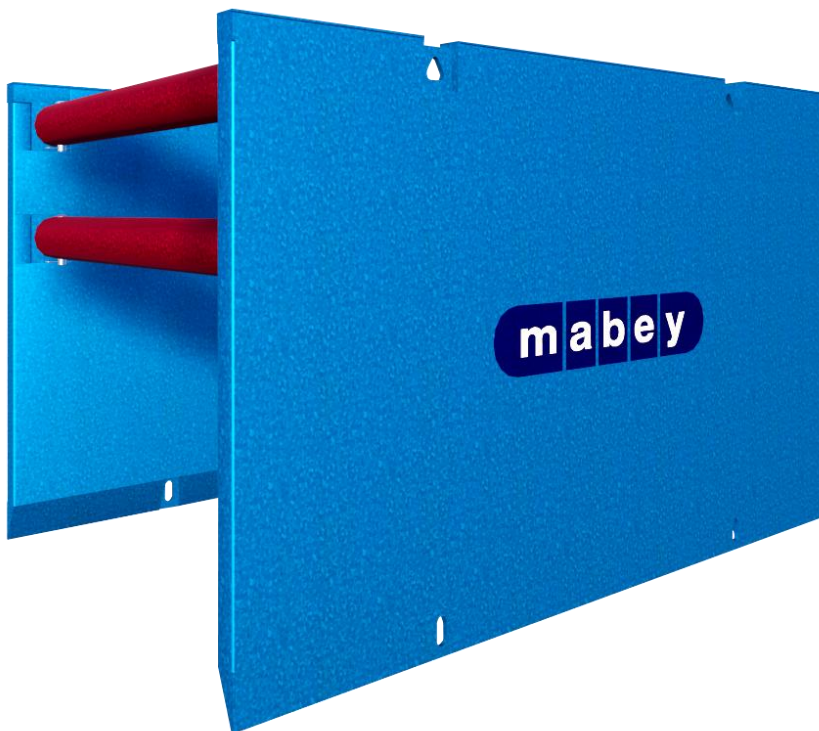


PRODUCT USER GUIDE

HEAVY DUTY SHIELD



Introduction

This booklet is intended to provide basic information for users of the Mabey Hire PTY Ltd. Steel Trench Shields system and to draw the client's attention to the practical aspects of Steel Trench Shields operational procedures and basic maintenance which need to be considered when compiling method statements, risk assessments and safe system of works. It is assumed that clients are familiar with general safe practices applicable to this type of work.

Our Heavy-Duty steel shields are designed and built for the toughest ground conditions and maximum internal working clearances. We have sourced some of the strongest steel fixed panel shields available today. All major components of the Steel Trench Shield system have handling and lifting points for safe slinging. It is not intended for other purposes.

Steel Trench Shields are not normally suitable for use in water bearing soils or in trenches crossed by frequent services. Trench Shields systems should not be used in seawater applications without prior consultation with the Mabey Hire PTY Ltd Engineering Department.

Configuration Available

- ▶ 2-Sided Trench Box
- ▶ 4-Sided Trench Box
- ▶ 2-Sided Wing Return Manhole Boxes

IMPORTANT NOTES

All excavation work must be thoroughly planned before work commences on site to identify hazards and assess risk.

These instructions form guidance for the typical installation of Trench Box Equipment. Non-standard applications should be approved by a suitably qualified engineer.

Ensure all personnel engaged in installation operations are properly briefed and adequately supervised by a competent person,

All hire for this equipment will usually be accompanied by a general arrangement or scheme specific drawing. This must be read in conjunction with these instructions.

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1. General Guidance notes

Safe System of Work

Assuming that the appropriate Aluminium Trench Shields has been selected for use, the Health and Safety at Work Act requires that a safe system of work be adapted to carry out the works on site.

These guidance notes are intended to draw the client's attention to practical aspects of Mabey Hire PTY Ltd. range of Aluminium Trench Shields components during use and basic maintenance which need to be considered when completing method statements for a safe system of work.

Access, Hard standing Areas and Site Storage

- Suitable firm, level, dry areas should be made available on-site for storage and pre-assembly work.
- Suitable lifting equipment of adequate capacity should be provided for off-loading and installation.
- Slings should always be carried out by suitably experienced and competent personnel.
- The weights of components and assemblies are given in this guide.
- Large components should be stacked, nested with suitable timber dunnage, max 3no panels per stack.
- Smaller components should be stored in skips/bins.

Personnel

The Management of Health and Safety at Work Regulations require that personnel deployed are suitably trained, experienced, and supervised by a competent person.

The main activities associated with Aluminium Trench Shields use are:

- Unloading and loading the delivery vehicle.
- Pinning components together.
- Slings and lifting the Aluminium Trench Shields into and out of the trench.

Plant and Lifting Equipment

A suitable appliance is required for off-loading, installation, and re-loading of equipment, together with lifting chains, available from Mabey Hire Pty Ltd., of suitable length and capacity and with current certification.

Warnings:

- If Aluminium Trench Shields components are to be lifted in or around an excavation, the appliance should be located at a safe distance from the edge of the excavation and the lifts and radii checked against the safe lifting capacities of the appliance. A surcharge for the appliance must have been allowed for in the excavation brief/design.

- No more than one assembled component must be lifted at a time.

