

OPERATING MANUAL

FlexShield



Operating manual is intended to provide basic information for users of the SafeXTrench system and to draw the client's attention to the practical aspects of FlexShield 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. It is advisable, before commencing installation, to read the notes and to become familiar with the procedures Involved when using the SafeXTrench system.

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Contents

General Guidance Notes	3
System Drawing	4
Technical Parameter	5
Assembly Instructions	6
Installation Instructions	7
PPE, Dos & Don'ts	11

General Guidance Notes

Safe System of Work

- Peraturan – Peraturan Keselamatan Dan Kesihatan Perkerjaan (Kerja Pembinaan) (Reka Bentuk Dan Pengurusan 2024).
- Occupational Safety and Health (Construction Work) (Design and Management) (Regulations 2024) require that a safe system of work is adopted to carry out the works on site.
- These guidance notes are intended to draw the client's attention to practical aspects of SafeXTrench. FlexShield 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.
- The weights of components and assemblies are given in this guide.
- 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.
- Large components should be stacked, nested with suitable timber planks, max 3 nos panels per stack.
- Smaller components should be stored in storage cabin/bins.

Personnel

- Flexshield system should only be installed and removed by competent persons in strict accordance with a design & installation sequence.
- The competent person shall be experienced and knowledgeable of trenching and excavation procedures, soils identification, and the JKPP & CIDB guidelines.
- The competent person shall continually monitor the excavation for signs of deterioration such as seepage of water or flowing soil into the excavation. Changing soil conditions may require adjustments to the shoring system.
- The main activities associated with FlexShield use are :
 - Unloading and loading the delivery vehicle.
 - Assembling components together on ground.
 - Slings and lifting the Steel 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 SafeXTrench, of suitable length and capacity and with current certification.

WARNINGS:

- If FlexShield components are to be lifted in or around an excavation, the machineries should be located at a safe distance from the edge of the excavation and the lifts and ready checked against the safe lifting capacities of the appliance. A soil temporary stock pile surcharge and machineries weight must have been allowed for in the excavator 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 in particular 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 move at all times.

Small Plant, Tools, and Lifting Chains

- Lifting Chains of suitable length and capacity complete with current certification. Typically for FlexShield a set of 4 legs 16mm chains with 4m 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 connection remains tight.
- Check that all pinned connection is intact and complete with a pin where required.
- Avoid striking equipment or loading it inappropriately.

