
Shield Canopy Site Conformance

This document outlines the site requirements for the Shield Canopy structure, detailing preparation of ground, installation, structural loadings, positioning of shipping containers and delivery of shipping containers (where applicable).

The information should be read thoroughly and the site appraised for stability by the customer. Included are the responsibilities of the customer ahead of, and during a **McGregor installation** along with general guidance/ preparation for **self install**.

Shield Canopy is supplied in two shipments - 1 x stillage containing the structural framework and fittings and 1 x palletised roof sheet (including any gable-D/ gable wall sheets). Installation manuals are supplied and included with the steel framework. Each shipment is delivered by lorry and will need a fork lift to be dropped to site.



Site Preparation

The shipping containers should be positioned on an even, stable and consistent ground that allows them to be set level in relation to each other. Where it is necessary to make the ground solid, a solid block material can be used to compensate for any lacking of stability in the existing base.

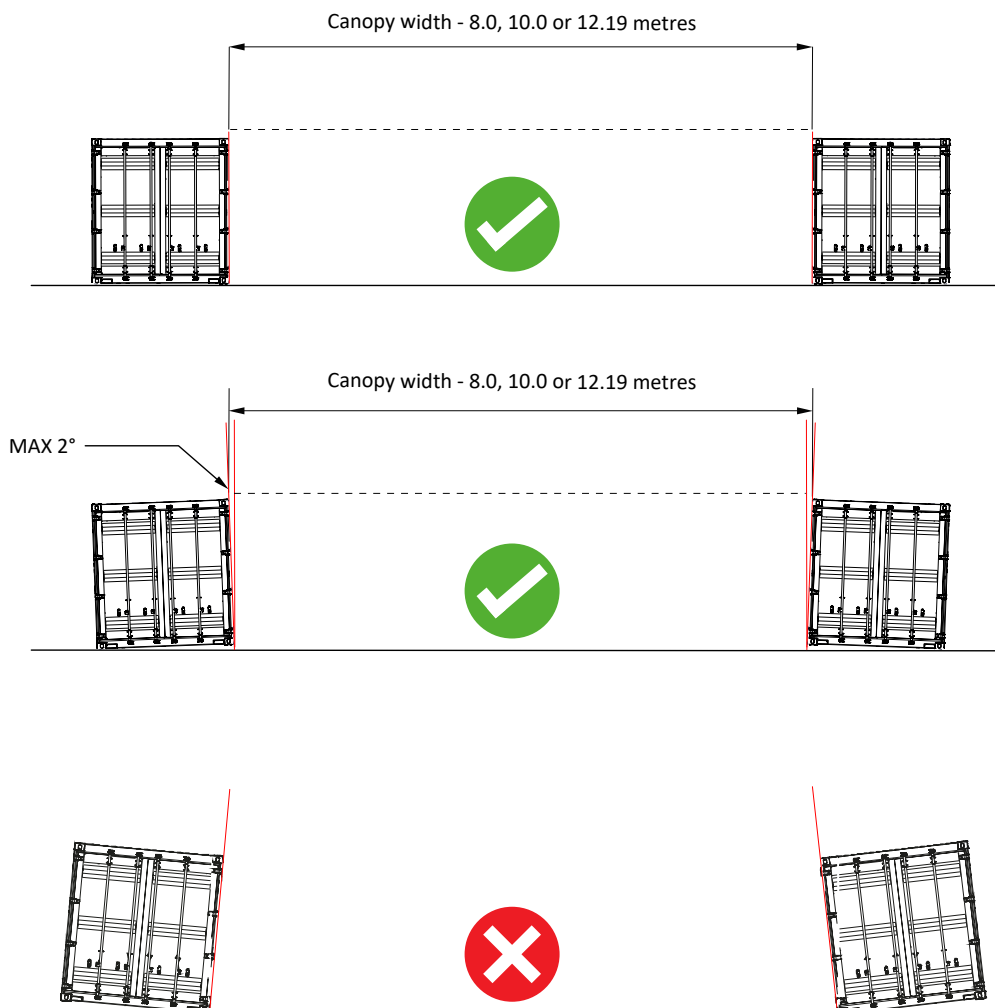
With the containers seated level, the heights of the two containers (in relation to each other) should match, however there is a working tolerance of 200mm maximum difference in height for canopies where there is no back wall fitted, and a maximum difference in height of 100mm where a back wall is fitted. Containers should be positioned flat or with a maximum of 2 degrees of leaning outwards, never leaning inwards, as per the illustration below.

Containers fitted with Shield Canopies can be installed on ground that has a continuous gradient both across the width or length, however gradient needs to be minimised in combination (diagonally - corner to corner, across the total buildings footprint).

A maximum gradient of 0.4 in 10 along the buildings length is permissible.
A maximum gradient of 0.4 in 10 along the buildings width is permissible.

Shipping containers are self-supporting and do not need any special foundations, however for the doors to operate properly they should be placed on solid, level ground.

The Shield Canopy and the shipping containers to which it is attached do not provide any drainage management surface water. Where it is anticipated that surface water may become a problem in the area surrounding the structure then advanced works (appropriate to the surface type) should be carried out to ensure there is no unnecessary ingress where the structure meets the ground.