Sling Warning

If a sling is to be used on an excavator, be aware of the following:

- It is very important that a means of allowing the sling to swivel be introduced above the master (top) ring. This will allow the sling, and particularly the master ring, to turn and align with the load.
- Without a swivel arrangement, the load may severely twist the master ring, resulting in damage or failure.
- All lifting accessories attached to the excavator lifting point must hang freely and be free to always move.

Small Plant, Tools, and Lifting Chains

- Lifting Chains of suitable length and capacity complete with current certification. Typically for Aluminium Trench Shield a set of 4 legs 16mm chains with 4m leg length.

Access & Egress and Edge Protection

- Install the edge protection as soon as possible before entering into the excavation.
- A competent person should inspect the means of access and egress regularly.

During Installation Works

- Check that all bolted connections remain tight.
- Check that all pinned connections are intact and complete with an 'R' clip, where required.
- Avoid striking equipment or loading it inappropriately.

After Installation Works

Each excavation must be inspected daily before personnel begin work.

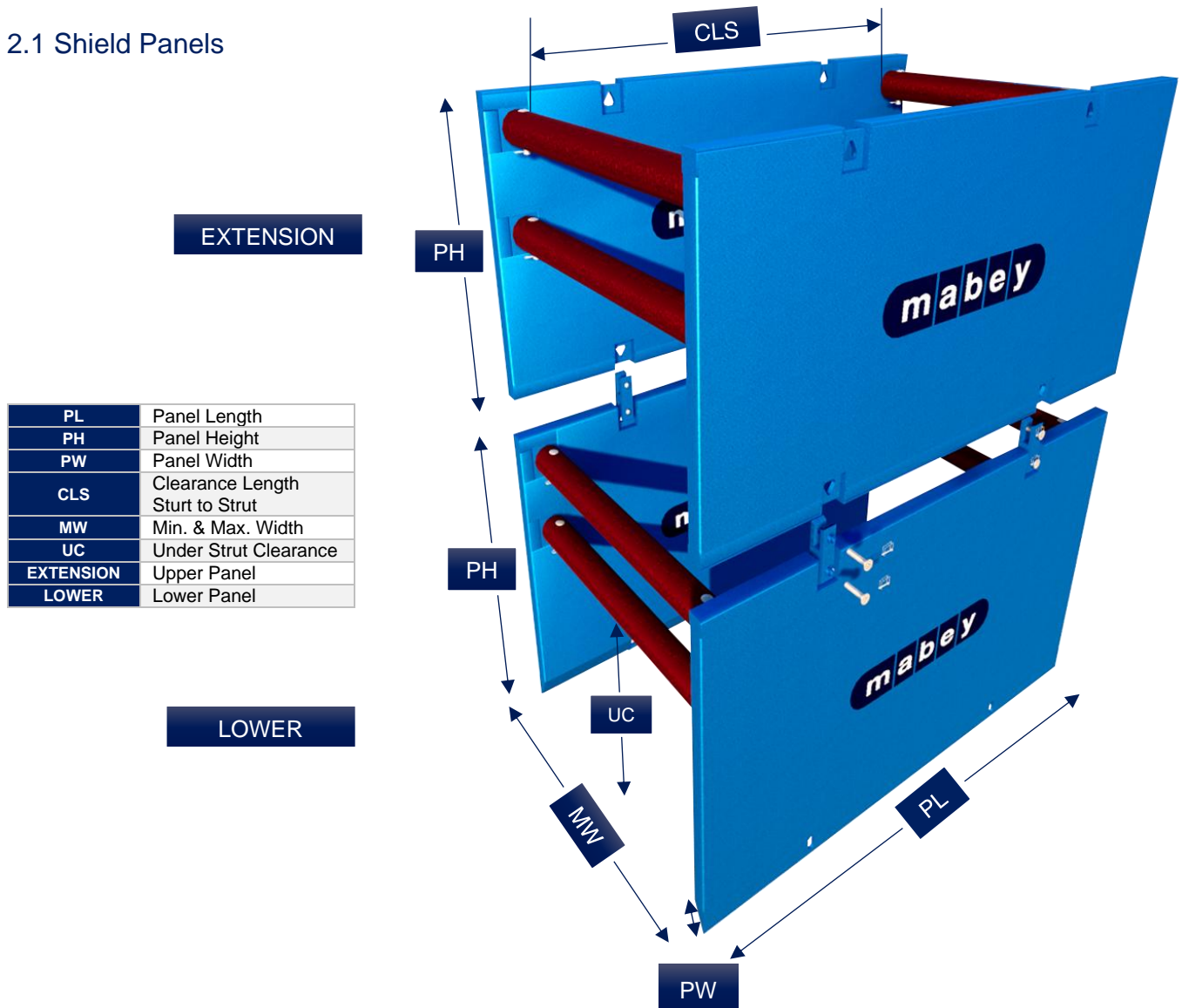
Return of Equipment Off-Hire

Clients should ensure that on removal, the equipment is returned clean and assembled as supplied.

Ensure all equipment is loaded to the satisfaction of the vehicle driver and is securely restrained to the vehicle bed.

