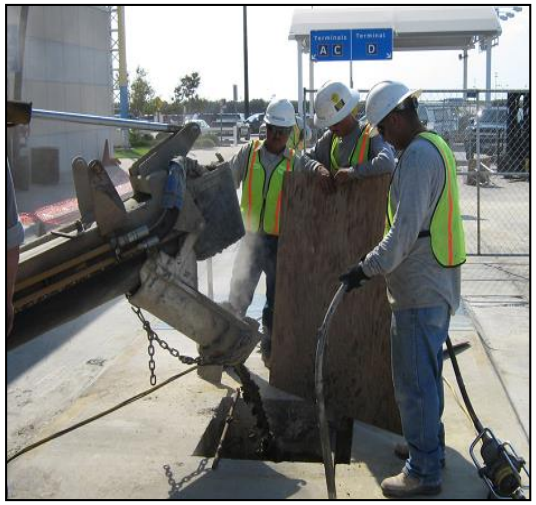
Sales Tools – Additional Expenses – Dirt Removal

Customers are not always aware of the amount of dirt that is being removed from the footings. For example, a standard size unit with a footing detail 24" x 8' is now normal. The amount of dirt for 4 footings this size is 3.72 yards of dirt. Which can be a massive amount of dirt especially when a customer wants it spread in a flower bed? Provisions should always be made with the customer and the cost of the dirt removal should be factored into the installation cost .

Sales Tools – Additional Expenses – Concrete Footings

Concrete Pump:

- Limited Access
- Prevent damage to existing Property
- 47 meters is largest Boom Pump
- Line Pump several hundred feet depending on the Concrete mix
- Cost from $100 per hour to $200 per hour with a 4 hour minimum
- You can have a concrete pumping company come give you a free survey of what size pump will be required



Sales Tools – Additional Expenses – Concrete Footings

Concrete Buggy:

- **Limited Access**
- **Prevent damage to existing Property**
- **Easy to maneuver**
- **Inexpensive alternative**
- **Cost from $250 to $500 per day minimum**

Sales Tools – Understanding Soil Types and Footings
Spread Footing

Needed when you have:

- high water tables
- Caliche/boulders (soil report to reduce the size of footings)
- Utility Conflicts
- Foundation or other structure conflicts

Pros:

- Allows footings to be completed before structure arrives

Cons:

- Requires 3x the concrete, rebar and labor
- Much more difficult to set templates exact
- Embed Column very difficult and dangerous to install
- Anchor bolts do not come with structure and will need to be ordered from a local industrial supply or ordered with purchase
- You will need to grout base plates

Sales Tools – Understanding Soil Types and Footings
Recessed Plate

Best used for these conditions:

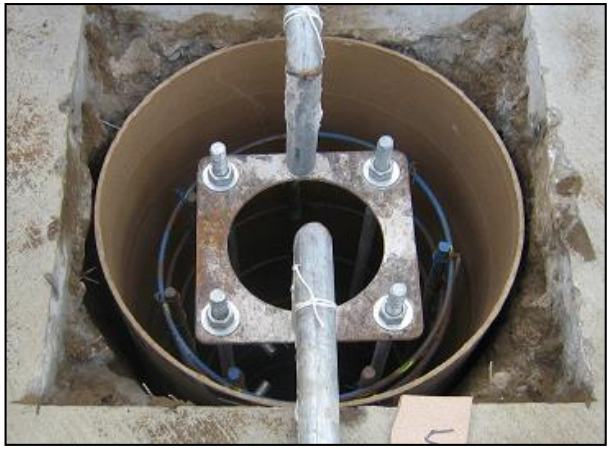
- When you want to complete footings before structure arrives
- Terrain is difficult to maneuver on
- Large columns such as super span or tension sail structures

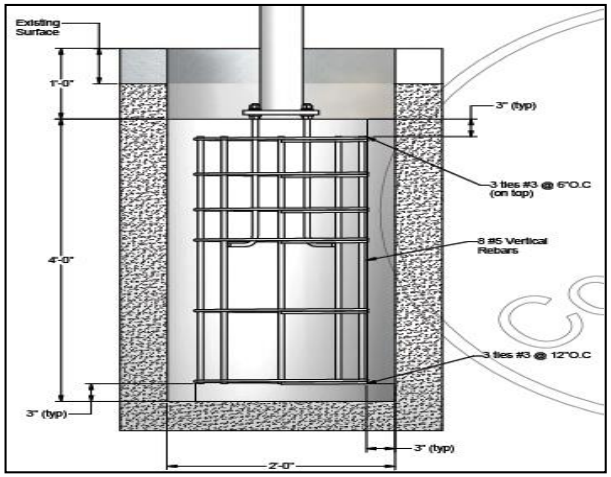
Pros:

