GROUNDWORKS
TRENCH BOXES
User Guide

GENERATION
HIRE & SALE

ALTRAD

Contents

Introduction

This booklet is intended to provide basic information for users of the Altrad Generation Groundworks Trench Box system and to draw the clients attention to the practical aspects of handling, assembly, installation and use which need to be considered in compiling method statements for a safe system of work. In particular, the clients attention is drawn to the size and weights of the Trench box components and the need for planning the lifting operations involved.

The Trench box is intended for shoring of trenches for which the excavation is being undertaken with small excavators which do not have the lifting capacity to work with standard, heavier, trench box systems. All major components of the Trench box system have handling and lifting points for safe slinging.

It is assumed that clients are familiar with general safe practices applicable to trenching and excavation work. Users should ensure that the length and selected width of the box is sufficient for the work to be carried out.

Trench boxes are not normally suitable for use in water bearing soils or in trenches crossed by frequent services. The Trench box is not intended for other purposes.

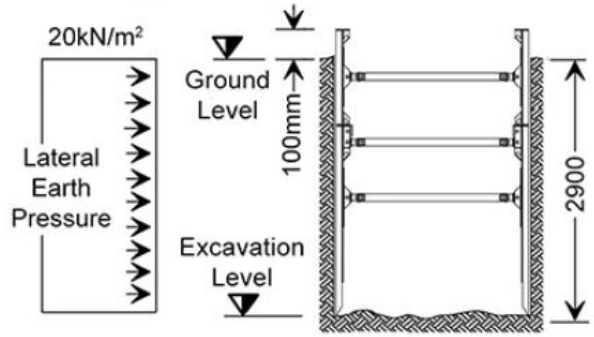
Altrad Generation Trench Boxes are simple to assemble, two-sided excavation support systems designed to be installed by an excavator utilising the 'dig and push' or 'excavate and lower' techniques. Trench boxes are often used where rapid installation of utility pipelines and trench runs are required and provide a safe working environment for those on site by safely withstanding the surrounding soil pressure. Trench Boxes can be used in conjunction with foursided Manhole Boxes to provide complete protection for personnel. Drag Boxes offer a speedy alternative to a Trench Box when laying long pipe runs. If the Permissible SWL is exceeded, **ALWAYS** enquire about our design service. Manhole Braces and Alloy Waller's can be used as alternatives.

Trench Box Design

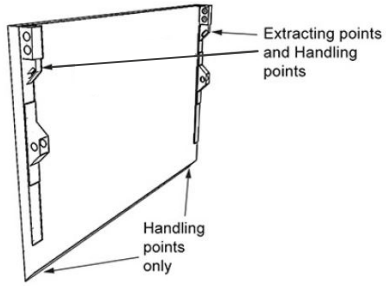
Methods of estimating lateral earth pressure vary. Typical working pressures that the Trench Box can sustain are as shown below, and should satisfy most situations. Contact Altrad Generation if further assistance is required. Users are advised to check that their excavation arrangement will not impose greater working pressures than these.

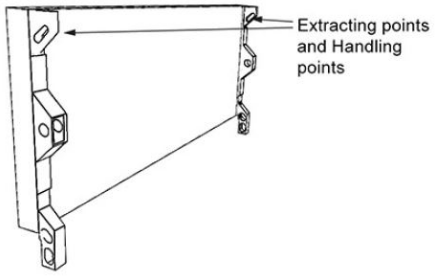
Conditions which are likely to increase the lateral earth pressure include:

a) Close proximity of structures.
b) Excavated or construction materials adjacent to the trench.
c) Close proximity of site roads.
d) Close proximity of railways.



Users should note that settlement of the reinstated ground and ground next to the Generation Trench Box is likely to occur after backfilling.





