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# HIRE & RENTAL INDUSTRY ASSOCIATION LTD

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HRIA Marquee Weighting  
Guide

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September 2016

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## Introduction

### Temporary structures / Marquee weighting guide

The following guide has been formulated to update the existing weighting guide; the new guide is in line with the ABCB Temporary Structures Standard 2015. The main purpose of producing this guide is to provide a base level of safety and protection.

It is not intended that the guide replace, supersede or override any manufacturer's specifications. However it is strongly advised that if a discrepancy between the manufacturer's recommendations and the HRIA weighting guide exist, then the greater of the two loads should be applied or further expert advice be obtained. Please note that specific structures may not be structural adequate under the wind speeds provided in this guide, therefore it is strongly advised guide users consult existing engineering or manufacturer's specifications for maximum permissible wind speeds.

Guide users will note that the one page weighting guide has been replaced with three wall configurations covering instances where concrete ballast is used or if the structure can be tied down (pegged/bolted). There is an important distinction to be made between the two sets of tables, in instances where horizontal movement of the marquee is restrained by nominal pegs or bolting, so that sliding or any horizontal movement potential is resolved, then the tie down values may be used even if concrete ballast is used. For example if the marquee is to be held down using ballast and a weight plate is used to anchor the marquee leg then the ballast tables must be used. If however the marquee is to be held down in the same way i.e. ballast but the marquee leg is prevented from horizontal movement by use of pegs or bolts then the tie down table can be used.

A terrain category of 2.5 has been adopted as before, so that the majority of areas are covered. It is strongly advised that even when within this terrain category individual site assessments should be made, for example, if the site is elevated or extremely exposed then further advice should be obtained from a suitably qualified professional. It is also strongly recommended that if the site is effected by heavy rain or flooding, further advice be sought particularly if using the tie down (pegging) method. If de-rig (removal of sheeting) wind speeds are adopted below the Ultimate Wind speed, ensure the site wind speed is measured with a wind anemometer attached to the highest point of the structure.

When using the ballast as a means of holding down the marquee, it is also imperative to make sure the marquee leg is securely anchored to the surface on which the marquee is placed. This can be achieved by either using a weight plate attached to the base plate and anchored by the ballast, pegging or mechanically fixing the leg to the surface on which the marquee is placed, or securing the marquee leg to the ballast provided. The weight plate should be part of the marquee kit and if not supplied by the manufacturer, the weight plate should be checked by a suitably qualified person to ensure adequacy and compliance, i.e. a registered professional structural engineer.

The drawing Figure 1, shows a typical set up when using concrete weights as a means of ballast This detail may be applied to all marquee configurations when using concrete ballast.

**Tie Down – All Walls Open Refer to Figure 2**

Tie down is to be provided at each portal column. The following values are provided for a condition in which the marquee is completely open (no walls). Tie down refers to the hold down capacity required to prevent uplift only (horizontal forces are assumed to be resolved - e.g. when connected to deck, slab, or connected with ground anchors).

**Table No.1**

<b>Span (m)</b>	<b>Width (m)</b>	<b>54km/hr (kg)</b>	<b>90km/hr (kg)</b>	<b>108km/hr (kg)</b>	<b>Ultimate Wind 1 week (kg)</b>	<b>Ultimate Wind 1 month (kg)</b>
<b>3</b>	<b>3 (Single bay)</b>	20	50	60	60	80
<b>3</b>	<b>3</b>	30	80	120	120	150
<b>4</b>	<b>3</b>		110	150	160	200
<b>5</b>	<b>3</b>		140	200	200	260
<b>6</b>	<b>3</b>		160	230	240	310
<b>7</b>	<b>3</b>		190	270	280	360
<b>8</b>	<b>3</b>		220	310	330	420
<b>9</b>	<b>3</b>		240	350	370	470
<b>10</b>	<b>3</b>		270	390	410	520
<b>10</b>	<b>5</b>		450	640	680	870
<b>12</b>	<b>5</b>		540	780	820	1050
<b>15</b>	<b>5</b>		680	970	1030	1320
<b>20</b>	<b>5</b>		910	1310	1380	1770
<b>25</b>	<b>5</b>		1130	1630	1720	2210