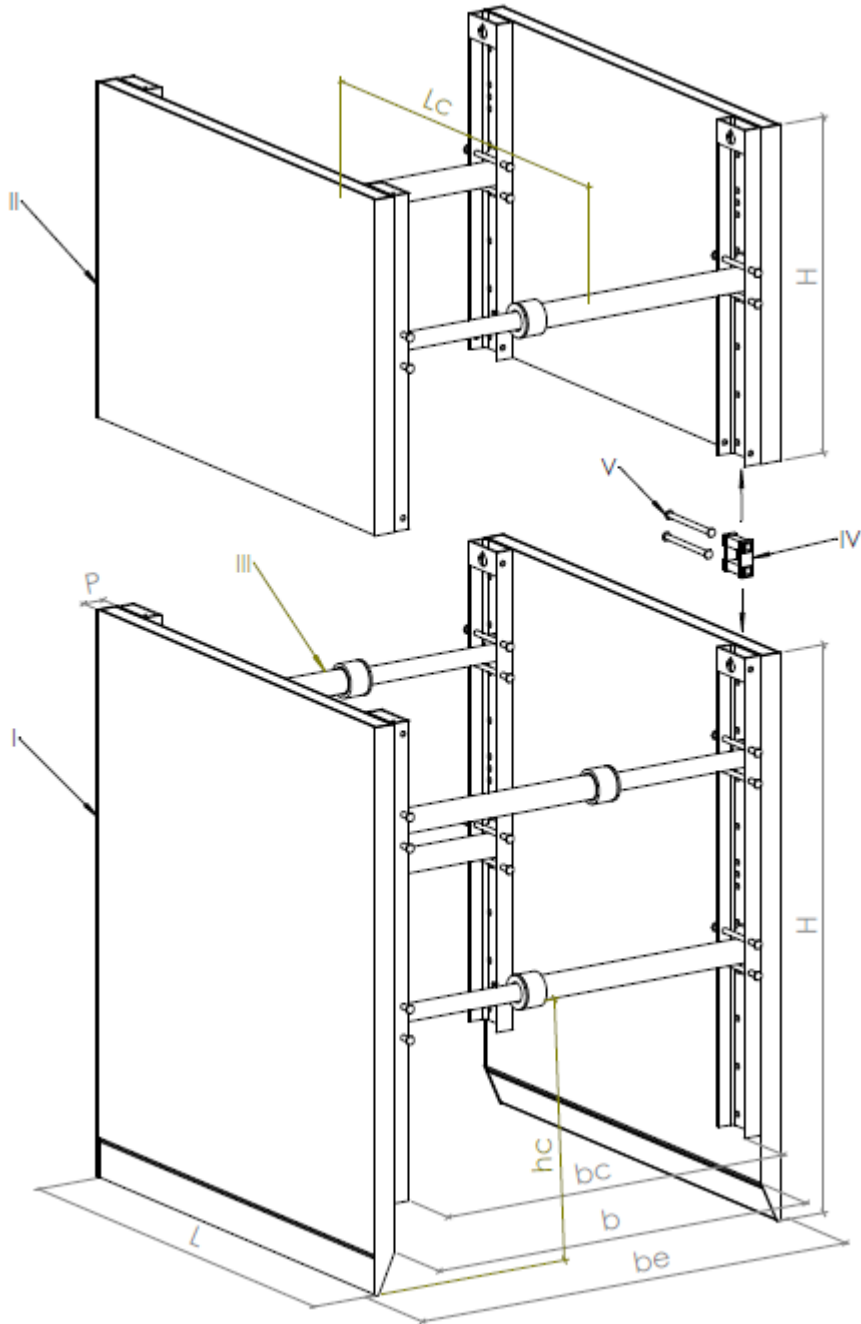
After Installation Works

- A competent person shall inspect each excavation and its protective system daily before personnel begin work, and as conditions change, including after rainstorms or other events that could increase hazards. Prior to removal of systems all hydraulic cylinders must be released and retracted, and systems pried clear of the trench wall, to avoid the need for excessive extraction forces and to avoid damaging the jack.

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.

System Drawing



I – Base panel

II – Extension panel

III – Strut (XSpindle)

IV – Panel connector

V - Pin

L – Panel length

Lc – Panel length clearance

H – Panel height

P – Panel thickness

b - Trench width

bc – Trench width clearance

be – Trench width excavate

hc – Panel height clearance

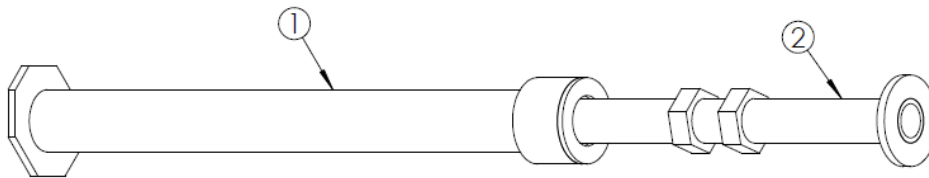
Technical Parameter

Plate thickness = 108mm

Panel length L (m)	Panel height H (m)	Panel length clearance Lc (m)	Panel height clearance hc (m)	Allowable Earth Pressure (kN / m ²)	Panel weight (Kg)
4.0	2.0	3.6	1.50	51.8	795
	2.0	3.6			970

