

TECHNICAL DATA

This guidance document on the Shore Hire vertishore system is intended to provide a starting point in assessing the suitable ground conditions where temporary excavations can be supported by the vertishore system. It also outlines the appropriate horizontal spacing for the vertishores. Vertishores should **NOT** be used in the following applications:

- Trenches of granular soils and soft cohesive soils.
- In areas susceptible to, or are affected by landslip.
- Excavation depths greater than 3m.
- Excavations adjacent to structures sensitive to foundation movements.
- High ground water levels unless piezometric levels are controlled by an appropriate dewatering system.
- Where the construction surcharge above the top of the excavation exceeds 20kpa

For any of the above conditions or soil types, it is recommended that site specific investigation and design is carried out by an experienced engineer and/or advice sought from the Shore Hire Engineering Dept.

Applicable Ground Conditions

Vertishores are to be used in stable, cohesive soil conditions. The following table outlines the applicable soil conditions where vertishores can be used as a shoring solution:

| SOIL CONDITIONS | | | |
|--|---|---|--|
| | SOIL TYPE A | SOIL TYPE B | SOIL TYPE C |
| MATERIAL | Clay, silty clay, sandy clay which behaves in a cohesive manner, extremely to highly weathered rock | Clay, silty clay and clayey sand which behaves in a cohesive manner | Clay, silty clay and sandy clay |
| FISSURING | Not allowed | Fissured clay if general strength is the same as soil type a | Fissured clay if general strength is the same as soil type a |
| WATER ALLOWANCE | Some minor seepage | No water seepage | No water seepage |
| STRENGTH | Very stiff | Stiff | Firm |
| UNCONFINED COMPRESSIVE STRENGTH, Qu (KPa) | Qu > 100 | 100 > Qu > 50 | 50 > Qu > 25 |
| EXISTING FILL | Not allowed unless tested by geotechnical engineer | Controlled fill consisting of clay, sandy clay or weathered rock | Controlled fill consisting of clay or sandy clay |

- Fissuring - These are definite planes or fractures that the soil tends to break along with little resistance, e.g. open or tension cracks.
- Planes of weakness - Seam between or within a soil type that are weaker than the rest of the soil.
- Very stiff soil strength: - Very stiff soil is soil that is readily indented with a thumb nail
- Stiff soil strength: - Stiff soil is soil that can be readily indented with a thumb but great effort is required to penetrate the soil with the thumb.
- Firm soil strength: - Firm soil is soil that requires considerable effort to penetrate the soil by a thumb.
- Unconfined compressive strength - The load per unit area required to fail a sample in compression, measured by laboratory testing or in the field by using an instrument such as a hand penetrometer for clay.
- Extremely weathered rock - Rock that is weathered to such an extent that it has soil properties. the original fabric of the rock is mainly preserved. it is assumed to be have like a cohesive material.
- Highly weathered rock - Rock whose strength has been noticeably reduced by weathering. rock pieces can generally be broken by hand across rock fabric and the rock material is partly friable; the rock may be highly discoloured.
- Controlled fill - Fill that has been placed and compacted in layers by mechanical means to a defined density requirement; normally not less than 90% standard compaction (AS 1289.5.1.1 - 2003)

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Shore Hire range of Aluminium Vertishores

Shore Hire offer a range of Vertishores for hire as outlined in the table below:

| ALUMINIUM VERTISHORES | | | | | | | | |
|-------------------------|----------|-----------|-----------|------------|-----------|------------|-----------|------------|
| | V450-900 | V450-1400 | V1050-900 | V1050-1400 | V1500-900 | V1500-1400 | V2100-900 | V2100-1400 |
| LENGTH OF RAIL | 450mm | 450mm | 1050mm | 1050mm | 1500mm | 1500mm | 2100mm | 2100mm |
| WIDTH OF RAIL | 204mm | 204mm | 204mm | 204mm | 204mm | 204mm | 204mm | 204mm |
| NO. OF CYLINDERS | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| MIN. TRENCH WIDTH | 560mm | 865mm | 560mm | 865mm | 560mm | 865mm | 560mm | 865mm |
| MAX. TRENCH WIDTH | 1740mm | 2300mm | 1740mm | 2300mm | 1740mm | 2300mm | 1740mm | 2300mm |
| STROKE | 340mm | 535mm | 340mm | 535mm | 340mm | 535mm | 340mm | 535mm |
| MIN. DEPTH | - | - | 1060mm | 1060mm | 1480mm | 1480mm | 1935mm | 1935mm |
| MAX. DEPTH | - | - | 2435mm | 2435mm | 2760mm | 2760mm | 3015mm | 3015mm |
| WEIGHT PER UNIT | 11kg | 14kg | 23kg | 28kg | 28kg | 32kg | 32kg | 37kg |
| MAX. HYDRAULIC PRESSURE | 1500psi | 1500psi | 1500psi | 1500psi | 1500psi | 1500psi | 1500psi | 1500psi |