The values listed above have been rounded up to the nearest 10kg. The values listed above are a guide only. Refer to relevant manual or engineering report for erection guidelines, maximum wind speed, and ballast requirements for a specific structure. The design has been based upon the following design parameters and assumptions:

1. Wind loading is based upon the following parameters:
  - a) 1/500 year recurrence interval (45m/s). Region A.
  - b) ABCB temporary reduction factor = 0.85 (1 month duration).
  - c) Maximum effective height of 10.0m, if erected on substructure it is assumed the marquee is not near the edge.
  - d) Terrain category 2.5, Mz.cat = 0.92
  - e) Md = Mt = Ms = 1.0
2. Structure is based upon the following parameters:
  - a) Eave height of 2.5m.
  - b) Roof pitch of 18 degrees.
  - c) Minimum width of 3 bays with 2 bays of bracing located in end bays.
  - d) For 15m, 20m, and 25m marquees a minimum of 50% more ballast is required in the end bays (typically tied to mullions).
3. Ballast values are based upon the following parameters:
  - a) 'Tie down' refers to the ballast required to prevent uplift only (horizontal forces are assumed to be resolved - e.g. when connected to deck, slab, or connected with ground anchors).
  - b) Ballast refers to the ballast weight required where there is no restraint from sliding (friction coefficient of 0.6 assumed). It is recommended that rubber mats are placed under ballast blocks. Where ballast blocks are placed on portal frame feet, they are to be ratchet strapped to the column/post or secured to the marquee eave junction with a strap in a manner to avoid 'tipping' of ballast.
  - c) Where ballast is provided by ground anchors, hold down capacity is to be tested and confirmed on site in accordance with AS1170.0 Appendix B with appropriate factors applied. Testing should be carried out for all likely site conditions (i.e. wet and dry). If the soil becomes saturated and the tension capacity is compromised, the marquee is to be disassembled or remedied with the appropriate ballast.

**Tie Down – One or More Walls Open      Refer to Figures 3 & 4**

Tie down is to be provided at each portal column. The following values are provided for a condition in which the marquee has one or more walls open. Tie down refers to the hold down capacity required to prevent uplift only (horizontal forces are assumed to be resolved - e.g. when connected to deck, slab, or connected with ground anchors).

**Table No.2**

<i>Span (m)</i>	<i>Width (m)</i>	<i>54km/hr (kg)</i>	<i>90km/hr (kg)</i>	<i>108km/hr (kg)</i>	<i>Ultimate Wind 1 week (kg)</i>	<i>Ultimate Wind 1 month (kg)</i>
<b>3</b>	<b>3 (Single bay)</b>	70	180	250	260	340
<b>3</b>	<b>3</b>	130	350	500	520	670
<b>4</b>	<b>3</b>		370	530	560	720
<b>5</b>	<b>3</b>		410	590	620	790
<b>6</b>	<b>3</b>		450	640	680	870
<b>7</b>	<b>3</b>		510	730	770	990
<b>8</b>	<b>3</b>		590	840	890	1140
<b>9</b>	<b>3</b>		660	950	1010	1290
<b>10</b>	<b>3</b>		740	1060	1130	1440
<b>10</b>	<b>5</b>		1070	1530	1620	2080
<b>12</b>	<b>5</b>		1290	1850	1960	2510
<b>15</b>	<b>5</b>		1660	2390	2520	3240
<b>20</b>	<b>5</b>		2270	3260	3450	4430
<b>25</b>	<b>5</b>		2900	4180	4420	5680

The values listed above have been rounded up to the nearest 10kg. The values listed above are a guide only. Refer to relevant manual or engineering report for erection guidelines, maximum wind speed, and ballast requirements for a specific structure. The design has been based upon the following design parameters and assumptions:

1. Wind loading is based upon the following parameters:
  - a) 1/500 year recurrence interval (45m/s). Region A.
  - b) ABCB temporary reduction factor = 0.85 (1 month duration).
  - c) Maximum effective height of 10.0m, if erected on substructure it is assumed the marquee is not near the edge.
  - d) Terrain category 2.5,  $M_z.cat = 0.92$
  - e)  $M_d = M_t = M_s = 1.0$
2. Structure is based upon the following parameters:
  - a) Eave height of 2.5m.
  - b) Roof pitch of 18 degrees.
  - c) Minimum width of 3 bays with 2 bays of bracing located in end bays.
  - d) For 15m, 20m, and 25m marquees a minimum of 50% more ballast is required in the end bays (typically tied to mullions).
3. Ballast values are based upon the following parameters:
  - a) 'Tie down' refers to the ballast required to prevent uplift only (horizontal forces are assumed to be resolved - e.g. when connected to deck, slab, or connected with ground anchors).
  - b) Ballast refers to the ballast weight required where there is no restraint from sliding (friction coefficient of 0.6 assumed). It is recommended that rubber mats are placed under ballast blocks. Where ballast blocks are placed on portal frame feet, they are to be ratchet strapped to the column/post or secured to the marquee eave junction with a strap in a manner to avoid 'tipping' of ballast.
  - c) Where ballast is provided by ground anchors, hold down capacity is to be tested and confirmed on site in accordance with AS1170.0 Appendix B with appropriate factors applied. Testing should be carried out for all likely site conditions (i.e. wet and dry). If the soil becomes saturated and the tension capacity is compromised, the marquee is to be disassembled or remedied with the appropriate ballast.

**Tie Down – All Walls Closed      Refer to Figures 5 & 6**

Tie down is to be provided at each portal column. The following values are provided for a condition in which the marquee is completely sealed (all walls closed). Tie down refers to the hold down capacity required to prevent uplift only (horizontal forces are assumed to be resolved - e.g. when connected to deck, slab, or connected with ground anchors).

**Table No.3**

<b>Span (m)</b>	<b>Width (m)</b>	<b>54km/hr (kg)</b>	<b>90km/hr (kg)</b>	<b>108km/hr (kg)</b>	<b>Ultimate Wind 1 week (kg)</b>	<b>Ultimate Wind 1 month (kg)</b>
<b>3</b>	<b>3 (Single bay)</b>	50	130	190	190	250
<b>3</b>	<b>3</b>	90	240	340	360	460
<b>4</b>	<b>3</b>		230	330	340	440
<b>5</b>	<b>3</b>		230	330	340	440
<b>6</b>	<b>3</b>		250	360	380	480
<b>7</b>	<b>3</b>		300	430	450	580
<b>8</b>	<b>3</b>		350	500	530	680
<b>9</b>	<b>3</b>		400	580	610	780
<b>10</b>	<b>3</b>		460	660	690	890
<b>10</b>	<b>5</b>		530	750	790	1020
<b>12</b>	<b>5</b>		640	920	970	1250
<b>15</b>	<b>5</b>		770	1100	1160	1490
<b>20</b>	<b>5</b>		1080	1550	1640	2100
<b>25</b>	<b>5</b>		1410	2030	2150	2760

The values listed above have been rounded up to the nearest 10kg. The values listed above are a guide only. Refer to relevant manual or engineering report for erection guidelines, maximum wind speed, and ballast requirements for a specific structure. The design has been based upon the following design parameters and assumptions:

1. Wind loading is based upon the following parameters:
  - a) 1/500 year recurrence interval (45m/s). Region A.
  - b) ABCB temporary reduction factor = 0.85 (1 month duration).
  - c) Maximum effective height of 10.0m, if erected on substructure it is assumed the marquee is not near the edge.
  - d) Terrain category 2.5, Mz.cat = 0.92
  - e)  $M_d = M_t = M_s = 1.0$
2. Structure is based upon the following parameters:
  - a) Eave height of 2.5m.
  - b) Roof pitch of 18 degrees.
  - c) Minimum width of 3 bays with 2 bays of bracing located in end bays.
  - d) For 15m, 20m, and 25m marquees a minimum of 50% more ballast is required in the end bays (typically tied to mullions).
3. Ballast values are based upon the following parameters:
  - a) 'Tie down' refers to the ballast required to prevent uplift only (horizontal forces are assumed to be resolved - e.g. when connected to deck, slab, or connected with ground anchors).
  - b) Ballast refers to the ballast weight required where there is no restraint from sliding (friction coefficient of 0.6 assumed). It is recommended that rubber mats are placed under ballast blocks. Where ballast blocks are placed on portal frame feet, they are to be ratchet strapped to the column/post or secured to the marquee eave junction with a strap in a manner to avoid 'tipping' of ballast.
  - c) Where ballast is provided by ground anchors, hold down capacity is to be tested and confirmed on site in accordance with AS1170.0 Appendix B with appropriate factors applied. Testing should be carried out for all likely site conditions (i.e. wet and dry). If the soil becomes saturated and the tension capacity is compromised, the marquee is to be disassembled or remedied with the appropriate ballast.