Container Suitability

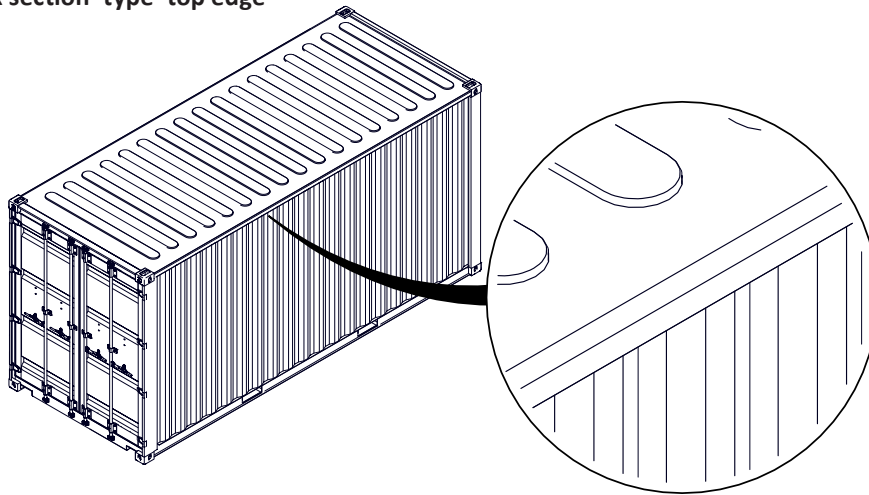
Shield Canopy is sold in two lengths to fit standard or high-cube*, front opening, 20ft or 40ft containers. If containers are of a non-standard or modified design it may not be possible to mount the canopy without modification to the standard Shield Canopy building. If there is any doubt of the suitability of the containers then this should be checked ahead of ordering.

The shipping containers used should be in good structural order with no penetrating rust. Particular attention should be paid to the integrity of the top edges and top corner castings. Shipping containers can be sited on a variety of ground types including concrete bases, tarmac, compressed aggregate, bare soil and greenfield sites.

The top edge (along the length) of standard shipping containers will be formed of either a box steel section or thick steel plate (both edge types across container sizes), see illustration below. The Shield Canopy is supplied with clamping components to enable clamping to both of these edge types.

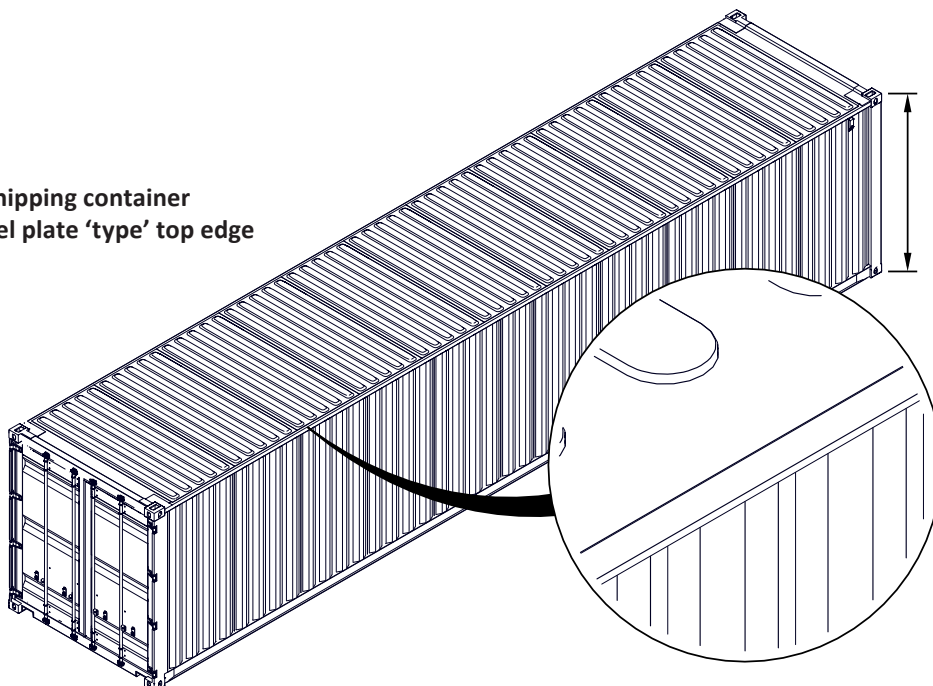
*Shield Canopy can be fitted to **high-cube shipping containers** however if the canopy is being supplied with a full height gable wall, an extension panel will be required, this should be specified during the ordering process.

**20ft standard shipping container
shown with box section 'type' top edge**



Container Height -
(measured between
outer faces of
corner castings)

**40ft standard shipping container
shown with steel plate 'type' top edge**

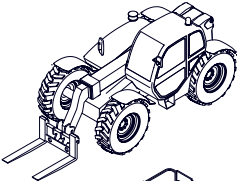





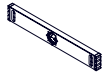


Standard 2590mm
High-cube 2900mm

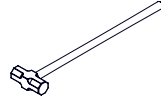
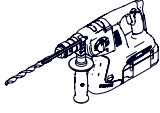

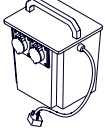
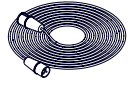

Self Install

Shield Canopy is supplied with a simple, staged installation manual that details the steps and methodology to fully install the structure. The installation manual also includes labelling and identification of all components used. It takes a trained, 3 person, installation team, 2-3 days to install a Shield Canopy - it is recommended to plan in excess of this for self install (using an untrained but capable workforce following the supplied installation manual).