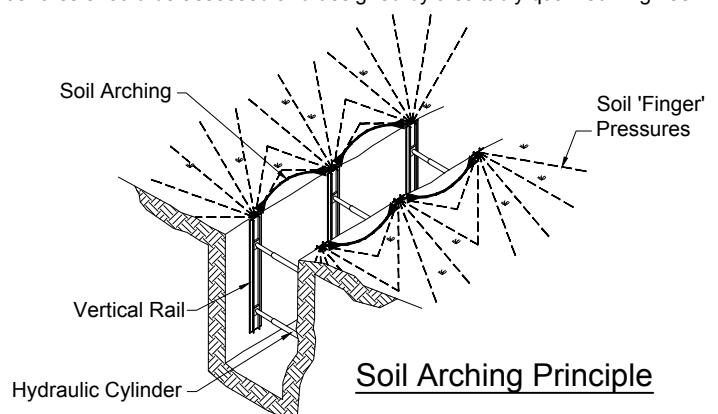
Notes:

1. Maximum vertical spacing of hydraulic cylinders is 1.2m.
2. Maximum horizontal spacing of vertishores is 1.2m.
3. A minimum of 3 vertishores must be used in an excavation, to facilitate soil arching (see below) in cohesive soils. Personnel must be situated between two vertishores at any one time.
4. The top hydraulic cylinder must be 300mm from the top of the trench.
5. The lower hydraulic cylinder must be a maximum of 1200mm from the bottom of the trench.
6. The above data is a guidance only and suitably competent personnel should assess the adequacy of use of vertishores in each application.
7. Formwork sheeting or other approved structural component should also be used if it is determined that there is a risk of local raveling of the trench face between vertishores. Sheeting or other form between vertishores should be assessed and designed by a suitably qualified Engineer.

Soil Arching:

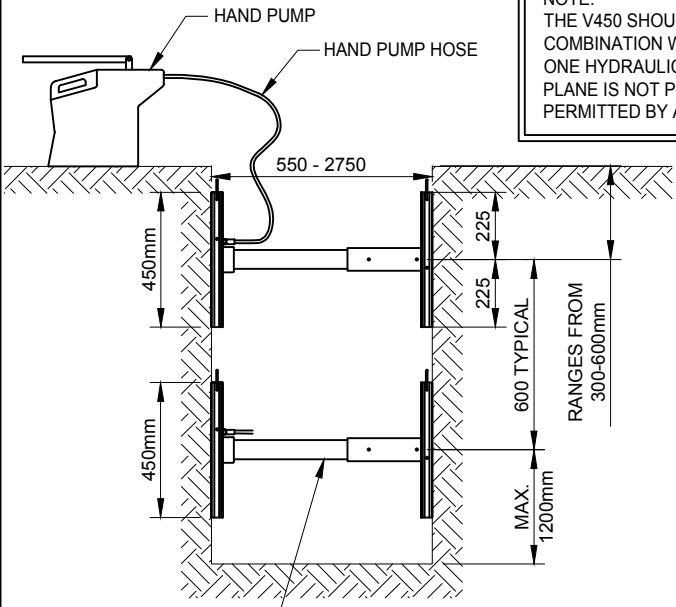
Soil arching can be achieved in cohesive soils with vertishores. It is created by the hydraulic pressure from the vertishore rams; creating "fingers" of pressure into the surrounding soil. These fingers produce a "soil arching" effect which prevents the soil collapsing into the excavation.

A minimum of three vertishores in the trench excavation are required to facilitate this effect. A suitably qualified and competent person is required to assess whether the soil conditions are suitable.