Allows for future removal needed
Provides no protruding “tripping” hazards

Cons:

Anchor bolts do not come with structure and will need to be ordered from a local industrial supply or ordered with purchase
Need to grout base plates





Sales Tools – Understanding Soil Types and Footings
Surface Mounting & Chemical Anchors

Best used for these conditions:

- When you want to complete footings before structure arrives
- When ground is almost level
- When you want to remove structure in the future if necessary

Pros:

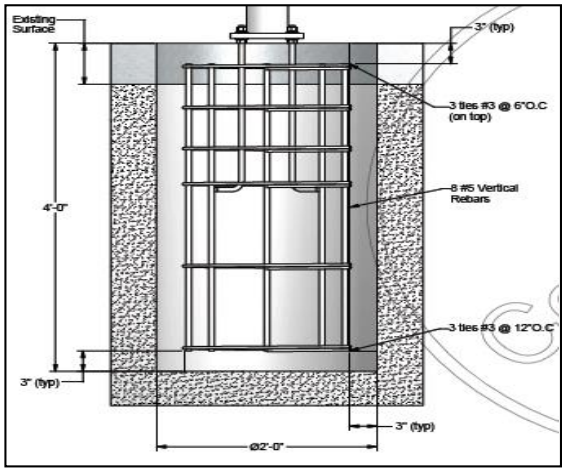
- Allows for future removal if needed

Cons:

- Anchor bolts do not come with structure and will need to be ordered from a local industrial supply or ordered with purchase
- Need to Grout base plates, allows footings to be completed before structure arrives
- Has protruding bolts that may need to be protected
- Allows for future removal if needed

CHEMICAL ANCHORS

- The same rules apply as above
- Ok to use only on properly reinforced concrete piers or slabs
- These will need to come from a specialty supply house, Hilti, Fastenal, etc.



Sales Tools – Understanding Soil Types and Footings
Pole In Hole / Imbed

Best used for these conditions:

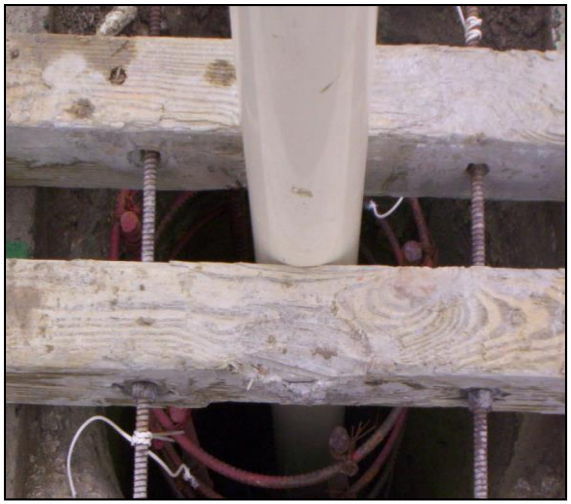
- You have a severe slope - you can order extra length to the columns and installers can adjust elevations easier in the field than anchor bolts
- You do not want to purchase anchors (you will need the appropriate wooden forms which are less expensive)

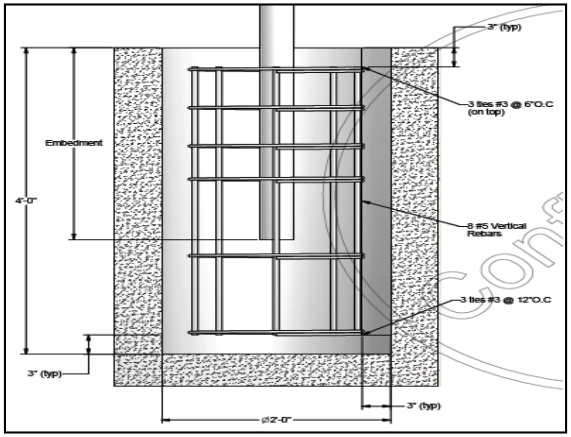
Pros:

- You will not need to purchase anchors
- You will not need to grout
- Reduced time for install
- Easier to adjust for elevations

Cons:

- More difficult for the inexperienced installer until they install a few times
- For heavier columns they will need a fork lift to install columns before concrete, which can increase rental time





IFAI EXPO

Sales Tools – Additional Expenses - Crane

Crane:

- **Limited access**
- **Possible damage to existing Property**
- **Reach Fork will not reach**
- **Load is too heavy for Reach Fork See steel weight Chart**
- **Cost from $100 per hour to $400 per hour 4 hour minimum**
- **You can have a crane company come give you a free estimate of what size crane will be required**

IFAI EXPO

Sales Tools – Additional Expenses - Cleanup

Typical Contract Language related to Cleanup

The Subcontractor shall take care of all of it's building materials on the job site.
In carrying out his work the Subcontractor shall take all necessary precautions to protect the finished work of other trades from damage caused by its
operations, and shall be liable to the Contractor for all such damage.
The Subcontractor shall at all times keep the job site clean of debris arising out of the operations of the Subcontract. If the Subcontractor fails to do so,
the Contractor may clean the building and premises of the debris and charge the cost of such cleaning to the Subcontractor.

Insert Company Logo

Customer Checklist & Sign-Off

Project:
Address Contact:
Telephone:
City, State, Zip:
Project number:

Customer Comments

	Customer Initials
All fabric covers fit tightly, and the steel cable is neatly tucked out of sight.	
All fabric covers are free of any dirt or defects.	
All steel columns are lined up and are plumb and level.	
All powder coated areas are to the customer's satisfaction.	
Colors of fabric and steel are correct.	
Structure(s) are at the correct entry height(s).	
All bolts, nuts and washers are tight and in place.	
All tools and excess parts have been removed from the work area.	
All work areas (i.e. parking lot, sidewalks, grass/turf, etc.) are clean and in original state of repair.	
Permit is posted and site is ready for city inspection (if applicable).	

Customer Comments:

I acknowledge that this is the final inspection on the above named project, and I have been given an opportunity to note any punch items which must be completed prior to sign off. I have inspected the structure(s) and work area, and have determined that the installation is complete to my satisfaction and in accordance with the contract. Any further obligation on the part of enter your company name will be solely those established by the warranty program.

NOTE: This checklist must be signed and returned to enter your company name within enter days business days from the construction completion date, or enter your company name will not be held responsible for any damage to the structure. The general warranty will also be considered null and void until this checklist is received.

Client Signature _____ Printed Name _____ Date _____

Install Manager's Signature _____ Printed Name _____ Date _____

050004A

Sales Tools - Engineering Differences

Over the last few years we have been asked about the differences between companies with regards to engineering philosophy so I though I would give you a few illustrations that you should be able to use in educating your clients.

Dead Load: This is defined as the structure self weight. The software used usually automatically computes the weight and includes it as part of the dead load case of analysis.

Some competitors claim they use dead load based on a distributed load (5 psf for example), this is an inaccurate method of calculating the loads and may lead to inadequate sizing and structural risk.

Live Load: In the building code this is defined as the load that equipment, personnel or other moving objects may impose in the structure, IBC in both 03 and 06 versions have a table of minimum loads you need to comply with, for example IBC 2003 has a minimum of 10 psf and IBC 2006 reduced it to a minimum of 5 psf, IBC 2009 and IBC 2012 also have load tables and 5 psf is the minimum.

Not many competitors use live load even when code calls for a minimum. Again this may lead to inadequate sizing and represents a potential structural risk.

Wind Load: This is the load applied by wind pressure on the structure through the fabric (mostly only fabric, wind is also applied to the steel surface and should be considered but is normally not extremely significant). You should be using 90 MPH 3 sec-gust as defined by IBC. Mostly exposure C is used which is the most conservative case, this means that wind is applied in a completely open area. You should apply all the wind pressure to the fabric and do not allow any reduction due to wind thru effect.

Competitors claim some of the wind goes thru the fabric but this is hard to prove, some of them even use 50%-60% of actual wind pressure. This practice is disallowed by the state of California as it may lead to inadequate sizing and represents a potential structural risk.

Soil and Footing Analysis: IBC and older codes have always used the same soil allowances, they have charts of soil types and properties to be used for analysis, per code you should always use soil type 5 which is the only one the code allows if soil report is not available. Code uses two types of bearing capacities, lateral and actual bearing. You should analyze foundations for both overturning due to lateral loads and axial capacity.

Competitors normally analyze foundations based on the foundation weight needed to resist uplift forces, this is totally wrong since overturning loads are normally what overrule any other force direction. This may lead to inadequate foundations and represents a potential structural risk.

