Groundforce
Specialist Construction Solutions

Groundforce Standard Solutions
Cohesive – Walers – 1 Frame (2.5m Depth)
No Groundwater

GROUND ENGINEERING AWARDS 2019
WINNER
Specialist Geotechnical Supplier of the Year

ISOQAR REGISTERED
UKAS MANAGEMENT SYSTEMS
0026
Certification Number 14419
ISO 9001
ISO 14001
ISO 45001

Design Complexity Risk:	0	
Groundforce Check Category:	1	
	**An additional check should be carried out on site by the contractor to assess the suitability of the design*	
Date / Number of Pages:	13/06/2022	16
Design Reference / Rev:	CO-0W-W-1F-25	C02

Provided by:
YourSolution
Your Excavation, Your Solution

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Contents

IMPORTANT PLEASE NOTE

1. The design calculations contained in this document have been prepared using Groundforce Shorco's specialist temporary works design software. The designs have been based on the basic assumptions listed, which the competent person must assess as having been satisfied. If any parameter exceeds these assumptions, then the user should obtain a site specific design by contacting Groundforce on 0800 000 345.
2. It is the contractor's responsibility to communicate the information contained within this design to all relevant parties including the site principal designer(s) and temporary works coordinators where appropriate. It is also the contractor's responsibility to ensure that this information is incorporated into site specific method statements and risk assessments.
3. Any significant residual risks remaining after the design process will be documented both on the relevant page of this design and also on the drawings. It is the contractor's responsibility to take steps to reduce these risks to an acceptable level.

Please ensure that this document is passed on to the site temporary works co-ordinator and or main contractor prior to commencing any excavation work.
If in doubt ASK!

CDM 2015 Statement

The key aim of the CDM 2015 regulations is to integrate health and safety into the management of the project. As a result, specific duties are imposed on the key parties involved in a construction project namely:

1. The client
2. The principal designer (on sites where there is, or is likely to be, more than one contractor at any time)
3. Designers (this includes Groundforce Shorco as appointed temporary works designers of the original solution and the person selecting the standard solution).
4. The principal contractor (on sites where there is, or is likely to be, more than one contractor at any time)
5. Contractors

As competent temporary works' designers operating within the CDM regulations, specifically regulation 9 and 10, along with regulation 8 – general duties, Groundforce Shorco undertake to:

1. Adopt a safety first approach to design work in accordance with recognised standards and codes of practice.
2. Eliminate hazards and reduce risks in their design process.
3. Communicate clear and concise information about design assumptions and residual risks to all relevant parties.

Under CDM, the designer is defined as anyone preparing or modifying a design. A design can consist of drawings, details or specifications relating to a structure. As such, a designer includes anyone who specifies a particular method of work, equipment or material. This person will assume the role and responsibilities of a designer under the CDM Regulations and must have the skills, knowledge and experience, necessary to fulfil the role. As a designer, they are duty bound to cooperate with other persons working on a project to enable them to fulfil their duties and maintain the health and safety of themselves and others. Based on the above definitions, it is clear that great care should be taken when specifying shoring equipment, and should only be done by those with a sufficient level of competence to fulfil the role of the designer.

It is the responsibility of the person selecting the standard solution to check that the site conditions match those assumed in the solution. In addition, as this person is effectively specifying the solution, they assume the role and responsibilities of the designer under CDM.

One responsibility imposed on the client under CDM is to ensure that a principal designer has been appointed on sites where there is, or is likely to be, more than one contractor at any time.

We have not been informed who the principal designer for this site is. A copy of this design should be passed on to the principal designer for consideration.

In addition to the requirements of the CDM 2015 regulations, the main contractor or principle contractor should appoint a temporary works' coordinator (TWC) and supervisor(s) (TWS) as recommended in BS 5975:2019. The duties of the TWC(s)' and TWS(s)' are specified in section 11 & 12 of the above standard.

A copy of this design should be passed on to the TWC and or the TWS for consideration.

Basis of Design

Excavation Details		
Duration of Excavation:	Less than 12 weeks	
Purpose of Excavation:	Cohesive – Walers – 1 Frame (2.5m Depth)	
Max. Excavation Depth:	2.50m*	
	** an additional 100mm allowance for overdig has been considered*	
Plan Dimensions:	External:	Varies (Refer to drawing ref: CO-0W-W-1F-25 C02)
	Internal:	Varies (Refer to drawing ref: CO-0W-W-1F-25 C02)
Min. Sheet Penetration:	1.20m (at stage 3)	
Clearance below frame:	1.90m	

Ground Conditions		
✓ **Suitable Ground**	**Refer to Cohesive Ground Standard Solutions**	✘ **Unsuitable Ground**
Well Compacted Cohesive Made Ground	Well Compacted Granular Made Ground	Very Loose or Loose Made Ground
Soft to Firm Clay	Road Construction	Silt
Firm Clay	Medium Dense, Dense or Very Dense Sand	Very Loose or Loose Sand
Stiff or Very Stiff Clay	Loose, Medium Dense, Dense or Very Dense Gravel	Very Loose Gravel
	Rock	Very Soft or Soft Clay
		Peat
SHOULD THE GROUND CONDITIONS ENCOUNTERED DIFFER FROM THOSE PERMITTED, STOP WORK IMMEDIATELY AND INFORM THE TEMPORARY WORKS CO-ORDINATOR		

Assumed soil parameters for purposes of design*						
Depth (m)	Soil Name	γ (kN/m³)	c_u (kN/m²)	K_a, K_p	K_{ac}, K_{pc}	δ
0.0 to 3.7	COHESIVE material (Minimum Soft to Firm)	18.6	30	1.00	2.00	0.00
No groundwater is permitted within the depth of the excavation						