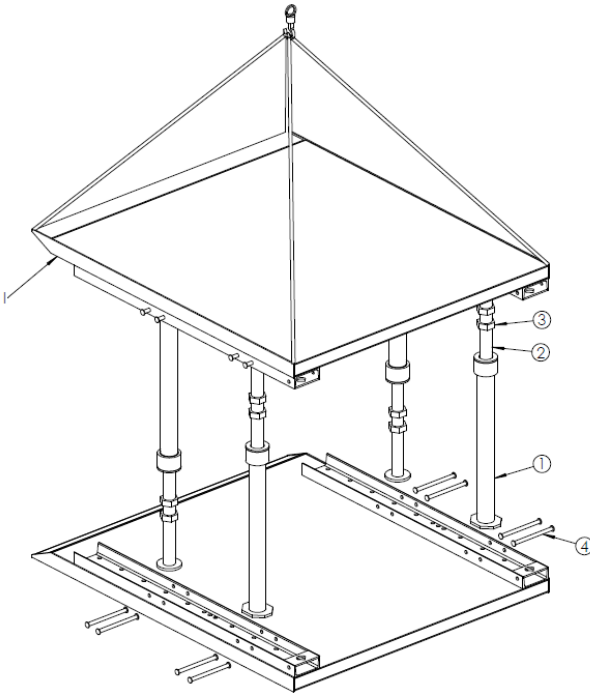
XSpindle

Trench Width clearance (m)	Type: Blue series			Allowed compressive force (kN)	Total weight (Kg)
	Part 1	Part 2	Part 3		
1.2 - 1.8	1 Nos	1 Nos	-	520	34
1.8 - 2.8	1 Nos	1 Nos	1 Nos	520	51.4
2.8 - 3.8	1 Nos	1 Nos	2 Nos	520	68.8



FlexShield 1 set

No	Description	Qty
1	Base panel	2 Nos
2	Extension panel	2 Nos
3	Strut (XSpindle)	6 Nos
4	Panel connector	4 Nos
5	Pin	8 Nos



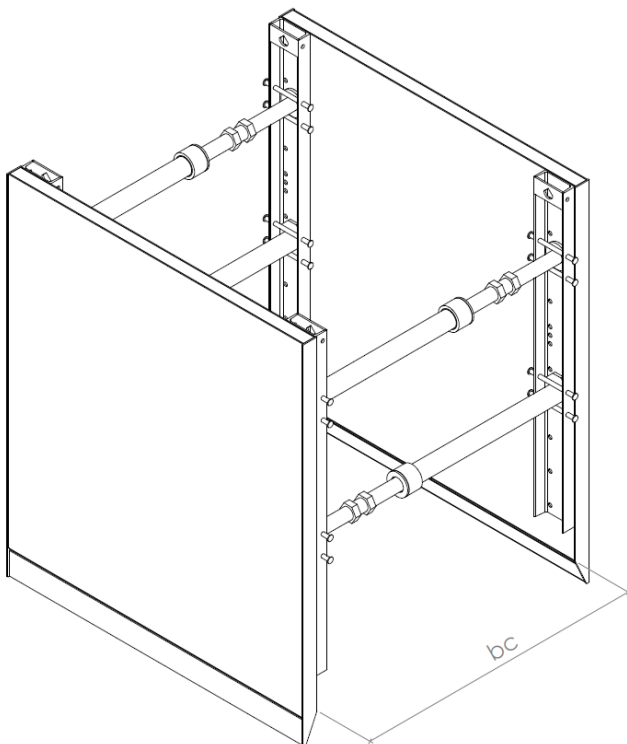
Assembly Instructions

Place the base panel on firm, level ground with the profile facing upwards.

Install the XSpindle into the panel profiles and secure it using $\varnothing 20$ mm pins, ensuring all pins are properly locked with clips.

Adjust the shoring system to the required trench width by installing the appropriate XSpindle, as specified.

After all spindles are installed, connect the next panel to the designated lifting and transport points at the top. Lower the panel from top and align it with the XSpindle of the panel below. Secure the connection using pins and clips.



Extend the XSpindle to achieve the required trench width. Care shall be taken to ensure that the bottom strut is extended approximately 30–50 mm more than the upper strut, in order to achieve the correct positioning and alignment of the shoring panels.

The shoring system shall be narrower at the top and slightly wider at the bottom to ensure proper seating and stability against soil pressure.

Installation of the top panel shall be carried out in the same manner as previously described.