Backhoe Trench Box

The Backhoe Trench Box is a robust piece of equipment, which acts as a safety shield providing a safe working area below ground level. For use when working on excavations and pipe laying operations. Used to support sides of excavations, generally used for the laying of small diameter utility pipes such as gas, water, telecoms or power cables. Designed for use with smaller machines such as 180' excavators and rubber tyred excavators. Lightweight alternative to Standard & Mini Trench Boxes when lifting capacity is an issue on site.

Key Features

- Provides safe working area below ground
- Easily Assembled
- Dig and Push method
- Pin and 'R' Clip method
- Additional Equipment available

BVB - Backhoe Trench Box

BVB - Backhoe Trench Box	Base Unit	Top Unit
Panel Length (mm)	3000	
Panel Height (mm)	2000	1000
Panel Thickness (mm)	60	
External Trench Width (mm)	690 - 2690	
Internal Trench Width (mm)	570 - 2570	
Weight (kg)	558	337
Distance Between Struts (mm)	2690	
Clearance Below Strut	980	-
Permissible SWL (kN/m²)	19.40	22.85

JVB - Backhoe Trench Box

JVB - Backhoe Trench Box	Base Unit	Top Unit
Panel Length (mm)	3000	
Panel Height (mm)	2000	1000
Panel Thickness (mm)	60	
External Trench Width (mm)	720 - 1720	
Internal Trench Width (mm)	600-1600	
Weight (kg)	730	420
Distance Between Struts (mm)	2670	
Clearance Below Strut	1200	-
Permissible SWL (kN/m²)	20	

Mini Trench Box

Two-sided mechanical excavation support BV60 Trench Boxes, ideal for the installation of utility pipes and services when ground movement is non-critical. Designed to be installed by an excavator using either the dig and push or excavate and lower in place technique, bottom cutting edge for ease of installation, top panels available to increase excavation depth and compatible with End Panels.

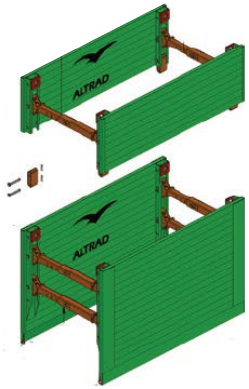
Manufactured and designed in accordance with the following: BS EN 13331 2002 parts 1 & 2 Trench lining systems and BS 5975 (200B) Code of practice for Temporary Works Procedures and the Permissible Stress Design of Falsework.

Key Features

- Support Below Ground
- Quick & Easy To Install
- Extension Boxes Available To Increase Depth
- Used In Trenches Up To 4000mm Deep
- Dig & Push Method Used
- Pin & Clip System
- Additional Equipment Available

BV60 - Mini Trench Box

BV60 - Mini Trench Box	Base Unit	Top Unit
Panel Length (mm)	3000	
Panel Height (mm)	2000	1000
Panel Thickness (mm)	60	
External Trench Width (mm)	610 - 3200	
Internal Trench Width (mm)	490-3080	
Weight (kg)	455	235
Clearance Between Struts (mm)	2600	
Clearance Below Strut (mm)	950	-
Permissible SWL (kN/m²)	23.5	



JV60 - Mini Trench Box

JV60 - Mini Trench Box	Base Unit	Top Unit
Panel Length (mm)	3000	
Panel Height (mm)	2000	1000
Panel Thickness (mm)	60	
External Trench Width (mm)	610 - 3200	
Internal Trench Width (mm)	490-3080	
Weight (kg)	1232	676
Clearance Between Struts (mm)	2720	
Clearance Below Strut (mm)	1100	-
Permissible SWL (kN/m²	20	

Standard Trench Box

With its easy 'pin and clip' adjustment the Standard Trench Box is the most advanced and effective box currently being used within the industry. The Standard Trench Box is used to provide a safe working area below ground and ensure that the side walls of an excavation are continually supported. Standard Trench Boxes can be used in conjunction with other boxes, including Manhole Boxes. They are quick and easy to install.