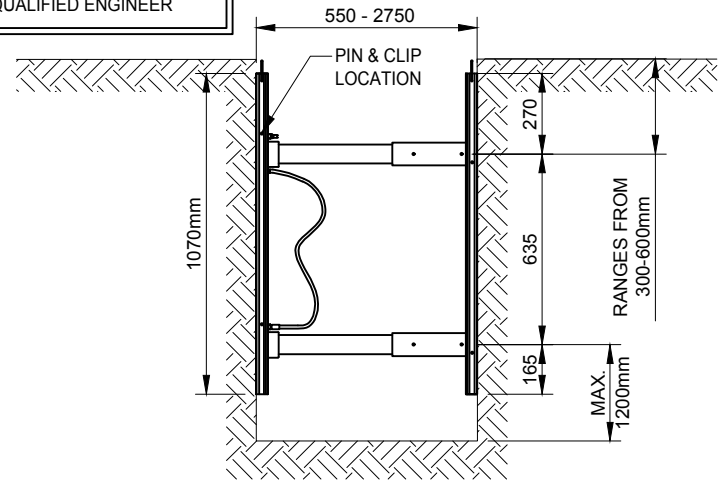


TECHNICAL DATA

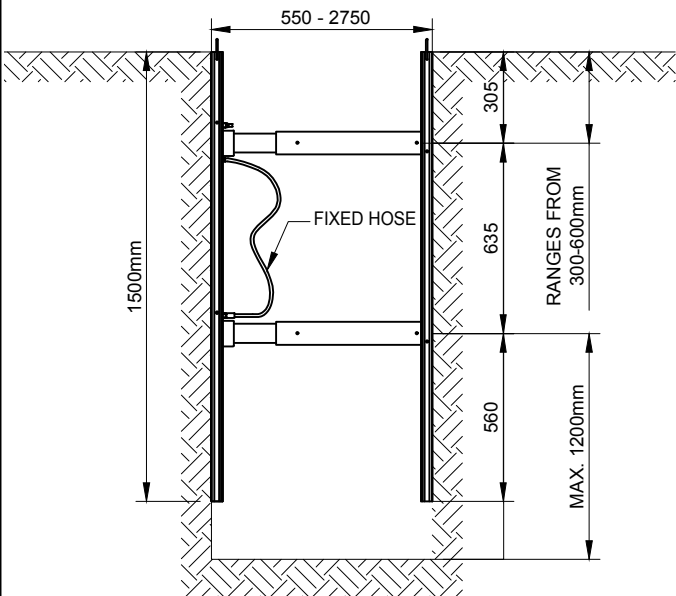
NOTE:
 THE V450 SHOULD ONLY BE USED IN COMBINATION WITH OTHER VERTISHORES. ONE HYDRAULIC STRUT IN THE VERTICAL PLANE IS NOT PERMITTED UNLESS PERMITTED BY A QUALIFIED ENGINEER