2. Component Identification

2.1 Shield Panels



2.2 Connectors & Extensions



Extension Connector
 Weight: 7.5 kg
 Dimensions: 100x100x9mm
 Length: 300mm
 To be used with **H Bracket**
Pin: ø38mm x 150mm long
 Weight: 1.5 kg



Strut Extensor for High Clear Arch
 Weight 8": 25.5 kg
 Length: 475 mm
 To be used with 8" Inch strut to give additional 250mm Strut Length



Corner Strut Connector 4-Sided Box
 8" Weight: 57.0 kg

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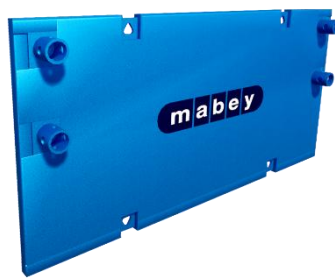
2.3 Shield Details

Panel Type	Panel Length PL (mm)	Panel Height PH (mm)	Panel Width PW (mm)	Clearance Length CLS (mm)	Min Width MW (mm)	Max Width MW (mm)	Under strut Clearance UC (mm)	Safe Working Load (kPa)	Unit Weight (kg)
Manhole Base	2400	2400	104	2100	1500	4000	1200	103	1200
Lower	4000	2400	104	3370	600	6000	1500 – 2300*	88 - 56*	1385
Extension	4000	2000	104	3370	600	6000	1040	100	1230
Lower	5000	2400	104	4370	600	6000	1498	60	1665
Extension	5000	2000	104	4370	600	6000	1041	61	1440
Lower	6000	2400	155	5370	600	6000	1625	60	2185
Extension	6000	2000	155	5370	600	6000	1040	62	1940

* High Clear Bars “Type 1” are Not compatible with 6.0m Lower Panel. Under Strut Clearance 2.30m.
See “Type 2” Steel High Clear Bars System for different high clear variation.



HD-Shield Lower
Weight: Refer to Table

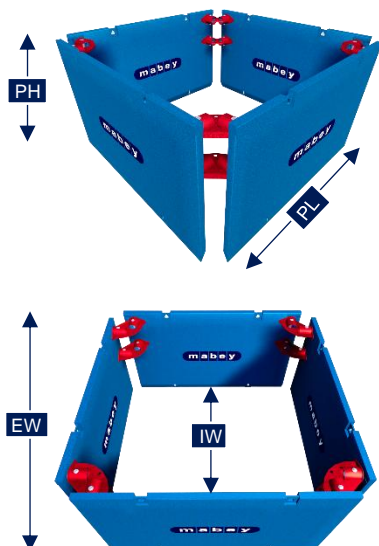


HD-Shield Extension
Weight: Refer to Table



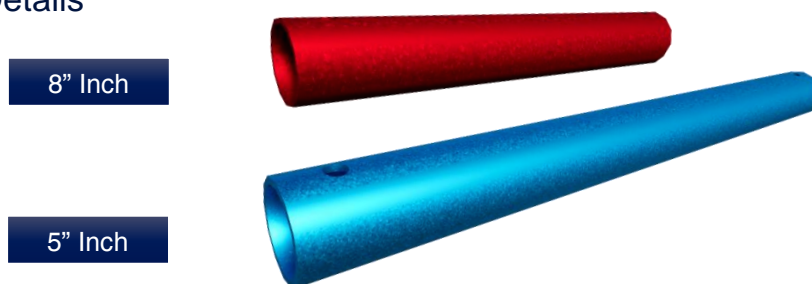
HD- Shield Manhole
Weight: Refer to Table

2.4 Sided Box Details



Panel Type	Panel Length PL (mm)	Panel Height PH (mm)	Internal Width IW (mm)	External Width EW (mm)	Safe Working Load (kPa)	Unit Weight (kg)
Lower	4000	2400	4210	4350	88	6000
Extension	4000	2000	4210	4350	100	5380
	5000	2400	5350	5560	60	7120
Extension	5000	2000	5350	5560	61	6220
Lower	6000	2400	6350	6660	60	9200
Extension	6000	2000	6350	6660	62	8220

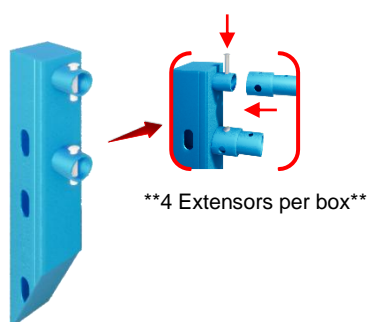
2.5 Strut Details



Length (mm)	600	1000	1200	1500	1800	2000	2500	2800	3000	3500	3800	4000	4500	4800	5000	5500	5800	6000
Weight 5" (kg)	X	X	X	2540	2630	2650	X	X	X	X	X	X	X	X	X	X	X	X
Weight 8" (kg)	39	65	78	97	117	130	163	182	195	228	248	260	293	312	325	358	377	390

Standard Strut *141.3 – 5"only used with Manhole Boxes
8" CHS used up to 6.0m Long – 65 kg/m

2.6 High Clear Arch & Connector Pin

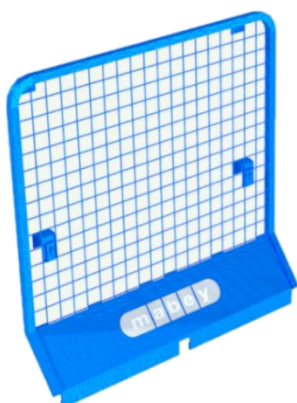


TYPE 1 - High Clear Arch
Weight 8": 340 kg / Wide: 375mm
Strut Extensor Available



Connector Pin & "R" Connector
Weight: 3.9 kg
HD Steel boxes Pin \varnothing 46.0mm x 290mm long.