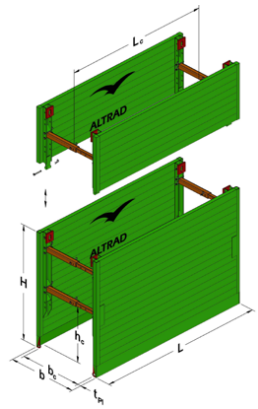
Up to two extension boxes can be added on top of the Standard Trench Box to achieve additional depth if needed.

Key Features

- Two-sided Support
- Used In Conjunction With Manhole Boxes
- Additional Top Boxes Available
- Quick & Easy To Install
- Dig & Push Method Used
- Additional Equipment Available

BV100 - Standard Trench Box

BV100 - Standard Trench Box	Base Unit	Top Unit
Panel Length (mm)	3500	
Panel Height (mm)	2360	1300
Panel Thickness (mm)	100	
External Trench Width (mm)	690 - 4500	
Internal Trench Width (mm)	490-4300	
Weight (kg)	925	600
Clearance Between Struts (mm)	3110	
Clearance Below Strut (mm)	1540	-
Permissible SWL (kN/m²)	39.7	



JV100 - Standard Trench Box

JV100 - Standard Trench Box	Base Unit	Top Unit
Panel Length (mm)	3500	
Panel Height (mm)	2600	1500
Panel Thickness (mm)	100	
External Trench Width (mm)	690 - 4500	
Internal Trench Width (mm)	490-4300	
Weight (kg)	2100	1130
Clearance Between Struts (mm)	3210	
Clearance Below Strut (mm)	1500	-
Permissible SWL (kN/m²	40	

5.0m Super Trench Box

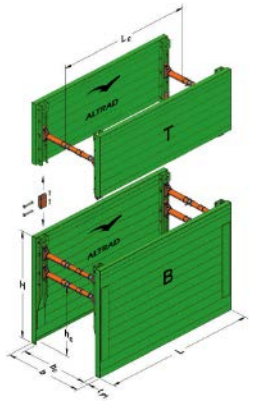
The Super Trench Box is used to provide a safe working area below ground and ensure that the side walls of an excavation are continually supported. Super Trench Boxes can be used in conjunction with other boxes, including manhole boxes. They are quick and easy to install. Up to two extension boxes can be added on top of the Super Trench Box to achieve additional depth if needed.

Key Features

- Two-sided support
- Used in conjunction with Manhole Boxes
- Additional top boxes available
- Quick and easy to install
- Dig and Push method used
- Edge Safe systems available
- Ladder Access systems available
- Additional Equipment Available

BVS - 5.0m Super Trench Box

BVS - 5.0m Super Trench Box	Base Unit	Top Unit
Panel Length (mm)	5000	
Panel Height (mm)	2360	1570
Panel Thickness (mm)	120	
External Trench Width (mm)	700 - 3300	
Internal Trench Width (mm)	500 - 3100	
Weight (kg)	1445	1015
Clearance Between Struts (mm)	4610	
Clearance Below Strut (mm)	-	-
Permissible SWL (kN/m²)	34.30	



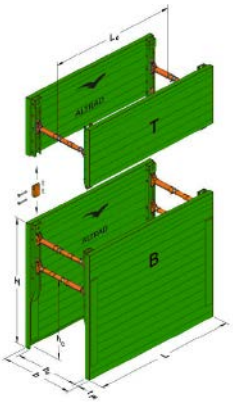
JVS - 5.0m Super Trench Box

JVS - 5.0m Super Trench Box	Base Unit	Top Unit
Panel Length (mm)	5100	
Panel Height (mm)	2500	1800
Panel Thickness (mm)	100	
External Trench Width (mm)	700 - 3300	
Internal Trench Width (mm)	500 - 3100	
Weight (kg)	3800*	2280*
Clearance Between Struts (mm)	4620	
Clearance Below Strut (mm)	1500	-
Permissible SWL (kN/m²)	40	

Magnum Trench Box

The Magnum Trench Box is the largest in the range of Altrad Generation trench boxes. It is designed for deep pipe laying activities. The design is similar to Std & BV100 Trench Boxes but it can achieve greater clearance under struts to allow larger diameter pipes to be installed. It provides clearance of 2460mm under strut through a panel height of 4000mm. Effective down to 6.60m, provided ground pressure does not exceed the Permissible SWL of 36.41 kN/m2 of this box.

