PRODUCT USER GUIDE

VERTISHORE

Introduction

This booklet is intended to provide basic information for users of the Mabey Hire Ltd Aluminum Vertical Shore system and to draw the client's attention to the practical aspects of Vertishores 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.

Maybe Equipment's lightweight aluminum vertical shores are exceptionally strong, durable, portable, and versatile. Strength is achieved with a high-yield aluminum construction and cylinder pads are mounted flush, providing even load distribution on side rails. The one-piece cylinder extensions can be installed easily on site to accommodate a variety of trench widths and a hinged design allows for fast knock-down and transport. Cylinder oversleeves are standard and bleed-off ports eliminate over-extension of cylinders to increase safety.

It is advisable, before commencing installation, to read the notes below and to become familiar with the procedures involved when using the Vertishores System.

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 Vertishores System. 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 accompanied by a general arrangement or scheme specific drawing. This must be read in conjunction with these instructions.

Contents

1. General Guidance notes

Safe System of Work

- Health and Safety at Work Act requires 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 Mabey Hire. Vertishore 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.
- If stacking Aluminium products ensure they are supported at max. 1.0m centres with timber skids to avoid bending, and those items are strapped down for stability especially in high winds.
- Smaller components should be stored in skips/bins.

Personnel

- Vertishore systems should only be installed and removed by competent persons in strict accordance with an Mabey Hire design & installation sequence.
- The competent person shall be experienced and knowledgeable of trenching and excavation procedures, the use of hydraulic shoring systems, soils identification, and the WHSQ standards.
- 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.

Equipment

- Ensure all quick release valves are functional and all strut pins in place and secured using the retaining clips provided prior to commencing works.
- No vertical or horizontal loads shall be applied to the hydraulic cylinders.
- Ensure gloves and eye protection when using hydraulics.

WARNINGS:

- Vertishore systems rely solely upon soil arching theory to support trench walls. Therefore, never enter a trench unless fully preloaded Vertishore rails are securely installed either side of the point of entry.
- The faces of the excavation shall be straight and near vertical. Shoring members must bear on firm soil or solid fill.
- No matter how much care is taken during the installation and removal of Vertishore systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.
- It is recommended that ends of trench runs be battered back at a safe angle.
- Do not work underneath service crossings unless an engineered support system is correctly installed, or the service has been inspected and confirmed to be stable by a competent person.
- Do Not butt rail back-to-back across an excavation.

Access & Egress and Edge Protection

- Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered. Always place ladders between loaded jacks.
- A competent person should inspect the means of access and egress regularly. Individual waler rails and jacks should be visually inspected for damage, excessive deflection, or loss of cylinder pressure prior to entering the excavation.
- Check trench service crossings for any soils or materials (including boulders, concrete or road construction) that could dislodge and fall / collapse onto operatives and if identified ensure that a jack is placed to prevent this or that an exclusion zone is established.

During Installation Works

- Installation is normally carried out using the dig and drop excavation method by lowering the assembled units to the correct installation level and pre-loading each jack in turn to ensure that the units are pressed firmly against the trench walls and cannot slip. Approximately pre-load pressure of 1500 psi must not be exceeded, and it must remain constant. If the soil is soft or gives, the trench may be unsafe and should not be entered.
- Units should always be installed square and plumb to the excavation walls ensuring the jacks bear directly onto firm soil. If this is not possible any gaps must be securely packed by using hardwood wedges or suitable compacted material to ensure pre-loading of the jacks imparts compressive forces into the soil.
- Vertishores are not suitable for the dig and push excavation technique.

After Installation Works

- Each excavation must be inspected daily before personnely begin work. Prior to removal of systems all hydraulic cylinders must be released and retracted, and systems prised clear of the trench walls, to avoid the need for excessive extraction forces and to avoid damaging the jacks.