2.7 Protection Components



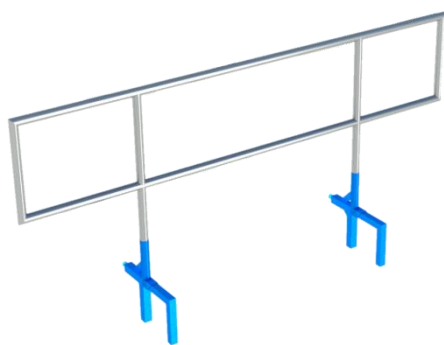
Sheet Guard Barrier
Weight: 9.0 kg



Access Platform
Weight: 110 kg

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Aluminum Handrail

Length	2.0m	2.4m	3.0m	4.0m
Weight	13.5 kg	14.5 kg	19.8 kg	21.6 kg

*Adjustable Clamping included in the weight (4.0km)



Davit Arm
Weight: 42 kg

3. Before Installation

Maximum Depth

Generally Suited to a lower and upper box assembly configuration. However, depending upon ground conditions and installation methods, greater shored depths may be achievable.

Deflection

As per AS4744.1 Section 5.3., the Maximum Span in the system is defined by **Span/60**. ie., the distance between struts.

Pulling Force

The minimum WLL of a single lifting point on any box panel 4.2 T (FOS of 3) or 11.27 T for 4no. lifting points. This rated capacity is for any angle between vertical and 60° from vertical.

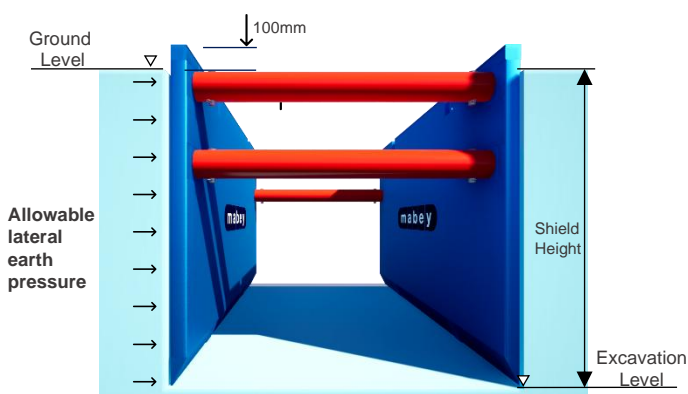
A minimum of 2 chains must always be used when lifting individual box panels. A minimum of 4 chains must always be used when lifting built up box system. Additional care must be used if using a single chain to pull on lifting points where a trench box system is held tightly in the ground.

Rated System Capacity

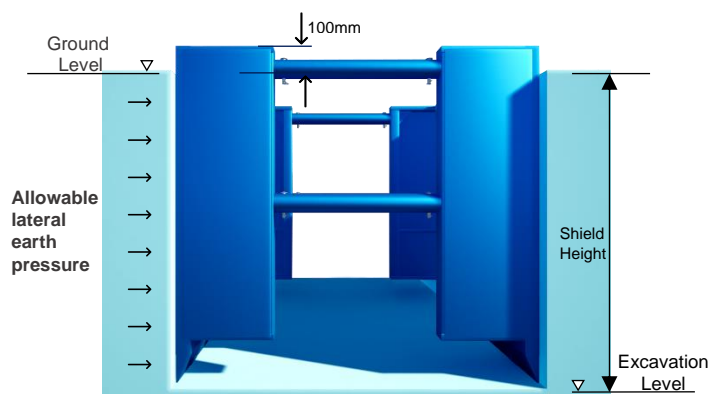
Users are advised to check that their excavations will not impose greater working earth pressures than they recommended.

For working earth pressures of Versa Shield System Box and Manhole Box, please refer to Shield Details Table page 5.

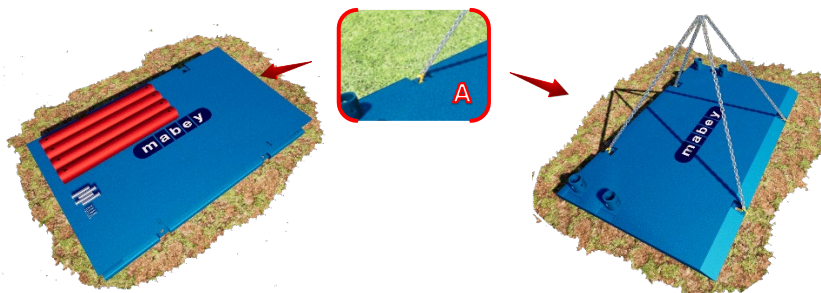
Rated System Capacity - Shield



Rated System Capacity - Manhole



4. Typical Site Assembly - Lifting & Installation - Shield

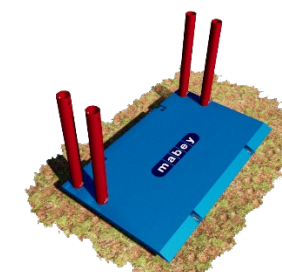


1. Remove panels from the truck by lifting panels with 4 point lift lugs. Detail "A"

2. Place a panel flat on the ground with the collars/channel/ribs facing up.



3. Connect the struts to the panel using the pins and clips, as shown in Detail B. The "R" clips should always be on the inside part of the structure for any Versa Shields to protect them.