BVM - Magnum Trench Box	Base Unit	Top Unit
Panel Length (mm)	3400	
Panel Height (mm)	4000	1970
Panel Thickness (mm)	100	
External Trench Width (mm)	960 - 4150	
Internal Trench Width (mm)	760 - 3950	960 - 3950
Weight (kg)	3136	2450
Clearance Between Struts (mm)	2950	
Clearance Below Strut (mm)	2460	-
Permissible SWL (kN/m²)	36.41	



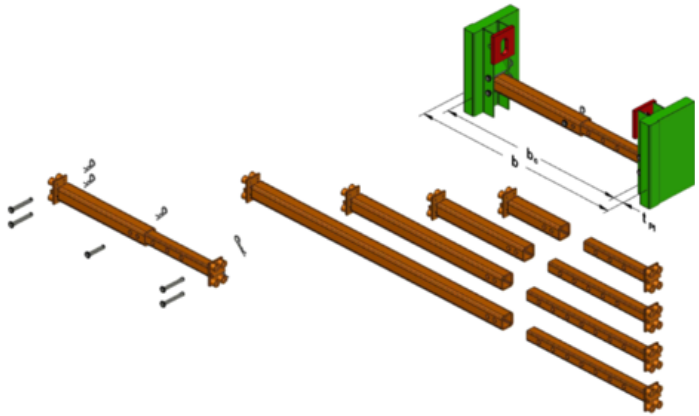
Trench Box Struts

Tensile Forces

Lifting eyes at the plate head	Rd	=	229	kN
Bottom Eyes	Rd	=	23	kN

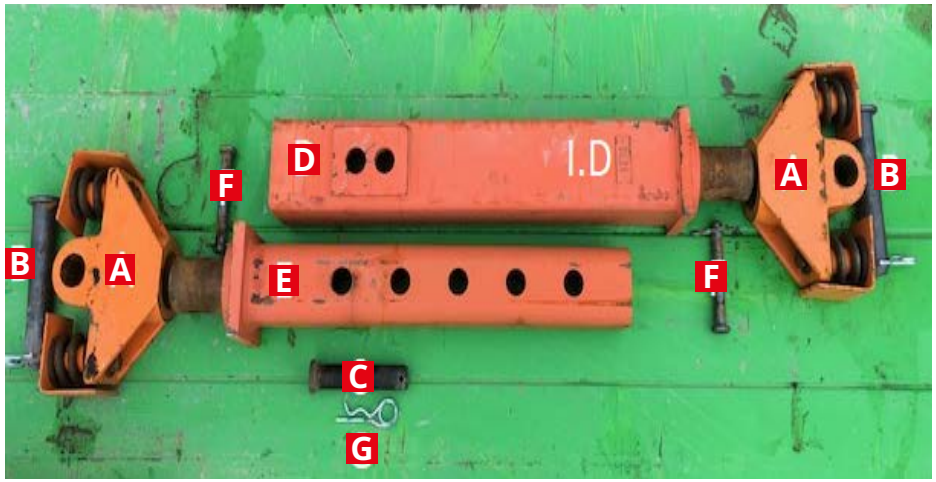
Telescopic Struts 80/60

bolt Ø20*110mm - connect outer tube and inner tube
bolt Ø20*148mm - connect telescopic strut and plate