Suggested tools and plant for Shield Canopy install

	X 1	Telescopic Handler 12.0M 3.0 tonne (or similar) for lifting hoops		X 1	20m Tape measure
	X 1	Scissor lift, 10.0m (or similar) for fitting perlin & bracing		X 1	8m Tape measure
	X 3	11mm Rope 20.0 metre lengths		X 1	Ground marking spray
	X 2	1/2" Impact driver		X 2	17mm Socket
	X 2	17mm Spanner		X 2	24mm Socket
				X 1	1m+ Spirit level
				X 1	Ratchet spanner

Tools for optional rear wall only

	X 1	Sledge hammer (Only for fitting anchors with ground stakes)
	X 1	110V SDS Drill (Only for fitting anchors with Excalibur bolts)
	X 2	10mm SDS drill bit (Only for fitting anchors with Excalibur bolts)
	X 1	110V Transformer (Only for fitting anchors with Excalibur bolts)
	X 1	110V Extension leads (Only for fitting anchors with Excalibur bolts)
	X 1	Hole cleaner/ blower (Only for fitting anchors with Excalibur bolts)

McGregor Installation - Customer Responsibilities

Inspect the ground - It is the customer's responsibility to fully inspect the ground's suitability. Check for load bearing capacity - ground types along with considerations are detailed on page 6 & 7 of this document. Check for utilities and services below the surface, most importantly when a rear wall is being fitted - see anchor details on page 6 of this document.

Pre-delivery of shipping containers - If shipping containers are being purchased or rented as part of the Shield Canopy sale, the McGregor installation team will be on site to help position the containers, however, it is the customer's responsibility to ensure the ground is adequately prepared in-line with the guidelines outlined in this document ahead of the installation date.

Shipping container positioning - Ahead of the installation it is the customer's responsibility to mark out the final position of the containers using measurements supplied in the anchor plan (provided on pages 10 - 12 of this document). The location of each container should be marked at its 4 corner feet positions - these should be marked with either a (removable) stake in the ground or ground marking paint.

Installation access equipment & plant - The McGregor installation team will need vehicle access to the installation site. The area around the install location should be sound and suitable for vehicle movement. The area in-front of and between the two shipping containers needs to be solid and stable for telehandler access (used to lift the hoops into place). The area between the two shipping containers needs to be clear and with a surface suitable for vehicle movement (including sharp static turning) - as part of a standard Shield Canopy install it is required to drive a scissor lift in the vacant space between the shipping containers. If delays to the installation are caused by unsuitable site access, McGregor Installations reserve the right to reschedule the installation at this point, with any additional expenses charged to the customer.

Additional equipment - As part of an installation where containers are being supplied/ delivered there will be no allocation of plant/ equipment for moving the containers other than the crane situated on the back of the delivery lorry. Once set on the ground or footings it is not advised to move the containers. Moving the containers in any direction will not be possible without additional lifting equipment. If additional equipment is required to move the containers during the installation then this can be facilitated by the installation team with any expenses charged to the customer - as this is likely to delay the installation and McGregor Installations reserve the right to reschedule the installation at this point.

Shipping Container Supply

If shipping containers are being purchased or rented as part of the Shield Canopy sale, containers will be delivered on a 'Hiab' lorry - a Hiab is fitted with its own crane so that it can lift and position the containers. For delivery, the Hiab will require a site with generous access and solid ground. The on-board crane sets down each storage container from the side of the lorry and therefore needs approximately a 25ft (7.62m) width to facilitate the offloading. Additionally, there must be no overhead cables or overhanging trees in the way.

The delivery lorry will be (approximately) either 34ft or 60ft long by 8.5ft wide. With the shipping container on the vehicle the height will be around 15ft and when the crane is extended to its full height this will be approximately 25ft.

If you are not sure about your site, then it is important you identify the potential limiting factors with **McGregor Fabric Structures** ahead of any proposed delivery/ installation dates and where necessary include drawings with dimensions along with photographs of the site for us to confirm if/ how delivery is feasible.

Failed delivery: If delivery of containers is arranged and the lorry is not able to unload and position the containers at the agreed site due to physical site restrictions, the lorry will have to return the containers to the depot. If containers are returned then this attempted delivery expense is payable by the customer.

Shipping containers are placed in their final position during delivery; it is important that the final position of the containers is defined and checked by the customer thoroughly ahead of the delivery/ installation date.

Ground Suitability, Loadings & Anchoring

Ballasting

It is important that the complete structure is fixed to the ground with ballast. Ballasting can be achieved by a combination of any weighted items stored in the containers. Alternatively, specific ballast can be used in the form of typical weighted items such as bags of sand or filled IBC containers. As a guide, a weighted ballast of 3000 KG should be distributed in each 40ft container, and a weighted ballast of 4100 KG in each 20ft container. Where possible ballast should be focused in the internal corners of each container.

If it is not possible to achieve ballasting in the containers then the structure should be fixed to the ground. This can be achieved by suitable mechanical fixings between the base corner knuckles of each container and solid ground beneath.

Reaction load tables with values to calculate ballasting and anchoring for different building sizes and variations can be referenced on pages 6 & 7 of this document.

