

UNDERSTANDING BALLASTING



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Introduction:

Nick Deninno
President, PTG Event Services, NY
Founder, Block And Roll® Tent Ballast Solutions

Qualifications:

Over 80% of our Tent Installs require Ballast
PTG stocks almost 2 million pounds of Concrete Ballast
We have transported over 1.2 Million pounds of ballast a month
Last Year over 8 million pounds

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Introduction:

Rob Roberts
CEO, Big 4 Party Rentals

Qualifications:

Approx. 800k lbs of Concrete
75% of non staked tents are Concrete
35% of revenue is Tenting (10% 8 years ago)

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Topics:

- Anchoring Tents/Inflatables
- Why we need to ballast?
- Case Study – Stakes or Ballast
- Types of Ballast
- Attaching to ballast
- How much Ballast do I need?
- Logistics
- Educating the customer
- Common Ballasting Problems
- Questions

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Anchoring Tents

Common misconceptions

- “We Stake our tents so we are good.”
- “This tent is engineered for 90 MPH...”
- “We never get wind here”
- “It’s only up for one day”
- “I always do it like that and never have an issue”



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Anchoring Tents

Staking

- 811
- Proper installation
- Soil test- Dynanometer
- Site specific engineering
- Changing ground conditions
- What goes in must come out



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4. Increasing the height of the stake head above the ground increases stake holding capacity.



Figure 16: Stake Head Height

5. Holding power varies with anchor types.

STEAK STAKES

STEAK STAKES are the most common and easiest to use. They are made of galvanized steel and are available in a variety of sizes and shapes. They are used to secure the tent to the ground and are the most common type of stake used.

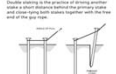


Figure 17: Steak Stakes

DRIVE STAKES

DRIVE STAKES are made of galvanized steel and are used to secure the tent to the ground. They are made of galvanized steel and are available in a variety of sizes and shapes. They are used to secure the tent to the ground and are the most common type of stake used.

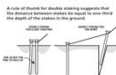


Figure 18: Drive Stakes

POCKET GUIDE

Pullout Capacity of Tent Stakes

Tent Rental Division

Systematic Approach to Stakes

1. The longer the stake diameter, the greater the holding power.



Figure 19: Stake Diameter

2. The deeper the stake, the greater the holding power.

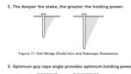


Figure 20: Stake Depth

3. Systematic approach to stake holding power.

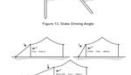


Figure 21: Stake Holding Power

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Estimating Pullout Capacity of Tent Stakes

It is important to understand the pullout capacity of tent stakes to ensure the tent is properly secured. The pullout capacity of a stake is the maximum weight that the stake can hold without pulling out of the ground. The pullout capacity of a stake is determined by the soil conditions, the stake diameter, the stake depth, and the stake angle.

Field Information*

Stake Diameter (in)	Stake Depth (in)	Stake Angle (deg)	Pullout Capacity (lb)
1/2	12	45	100
1/2	18	45	150
1/2	24	45	200
3/4	12	45	150
3/4	18	45	225
3/4	24	45	300
1	12	45	200
1	18	45	300
1	24	45	400

Estimates of Pullout Capacity for Baseline Case

The following table provides estimates of the pullout capacity of tent stakes for a baseline case. The baseline case is defined as a stake with a diameter of 1/2 inch, a depth of 12 inches, and an angle of 45 degrees.

Stake Diameter (in)	Stake Depth (in)	Stake Angle (deg)	Pullout Capacity (lb)
1/2	12	45	100
1/2	18	45	150
1/2	24	45	200
3/4	12	45	150
3/4	18	45	225
3/4	24	45	300
1	12	45	200
1	18	45	300
1	24	45	400

Adjusting Estimated Capacity for Conditions Different than Baseline Case

The following table provides estimates of the pullout capacity of tent stakes for conditions different than the baseline case. The conditions are defined by the stake diameter, stake depth, and stake angle.

Stake Diameter (in)	Stake Depth (in)	Stake Angle (deg)	Pullout Capacity (lb)
1/2	12	45	100
1/2	18	45	150
1/2	24	45	200
3/4	12	45	150
3/4	18	45	225
3/4	24	45	300
1	12	45	200
1	18	45	300
1	24	45	400

Risked vs. Smooth Stakes

The following table provides estimates of the pullout capacity of tent stakes for risks and smooth stakes. The risks are defined by the stake diameter, stake depth, and stake angle.