**Ballast – All Walls Open Refer to Figure 2**

Ballast is to be provided at each portal column. The following values are provided for a condition in which the marquee is completely open (no walls). Ballast values are provided for concrete blocks for a condition where there is no restraint against sliding.

**Table No.4**

<b>Span (m)</b>	<b>Width (m)</b>	<b>54km/hr (kg)</b>	<b>90km/hr (kg)</b>	<b>108km/hr (kg)</b>	<b>Ultimate Wind 1 week (kg)</b>	<b>Ultimate Wind 1 month (kg)</b>
<b>3</b>	<b>3 (Single bay)</b>	20	50	70	90	70
<b>3</b>	<b>3</b>	40	90	130	170	130
<b>4</b>	<b>3</b>		120	170	220	180
<b>5</b>	<b>3</b>		150	210	280	220
<b>6</b>	<b>3</b>		170	250	330	260
<b>7</b>	<b>3</b>		200	290	390	300
<b>8</b>	<b>3</b>		230	330	440	350
<b>9</b>	<b>3</b>		260	370	500	390
<b>10</b>	<b>3</b>		290	410	550	430
<b>10</b>	<b>5</b>		470	680	920	720
<b>12</b>	<b>5</b>		570	810	1100	860
<b>15</b>	<b>5</b>		700	1010	1370	1070
<b>20</b>	<b>5</b>		940	1350	1830	1430
<b>25</b>	<b>5</b>		1170	1690	2290	1780

The values listed above have been rounded up to the nearest 10kg. The values listed above are a guide only. Refer to relevant manual or engineering report for erection guidelines, maximum wind speed, and ballast requirements for a specific structure. The design has been based upon the following design parameters and assumptions:

1. Wind loading is based upon the following parameters:
  - a) 1/500 year recurrence interval (45m/s). Region A.
  - b) ABCB temporary reduction factor = 0.85 (1 month duration).
  - c) Maximum effective height of 10.0m, if erected on substructure it is assumed the marquee is not near the edge.
  - d) Terrain category 2.5, Mz.cat = 0.92
  - e)  $M_d = M_t = M_s = 1.0$
2. Structure is based upon the following parameters:
  - a) Eave height of 2.5m.
  - b) Roof pitch of 18 degrees.
  - c) Minimum width of 3 bays with 2 bays of bracing located in end bays.
  - d) For 15m, 20m, and 25m marquees a minimum of 50% more ballast is required in the end bays (typically tied to mullions).
3. Ballast values are based upon the following parameters:
  - a) 'Tie down' refers to the ballast required to prevent uplift only (horizontal forces are assumed to be resolved - e.g. when connected to deck, slab, or connected with ground anchors).
  - b) Ballast refers to the ballast weight required where there is no restraint from sliding (friction coefficient of 0.6 assumed). It is recommended that rubber mats are placed under ballast blocks. Where ballast blocks are placed on portal frame feet, they are to be ratchet strapped to the column/post or secured to the marquee eave junction with a strap in a manner to avoid 'tipping' of ballast.
  - c) Where ballast is provided by ground anchors, hold down capacity is to be tested and confirmed on site in accordance with AS1170.0 Appendix B with appropriate factors applied. Testing should be carried out for all likely site conditions (i.e. wet and dry). If the soil becomes saturated and the tension capacity is compromised, the marquee is to be disassembled or remedied with the appropriate ballast.

## **Ballast – One or More Walls Open Refer to Figures 3 & 4**

Ballast is to be provided at each portal column. The following values are provided for a condition in which the marquee has one or more walls open. Ballast values are provided for concrete blocks for a condition where there is no restraint against sliding.