Ground bearing strength

It is important that the containers are mounted on suitable and stable ground. Containers fitted with canopies weigh a significant amount, if the ground is not load bearing or 'soft' in places then the containers can sink unevenly - this will compromise the structure.

Ground bearing strength can be estimated by using the Typical allowable bearing pressures under static loads table on page 7 of this document.

Concrete pad: Concrete should be a minimum of C35 at a thickness of 150mm laid on an appropriate base. Levels should be checked on an existing concrete pad - most concrete pads are angled to promote drainage. If a concrete pad does not allow the containers to sit flat in relation to each other, then levelling pads will be necessary.

Tarmac/ asphalt: Tarmac/ asphalt should be I-4 or commercial top grades, laid on an appropriate base. Depths should be checked on an existing pad - most Tarmac/ asphalt pads are angled to promote drainage. If a pad does not allow the containers to sit flat in relation to each other, then levelling pads will be necessary.

Compacted aggregate: Compacted aggregate should be of a structural 'interlocking' type eg. Type 1, laid to a minimum thickness of 150mm (adjusted for the ground conditions) compacted with heavy rolling equipment.

Grass field: Containers can be positioned on a firm grass field, as with all sites the two containers will need to be level relative to each other. Typically a container will rest on its corner castings, however, when placed on grass the container will sink slightly and sit on its perimeter edge, the under-floor of the container is sub flush with the container edge, so cannot be expected to spread the load on the ground.

Compacted soil: Refer to grass field.

Rear wall anchors

If the canopy is supplied with a rear wall then the steel uprights will be secured to the ground with plated anchors. Plated anchors are mechanically fixed to the ground, check for utilities services below the surface (to an appropriate depth) ahead of installation. When fitting to a concrete pad the anchors will be fixed with M10 x 75mm excalibur bolts, when fitting the anchors to loose aggregate or bare earth the anchors will be fixed to the ground with 550mm long steel ground spikes.

Typical allowable bearing pressures under static loads

Description	Safe bearing capacity ¹ KN/m ²	Field description/ notes
Strong igneous rocks and gneiss Strong limestones and hard sandstones Schists and slates Strong shales and mudstones Hard block chalk	10000 4000 3000 2000 80-600	Footings on unweathered rock Beware of sink holes and hollowing as a result of water flow
Compact gravel and sandy gravel ² Medium dense gravel and sandy gravel ² Loose gravel and sandy gravel ² Compact sand ² Medium dense sand ² Loose sand ²	>600 200-600 <200 >300 100-300 <100	Requires pneumatic tools for excavation Hand pick - resistance to shovelling Small resistance to shovelling Hand pick - resistance to shovelling Hand pick - resistance to shovelling Small resistance to shovelling
Very stiff and hard clays Stiff clays Firm clays Soft clays and silts Very soft clays and silts	300-600 150-300 75-150 <75 Nil	Requires pneumatic spade for excavation but can be indented by the thumbnail Hand pick - cannot be moulded in hand but can be indented by the thumb Can be moulded with firm finger pressure Easily moulded with firm finger pressure Extrudes between fingers when squeezed
Firm organic material Unidentifiable made ground	20-40 25-50	Can be indented by thumbnail. Only suitable for small- scale buildings where settlements may not be critical Bearing values depend on the likelihood of voids and the compressibility of the made ground
Springy organic material/ peats Plastic organic material/ peats	Nil Nil	Very compressible and open structure Can be moulded in the hand and smears the fingers

Notes:

1. This table should be read in accordance with the limitations of BS 8004.

2. Values for granular soil assume that the footing width, B, is not less than 1m and that the water table is more than B below the base of the foundation.

Source: BS 8004: 1986

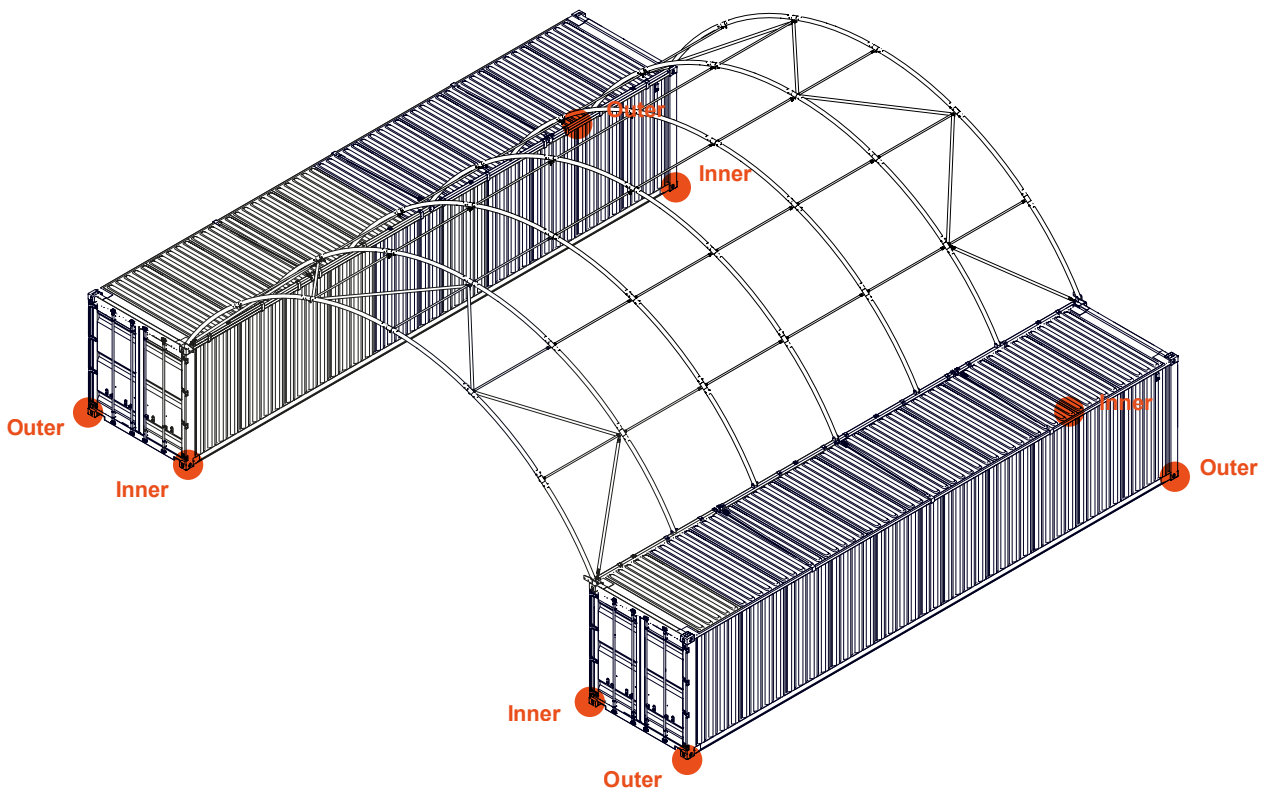
Reaction Load Table - Container Anchor Loadings