N.B. This design is based on saturated densities to allow for pipe bursts etc.
** These simplified parameters are deemed to be conservative based on the above information and result in a safe solution.*

Basis of Design (continued)

Surcharges (one option per side)	
A uniform surcharge of 16kN/m² at ground level to allow for general site traffic and	
✓ Permitted	✗ Not Permitted
Excavators up to 30 tonne weight working near the excavation.	Plant exceeding 30 tonne (including cranes)
Live roads up to and including Principal (A) roads, site access or closed roads	Railways, motorways and trunk roads
Simple boundary wall no more than 1.0m high	Embankments, sloping ground (greater than 1 in 10), spoil heaps, stored material
	Buildings/structures

Unsuitable Site Conditions
Design is not valid if any of the following conditions exist on site:
▪ Adjacent watercourses ▪ Presence of groundwater ▪ Excavation duration exceeding 12 weeks

Specification of Support Equipment

Sheets		
Sheet Type:	Groundforce SD33 or KD4 (lapped sheets)	
Minimum Length:	4.00m (including a 1.20m toe-in) plus required upstand (to be assessed by contractor)	
Allowable Bending Moment:	SD33 Trench Sheets	8.5kNm/m
	KD4 Trench Sheets	19.0kNm/m
Calculated Max. B Moment:	7.0kNm/m (at stage 3)	
Calculated Max. Deflection:	Less than 30mm	

Waler		
Frames:	1 No. level of Groundforce Aluminium or Steel Waler (Refer to drawing ref: CO-0W-W-1F-25 C02)	
Working Load (Walers):	2.0m Aluminium Waler	63.7kN/m
	3.0m Aluminium Waler	23.6kN/m
	4.0m Aluminium Waler	22.2kN/m
	5.0m Aluminium Waler	29.7kN/m
	3.9m HD Steel Waler	40.4kN/m
	5.0m Std. Steel Waler	18.0kN/m
	5.0m HD Steel Waler	28.0kN/m
	5.0m SHD Steel Waler	40.0kN/m
Working Load (WEBs):	Type AA	63.7kN/m
	Type AB	63.7kN/m
	Type BA	63.7kN/m
	Type BB	59.2kN/m
	Type CA	40.6kN/m
	Type CB	27.4kN/m
	Type C1	14.2kN/m
	Type C2	10.6kN/m
Calculated Maximum Load:	9.1kN/m (Frame 1 at stage 3)	
Calculated Max. Deflection:	Less than 50mm	

Restraining Chains	
Restraint Chains:	4 No. For Location see drawing ref: CO-0W-W-1F-25 C02
Chain Connection Detail:	Standard detail (see installation instructions)

General Notes

1. This design is only valid when used in conjunction with Groundforce Shorco & Piletec equipment.
2. This design is only valid for short-term (< 12 wks) temporary works' applications. Therefore total stress soil parameters have been used for cohesive materials in the temporary case.
3. The installation and use of the equipment is the responsibility of the Hirer. It is essential that appropriately trained personnel are employed to install and use this equipment in accordance with the design specifications and user guides and general good practice. Groundforce can provide an installation advisory service to assist you with installing the equipment. Alternatively we can provide on site 'toolbox training'. Detailed user guides have been provided with the equipment, if not please ask.
4. The contractor is responsible for:
    - Providing adequate lifting facilities to ensure the safe off-loading, installation and removal of the equipment. Equipment weights are listed on the scheme drawings and user guides.
    - Checking for the presence of underground and overhead services and dealing with accordingly.
    - Providing appropriate edge protection to the perimeter of the excavation and also suitable means of access / egress to and from the excavation.
5. Unless otherwise stated in the scheme specific notes, all structural information has been calculated as the "worst case" loading resulting from a stage-by-stage installation sequence analysis.
6. The temporary works scheme has been designed with reference to the following documents as considered appropriate for the specific design:
    - British Steel (Arcelor) Piling Handbook;
    - CIRIA Special Publication 95 (1993): The Design & Construction of Sheet-Piled Cofferdams.
    - CIRIA Report C760: Embedded Retaining Walls (replaces CIRIA C580)
    - BS 8002:2015 Code of Practice for Earth Retaining Structures
    - BS 6031:2009 Code of Practice for Earthworks
7. The structural resistance of the supporting equipment has been generally designed in accordance with the following standards as considered appropriate to the specific design:
    - BS 5950 Part1-2000: Structural Use of Steelwork in Building where applicable
    - Eurocode 3: Design of steel structures. BS EN 1993 (part 1)
    - Eurocode 9: Design of aluminium structures. BS EN 1999 (part 1)
    - BS EN 14653 (parts 1 & 2) 2005: Manually operated hydraulic shoring systems for groundwork support.
8. Attention is drawn to current safety legislation particularly CDM 2015 regulations & BS 5975:2019 (see also page 2). Appropriate site specific risk assessments **must** be performed by the contractor. In addition, the excavation must be inspected by a competent person in accordance with statutory requirements. Any defects or signs of deterioration to the support system must be notified to us immediately and work stopped within the excavation.
9. Any installation method statement supplied by GFS will be non-site specific. This will not take into account health and safety matters which should be dealt with in the hirer's own safety method statement. In addition the method statement should be read in conjunction with the design brief, drawings and equipment installation instructions supplied by Groundforce. Any deviation from these instructions/recommendations should be notified to us for verification of the adequacy of the scheme.