**Table No.5**

<b>Span (m)</b>	<b>Width (m)</b>	<b>54km/hr (kg)</b>	<b>90km/hr (kg)</b>	<b>108km/hr (kg)</b>	<b>Ultimate Wind 1 week (kg)</b>	<b>Ultimate Wind 1 month (kg)</b>
<b>3</b>	<b>3 (Single bay)</b>	90	230	340	450	350
<b>3</b>	<b>3</b>	170	460	670	900	700
<b>4</b>	<b>3</b>		530	750	1020	800
<b>5</b>	<b>3</b>		590	840	1140	890
<b>6</b>	<b>3</b>		640	920	1250	980
<b>7</b>	<b>3</b>		700	1010	1370	1070
<b>8</b>	<b>3</b>		770	1100	1490	1160
<b>9</b>	<b>3</b>		830	1190	1610	1260
<b>10</b>	<b>3</b>		890	1280	1730	1350
<b>10</b>	<b>5</b>		1470	2120	2880	2240
<b>12</b>	<b>5</b>		1680	2410	3280	2560
<b>15</b>	<b>5</b>		1980	2860	3880	3020
<b>20</b>	<b>5</b>		2510	3610	4900	3810
<b>25</b>	<b>5</b>		3020	4350	5910	4600

The values listed above have been rounded up to the nearest 10kg. The values listed above are a guide only. Refer to relevant manual or engineering report for erection guidelines, maximum wind speed, and ballast requirements for a specific structure.

The design has been based upon the following design parameters and assumptions:

1. Wind loading is based upon the following parameters:
  - a) 1/500 year recurrence interval (45m/s). Region A.
  - b) ABCB temporary reduction factor = 0.85 (1 month duration).
  - c) Maximum effective height of 10.0m, if erected on substructure it is assumed the marquee is not near the edge.
  - d) Terrain category 2.5, Mz.cat = 0.92
  - e)  $M_d = M_t = M_s = 1.0$
2. Structure is based upon the following parameters:
  - a) Eave height of 2.5m.
  - b) Roof pitch of 18 degrees.
  - c) Minimum width of 3 bays with 2 bays of bracing located in end bays.
  - d) For 15m, 20m, and 25m marquees a minimum of 50% more ballast is required in the end bays (typically tied to mullions).
3. Ballast values are based upon the following parameters:
  - a) 'Tie down' refers to the ballast required to prevent uplift only (horizontal forces are assumed to be resolved - e.g. when connected to deck, slab, or connected with ground anchors).
  - b) Ballast refers to the ballast weight required where there is no restraint from sliding (friction coefficient of 0.6 assumed). It is recommended that rubber mats are placed under ballast blocks. Where ballast blocks are placed on portal frame feet, they are to be ratchet strapped to the column/post or secured to the marquee eave junction with a strap in a manner to avoid 'tipping' of ballast.
  - c) Where ballast is provided by ground anchors, hold down capacity is to be tested and confirmed on site in accordance with AS1170.0 Appendix B with appropriate factors applied. Testing should be carried out for all likely site conditions (i.e. wet and dry). If the soil becomes saturated and the tension capacity is compromised, the marquee is to be disassembled or remedied with the appropriate ballast.

## **Ballast – All Walls Closed Refer to Figures 6 & 7**

Ballast is to be provided at each portal column. The following values are provided for a condition in which the marquee is completely sealed (all walls closed). Ballast values are provided for concrete blocks for a condition where there is no restraint against sliding.

**Table No.6**

<b>Span (m)</b>	<b>Width (m)</b>	<b>54km/hr (kg)</b>	<b>90km/hr (kg)</b>	<b>108km/hr (kg)</b>	<b>Ultimate Wind 1 week (kg)</b>	<b>Ultimate Wind 1 month (kg)</b>
<b>3</b>	<b>3 (Single bay)</b>	70	180	260	350	270
<b>3</b>	<b>3</b>	130	360	510	690	540
<b>4</b>	<b>3</b>		380	550	740	580
<b>5</b>	<b>3</b>		410	590	790	620
<b>6</b>	<b>3</b>		430	610	830	650
<b>7</b>	<b>3</b>		450	650	880	690
<b>8</b>	<b>3</b>		480	690	930	730
<b>9</b>	<b>3</b>		510	730	980	770
<b>10</b>	<b>3</b>		530	760	1030	800
<b>10</b>	<b>5</b>		880	1270	1720	1340
<b>12</b>	<b>5</b>		960	1390	1880	1470
<b>15</b>	<b>5</b>		1090	1570	2130	1660
<b>20</b>	<b>5</b>		1310	1890	2560	2000
<b>25</b>	<b>5</b>		1540	2210	3000	2330

The values listed above have been rounded up to the nearest 10kg. The values listed above are a guide only. Refer to relevant manual or engineering report for erection guidelines, maximum wind speed, and ballast requirements for a specific structure.