Stake Diameter (in)	Stake Depth (in)	Stake Angle (deg)	Pullout Capacity (lb)
1/2	12	45	100
1/2	18	45	150
1/2	24	45	200
3/4	12	45	150
3/4	18	45	225
3/4	24	45	300
1	12	45	200
1	18	45	300
1	24	45	400

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The IFAI-TRD study found the following for field/soil capacity. The baseline stake was:

- Stake was a 36" x 1",
- Stake side was smooth,
- Stake was driven vertically with only 2" exposed,
- The load was fasten at the surface, load was pulled at a 45° angle.

In order for installers to have a field reference for soil/pullout capacity the IFAI-TRD study correlated the amount a stake penetrated with the soil's hold power. A stake is embedded 31" and struck with a 16 lbs sledge hammer using a normal swing. The amount of penetration is correlated in the table below.

Soil Consistency	Stake Penetration	Pullout Capacity in Pounds
Hard (Very Dense)	Less than 0.2"	2,500
Very Stiff (Dense)	0.2-0.5"	1,600
Stiff (Med-Dense)	0.5-1.5"	800
Medium	1.5-3"	400
Soft (Loose)	3-6"	200
Very Soft (Very Loose)	Greater than 6"	100

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Why Ballast?

- Can't pierce the surface
- Underground Utilities/not enough time to call 811
- Rock under ground
- Soft earth (Case study)

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Case study: are stakes better than ballast?

- College Fundraising Gala
- 25m X 60m Main Structure
- Ideal setup location
- Tents set up there all the time
- Stake test Failed
- Could not change location
- Ballast had to be brought in
- Cost Client additional \$20,000

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Stake holding test





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Other types of concrete/storage



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600-800 lb Barrels filled with concrete
\$100-150



300-500 Round Concrete blocks
\$60-100

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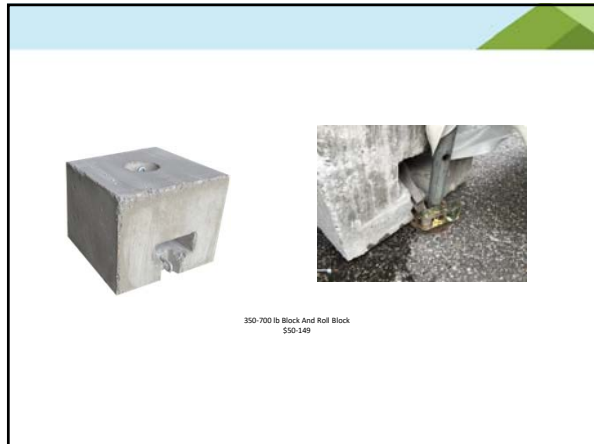


660 lb Giffy Barrel



1320 lb Giffy Barrel

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Attaching to the ballast

- Can the ballast tie off support the forces?
- High tie off points: Will the ballast tip over?
- Can you tie off to the leg as well?
- Do not over tighten strap.
- Distance from the tent leg

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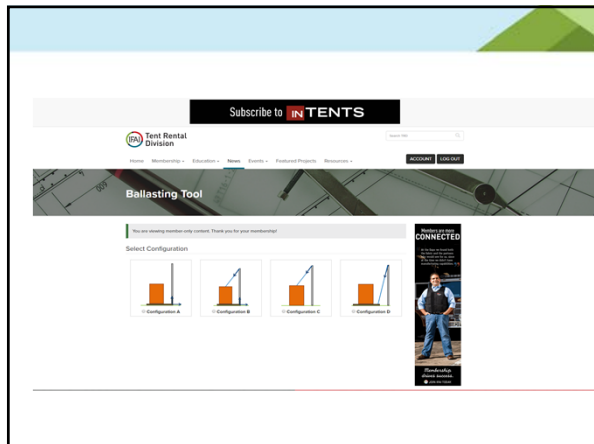
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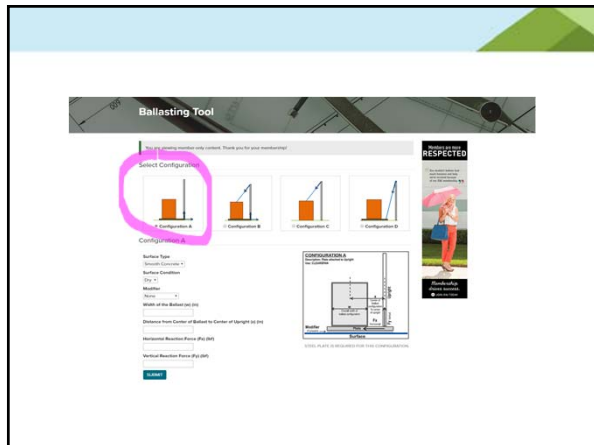
How much ballast do I need?