	Inner Anchor Reactions (KN)				Outer Anchor Reactions (KN)			
	X	Y+	Y-	Z	X	Y+	Y-	Z
8 Metre canopy fixed to 20ft containers	0.42	14.18	-6.26	8.18	1.37	7.02	-0.45	2.86
8 Metre canopy fixed to 40ft containers	4.12	40.38	-7.77	26.82	7.54	31.02	-5.47	29.56

	Inner Anchor Reactions (KN)				Outer Anchor Reactions (KN)			
	X	Y+	Y-	Z	X	Y+	Y-	Z
10 Metre canopy fixed to 20ft containers	2.15	25.61	-9.56	11.77	2.56	14.31	-6.82	9.16
10 Metre canopy fixed to 40ft containers	6.88	41.1	-8.42	24.16	9.62	25.79	-7.21	22.58

	Inner Anchor Reactions (KN)				Outer Anchor Reactions (KN)			
	X	Y+	Y-	Z	X	Y+	Y-	Z
12.2 Metre canopy fixed to 20ft containers	2.48	27.77	-13.91	15.44	3.78	20.09	-3.19	11.32
12.2 Metre canopy fixed to 40ft containers	5.26	40.13	-11.09	23.10	21.99	64.31	-9.19	53.17

Y+ shows compressive loading Y- shows uplift loading



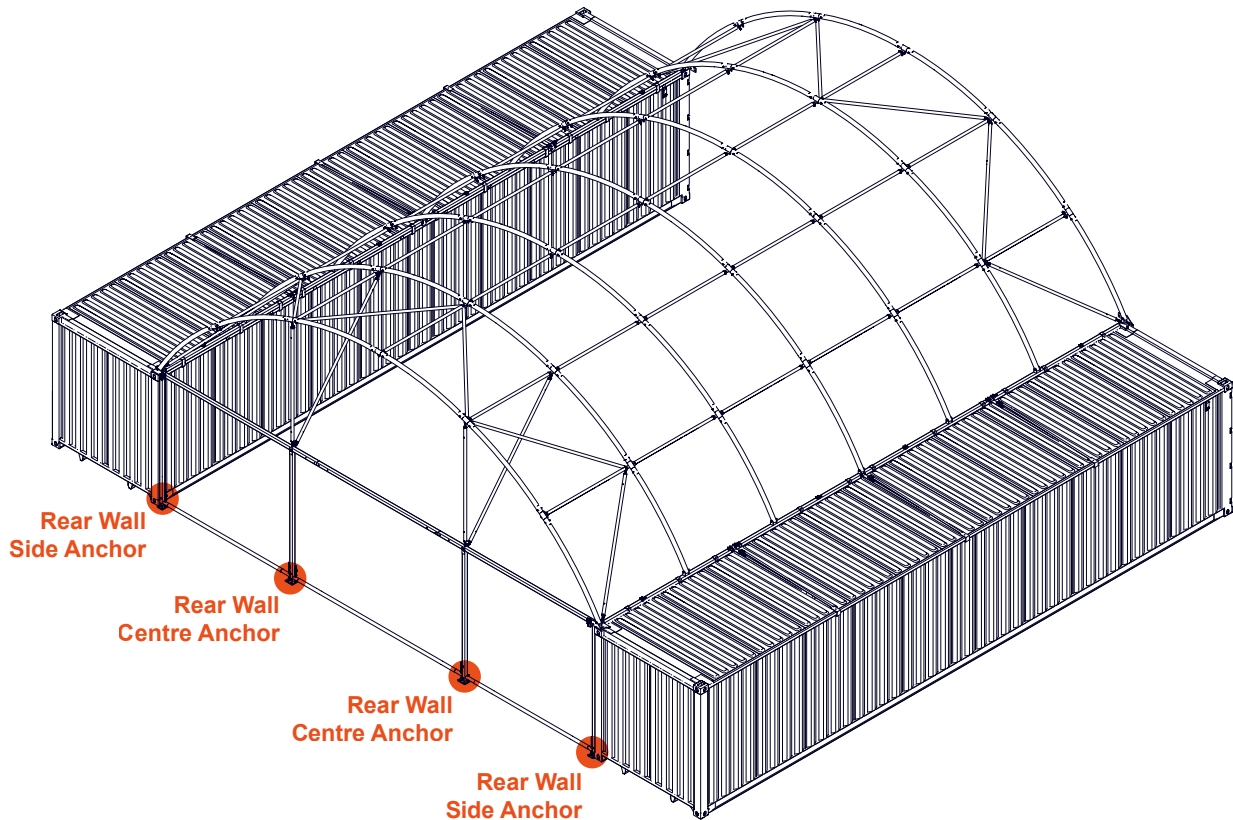
Reaction Load Table - Gable Wall Loadings