The design has been based upon the following design parameters and assumptions:

1. Wind loading is based upon the following parameters:
  - a) 1/500 year recurrence interval (45m/s). Region A.
  - b) ABCB temporary reduction factor = 0.85 (1 month duration).
  - c) Maximum effective height of 10.0m, if erected on substructure it is assumed the marquee is not near the edge.
  - d) Terrain category 2.5, Mz.cat = 0.92
  - e)  $M_d = M_t = M_s = 1.0$
2. Structure is based upon the following parameters:
  - a) Eave height of 2.5m.
  - b) Roof pitch of 18 degrees.
  - c) Minimum width of 3 bays with 2 bays of bracing located in end bays.
  - d) For 15m, 20m, and 25m marquees a minimum of 50% more ballast is required in the end bays (typically tied to mullions).
3. Ballast values are based upon the following parameters:
  - a) 'Tie down' refers to the ballast required to prevent uplift only (horizontal forces are assumed to be resolved - e.g. when connected to deck, slab, or connected with ground anchors).
  - b) Ballast refers to the ballast weight required where there is no restraint from sliding (friction coefficient of 0.6 assumed). It is recommended that rubber mats are placed under ballast blocks. Where ballast blocks are placed on portal frame feet, they are to be ratchet strapped to the column/post or secured to the marquee eave junction with a strap in a manner to avoid 'tipping' of ballast.
  - c) Where ballast is provided by ground anchors, hold down capacity is to be tested and confirmed on site in accordance with AS1170.0 Appendix B with appropriate factors applied. Testing should be carried out for all likely site conditions (i.e. wet and dry). If the soil becomes saturated and the tension capacity is compromised, the marquee is to be disassembled or remedied with the appropriate ballast.