Installation Instructions

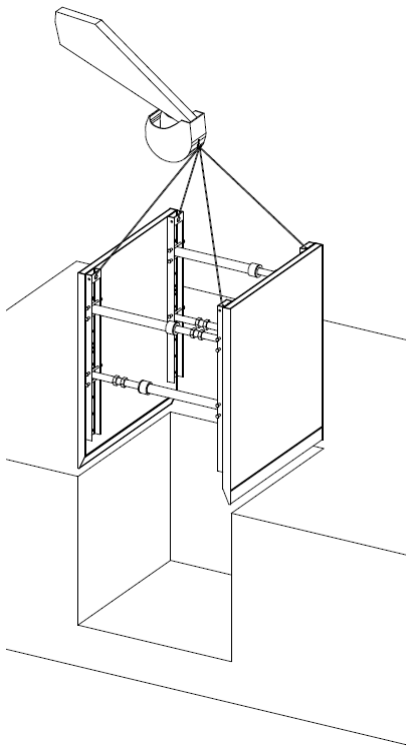
Option A: Place and Adjust Method

The shoring panel shall be installed into a fully pre-excavated trench using the *place and adjust* method.

This method is permitted only when all of the following conditions are met:

- The soil is temporarily stable
- The excavation is beyond the structural influence zone of nearby buildings or permanent structures.
- The excavation is beyond traffic surcharge zones and away from existing underground services at risk
- Minor ground settlements are acceptable

Soil shall be considered temporarily stable when no significant collapse or instability occurs during the period between the commencement of excavation and the installation of the shoring system.



For trench depths exceeding the height of a single base panel, and where the *place and adjust* method is adopted, the base and top panels shall be pre-assembled outside the trench and installed as one complete unit.

The base and top panels shall be connected using box connectors and pins, and all connections shall be secured with retaining clips.

Lifting chains shall be attached to the designated lifting eyes provided in the panel profiles, at a minimum of four lifting points.

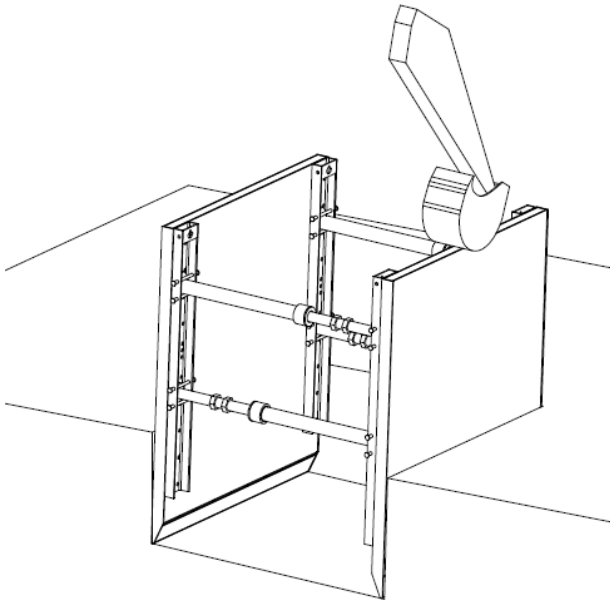
The fully assembled panel unit shall be lowered into the fully pre-excavated trench using suitable lifting equipment and approved lifting accessories.

The excavation length shall be limited to the panel length at all times. Excavation depth shall not exceed the panel height.

Any voids between the shoring panels and the soil shall be backfilled and properly compacted immediately to ensure stability.

Option B: Cut and lower method

In unstable/soft soils, the shoring has to be installed by alternately pushing in and lowering.