- Manufacture specifications
- IFAI Ballast Study
- The un-official Rule of thumb
 - 10-15lbs per square foot

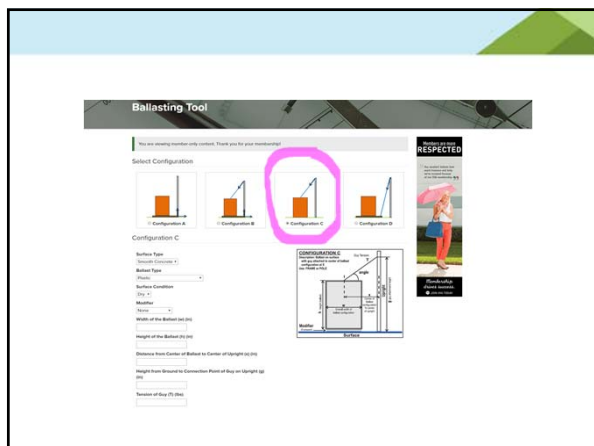
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logistics

- Transporting
- Handling
- Filling/dumping

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Mechanical Equipment

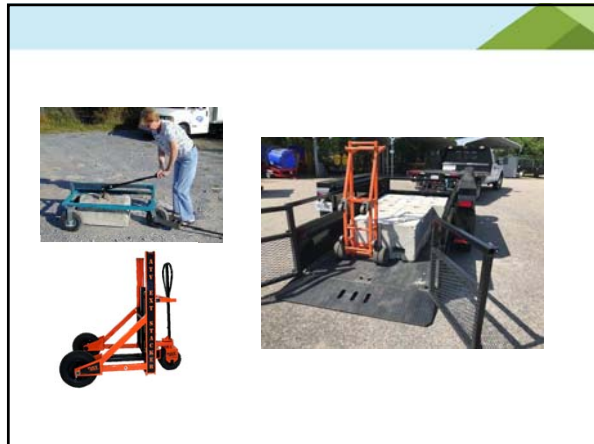


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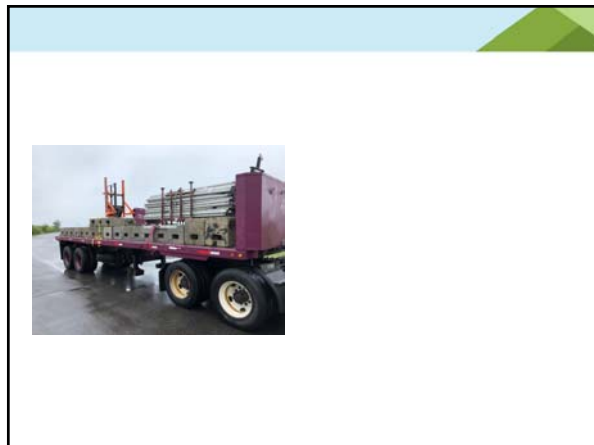
Manual Handling Equipment



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Educating the customer

- Tents are temporary structures
- Tents can be compromised with weather
- Tents are not safe havens during severe weather
- Have an evacuation plan
- Use industry documents
- Explain the logistics in ballasting safely
- Get your fees for the extra work