4. Check all struts are properly attached and secure before place and connect the second panel



5. Lift the second panel onto the struts and secure it with the pins and clips. For struts, longer than 3.0m, lay the second panel on the ground and connect as shown in Detail C.

6. Lift the unit slowly into a standing position using either a four-leg chain or sling connected to the lifting lugs provided (2 per panel at the top edge).

Do **NOT** lift the shield with the chain sling attached to the struts.



Ensure the struts are horizontal and at right angles to the panels.



7. Pre-excavation max. 1.0 m and not more than one shoring section length. In principle, the pre-excavation complies with the type of soil and safety regulations. We advise expressly that is forbidden to enter the danger area during the installation and the reinstallation.

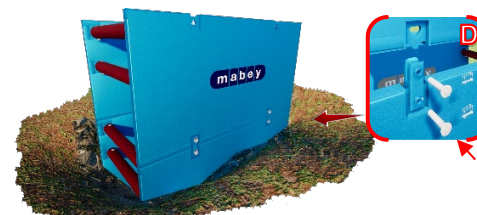
8. Check to make sure all pins and clips are secure. Once the trench is dug to the required width and depth, lift the shield(s) using the four-leg chain sling attached to the four lifting points at the top of the uppermost pair of panels and place the shield into the pre-dug trench.



9. If the shield is not on the base of the excavation, gently with the machine push each corner down to make sure the shield is safely in place and will not suddenly slide down into the excavation.



10. Continue excavation to level by dig and push. Once the shield is in place, remove the chains or slings. Leave the top of the shield 100mm above the surrounding ground level. **Do NOT** use any unsupported part of the trench for access.

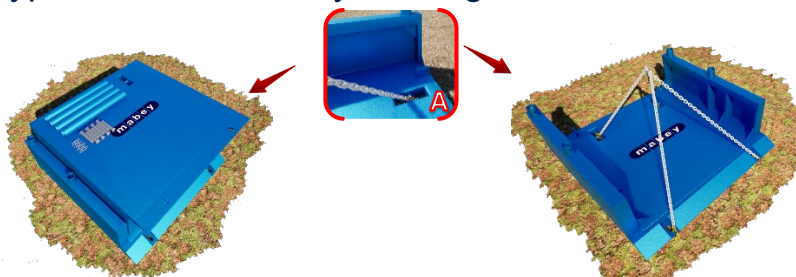


11. If the trench depth requires multiple shields, they can be connected on top of each other using the "Extension Connector" bracket and its clips, as shown in Detail "D". Once the shield is in place, remove the chains or slings. If the shield is not on the base of the excavation use the dig and push method.

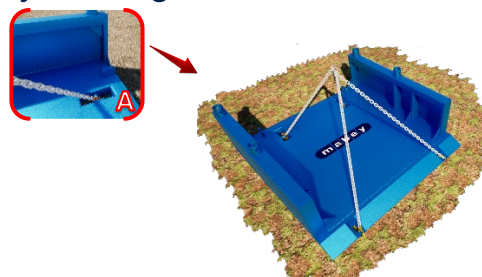


12. Backfill any gap between the pre-dug trench and the shoring box. The ends of the shoring should be suitable benched or have suitable end panels that **Do NOT** bear onto the struts. It is Advisable the use of Safety Equipment.

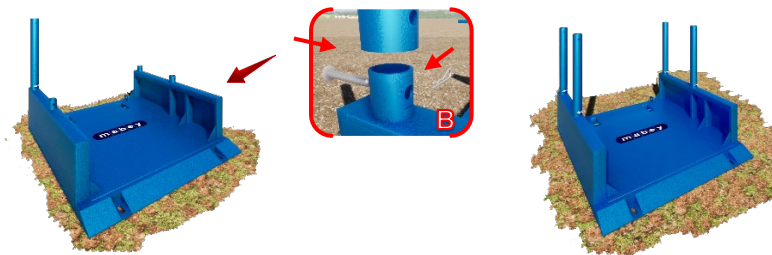
4.1 Typical Site Assembly - Lifting & Installation - Manhole



1. Remove panels from the truck by lifting panels with 4 point lift lugs. Detail "A"



2. Place a panel flat on the ground with the collars/channel/ribs facing up.



3. Connect the struts to the panel using the pins and clips, as shown in Detail "B". The "R" clips should always be on the inside part of the structure for any Versa Shields to protect them.

4. Check all struts are properly attached and secure before place and connect the second panel



5. Lift the second panel onto the struts and secure it with the pins and clips. Not suitable for struts longer than 3.0m.



Do **NOT** lift the shield with the chain sling attached to the struts.

6. Lift the unit slowly into a standing position using either a four-leg chain or sling connected to the lifting lugs provided (2 per panel at the top edge).



Ensure the struts are horizontal and at right angles to the panels.

7. Pre-excavation max. 1.0 m and not more than one shoring section length. In principle, the pre-excavation complies with the type of soil and safety regulations. We advise expressly that is forbidden to enter the danger area during the installation and the reinstallation.

8. Check to make sure all pins and clips are secure. Once the trench is dug to the required width and depth, lift the shield(s) using the four-leg chain sling attached to the four lifting points at the top of the uppermost pair of panels and place the shield into the pre-dug trench.