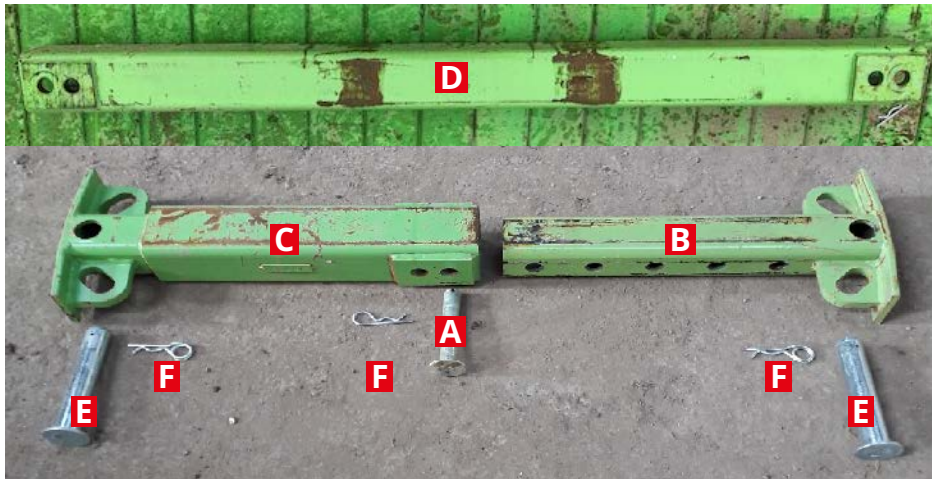
Type	Stroke	Internal Width	External Width	Inner Tube 60 /60	Outer Tube 80 / 80	Weight
	(mm)	bc Internal (mm)	b 3m External (mm)	No. of Holes	Length (mm)	Including Pins & Clips (kg)
A	200	570 - 770	690 - 890	3	565	15.7
B	450	820 - 1270	940 - 1390	5	815	22.4
C	650	1220 - 1870	1340 - 1990	7	1215	31.6
D	650	1920 - 2570	2040 - 2690		1915	43.8

Preffered Strut Assembly (LTW Extendable)



Part	Code	Description	ID Plate	No. Of Holes
A	084791	BV100 MUSHROOM FP80		
B	084827	212 X 43MM BV100 BOLT		
C	084840	BV100 STRUT CENTRE PIN		
D	084841	700 - 800 BV100 O/STRUT	700	
E	084842	700 - 800 BV100 I/STRUT		2
D	084843	900 - 1200 BV100 O/STRUT	815	
E	084844	900 - 1200 BV100 I/STRUT		4
D	084845	1300 - 1600 BV100 O/STRUT	1300	
E	084846	1300 - 1600 BV100 I/STRUT		5
D	084847	1700 - 2400 BV100 O/STRUT	1700	
E	084848	1700 - 2400 BV100 I/STRUT		8
D	084849	BV100 STRUT 2500 - 3200 OUTER	2500	
D	084851	BV100 STRUT 3000 - 3700 OUTER	3000	
F	084826	125 X 20MM BV100 BOLT		
G	084063	CONNECTOR R CLIP		

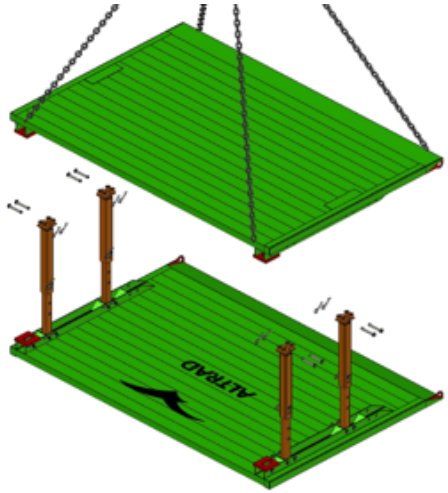
Alternative Strut Assembly (P Strut)