Some companies actually cut corners on more than one of these issues without substantiation (e.g. a valid soils report or wind study), thereby substantially increasing the risk of structural failure. Over the years we have seen what happens when companies take short cuts in their engineering in order to reduce costs. Unfortunately recent events at the Cowboys practice facility are a reminder of how important it is to get these things right. Most companies, on the other hand have taken a more conservative approach in compliance with the code to ensure they do all they can to produce a structure that they can be proud of and is one of the reasons they are seen as the quality standard in this industry.

Sales Tools – Standard Shapes for Shade Structures

Standard Modular Shade Designs

Hip Style Structure

Length of the structure is usually around 12 ft minimum to 40 ft maximum and no more than 2 times the width; the width is 10 ft minimum and 40 ft maximum and shall be no less than 1/2 the length. Entry heights vary from 7 ft to 14 ft can usually be joined

Pyramid Style Structure

Length and width must be the same with typically a 10 ft minimum to a 40 maximum

4-Post Superspan or Megaspan Structure

Typical length of the structure is 41 ft minimum and uop to a 60 ft maximum and no more than 2 times the width;the width is typically 21 ft minimum and 60 ft maximum and shall be no less than 1/2 the length. Entry height can vary from 8 ft to 16 ft and can be joined

6-Post Superspan or Megaspan Structure

Length is 61 ft to 90 ft with a width from 41 ft to 56 ft and entry heights vary from 10 ft to 14 ft. Typically the top is in two pieces and joined by a keder rail system

2-Post Hip Structure

Typical length is around 22 ft and typical width is around 14 ft with a standard mounting height of 8 ft

Single Post Pyramid Structure

Typical sizes are 10' x 10', 12' x 12', 14' x 14', 20' x 20' and 24' x 24', entry heights range from 8 ft to 12 ft

IFAI EXPO

Sales Tools – Standard Shapes for Shade Structures

Standard Modular Shade Designs

Aurora or Framed 4-Point Hypar Structure

Standard sizes are usually 12 ft x 12 ft, 16 ft x 16 ft, and 20 ft x 20 ft and entry heights are usually 7 ft

Twilight or 8-Point Umbrella Structure

Standard sizes are usually 12 ft, 16 ft, 20 ft and 25 ft with an entry heighht of 7 ft

Wave or Kite Structure

Standard sizes are 20 ft x 20 ft with entry heights of 7 ft and one at 16 ft or entry heights of 10 ft and one at 19 ft or a 25 ft x 25 ft with entry heights of 7 ft and 18 ft or entry heights of 10 ft and 21 ft

Slanted Hip Structure

Standard sizes include 15 ft x 20 ft with 10 ft front column and 12ft 6 in rear columns, 20 ft x 30 ft with 10 ft front column and 13 ft rear columns and 25 ft x 35 ft with 10 ft front columns and 14 fdt rear columns

Lifeguard Structure

Typical sizes are 9 ft x 8 ft across the front or 11 ft x 10 ft acreoss the front entry height is usually variable and typicaly cut on site from a 17ft to 18 ft column.

Extended Hip Structure (One Top)

Available in 2 tops (with keder rail) : 20 ft x 75 ft; 25 ft x 75 ft; 28 ft x 56 ft Available with 3 tops (with keder rail) 25 ft x 90 ft Entry height can vary from 7 ft to 16 ft

IFAI EXPO

Sales Tools – Standard Shapes for Shade Structures

Standard Modular Shade Designs

Triangle Structure

All sides must be equal Usually available from 18 ft x 18 ft x 18 ft to 40 ft x 40 ft x 40ft Entry height varies from 7 ft to 16 ft

Hexagon Structure

Al sides must be equal usually avaialable in diameters of 20 ft to 50 ft with entry heights from 7 ft to 16 ft

Octagon Structure

All 8 sides must be equal and usually avialable in diameters from 20 ft to 50 ft with entry heights from 7 ft to 16 ft

Coolbrella or Telebrella Structure

Typically avaialable in 12 ft and 20 ft diamterers only with an 8 ft entry height valvance is ty;ically 4". Most of these are not rated for 90 mph wind speed or any snow load

Butterfly Structure

Typically 24 ft x 24 ft with wings either Upward, Flat, or Downward, typical entry height is 12 ft

Flower Structure

Typically 20 ft x 20 ft with varying entry heights of 7 ft to 20 ft, typically petals are upward, flat or downward and a curved colunm is available

IFAI EXPO

Sales Tools – Standard Shapes for Shade Structures

Standard Modular Shade Designs

3-Point Sail

Available up to 40 ft maximum span per side, no side shorter than 1/2 the longest side, entry height is 8 ft to 16 ft