	Rear Wall Anchor Reactions (KN)			
	X	Y+	Y-	Z
8 Metre canopy fixed to 20ft containers	0.00	3.72	0.00	4.27
8 Metre canopy fixed to 40ft containers	0.00	3.72	0.00	4.27

	Rear Wall Anchor Reactions (KN)			
	X	Y+	Y-	Z
10 Metre canopy fixed to 20ft containers	0.17	5.66	-3.43	5.06
10 Metre canopy fixed to 40ft containers	0.17	5.66	-3.43	5.06

	Rear Wall Anchor Reactions (KN)			
	X	Y+	Y-	Z
12.2 Metre canopy fixed to 20ft containers	0.00	6.16	2.97	5.48
12.2 Metre canopy fixed to 40ft containers	0.00	6.16	2.97	5.48

Y+ shows compressive loading Y- shows uplift loading



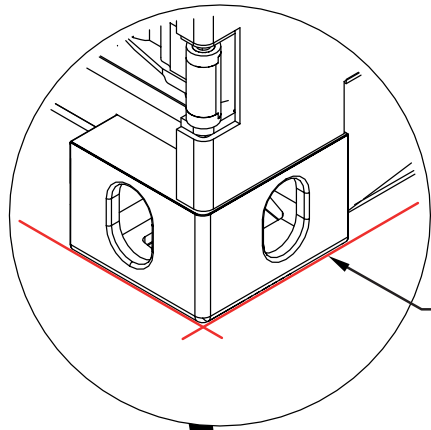
Wind & Snow Loadings Table

	Wind Loading	Snow Loading	Drifed Snow
8 Metre canopy fixed to 20ft containers	500 N/m ²	600 N/m ²	1200 N/m ²
8 Metre canopy fixed to 40ft containers	500 N/m ²	600 N/m ²	1200 N/m ²

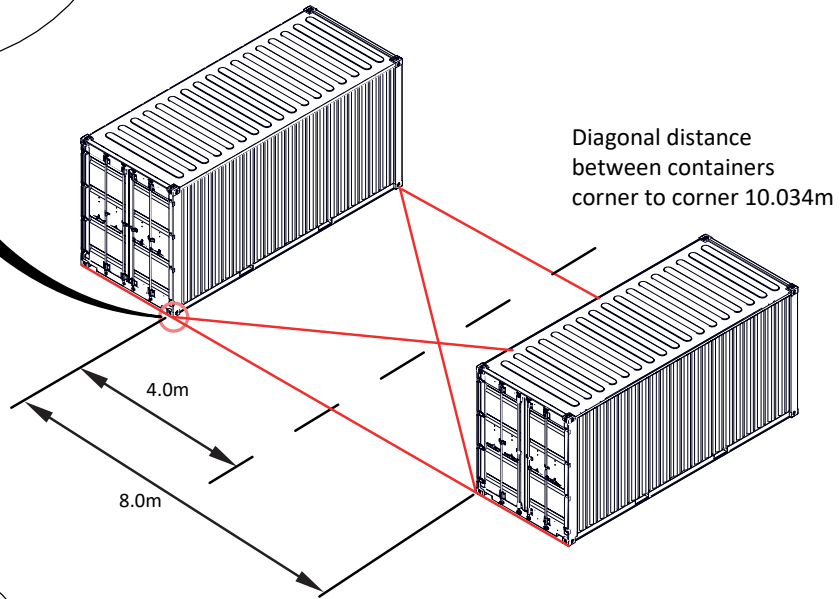
	Wind Loading	Snow Loading	Drifed Snow
10 Metre canopy fixed to 20ft containers	500 N/m ²	600 N/m ²	1200 N/m ²
10 Metre canopy fixed to 40ft containers	500 N/m ²	600 N/m ²	1200 N/m ²

	Wind Loading	Snow Loading	Drifed Snow
12.2 Metre canopy fixed to 20ft containers	500 N/m ²	420 N/m ²	840 N/m ²
12.2 Metre canopy fixed to 40ft containers	500 N/m ²	420 N/m ²	840 N/m ²