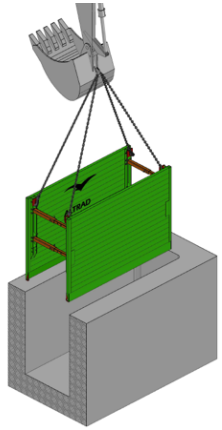
Part	Code	Description
A	084270	P STRUT CENTRE PIN
B	084271	P STRUT 0 INNER
C	084272	P STRUT 0 OUTER 600-800MM
B	084273	P STRUT 1 INNER
C	084274	P STRUT 1 OUTER 800-1200MM
D	084275	P STRUT 2 OUTER 1250-2050MM
D	084276	P STRUT 3 OUTER 2000-2800MM
D	084277	P STRUT 4 OUTER 2700-3500MM
E	084278	P STRUT CONNECTOR PIN
F	084063	CONNECTOR R CLIP

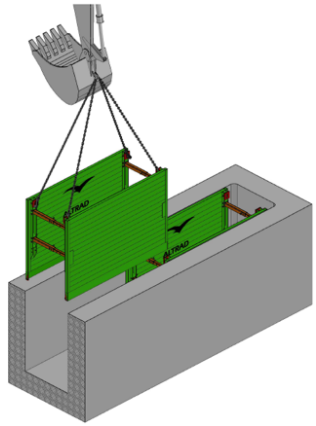
Trench Box Install Guide

1. Lay the first trench box panel on level ground with the strut attachment points facing upwards.
2. Adjust the telescopic struts to the desired trench width.
3. Connect outer tube and inner tube with locating pin.
4. Insert the four strut assemblies into the channel and secure with 20mm dia locating pins and insert 5mm R clips into each pin.
5. Carefully place the second trench box panel onto the struts and secure with locating pins and R clips in the manner described above. Please refer to the data sheets for the weights.



6. Using the top two lifting points, attach two legs of a Generation four leg chain and rotate box into vertical position for use. All personnel should be kept well clear during process.





Trench Box Off Loading, Site Handling and Assembly

Manpower

The Health and Safety legislation require that personnel deployed are suitably trained, experienced and supervised by a competent person. All lifting operations are to be controlled by an appointed person in accordance with BS7121 and LOLER regulations.

Plant for Lifting

A suitable appliance is required for off-loading and assembly if required. The machine lifting capacity and clearance under the lifting point should be checked against the sizes and weights of the box components and against the assembly/ dismantling stages.

WARNING : If an excavator is being used for lifting operations, refer to safety information in the "Lifting Chains" User Guide.

Lifting Chains (available from Altrad Generation)

Lifting Chains of suitable length and capacity complete with current certification.
Typically for Trench boxes a set of 4 leg 10mm chains with 3m leg length complete with safety hooks and shortening clutches. (Weight: 37Kg).

Edge Protection, Access and Hard Standing Areas

These include:-

- Suitable area to off-load the lorry and assemble the Trench box.
- Suitable hard standing for the machine to operate to lift the box into the trench.
- Suitable access equipment (ladder or staging) for attaching lifting chains.
- Ladders and possibly other provisions to provide safe access into and out of the trench.
- Edge protection, ladders and possibly other provisions to provide safe access into and out of the trench. (Edge protection and ladder access platforms can be supplied by Generation UK Ltd).

Return of Equipment Off-Hire (Important)

Clients should ensure that on removal, the equipment is returned in sections as supplied.

Stacking, Handling and Transportation

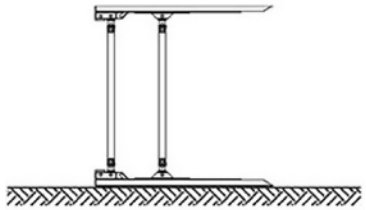
In Dismantled Form and in Transit

Base and extension panels should be stacked as shown with suitable timber dunnage. (Max 6 panels per stack). Strut components and pins etc should be stored in skips / bins.
During transportation stacks should be securely restrained to the vehicle bed.