9. If the shield is not on the base of the excavation, gently with the machine push each corner down to make sure the shield is safely in place and will not suddenly slide down into the excavation.



10. Continue excavation to level by dig and push. Once the shield is in place, remove the chains or slings. Leave the top of the shield 100mm above the surrounding ground level. **Do NOT** use any unsupported part of the trench for access.

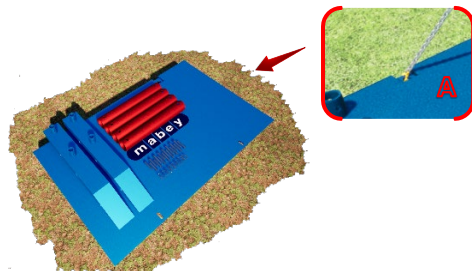


11. Once the shield is in place, remove the chains or slings. If the shield is not on the base of the excavation use the dig and push method.

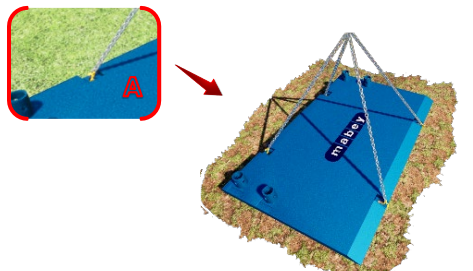


12. Backfill any gap between the pre-dug trench and the shoring box. The ends of the shoring should be suitable benched or have suitable end panels that **Do NOT** bear onto the struts. It is Advisable the use of Safety Equipment.

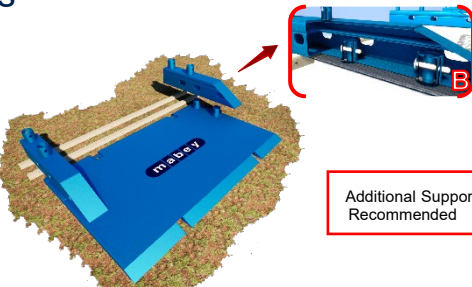
4.2 Typical Site Assembly - Lifting & Installation - High Clear Arches



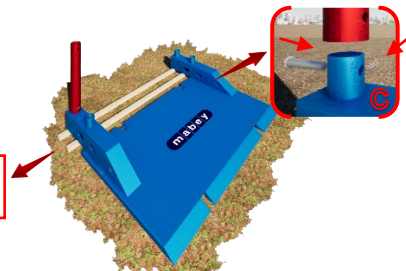
1. Remove panels from the truck by lifting panels with 4-point lift lugs. Detail "A"



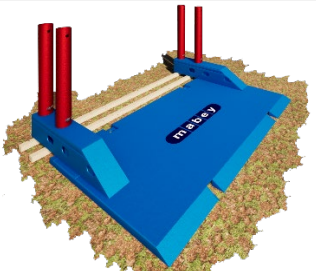
2. Using a 4-leg chain connected to all lifting points. lift one lower box panel and place it on timber skids, with strut channels facing upwards. Detail "A".



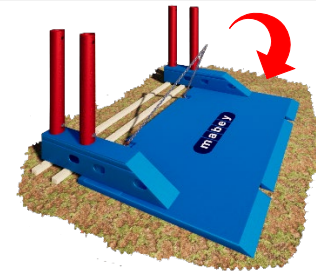
3. Connect the High Clear Arches to the panel using the pins and "R" clips through the cavity access of the High Clear, as shown in Detail "B".



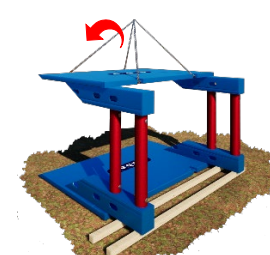
4. Connect the Struts to the High Clear Arches using the pins and clips, as shown in Detail "C". The "R" clips should always be on the inside part of the structure for any Versa Shields to protect them.



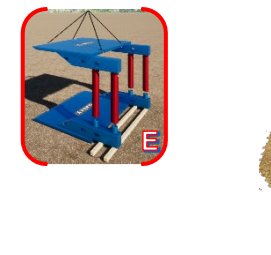
5. Check the Arches and struts are properly attached and secure before placing and connecting to the second panel.




6. Attach two hanging chain legs to the lifting points of the shield. Rotate the assembly as shown until the unit is safely positioned with the base of the arch on the ground. "Detail D".




7. Position the arches and struts and ensure pin holes on the struts/arches on the panels are aligned Detail "E". Install pins and clips. Attach 4 hanging chain legs to the lifting lugs of the upper panel. Shorten or relocate lifting points of chains where required, to rotate the shoring box assembly as shown.




8. Lift the unit slowly into a standing position using either a four-leg chain or sling connected to the lifting lugs provided (2 per panel at the top edge).




9. Pre-excavation max. 1.0 m and not more than one shoring section length. In principle, the pre-excavation complies with the type of soil and safety regulations. We advise expressly that is forbidden to enter the danger area during the installation and the reinstallation.



10. Lower the shoring box assembly into a pre-dug trench. Once the shield is in place, remove the chains or slings. Continue to excavation to level by dig and push. The customer must provide that stability of this temporarily un-supported trench is assessed as stable throughout the duration of the work.