4-Pont Hypar (Sail)

Avialable up to 40 ft maximum per side, no side shortert than 1/2 of the longest side. 6-Point Rule applies, entry height is 8 ft to 16 ft

5-Point Hypar (Sail)

Avialable up to 40 ft maximum per side, no side shortert than 1/2 of the longest side. 6-Point Rule applies, entry height is 8 ft to 16 ft

Mariner Pyramid or Multi Sail Structure

Typicaly 2 covers on top & 2 covers on mottom rotated $90^0$to each other. Width and length must be equal. Typical dimensions are 20 ft minimum with a maximum of 32 ft, entry height is from 7 ft to 16 ft

Pyramid Mast Panel Structure

Typically 2 covers attach to the top of the mast and 2 covers attach to the bottom of the mast, rotated 90^0 to eachg other, width and length must be equal, typical dimensions are from 10 ft to a maximum of 32 ft and entry hesight is from 7 ft to 16 ft

Hexagon Mast Panel Structure

3 Covers attach to the top of the mast and three covers attach to the bottom of the mast, all rotated 90^0 to each other, typically available in 30 ft, 40 ft, and 50 ft diameters with entry heights from 7 ft to 16 ft

IFAI EXPO

Sales Tools – Standard Shapes for Shade Structures

Standard Modular Shade Designs

Hexagon Multi-Panel Structure

Canopy consists of 6 covers available typically in dameters from 20 ft to 50 ft with entry heights from 7 ft to 16 ft

SuperSpan or MegaSpan Pyramid Multi Structure

Canopy consists of 4 lower panels rotated 45^0 to the upper 4 upper panels, length and width must be equal typically available in lengths and widths of 30 ft to 60 ft with entry heights from 8 ft to 16 ft

SuperSpan or MegaSpan Octatgon Multi Panel Structure

Canopy consists of 8 lower panels that are rotated 22.5^0 to the 8 upper lanels typically avaialable in 50 ft and 60 ft diameters with entry heights from 8 ft to 16 ft

Sandton or Gabled Tennis Structure or Bench Cover

This is typically a stand alone structure in a width of 8 ft and a length of 12 ft and has an entry height of 7 ft to 10 ft, typically custom sizes are available

Linksfield or Barrell Vault Tennis Structure or Bench Cover

This is typically a stand alone structure in a width of 8 ft and a length of 12 ft and entry heights from 7 ft to 10 ft, typically custom sizes are avaialble

Full Cantilever Single Wide

Usually used for parking structures, the length (between the columns) ranges from 15 ft to 36 ft and cannot exceed 2 times the projection. Width/projection is avaialble from 10 ft to 20 ft and cannot be less than half the length, entry height ranges from 7 ft to 12 ft

IFAI EXPO

Sales Tools – Standard Shapes for Shade Structures

Standard Modular Shade Designs

Full Cantilever Double Wide Structure

Usually used for parking structures, the length (between columns) ranges from 15 ft to 36 ft. Width/Projection is avialable from 20 ft (10 ft per canopy) to 40 ft (20 ft per conopy) Entry height ranges from 7 ft to 12 ft

Tri-Truss Double Wide Structure

Usually used for parking structures, the length (between columns) ranges from 15 ft to 36 ft. Width/Projection is avialable from 20 ft (10 ft per canopy) to 40 ft (20 ft per canopy) Entry height ranges from 7 ft to 12 ft

Full Arch Double Wide Structure

Available only in a 30 ft length with a 40 ft projectoin (20 ft each side) and an entry height of 8 ft. Cover is typically attached on the ends with keder rail that is secured to the arch

Single Center Bow Structure

Available typicly in 27 ft length and 18 ft projection with an entry height of 10 ft. Double center bow cantilevers are avialable in 27 ft length and 36 ft projections (18 ft each side)

Panorama or Single Arch

Avaialble typically only in 20 ft length and 18 ft cantilever with an 8 ft entry height. Custom order sizes are typically available

T-Arch Cantilever Structure

Typically avialable in lengths from 15 ft to 30 ft and width from 10 ft to 20 ft and entry heights of 7 ft to 10 ft. Fabric is typically attached to the outside bows with keder track.

IFAI EXPO

Questions & Answers

Thank You

Presented by: Marc Shellshear, IFM, MFC
General Manager
Value Vinyls, 301 E. Trinity Blvd., Grand Prairie, TX 75050
marc@valuevinyls.com, www.valuevinyls.com

VALUEvinyls
STRUCTURE FABRICS