Scheme Specific Notes
(to be read in conjunction with risk schedule)

1. This design is based on a “Dig & Push” method of installation. The SD33 or KD4 sheets are to be pushed ahead of the excavation by a minimum embedment as detailed in the installation sequence see drawing CO-0W-W-1F-25 C02 for each stage of the excavation.
2. The analysis is based on a maximum installation clearance (dig level) below the frames of 100mm during installation stages. The excavation must not proceed beyond this level until the entire frame configuration has been installed.
3. The temporary works installation has been modelled providing adequate stability at each intermediate installation stage. No beneficial soil phenomena have been considered to achieve stability during the installation process such as a removal of passive softening of the clay or any form of adhesion/interface friction coefficient.
4. The proposed scheme has been designed as a "propped cantilever" that is with only a single top frame. The scheme therefore relies totally on the specified toe-in of the sheets for stability. If this toe-in cannot be achieved, a temporary lower frame will be required until a suitable blinding/base slab has been cast.
5. This design includes allowance for the following surcharges – **one option per side**. (Note: If the surcharge is not listed below it has not been considered in this design and should therefore not be within the zone of influence):

   A uniform surcharge of 16kN/m² at ground level to allow for general site traffic and
   - Excavators up to 30 tonne weight working near the excavation.

     OR
   - Live roads up to and including Principal (A) roads, site access or closed roads

     OR
   - Simple boundary wall no more than 1.0m high.
6. A 100mm overdig has been considered within the design calculations. The contractor must therefore ensure that the excavation process is controlled accordingly (see also the residual risk assessment sheet).
7. As soon as the formation level is exposed, it is recommended that blinding concrete should be placed immediately to prevent degradation of the base.
8. The contractor should use a suitable “Bond break” medium such as visqueen, between the concrete and trench sheets to aid extraction of equipment.

Residual Risk Schedule

The followings items have been identified as potential residual risks remaining after the design process risk assessment. Based on the information that we have available, we have allocated each risk a rating number depending on its potential to cause a problem. Those with a rating of 2, 3 and 4 are highlighted on the scheme drawing. **A further site specific risk assessment must be carried out on these items to assess their importance and potential consequence and to determine a course of action or monitoring in order to mitigate the risk to an acceptable level**.

Residual Risk Item	Risk Rating
Site specific risk assessments	2
Size and weight of the equipment	2
Ground conditions	2
Surcharge	2
Accidental excavation (Overdig)	2
Working at height & access/egress	2
Ground movement	2
Sheet damage	2
Unsupported ground at ends of excavation	2
Insufficient toe-in	2

Key to Risk Rating	
1	Unlikely to be a problem
2	Possible problem
3	Probable problem
4	Almost certain to be a problem

Notes on possible further mitigation action required at site level.

1. Site specific risk assessments: Site specific risk assessments must be performed by the contractor. In addition the excavation must be inspected by a competent person in accordance with statutory requirements. Any defects or signs of deterioration to the support system must be notified to Groundforce immediately and work stopped within the excavation.

2. Size and weight of the equipment: Ensure that this information is taken into account during the planning of any work to be carried out, including the provision of adequate lifting facilities to ensure the safe loading, installation and removal of the equipment.

3. Ground conditions: Should the ground conditions differ from those considered, excavation should stop immediately and a site specific temporary works design be obtained. Any immediate hazards should be made safe by backfilling if necessary.

4. Surcharge: A uniform surcharge of 16kN/m^2 has been applied at ground level to allow for any of the following surcharges ***(1 option per side)***:

    - Excavators up to 30 tonne weight working near the excavation.
      OR
    - Live roads up to and including Principal (A) roads, site access or closed roads
      OR
    - Simple boundary wall no more than 1.0m high.

    If plant exceeds weight limit of 30Te, or total surcharge loading is exceeded design stated values scheme needs to be reassessed.

    All spoil and excavated material should be moved to outside the zone of influence to avoid additional surcharging of the excavation.

5. Accidental excavation (Overdig): A 100mm overdig has been considered within the design calculations. Specific control measures should be put in place to ensure that the dig is not allowed to progress beyond the indicated formation level.

6. Working at height & access/egress: Suitable edge protection and appropriate means of access and egress to and around the excavation. Groundforce's integrated EdgeSafe and LadderSafe products are recommended.

7. Ground movement: Monitor the ground surrounding the excavation for signs of movement (cracks, settlement etc.) and seek advice if necessary. Risk assess the impact of any ground movement on the integrity of any adjacent structures, roads and services.

8. Sheet damage: Due to the use of lightweight sheets in potentially hard ground there is a chance of sheet damage. Installation should be carefully monitored to ensure damage of sheets is minimised. Pre Auger may be required.

9. Unsupported ground at ends of excavation: The ends of the excavation should be battered back at a safe angle or suitable waler end bearers and trench sheets used. **Trench sheets should not be placed against the hydraulic cylinders.**

10. Insufficient toe-in: The solution has been designed as a "propped cantilever" and relies totally on the specified toe-in of the sheets for stability. If this toe-in cannot be achieved, a temporary lower frame will be required until a suitable blinding/base slab has been cast.