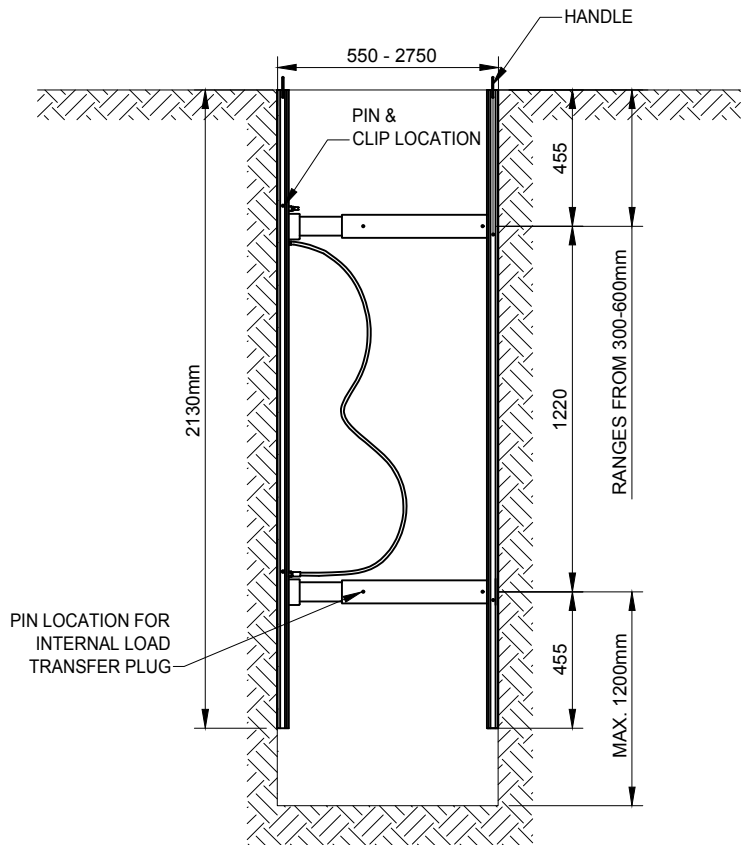
V450 ALUMINIUM VERTISHORE



V1050 ALUMINIUM VERTISHORE



V1500 ALUMINIUM VERTISHORE

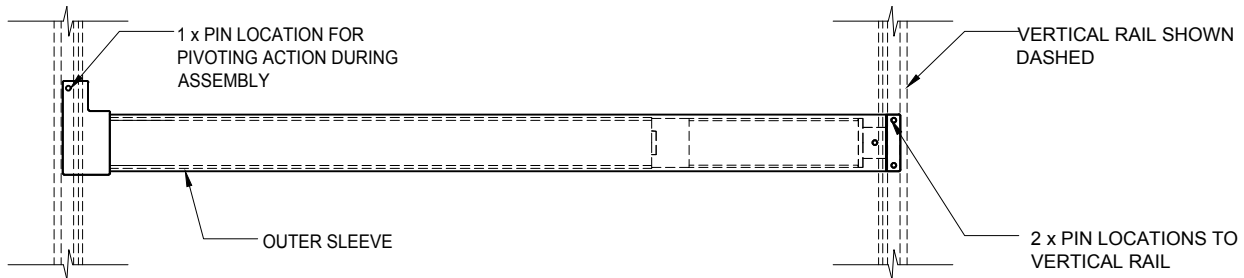


V2100 ALUMINIUM VERTISHORE

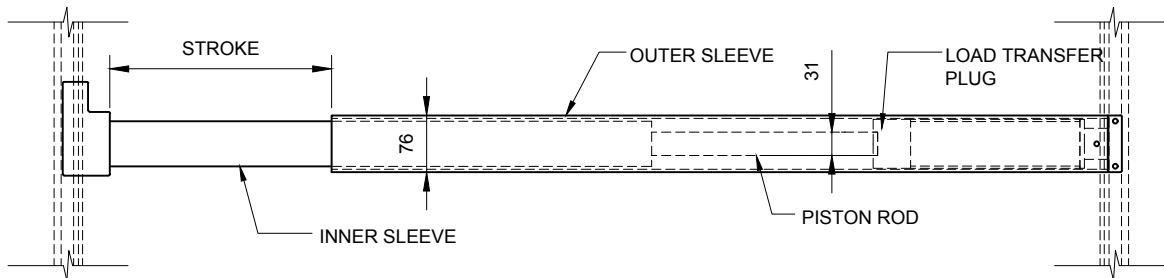
TECHNICAL DATA

Vertishore Cylinder Details:

1. The cylinder extensions are a convenient and efficient means of extending the minimum and maximum working range of vertical shore rails.
2. They are fabricated from lightweight aluminium for ease of handling.
3. Cylinder extension units are pre-assembled for ease of attachment and include all connecting hardware.
4. Reference should be made to TDS03- Page 3 for the range of cylinder extensions and their associated minimum and maximum working ranges.



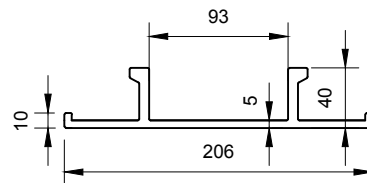
CLOSED CYLINDER DETAILS



EXTENDED CYLINDER DETAILS

Vertishore Vertical Rail Details:

1. Extruded from 6000 Series structural grade aluminium.
2. Solution heat treated and artificially aged to Temper T6 designation.
3. Pin holes provided for assembly and connection of cylinder extensions.
4. Reference should be made to TDS03-Page 3 for vertical rail lengths available from Shore Hire



VERTICAL RAIL SECTION PROFILE