Return of Equipment Off-Hire

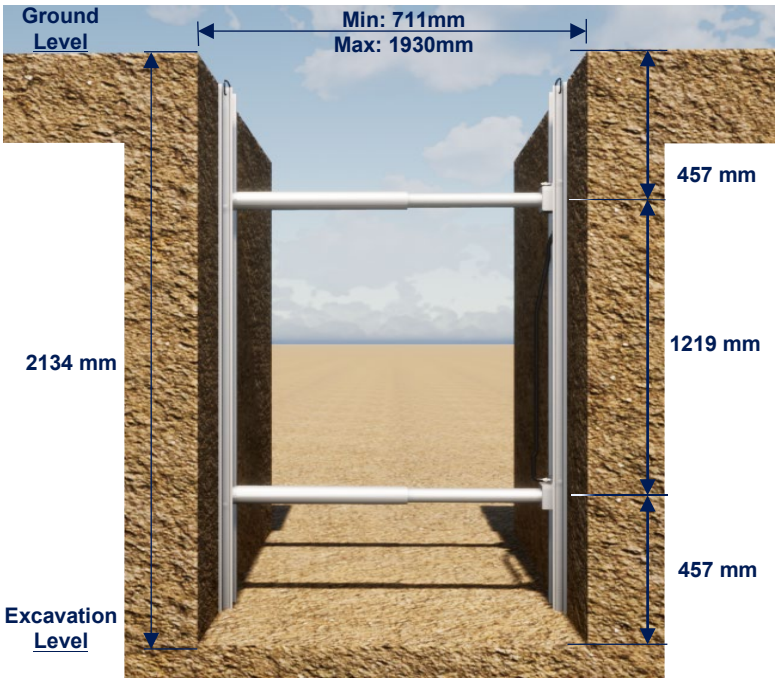
- Clients should ensure that on removal, the equipment is returned clean and assembled as supplied.
- Ensure all equipment is loaded to the satisfaction of the vehicle driver and is securely restrained to the vehicle bed.

2. Component Identification

2.1 Vertishores

A lightweight, modular shoring solution for excavations up to 3.0m deep with widths from 711mm to 1930mm with a maximum under strut clearance of 1200mm to allow services to pass. Due to the soil arch created by the hydraulic struts, Vertishores can be set out with a clear space of up to 1.2m between cylinders making them an efficient solution for longer trench runs. Designed for use in compacted made ground, firm, cohesive and medium soils which is generally self-supporting in the short term and where no ground water is present.

Vertishores can be used with and without plywood backing. If required plywood sheeting shall normally be 17 mm thick to 27mm thick. The plywood is not intended as a structural member, but only as a device of prevention of local ravelling or sloughing of the trench face between the shores.



When plywood sheeting is used, it shall extend to the top of the excavation and within 0.6 m of the bottom of the trench.

Trenches exceeding 2.43 m in length will have a minimum of three (3) shores spaced according. In trenches shorter than 2.43 m in length, 2 sets of vertical shores are required at the horizontal spacing.

For trenches 1.5 to 3 m in depth, vertical shoring shall consist of a minimum of two hydraulic cylinders in each vertical plane. The single or lowest cylinder shall be positioned no more than 1.2 m from the bottom of the trench and there shall be no more than 0.6 m from the top of the trench to the top or single cylinder.

Rail Length (mm)	Min Trench Width (mm)	Max. Trench Width (mm)	Min. Trench Depth (mm)	Max. Trench Depth (mm)	Weight (kg)
2134	711	1930	1800	3000	33.5

Standard Rail Section

Section Properties	Value	Units
Material	Aluminum	-
Alloy	6005-T5 (or 6061-T6)	-
Area	15.87	cm^2
Weight	4.37	kg/m
Top Section Modulus	7.21	cm^3
Bottom Section Modulus	21.30	cm^3
Allowable Bending Stress	144,789	kPa
Allowable Shear Stress	82,77	kPa

Section Properties	Length	Weight	System Length
Material Aluminum			
Cylinder Extension	580 mm	9 kg	781-1480 mm
Cylinder Extension	1350 mm	14 kg	1480-1930 mm