SUMMARY

INPUT

Excavation Depth	2.6 m
Surcharge	16.0 kN/m²
Active Water Depth	10.0 m
Passive Water Depth	10.0 m
Water Density	9.81 kN/m³
Min Fluid Density	5.0 kN/m³

SOIL PROFILE

Depth (m)	Soil Name	y(kN/m³)	y'(kN/m³)	C(kN/m²)	Ø(°)	Ka	Kp	Kac	Kpc	delta
0.0	Soft to Firm CLAY	17.50	7.50	30.00	0.00	1.00	1.00	2.00	2.00	0.00

SOLUTION

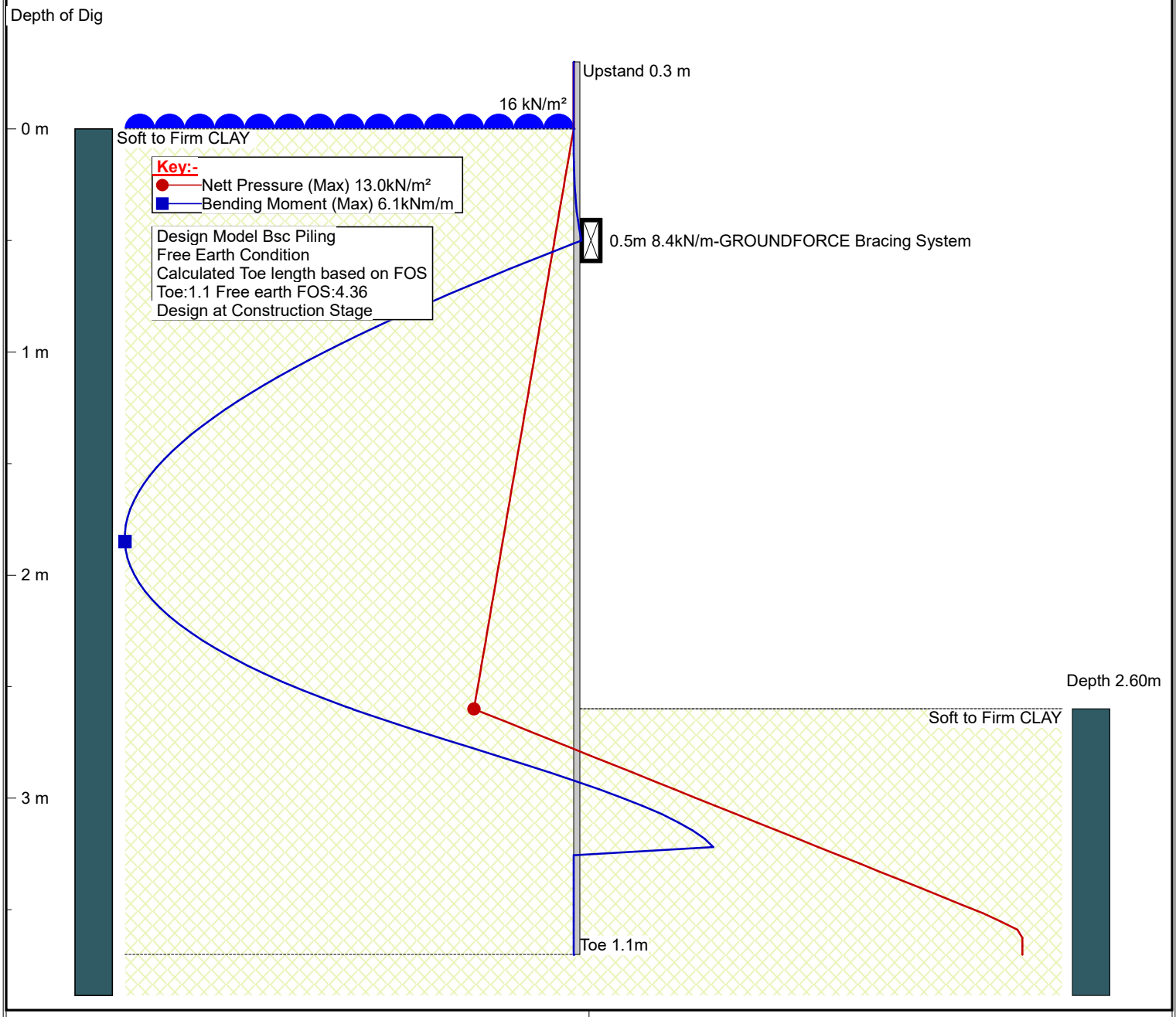
DESIGN SOLUTION		
Support Type	Free Earth Support	Toe = 1.1 m
Pressure Model	BSC Piling method	
Passive Softening	Applied	
Water Balancing	Not Applied	

SHEET				
Sheet Type	Z cm³/m	I cm4/m	Allowable Stress N/mm²	Allowable Moment kNm/m
Groundforce Std. SD33	48.40	81.90	186.00	8.50

DESIGN FORCES	Maximum	Depth
Soil Pressure	13.0 kN/m²	2.6 m
Current Bending Moment	6.06 kNm/m	1.85 m
Maximum Bending Moment	6.06 kNm/m	1.85 m
Shear Force	-9.66 kN	2.78 m

Current Support Details		
Depth m	Load kN/m	**GROUNDFORCE Equipment**
0.5	8.4	Bracing System

Maximum Support Loads		
Depth (m)	Load (kN/m)	**GROUNDFORCE Equipment**
0.5	0.0	Bracing System



Issued for Construction.

-- Groundwater not considered.
-- Please refer to the drawing for suitable waler frames and clear opening of frames.
-- Please refer to the drawing for further information on ground conditions suitable for this design.
-- Clearance below bottom frame = 1.90m.