11. Leave the top of the shield 100mm above the surrounding ground level and backfill any gap between the pre-dug trench and the shoring box. Install end panels assemblies, if and where required. **Do NOT** use any unsupported part of the trench for access. It is Advisable the use of Safety Equipment.



12. If the trench depth requires multiple shields, they can be connected on top of each other using the "Extension Connector" bracket and its clips, as shown in Detail "F". Also four Strut Extensors must be used in one side of the upper box as shown in Detail "G". If the shield is not on the base of the excavation use the dig and push method.

Ensure pin holes on strut channels and high clear arch are aligned

Additional Support Recommended

Ensure the struts are horizontal and at right angles to the panels.

UPPER AND LOWER SHIELD ASSEMBLE

Do NOT lift the shield with the chain sling attached to the struts.

IMPORTANT: The Versa Square Box System creates a stiff and rigid shoring system that Does Not allow significant Panel / Strut movement and is therefore more suitable for Dig and Drop Installation Method.

4.3 Typical Site Assembly - Lifting & Installation – Square Box – (Four-sided boxes can be very heavy therefore only a lower is shown in the installation sequence)

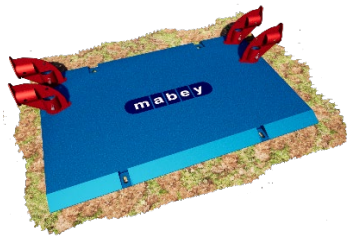


1A. Remove panels from the truck by lifting panels with 4-point lift lugs. Detail "A"

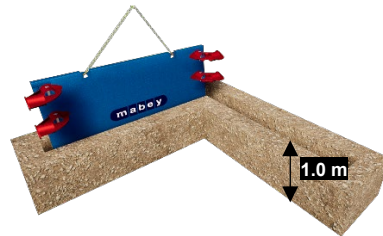
2A. Using a 4-leg chain connected to all lifting points, lift one lower box panel and place it on timber skids, with strut channels facing upwards. Pin the four corner struts into the panel using standard pins and 'R' clips provided as shown in Detail "B"

3A. Connect the corner struts into the second panel using pins and 'R' clips provided. The customer is to provide adequate support to prevent overturning of the system. Pin and corner strut must be connected at the same location that is suggested in standard box construction.

4A. Attach 4 chains to four upper lifting points and carefully rotate the panel assembly to a standing position. The assembly shall remain on a stable, firm, and flat ground surface. Detail "C". Continue Step "5"

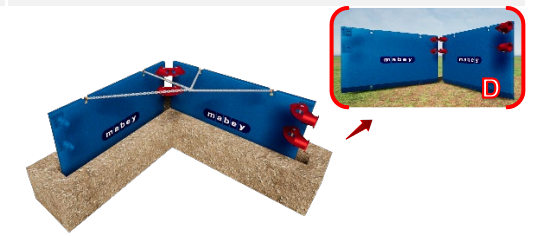


1B. Using a 4-leg chain connected to all lifting points, lift one lower box panel and place it on timber skids, with strut channels facing upwards. Detail "A". Pin the four corner struts into the panel using standard pins and 'R' clips provided.



2B. Excavate two trenches (as shown). The trench should work as temporary support for two (perpendicular) panels to stand vertically. Lower first panel into the trench. customer is to ensure that the trench will always remain stable.

3B. Lower the second panel into the trench. Ensure there is enough reach and maneuvering space for site personnel to connect the two panels. Pin the corner struts into the second panel using pins and 'R' clips provided.



4B. Attach 4 chains to the upper lifting points and lift the box out of the trench. Relocate the assembly to rest on a stable, firm, and flat ground surface. As shown Detail "D"



5. Ensure the second and third panels are parallel, leaving enough clearance to install the fourth panel. A Standard strut can be, alternatively, used on the end opening to create a three-sided shoring system.



6. Connect the fourth panel to the assembly using four corner struts, pins, and 'R' clips provided.

Do **NOT** lift the shield with the chain sling attached to the struts.



An Upper box maybe added and connected to a lower using extension connectors



7. Attach 4 chains to the upper lifting points and lower the box assembly into the pre-dug hole. The customer is to ensure this temporarily unsupported excavation is stable throughout the duration of the work.

8. Backfill any gap between the pre-dug excavation and the shoring assembly with self-compacting materials. Excavator and site personnel are to be located at a safe distance away from the excavation when the box assembly is lowered into the excavation.

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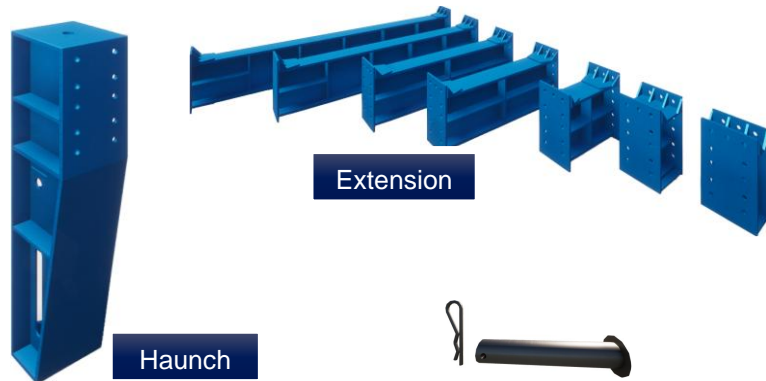
HEAVY DUTY SHIELD

5. Alternative Steel High Clear Bars- Type 2

Heavy Duty High Clear Bars system can be fitted on HD Steel & Aluminium Trench box range allowing 2400mm under strut clearance. Various widths are available to suite your onsite requirements. HD High Clear Bars system is ideal for applications such as the laying of large diameter pipes.