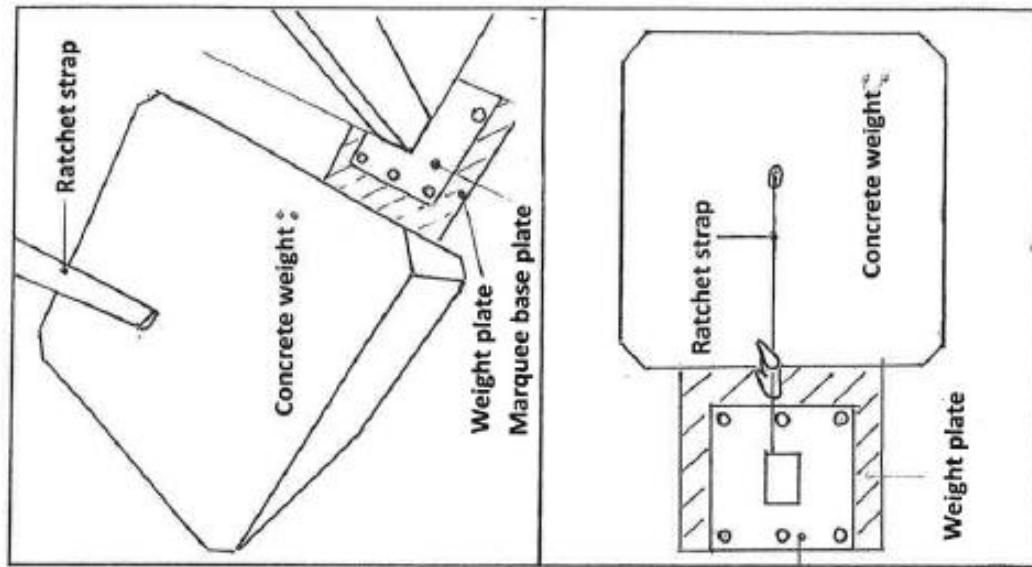
## Check list

When pegging a marquee as means of hold down

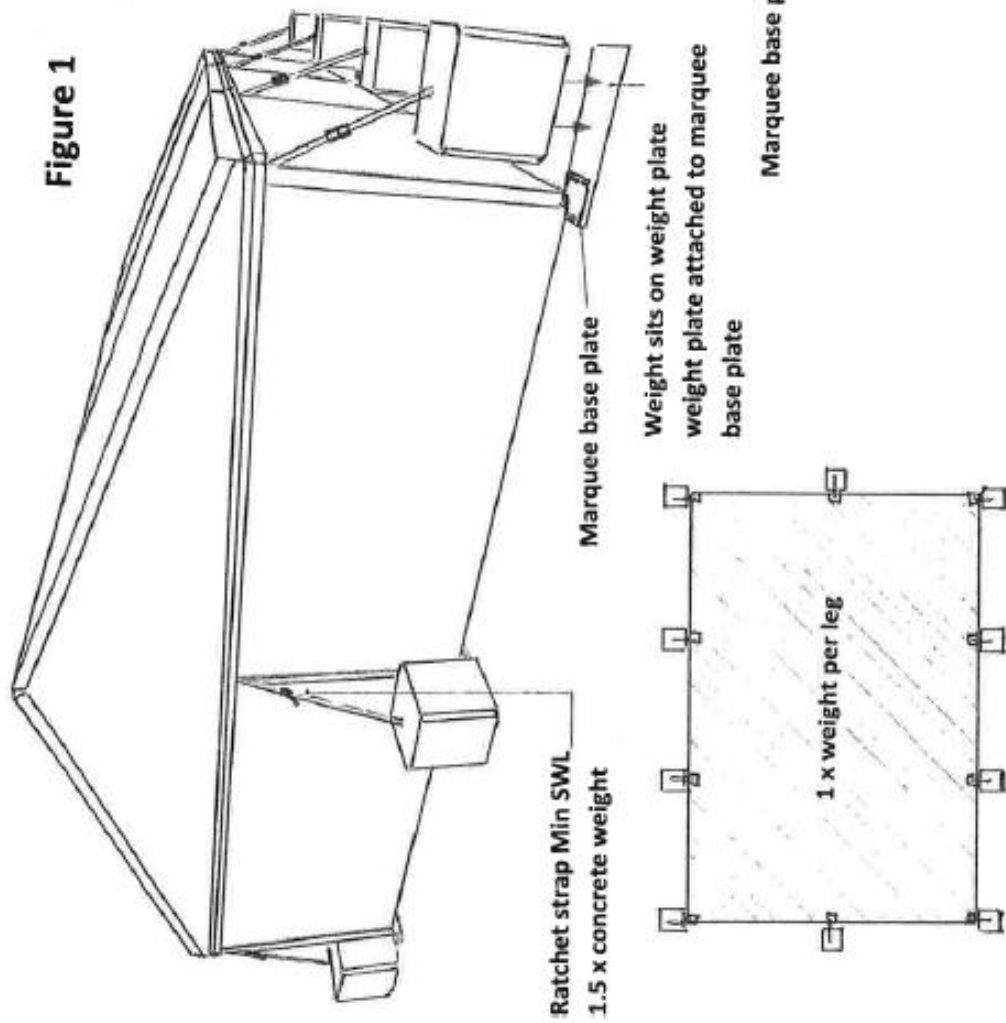
- Are the pegs adequate to provide the hold down force required?
- Has a pull out test been performed to confirm the holding capacity?
- Are ground conditions likely to change if the weather becomes inclement?
- Are the correct numbers of pegs used on each leg?
- Have the site conditions been correctly identified?
- Has the correct table been used for the specific configuration?

When using concrete ballast as a means of hold down

- Is the leg of the marquee fixed in place and unable to move in any direction?
- If using a weight plate is it fixed to the marquee leg?
- Is the weight plate appropriate for the weights and marquee size?
- If using straps are they in good, serviceable condition?
- Is the SWL of the strap equivalent to 1.5 x the weight of the ballast?
- Have the site conditions been correctly identified?
- Has the correct table been used for the specific configuration?



**Figure 1**





**Figure 2**



**Figure 3**



**Figure 4**



**Figure 5**



**Figure 6**



**Figure 7**