Sheet Pile Definition

8.5kNm/m > 6.1kNm/m(Bending Capacity is Adequate)

Sheet Type:	**Groundforce Std. SD33**
Allowable Moment =	8.5 kNm/m
Moment of Inertia =	81.9 cm4/m
Youngs Modulus (E) =	210.0 kN/mm²
Allowable Stress =	186.0 kN/mm²
Section Modulus =	48.4 cm³/m
Pressure Model:	BSC Piling
Load Model:	Hinge Method
Support Type:	Free Earth Toe-In

Support Information
Frame 1
Type: Bracing System/
Level: 0.50 m
WLL: 0.0 kN/m
Load: 8.4 kN/m

Groundforce Software Licensed to: STAYLOR	Title :Standard Solutions Contract :- Contractor:-	Designer :SPT Reference:CO-0W-W-1F-25 Date:26/05/2022 Construction Stage Rev: 02

Groundforce Shorco
Excavation Support

1 CHECK GROUND CONDITIONS

The standard solution indicated on this drawing can be used in the following ground conditions. Should the ground conditions be unsuitable, please contact Groundforce for a site specific design.

✓ SUITABLE GROUND

- Cohesive Made Ground
- Soft-Firm Clay
- Firm Clay
- Stiff Clay
- Very Stiff Clay

✕ UNSUITABLE GROUND

- Granular Made Ground
- Silts, Sands & Gravels
- Very Soft or Soft Clay
- Peat
- Rock

No groundwater is permitted within the depth of the excavation.

SHOULD THE GROUND CONDITIONS ENCOUNTERED DIFFER FROM THOSE PERMITTED, STOP WORK IMMEDIATELY AND INFORM THE TEMPORARY WORKS CO-ORDINATOR

2 CHECK SITE CONDITIONS & SURCHARGES

The standard solution indicated on this drawing is valid based on the below conditions. Should the site conditions and/or surcharges be unsuitable, please contact Groundforce for a site specific design.

✓ PERMITTED
(within the zone of influence*)

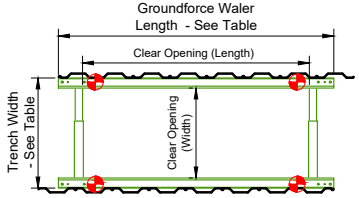
- Plant up to 30t (10kN/m²)
- Live roads up to and including Principal (A) roads, site access or closed roads
- Simple boundary walls less than 1.0m high

✕ NOT PERMITTED
(within the zone of influence*)

- Plant exceeding 30t (including cranes)
- Railways, motorways and trunk roads
- Embankments, sloping ground (greater than 1 in 10), spoil heaps, stored material
- Buildings/structures

* The Zone of Influence is assumed to extend back from the edge of the excavation by a distance equal to 1.0 x dig depth (i.e. at 45° from formation level)

3 SELECT SUITABLE EQUIPMENT



RESTRAINING CHAINS
To be attached at these locations in accordance with the installation instructions

RESTRAINT CHAINS	4 No.

Must **NOT** to be used for lifting purposes

Sheets to be doubled up either side of gaps due to existing services. Maximum gap width = 600mm

The ends of the excavation should be battered back at a safe angle (to be determined by the contractor). Alternatively, where Aluminium Walers are utilised, suitable Waler End Bearers can be used to allow the ends of the excavation to be sheeted.

SPECIFICATION - WALER END BEARERS	Trench Width (m)	Weight of Item (kg)
Type AA	0.55 - 0.69	8.7
Type AB	0.65 - 0.85	10.0
Type BA	0.78 - 1.02	12.0
Type BB	0.98 - 1.27	14.1
Type CA	1.30 - 1.75	19.0
Type CB	1.70 - 2.20	22.9
Type C1	1.90 - 2.80	28.7
Type C2	2.50 - 3.40	34.0

SELECT SUITABLE SIZED WALERS TO FIT THE DIMENSIONS OF THE EXCAVATION

SPECIFICATION - WALERS	Length (m)	Clear Opening (Length) (m)	Trench Width (m)	Clear Opening (Width) (m)	Weight of Frame (kg)
2.0m Aluminium Waler	2.00	1.49	0.55 - 4.00	0.23 - 3.68	59 - 190
3.0m Aluminium Waler	3.00	2.45	0.55 - 4.00	0.23 - 3.68	81 - 212
4.0m Aluminium Waler	4.00	3.30	0.55 - 4.00	0.23 - 3.68	102 - 233
5.0m Aluminium Waler	5.00	2.90	0.55 - 4.00	0.23 - 3.68	123 - 254
3.9m HD Steel Waler	3.90	3.20	0.85 - 4.30	0.45 - 3.90	306 - 437
5.0m Standard Steel Waler	5.00	4.30	0.75 - 4.20	0.45 - 3.90	448 - 579
5.0m HD Steel Waler	5.00	4.30	0.85 - 4.30	0.45 - 3.90	387 - 518
5.0m SHD Steel Waler	5.00	4.30	0.85 - 4.30	0.45 - 3.90	557 - 688

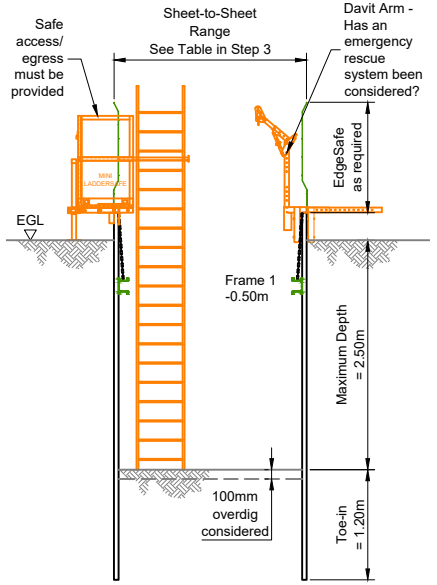
SELECT A SUITABLE NUMBER OF SHEETS TO FIT THE DIMENSIONS OF THE EXCAVATION

SPECIFICATION - SHEETS	Minimum Length* (m)	Width (mm)	Pan Depth (mm)	Weight (kg/m)
Groundforce SD33	4.00	330	35	10.9
Groundforce KD4	4.00	400	50	22.1