Assembly onsite is quick and easy, with a range of bolt-on struts enabling the spreaders to be pinned in place on Heavy Duty Shields and some of the biggest Versa shields, to create exceptionally high clearances (see tables below)

TYPE 2 Steel High Clear Bars Weights		
Components	Weight	Units
Haunch	620	kg
0.3m extension	270	kg
0.5m extension	332	kg
1.0m extension	440	kg
2.0m extension	700	kg
2.5m extension	835	kg
3.5m extension	1044	kg
4.5m extension	1310	kg



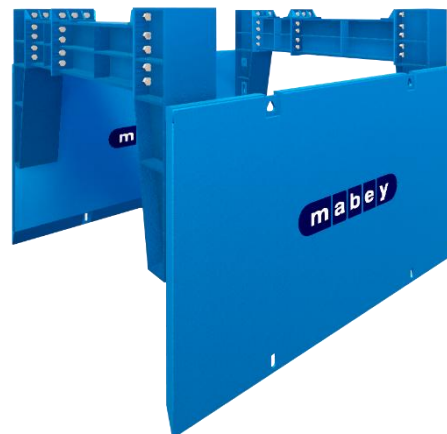
To be used with **H Bracket Pin**:
ø60mm x 330mm long
Weight: 7.5kg

High Clear Bars with HD Steel Shield System

kPa Rating	Panel Width (mm)	Panel Type	Strut Size (mm)										
			1000	1500	2000	2500	3000	3500	3800	4000	5000	5800	6000
88	104	4000 x 2400 Lower	5250	5920	6130	6800	6650	6920	7460	7590	8010	8410	8540
60	104	5000 x 2400 Lower	5810	6480	6690	7360	7210	7480	8020	8150	8570	8970	9100
60	155	6000 x 2400 Lower	6850	7520	7730	8400	8250	8520	9060	9190	9610	10010	10140



Versa Shield



HD Steel Shield

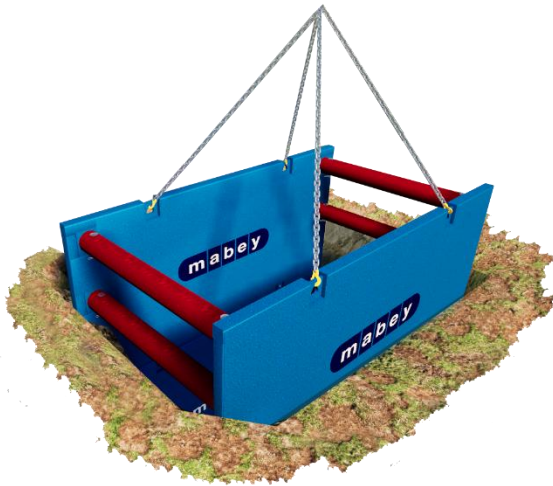
High Clear Bars with Versa Shield System

kPa Rating	Panel Width (mm)	Panel Type	Strut Size (mm)											
			1000	1500	2000	2500	3000	3500	3800	4000	5000	5800	6000	
99	181	5000 x 2400 Lower	4580	5260	5460	6140	5980	6260	6800	6920	7340	7740	7880	
36	181	7200 x 2400 Lower	5880	6560	6760	7440	7280	7560	8100	8220	8640	9040	9180	

PRODUCT USER GUIDE

HEAVY DUTY SHIELD

6. Extraction of a Heavy-Duty Shield Box



To extract the shield from the trench, attach the chain sling as for installation (using the four topmost lifting points on the shield) and lift the shield vertically out of the trench.

If the shield is tight in the trench, place the lifting chains on the two lifting lugs at one end of the shield. Lift this end of the shield slightly and then reposition the chains to the other end of the shield and lift slightly.

Continue to swap the chains from one end of the shield to the other, lifting slightly each time until the shield is loose in the trench and can then be removed in the normal fashion using all four legs of the sling on the top four lifting points.

7. General

Basic Maintenance

- ▶ Regularly check that all pins are in place and 'R' clips fit.
- ▶ Replace damaged components.
- ▶ Remove debris from Pins and 'R' clips.
- ▶ Avoid laterally loading the struts-either by hanging or propping them from them or accidentally striking them with the site plant.

Do's and Don'ts

- ▶ DO use a ladder to enter the working space between the struts of the shield.
- ▶ DO wear a safety helmet to minimize the risk of head injury.
- ▶ DO ensure that the excavator operator is aware of your intentions.
- ▶ DO ensure that the unsupported part of the trench is safely battered.
- ▶ Do NOT climb up or down the struts.
- ▶ Do NOT use any unsupported part of the trench for access.
- ▶ Do NOT move the shield when personnel is inside it.

Since our policy is one of continual improvement, components may vary in detail from the descriptions given in this publication.

While information in this Guide is correct at time of printing, product specifications and product availability are subject to change without further notice. Please visit our website for the most up to date information. Job site photos are strictly intended for general product illustration only and may not comply with all applicable safety standards or site requirements. Specification data has been taken from manufacturers' serialised specific tabulated data.

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