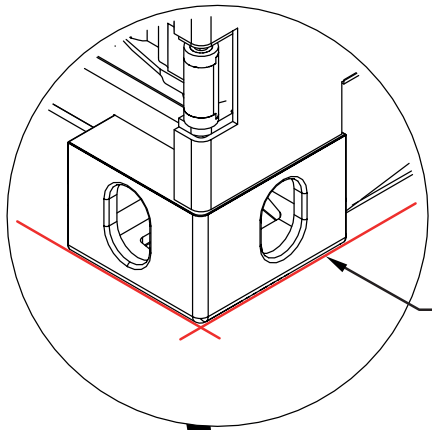
Anchor plan for 8 metre Shield Canopy, showing 20ft & 40ft container variants



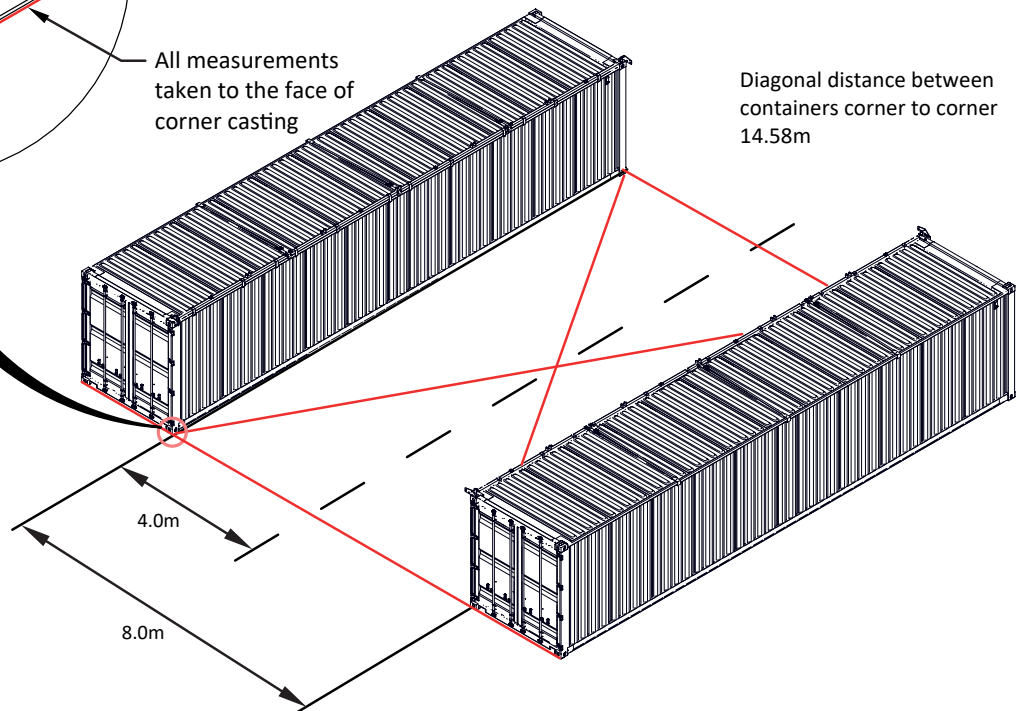
All measurements taken to the face of corner casting