* Sheets available in 0.5m increments

Note: This design is not suitable for use with any other supplier's equipment and no liability shall be accepted by Groundforce for such use

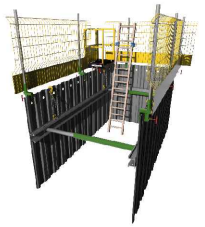
4 TYPICAL SECTION



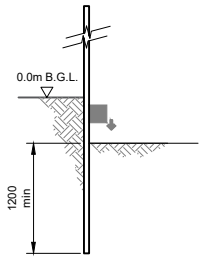
Maximum Allowable Dig Depth = 2.50m

Notes

1. This standard solution has been produced to enable a competent person (*someone who has sufficient training, skills, experience, knowledge and also the authority to carry out the task in hand*) to specify the shoring requirements for relatively small, shallow excavations in reasonable ground conditions so as to avoid having to produce a site specific design.
2. For the applicability of the standard solution, refer to the "Ground Conditions" and "Site Conditions & Surcharges" boxes opposite.
3. The excavation should be open for less than 12 weeks.
4. Should any of the above conditions not be met or there be a requirement to use alternative equipment, the TWC should obtain a site specific temporary works design by contacting Groundforce on 0800 000 345.
5. The installation of the equipment is the responsibility of the hirer. It is essential that appropriately trained personnel are employed to install this equipment in accordance with this drawing and specific Groundforce User Guides. Groundforce can provide an installation supervision service if required or alternatively provide 'toolbox training' for the site operatives.
6. Assumed Installation Method: Dig and Push (See Installation and Removal Sequence).
7. A general surcharge of 16kN/m² has been allowed for. This will account for most common site equipment. If abnormal surcharges are likely to be present, seek further advice from Groundforce.
8. The excavation support design allows for 100mm overdig. The contractor MUST ensure the excavation process is controlled and monitored at all stages to avoid overdigging.



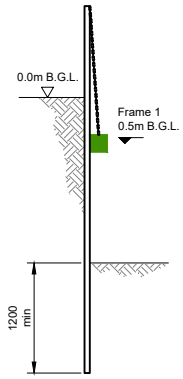
5 INSTALLATION & REMOVAL SEQUENCE



⚠ Note:
A minimum toe-in equal to or greater than the final specified toe-in is required to be maintained at all times.

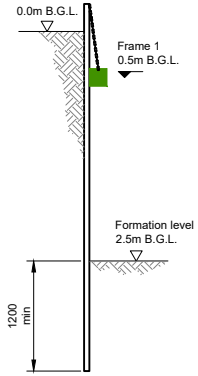
Installation - Stage 1

- Install the single level of frame at ground level and use as a guide to pitch the sheets.
- Begin dig and push operation, lowering the frame as the excavation progresses.
- Install frame 1 at 0.5m B.G.L.



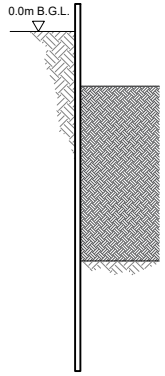
Installation - Stage 2

- After installing frame 1 continue dig and push operation, maintaining minimum toe-in requirement.



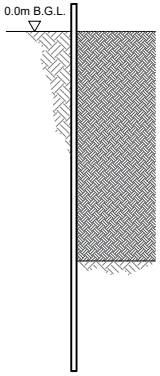
Installation - Stage 3

- Continue dig and push operation until formation level at 2.5m B.G.L. is reached.



Removal - Stage 1

- Backfill in well compacted layers to the underside of frame 1 and remove frame 1.



Removal - Stage 2

- Backfill in well compacted layers to ground level and then extract trench sheets.

⚠ RESIDUAL RISKS ⚠

1. **Site specific risk assessments** must be performed by the contractor. In addition the excavation must be inspected by a competent person in accordance with statutory requirements. Any defects or signs of deterioration to the support system must be notified to Groundforce immediately and work stopped within the excavation.
2. **Size and weight of the equipment**: Ensure that this information is taken into account during the planning of any work to be carried out, including the provision of adequate lifting facilities to ensure the safe loading, installation and removal of the equipment.
3. **Ground conditions**: Should the ground conditions differ from those considered, excavation should stop immediately and a site specific temporary works design be obtained. Any immediate hazards should be made safe by backfilling if necessary.
4. **Surcharge**: Prior to commencing excavation, the competent person selecting the standard solution should ensure that no excessive surcharges are present.
5. **Accidental excavation (Overdig)**: Care should be taken during excavation to ensure that maximum allowable dig levels are not exceeded.
6. **Working at Height & Access/Egress**: Suitable edge protection and appropriate means of access and egress to and around the excavation. Groundforce's integrated EdgeSafe and LadderSafe products are recommended.
7. **Ground movement**: Monitor the ground surrounding the excavation for signs of movement (cracks, settlement etc.) and seek advice if necessary. Risk assess the impact of any ground movement on the integrity of any adjacent structures, roads and services.
8. **Sheet Damage**: Due to the use of lightweight sheets in potentially hard ground there is a chance of sheet damage. Installation should be carefully monitored to ensure damage of sheets is minimised. Pre Auger may be required.
9. **Unsupported ground at ends of excavation**: Ground should be battered back at a safe angle or suitable waler end bearers and trench sheets used.
10. **Insufficient Toe-in**: The solution has been designed as a "propped cantilever" and relies totally on the specified toe-in of the sheets for stability. If this toe-in cannot be achieved, a temporary lower frame will be required until a suitable blinding/base slab has been cast.