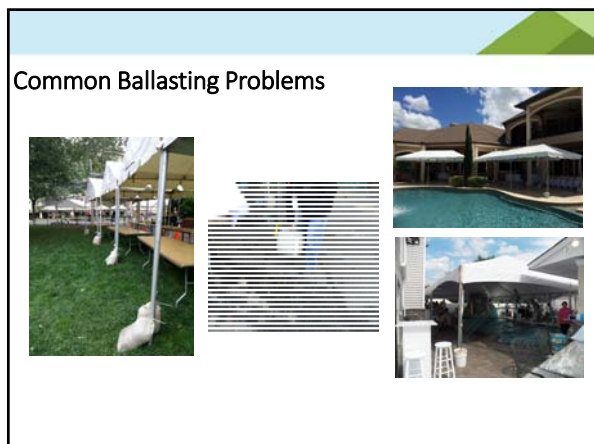
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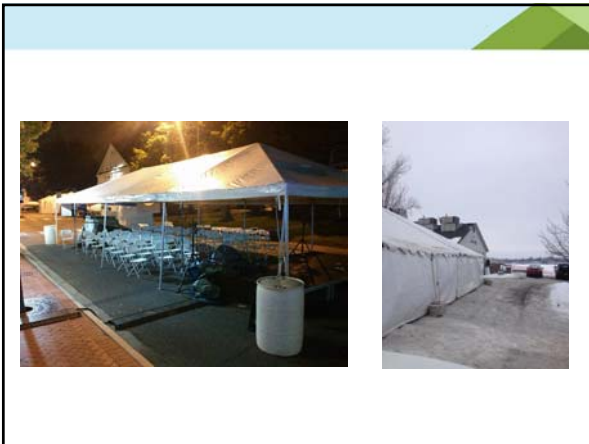
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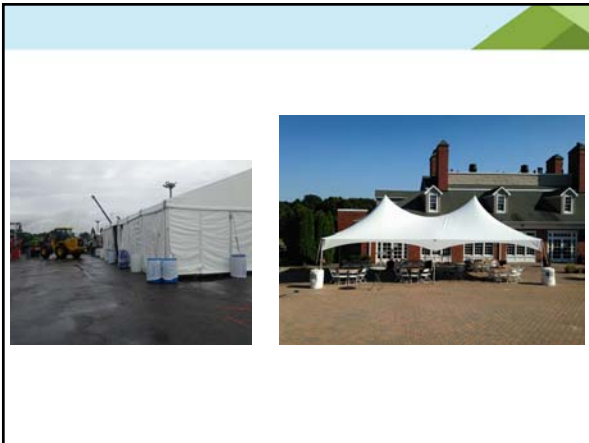
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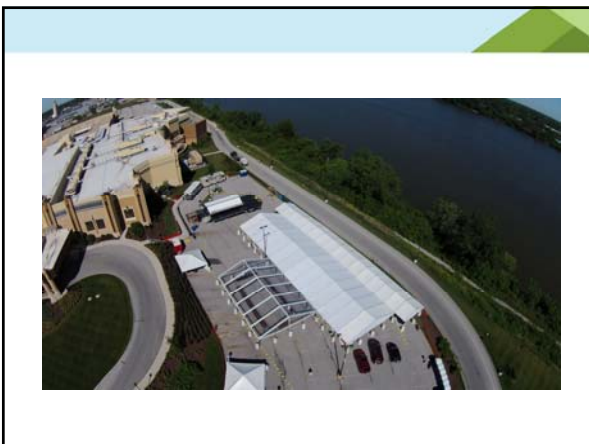
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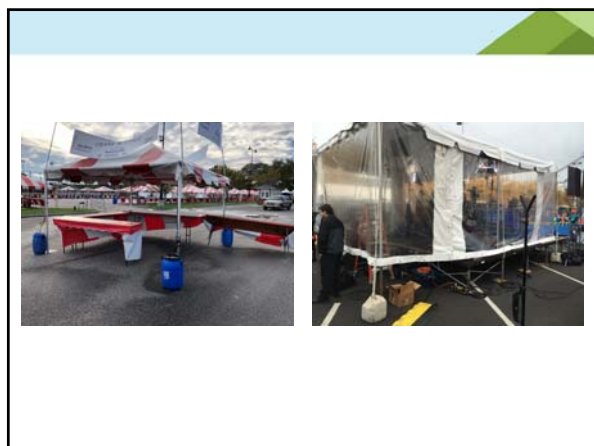
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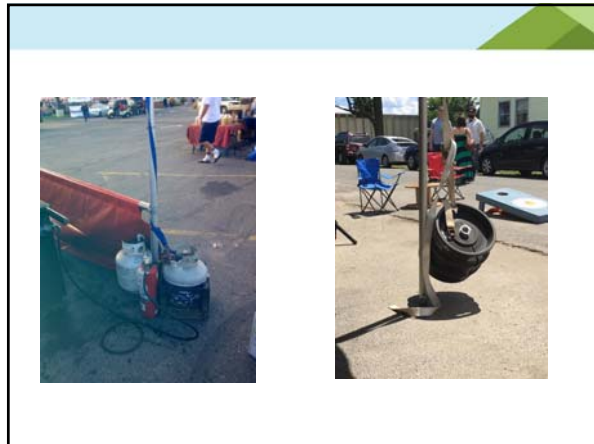
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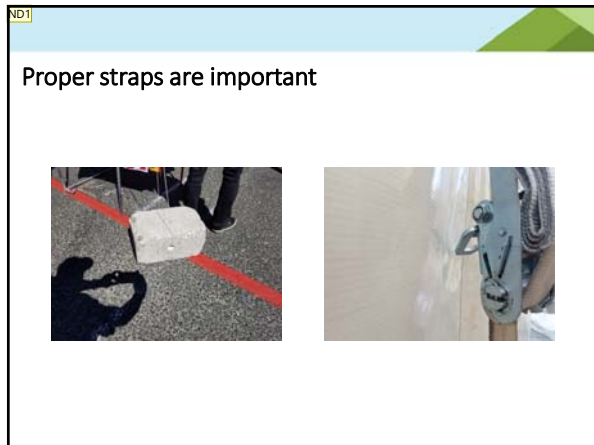
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It can happen