Diagonal distance between containers corner to corner 10.034m

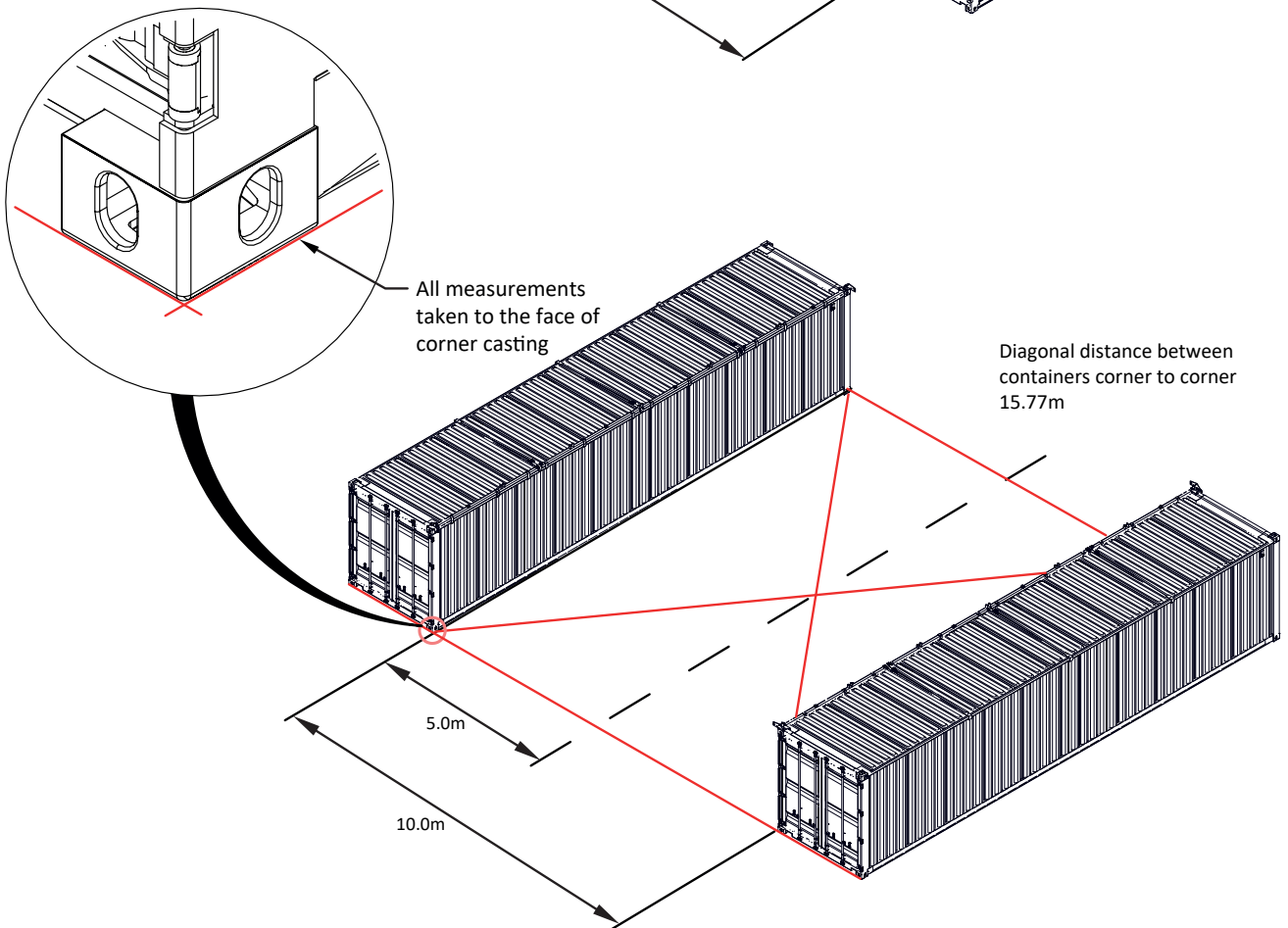
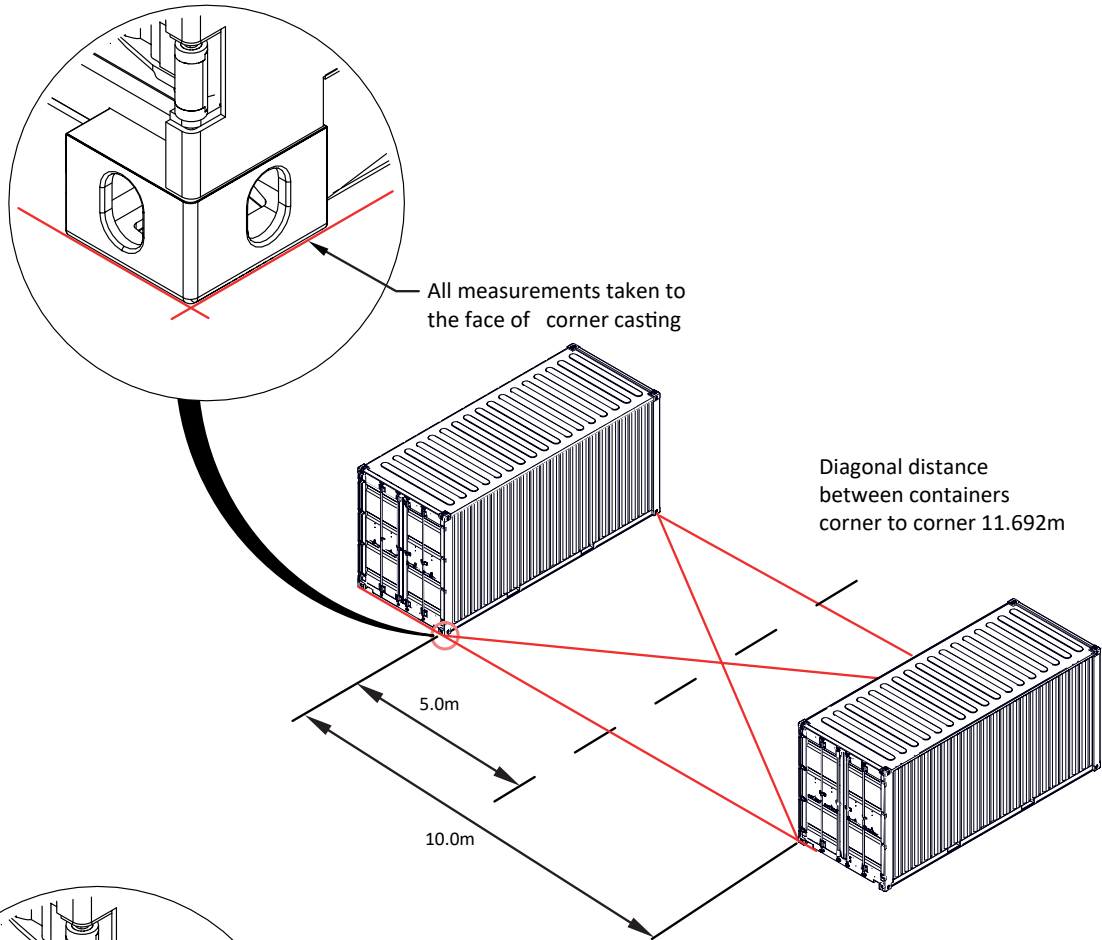


All measurements taken to the face of corner casting



Diagonal distance between containers corner to corner 14.58m

Anchor plan for 10 metre Shield Canopy, showing 20ft & 40ft container variants



Anchor plan for 12 metre Shield Canopy, showing 20ft & 40ft container variants