IF YOU ARE IN ANY DOUBT...ASK!

Scheme Title: _____

Scheme Number: _____

Location: _____

I certify that, to the best of my knowledge, the actual site and ground conditions do not conflict with the parameters of this Temporary Works Design

Signed: _____
Temporary Works Co-ordinator

Date: _____

Company: _____

! CO_2e FOR THIS HIRE

$kgCO_2e$ per kg of equipment per week
Steel = 0.0145, Aluminium = 0.0358
- *Raw Material Supply (A1), Transport (A2), Manufacturing (A3)*

\+ $kgCO_2e$ per kg of equipment per hire = 0.015 - *Transport to and from site (A4)*

Groundforce Shorco
Standard Solutions

2.50m Deep
Cohesive Ground
No Groundwater
Walers - 1 Frame

Groundforce Shorco

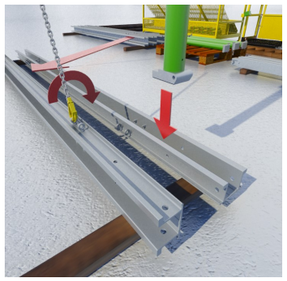
Excavation Support

Hydraulic Waler Frames

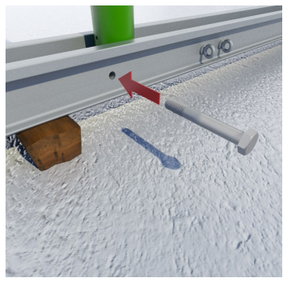
Installation Guide

To be read in conjunction with User Guides

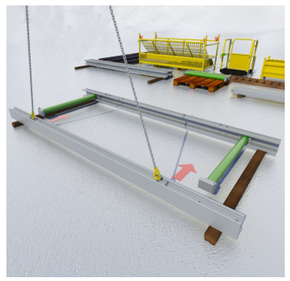
Assembly



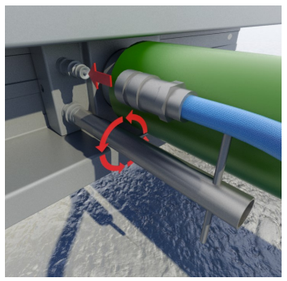
1. Using a certified two leg lifting chain, position the first waler rail and rotate as shown in order to receive the hydraulic cylinders.



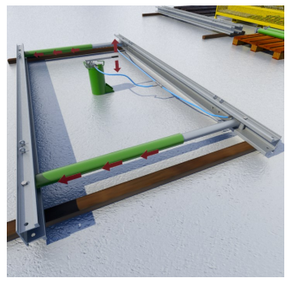
2. Fit both cylinders into the channel/strut housings. Align the holes in the cylinder feet with those in the rail. Secure as shown using the nut and bolt supplied.



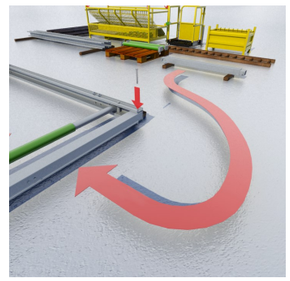
3. Using a two leg lifting chain, lift and position the 2nd waler rail. Align the hole in the cylinder head and waler rail as before and secure with the nuts and bolts provided.



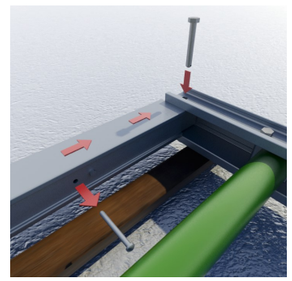
4. Connect a two way hose from the two quick release valves on the cylinders to a manual hydraulic pump. Open the lock off valve by turning it anti-clockwise 2 turns.



5. The hydraulic cylinders can now be pumped out to approximately 100mm narrower than the width of the trench and the lock off valve closed by turning clockwise.



6. If the end of the excavation requires support, Waler End Bearers can be used. (refer to the 'Waler End Bearers' user guide for full details)



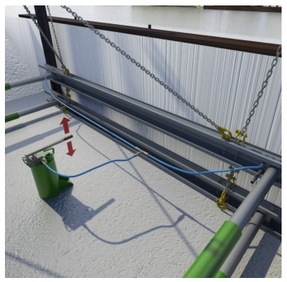
7. Remove the transit pin and extend the sleeve before securing the end with a nut and bolt.

Installation

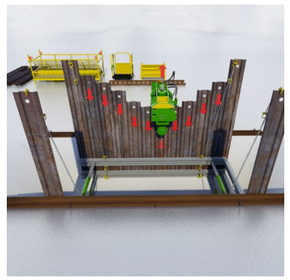
1. Mark out the trench width, either with spray paint or with timbers. Excavate a nominal one metre deep guide trench, or as prescribed in the design.

2. Using a certified four leg lifting chain, lower the assembled frame into the trench to the desired depth. Install four trench sheets to depth or refusal at each end of the waler rails.

3. Lower the second frame into the trench above the first. Using restraint chains, hang the first frame from the tops of the four trench sheets Secure the second to the first using the eye bolts.

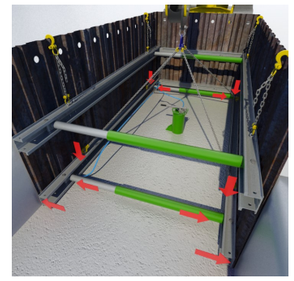


4. Ensure the frames are level and attach the hydraulic hoses. Open the lock off valve and pressurise both frames in turn to approx 1000psi. Close the lock off valve. **Do not over tighten the lock off valve.**



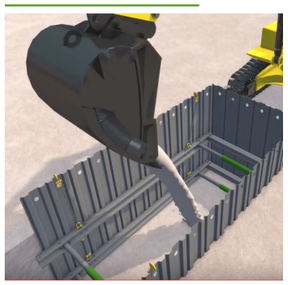
5. Install the remainder of the trench sheets using the waler rails as guides; ensuring that the waler rails contact the sheets.