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Know your area

- 60mph winds



- Is this tent ok?

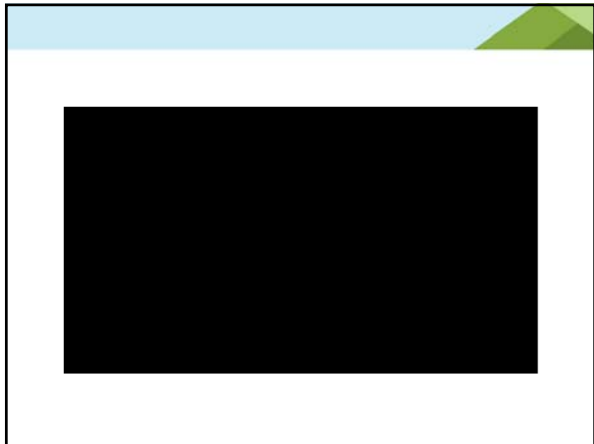


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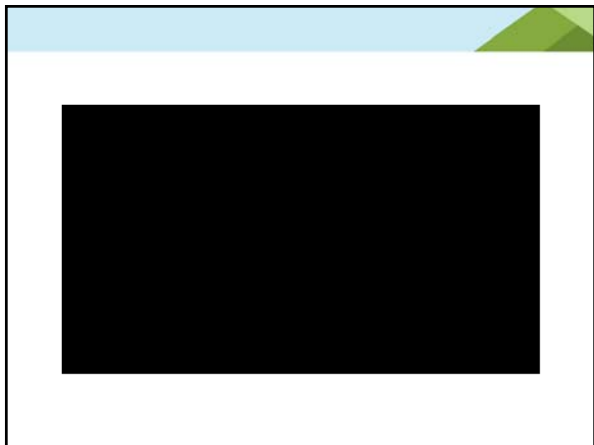


Even Staked Tents go down

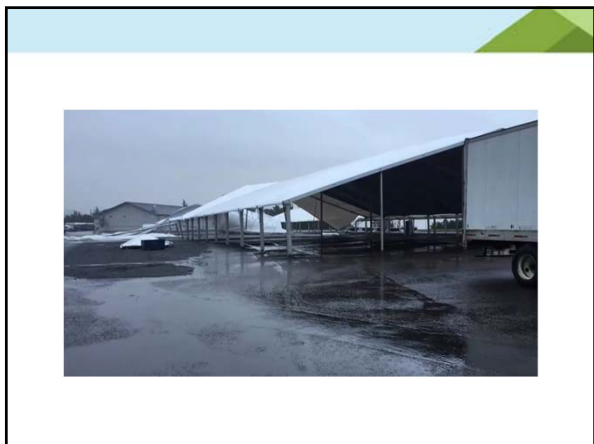
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Take your anchoring seriously

THANK YOU!



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