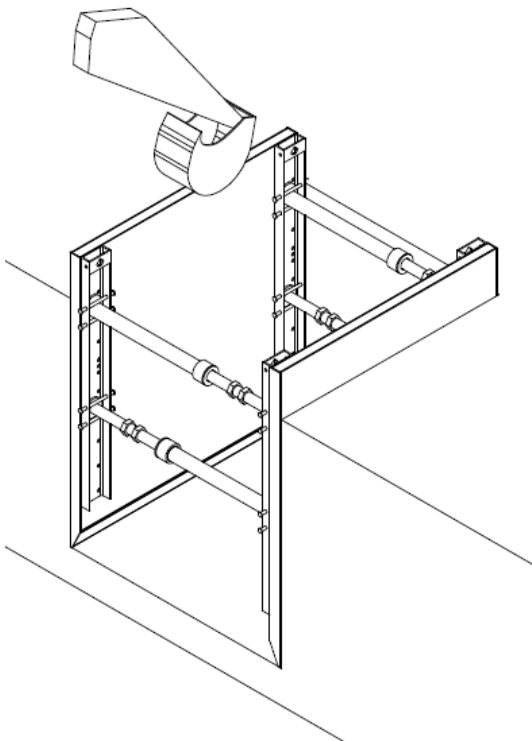
Installation of Base Panels

Pre-excavation shall be limited to a maximum depth of 1.25 m and not exceeding one shoring section length. Pre-excavation depth shall always comply with the soil conditions and applicable safety regulations.

Attach lifting chains to the four designated lifting eyes on the panel profile. Lower the base panel, pre-adjusted to the required trench width, into the pre-excavated trench. Align the panel correctly and push it into position.

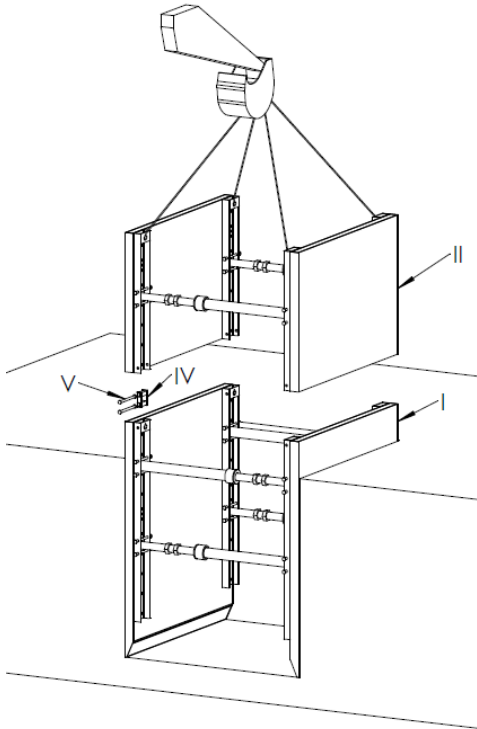
Any voids between the shoring panel and the soil shall be backfilled and compacted immediately.

Shoring panels shall be pushed in only and shall not be hammered or battered. For safety reasons, strut Xspindle shall not be pushed/pulled. During this stage, entry into the trench is strictly prohibited.



Smaller incremental pushing steps are recommended to maintain shoring stability. Pushing on any one side shall not exceed 0.5 m per stage, and the swivelling angle of the spindles shall be limited to $\pm 5^\circ$.

This procedure shall be repeated progressively until the required trench depth is achieved.

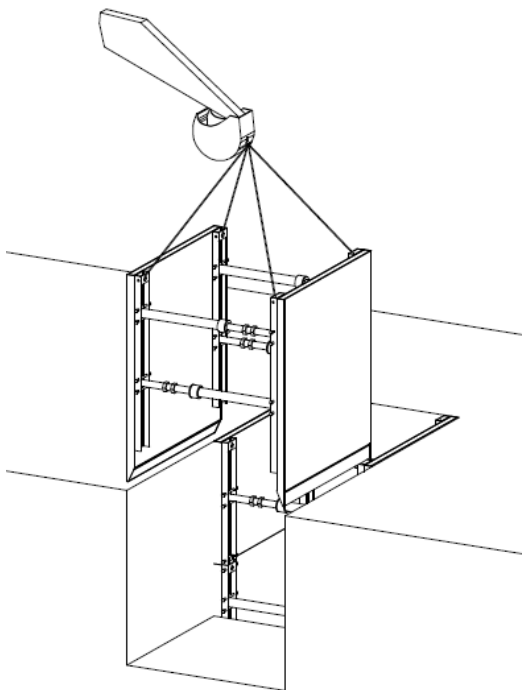


Installation of Top Panel

Where the excavation depth exceeds the height of the base panel, top panels to be added. The top panels shall be pre-assembled to the required trench width and lifted using the four designated lifting eyes. The panels shall be aligned above the installed base panel and securely connected using panel connectors and $\varnothing 20$ mm pins with clips.