6. Temporarily depressurise the lower frame and loosen the chains. Continue digging within both frames until the proposed position of the lower frame is reached. Lower the second frame as excavation progresses ensuring that the sheets are driven ahead of the dig level.

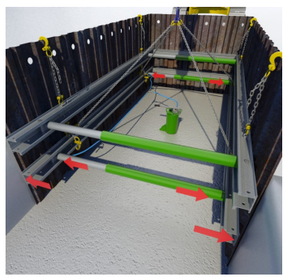


7. Once the proposed position of the lower frame is achieved, re-pressurise the frame and refit the restraint chains. Continue to excavate to formation level.

Extraction



1. Begin extraction by backfilling to the underside of the lowest frame.



2. Loosen the restraint chains and depressurise the lower frame. Then either collapse the frame so it can be tilted and removed through the upper frame, or reposition the lower frame to the underside of the upper frame. Re-pressurise and reattach the restraint chains.

3. Continue backfilling to the underside of subsequent frames and repeat the operation until all frames are removed. Extract the trench sheets and backfill to ground level.

Do

- ✓ Inspect all components at the start of every shift
- ✓ Prepare a lifting plan; assess weights correctly and use appropriately certified lifting equipment during installation and removal
- ✓ Use only designated lifting points for chain attachment
- ✓ Use edge protection or handrail panels
- ✓ Attach a minimum of four restraining chains per frame; one in each corner
- ✓ Keep personnel clear of excavator slewing zone
- ✓ Locate any existing underground services before excavating
- ✓ Provide a safe means of access and egress
- ✓ Watch the 'Hydraulic Waler Frames' video animation on YouTube prior to using the equipment
- ✓ Take care to avoid trapping fingers

Do Not

- X Over tighten the lock off valves (if fitted)
- X Allow excessive amounts of spoil to collect on top of the waler members
- X Use excessive force during installation/removal
- X Depressurise waler components without adequate support. other than provided by the hanging chains, being in place
- X Drag the waler out of the ground without releasing the pressure
- X Strike the waler components during excavation
- X Use shoring fluid other than that supplied by Groundforce

A Hydraulic Waler Frames video showing a typical installation method is available to watch now on our YouTube channel.

Rev	Date	Comments	Initial
1.1	09/01/20	First Issue	ARL

ISOQAR REGISTERED UKAS MANAGEMENT SYSTEMS 0026

Certification Number 14419
ISO 9001
ISO14001
ISO 45001

Liability Statement

This design has been prepared by the Groundforce Shorco (GFS) technical department in accordance with their documented design procedure (a copy of which is available on request). Great care has been taken to provide a safe and workable solution in accordance with the principles set out in BS 5975:2019 section 13 and the Construction (Design and Management) Regulations 2015 as far as is reasonably possible.

The Hirer should note that they have a duty under CDM and BS 5975 to check the suitability of the design for the site conditions and proposed use.

The calculations and drawings given in support of the equipment usage is based solely on a set of standard assumptions. Therefore the stability of the suggested configurations is solely dependent on the validity and accuracy of these assumptions. It is essential therefore that the Hirer or their representative checks carefully the validity of the assumption within this document to ensure that the scheme is practical and workable.

Should there be any changes to the site conditions from those assumed in the design, the Hirer should first reassess the suitability of the design. Should the Hirer deem that the design is no longer suitable, it is recommended that they contact GFS immediately. If the Hirer fails to notify GFS of such changes which the Hirer knew or ought reasonably to have known, GFS take no further responsibility whatsoever for the continued use of the equipment.

Design & Check Certificate

This design has been prepared by the Groundforce Shorco (GFS) technical department based on the agreed design brief supplied in accordance with their documented design procedure (a copy of which is available on request). Great professional skill and care has been taken to provide a safe and workable solution in accordance with the principles set out in BS 5975:2019 and the Construction (Design and Management) Regulations 2015 as far as is reasonably possible.

The design has been checked internally by Groundforce Shorco in accordance with check **Category 1** as described in BS5975:2019. It is the responsibility of the temporary works coordinator to assess the required check category and ensure that the design has been checked accordingly.

The shoring temporary works scheme is described by the documents referenced below:

- ***Standard Solution Design Document: CO-0W-W-1F-25 C02***
- ***Drawing(s): CO-0W-W-1F-25 C02***

I certify that reasonable professional skill and care has been used in the design of the Temporary Works scheme identified and described by the above referenced drawings and other documents:

Signed:		Name: Steven Taylor-Costa *BSc (Hons) MEng (Hons) GMICE*
		Date: 13/06/22
Title / Position:		Principal Engineer (Development)

I certify that reasonable professional skill and care has been used in the checking of the Temporary Works scheme identified and described by the above referenced drawings and other documents.

Signed:		Name: Vicky Mastoridou *MEng MSc GMICE*
		Date: 13/06/22
Title / Position:		Development Manager

I certify that the staff who have completed the above design and check are competent to carry out their duties and that they have exercised reasonable professional skill, care and diligence under CDM 2015.

Signed:		Name: Oliver J. Smith *MEng (Hons) CEng MICE CMgr MCMI*
		Date: 13/06/22
Title / Position:		Head of UK Engineering Design

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