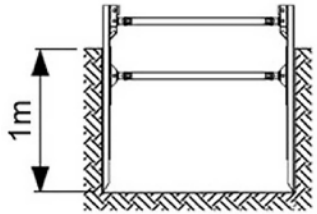
Site Storage

If not in use, separate base boxes from extension boxes. Dismantle extension boxes and store as above. Base boxes should be stored on their side or temporarily dug in when not in use (see below). Uneven or sloping ground or wind loading can result in inadequate stability if left upiright.

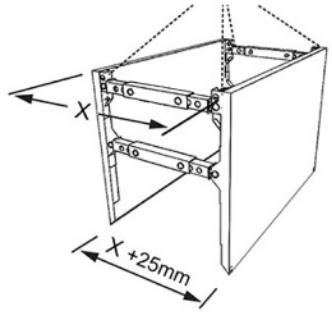
Lie base boxes on their side



or leave them temporarily dug in 1m

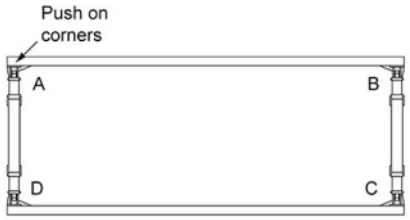


Installation of the Trench Box



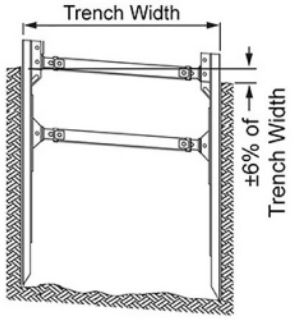
After standing upright the box width (x) will have a "toe-out" at the cutting edge of 25mm. Check all pins and safety clips are in place. Lift the box using the four leg chain sling attached to the lifting points at the top of each panel.

Installation of the Trench Box

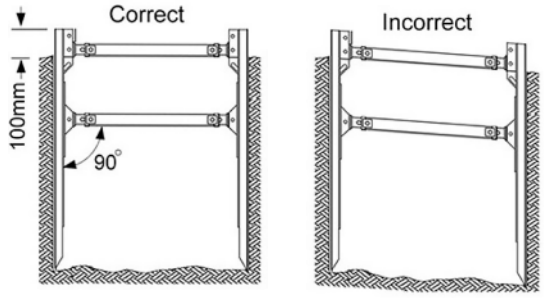


Dig the trench approx. 600-1000mm deep to the correct width, and using the four leg sling place the box in the trench. By digging between the box panels and pushing down on the ends of the panels, the box can be installed to the correct depth. Always dig below the panels before pushing down. Push only on the corners of each panel and never in the middle.

When pushing the box panels down, always push down in the sequence shown and never diagonally across corners. i.e. push A then B followed by C then D, and not A then C or B then D.



During the dig and push operation restrict the advance of one panel over the other to 6% of the box width.



When the required trench level is reached and the box sunk to full depth, ensure that the struts are horizontal and at right angles to the panels before entering the trench.

DO NOT use any unsupported part of the trench for access. Leave the top of the box 100mm above the surrounding ground level.

Installation and Extraction of the Trench Box

Backhoe Trench Box Installation Instructions

- Excavate to required depth moving any spoil safely away from the edge of the excavation.
- Lower trench box into the excavation using Generation four leg lifting chains.
- Connect top box using the welded backhoe box connector and secure using connector pins and R clips.
- Lift and lower the base and top into pre dug trench as a single unit.
- The lengths of the unsupported excavation should not be more than the length of the Box.
- Any gaps between the trench walls and the installed shoring must be backfilled and compacted.
- If using end panels, insert into excavation ensuring min contact of 150mm each side with box panels and backfill against to secure excavation.
- Attach Generation trenchguard & laddersafe module to top edge of panel (see Trenchguard & Laddersafe installation manual)

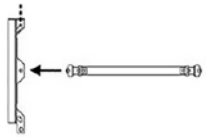
Extraction Process

- Reversal of installation process using a Generation snatch chain to apply force to each corner lifting point of panel to break any adhesion caused by ground settlement. Maximum of 500mm increments is recommended.
- Always backfill and compact when extracting trench box and never leave any unsupported ground.
- Always use lifting points, never lift or extract the box using the struts as damage will occur.