Subsequent installation shall be carried out by alternating excavation and controlled pushing of the shoring panels, in the same manner as previously described.

The top edge of the shoring system shall extend at least 50 mm above the surrounding ground level to prevent soil or debris from falling into the trench.

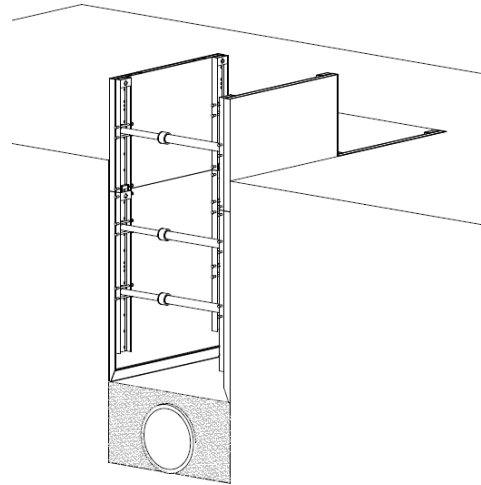
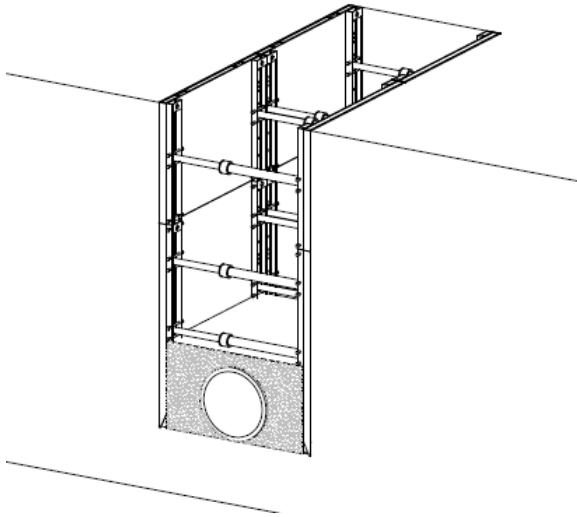


Installation of Further Shoring Sections

Once the previously installed shoring section has reached the full design depth, installation of the next shoring section may commence.

Subsequent shoring sections shall be installed in the same manner as previously described, following the approved installation sequence and safety requirements.

Upon completion of shoring installation, pipe laying or utility works may proceed within the shored and secured trench.



Extraction Instruction

Upon completion of pipe laying works, panel extraction of the shoring system shall commence.

Backfilling shall be carried out in layers not exceeding 0.5 m thickness, with each layer properly compacted. The shoring panels shall then be lifted incrementally in accordance with the backfilled height, followed by further soil compaction.

Smaller lifting increments are recommended to maintain shoring stability. Lifting on any one side shall not exceed 0.5 m per stage, and the swivelling angle of the XSpindle shall be limited to $\pm 4^\circ$.

This procedure shall be repeated progressively until the shoring panels can be fully extracted from the trench in compliance with applicable safety regulations.

Shoring panels shall be lifted only at the designated lifting points and lifting lugs. Lifting at the XSpindle is strictly prohibited.

Personnel are strictly prohibited from entering the danger zone during both installation and panel extraction works.

To prevent overstressing or damage to the shoring panels, one-sided lifting is not permitted. Lifting accessories shall be attached at a minimum of two lifting points on each panel at all times.

PPE, Dos & Don'ts

Basic Maintenance

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

Personal Protective Equipment (PPE)



Safety helmet



Safety goggles



Hand gloves



Safety boots



Safety vest



Lifting point

Dos and Don'ts

- DO use a ladder to enter the working space between the struts of the shield.
 - DO wear PPE 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 use designated lifting points or lifting eyes when lifting shoring panels.
 - DO ensure lifting chains, slings, and shackles are certified and in good condition before lifting panels.
 - DO keep personnel clear of the lifting zone while shoring panels are being lifted or lowered.
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- 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 are inside it.
 - DO NOT stand beneath or within the swing radius of suspended shoring panels during lifting operations.
 - DO NOT lift shoring panels using non-designated points, struts, or connectors.