Cylinder Extension System

2.2 Vertishores Accessories

Hydraulic Manual Pump
Capacity: 18.7 L

Release Tool - Steel
Length: 1.22m

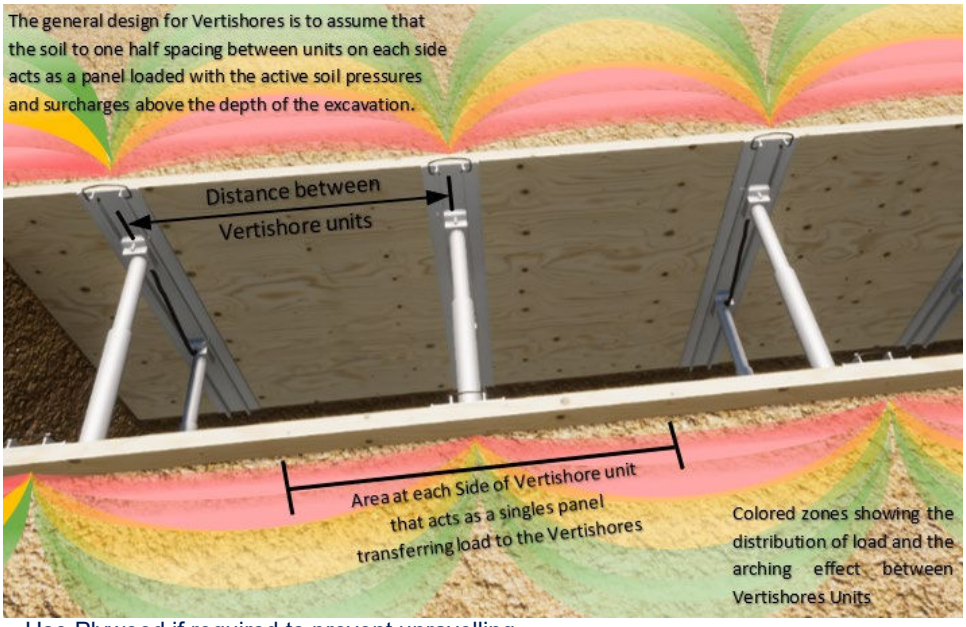
Release Hook- Steel
Length: 1.22m

2.3 How Vertishores Work

Vertishores work on the principle of 'soil arching'. Compact or cohesive soils have a greater ability for soil arching than loose and cohesion less soils. That is why Vertishores should only be considered in ground that is self-supporting or has the ability to stand once a vertical face has been excavated e.g., good clay.

The maximum horizontal distance between Vertishores should be 1.2m. The customer is responsible for choosing the horizontal spacing of Vertishores.

The image below shows the general concept of soil arching:

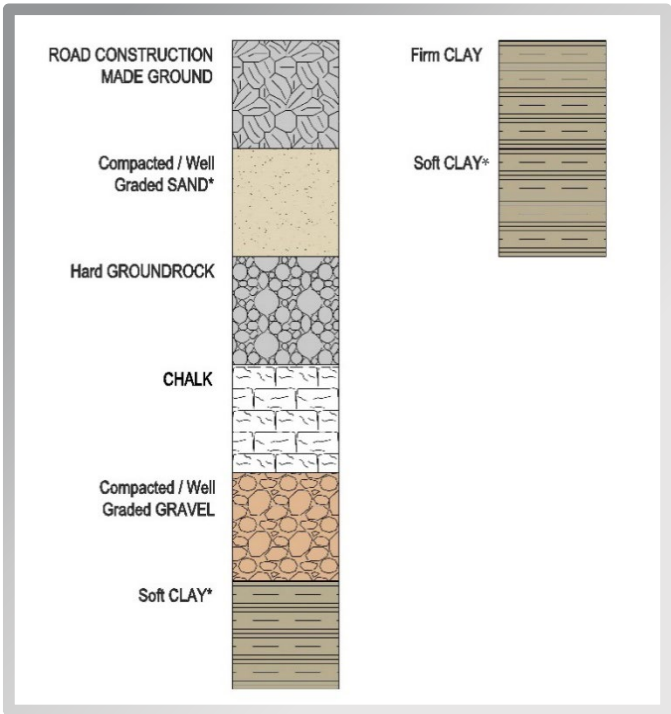


Use Plywood if required to prevent unravelling

2.4 Where Vertishores should be used:

- Trench Jack recommended Pre-loads

PERMITTED



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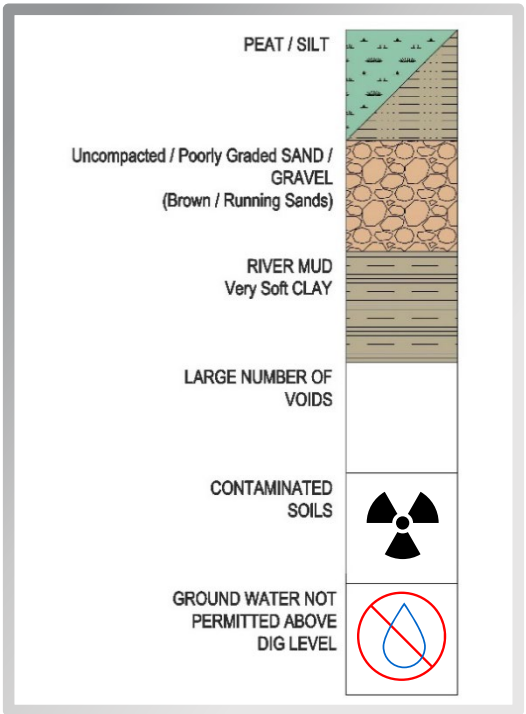
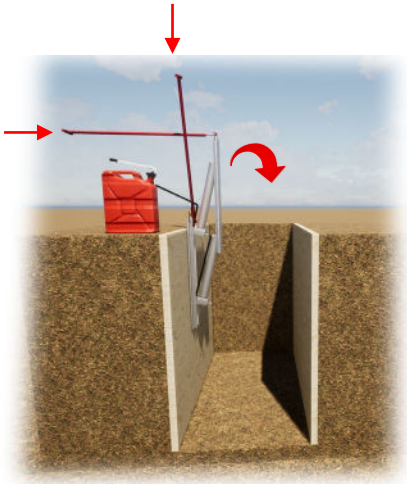


- Pre-load: 750-1500 PSI
- *Customer may wish to consider utilizing backing boards

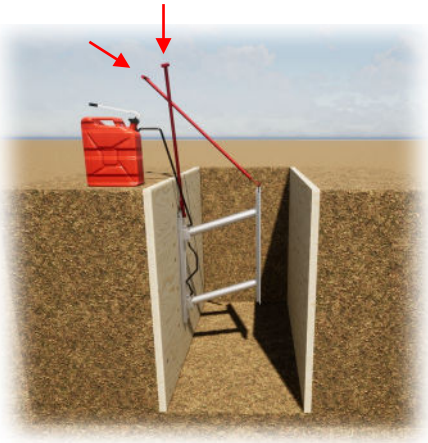
3. Typical Site Assembly - Installation & Extraction – Shown with backboard in prior place

INSTALLATION

1. Vertishore System:
- 2 no. Standard Rail Section
- 2 no. Cylinder Extensions
- 1 x Hand Pump and hoses with fluid
- 1 x Release Tool & Extraction Tool



2. Connect the hose to the inlet valve on the lower rail, ensuring the pump valve is open.
Insert the release tool through the handle and place unit on trench side.



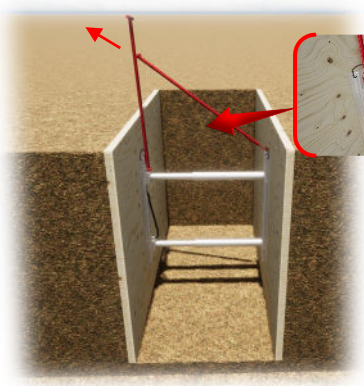
3. Keep folded and lower until in correct position, release and allow to unfold ensuring cylinders are horizontal.

4. When shore is in thew correct position and still holding the release tool, close the pump valve and pump to approximately 1500psi as shown on the pump gauge, ensuring pressure is maintained.

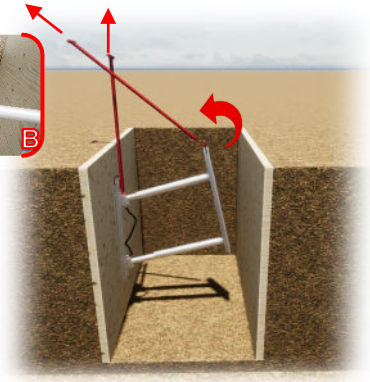
5. Re-position the release tool behind the collar of the hose coupling, pull the handle towards you and the coupling will spring free. Detail A.

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

EXTRACTION



7. Insert the release tool through the handle and locate on the valve. Insert the hook tool onto the opposite rail handle and push the release tool against the valve, releasing enough shoring fluid for easy removal.
The shore will scissor back toward a folded position.



8. Close the Vertishore by pulling the opposite rail up and towards you until it folds flat and remove the unit from the trench.
Clean and store the Vertishore, Manual Pump and ancillary equipment in a safe manner ready for collection. Care must be taken to not lose any ancillary equipment.

4. General

Basic Maintenance

- Regularly check that all pins are in place and clips fitted.
- Replace damaged components.
- Remove debris from Pins and clips.
- Avoid laterally loading the struts-either by hanging or propping from them or accidentally striking them with 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 system when personnel are inside it.

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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