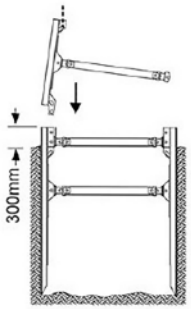
Installation of the Extension Box
(Removal in reverse procedure)

It Is Recommended That To Ease Installation, The Extension Box Is Not Fully Pre-Assembled Prior To Fitting On The Base Box.

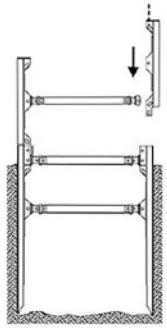
Dig and Push base box to within say 300mm of top of base box.



Lift one extension panel upright using two legs of the 4 leg chain sling (max. weight 200kg) and pin 2No. pre-assembled struts to panel using pins and 'R' clips.

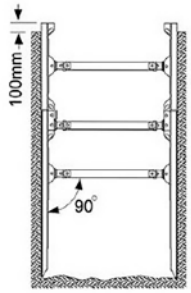


Lift the extension panel complete with struts (max. weight 268kg) and lower onto one side of the base box. Secure to the base box with pins and 'R' clips.



Lift the second extension panel upright using two legs of the 4 leg chain sling and lower onto the other base panel, at the same time locating the two number struts into the panel. Secure the panel to the base box using pins and 'R' clips.

Continue the dig and push operation until the required excavation level is reached. Ensure all the struts are horizontal and at right angles to the panels before entering the excavation.



DO NOT use any unsupported part of the excavation for access. Leave the extension 100mm minimum above the surrounding ground level.

Trench Box Maintenance

- Inspect all panels prior to entering any excavation at start of shifts
- Inspect all pins and r clips prior to entry
- Inspect all handrail components regularly and ensure that all screw threads are tight

Summary do's and don'ts:

- Do:

- Use all relevant PPE at all times
- Ensure that all operatives are familiar with the safety and operating instructions
- Check that all connecting pins are in place and properly secured with R clips
- Follow the basic maintenance instructions
- Use a ladder and Laddersafe platform to enter excavations
- Provide and use all edge protection equipment supplied
- Support all stages of excavation down to required depth
- Use Generation end panels to close and support open ends of excavations.Batter trench ends sufficiently if not using end panels
- Inspect and use all red lifting points prior to and during lifting and ensure all personnel are away from operation and excavator slewing area.
- Always take measures to avoid risk of falls from height
- Always take measures to avoid trapping of fingers or limbs in equipment

Do not:

- Install box in very weak grounds such as very soft clays or peat.
- Move box with personnel inside
- Place box unattended on sloping ground, always ensure box is self supporting.
- Move boxes by pulling or lifting on struts or spacers
- Use more than two extension boxes (one extension with backhoe box), without a bespoke design. Refer to max permissible ground pressures at all times.
- Use more than the allocated struts or go over max specified width externally per box.
- Use unsafe lifting equipment or practices
- Hammer the panels with the excavator
- Use the struts to enter box, always use properly secured ladder and Generation Laddersafe platform.
- Enter unsupported parts of the excavation
- Allow personnel inside box during installation
- Apply lateral loads to extensions or struts (eg: with trench sheets)
- Strike the struts when installing or extracting
- Use the struts to move or extract the box, use red lifting points only
- Drag the box in anyway
- 'Fly' the box above the base of the excavation on unsupported ground

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