



# Groundforce

Specialist Construction Solutions



## Groundforce Standard Solutions 2.5m Backhoe Manhole Box (2.0m Depth) No Groundwater



Certification Number 14419  
ISO 9001  
ISO 14001  
ISO 45001

|                             |                                                                                                                     |     |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------|-----|
| Design Complexity Risk:     | 0                                                                                                                   |     |
| Groundforce Check Category: | 1                                                                                                                   |     |
|                             | <i>*An additional check should be carried out on site by the contractor to assess the suitability of the design</i> |     |
| Date / Number of Pages:     | 23/05/2022                                                                                                          | 16  |
| Design Reference / Rev:     | MIX-0W-MB-B25-20                                                                                                    | C02 |

Provided by:

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## Contents

| Description:                                          | Page:      |
|-------------------------------------------------------|------------|
| CDM 2015 statement                                    | 3          |
| Basis of Design                                       | 4 - 5      |
| Equipment Specification                               | 6          |
| General Notes                                         | 7          |
| Scheme Specific Notes                                 | 8          |
| Residual Risk Items                                   | 9 – 10     |
| Design Calculations                                   | 11 - 12    |
| Drawing                                               | 13         |
| Installation Guide                                    | 14         |
| Liability statement                                   | Appendix A |
| Internal Design Check Certificate - see note 5 below. | Appendix B |



### **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:  | 2.5m Backhoe Manhole Box (2.0m Depth)      |                                                        |
| Max. Excavation Depth:  | 2.00m*                                     |                                                        |
|                         | <i>* includes no allowance for overdig</i> |                                                        |
| Plan Dimensions:        | External:                                  | Varies<br>(Refer to drawing ref: MIX-0W-MB-B25-20 C02) |
|                         | Internal:                                  | Varies<br>(Refer to drawing ref: MIX-0W-MB-B25-20 C02) |
| Clearance below struts: | 1.18m                                      |                                                        |

| Ground Conditions                                                                                                                              |                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| ✓ Suitable Ground                                                                                                                              | ✗ Unsuitable Ground             |
| Well Compacted Made Ground                                                                                                                     | Very Loose or Loose Made Ground |
| Road Construction                                                                                                                              | Silt                            |
| Medium Dense, Dense or Very Dense Sand                                                                                                         | Very Loose or Loose Sand        |
| Loose, Medium Dense, Dense or Very Dense Gravel                                                                                                | Very Loose Gravel               |
| Soft-Firm, Firm, Stiff or Very Stiff Clay                                                                                                      | Very Soft or Soft Clay          |
| Rock                                                                                                                                           | Peat                            |
| <b>SHOULD THE GROUND CONDITIONS ENCOUNTERED DIFFER FROM THOSE PERMITTED, STOP WORK IMMEDIATELY AND INFORM THE TEMPORARY WORKS CO-ORDINATOR</b> |                                 |

| Assumed soil parameters for purposes of design*                       |                             |                                  |                                |      |      |          |
|-----------------------------------------------------------------------|-----------------------------|----------------------------------|--------------------------------|------|------|----------|
| Depth (m)                                                             | Soil Name                   | $\gamma$<br>(kN/m <sup>3</sup> ) | $\phi$<br>(kN/m <sup>2</sup> ) | Ka   | Kp   | $\delta$ |
| 0.0 to 2.0                                                            | MIXED GROUND<br>(See Above) | 18.0                             | 32                             | 0.31 | 3.25 | 0.00     |
| <b>No groundwater is permitted within the depth of the excavation</b> |                             |                                  |                                |      |      |          |

*\*These simplified parameters are deemed to be conservative based on the above information and result in a safe solution. The solutions have also been checked using undrained shear strength values to represent the soft-firm clay (minimum cohesion of 30kN/m<sup>2</sup>) in the short-term.*

## Basis of Design (continued)

| Surcharges (one option per side)                                                                 |                                                                                  |
|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| A uniform surcharge of 16kN/m <sup>2</sup> 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:                                                                                          |
| <ul style="list-style-type: none"> <li>▪ Adjacent watercourses</li> <li>▪ Presence of groundwater</li> <li>▪ Excavation duration exceeding 12 weeks</li> </ul> |



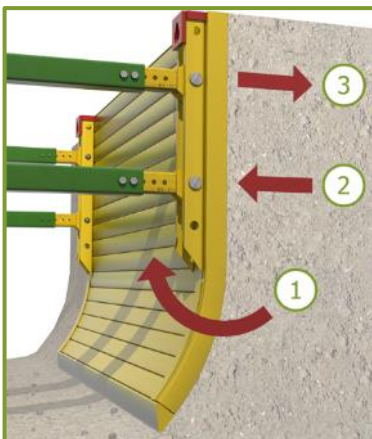
## Specification of Support Equipment

| Boxes            |                                      |       |            |      |
|------------------|--------------------------------------|-------|------------|------|
| Box Type:        | Groundforce 2.5m Backhoe Manhole Box |       |            |      |
| Number of Units: | Base Unit:                           | 1 No. | Top Ext's: | None |

| Box Plates                     |           |
|--------------------------------|-----------|
| Allowable Kicking Moment:      | 117.4kNm  |
| Calculated Kicking Moment (1): | 13.5kNm   |
| Allowable Bowing Moment:       | 43.6kNm/m |
| Calculated Bowing Moment (4):  | 11.8kNm/m |

| Box Struts (Type – Backhoe)           |          |
|---------------------------------------|----------|
| Allowable Compressive Strut Load      | 126.5kN  |
| Calculated Compressive Strut Load (2) | 45.2kN   |
| Allowable Tensile Strut Load          | -121.7kN |
| Calculated Tensile Strut Load (3)     | -19.1kN  |

| 3.00m End Closure Panel (at maximum box width)*                                                                                                |           |
|------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Maximum Allowable Bowing Moment:                                                                                                               | 79.1kNm/m |
| Calculated Bowing Moment:                                                                                                                      | 17.2kNm/m |
| <i>* Smaller End Closure Panels may be used at shorter box widths.<br/>Refer to drawing for suitable panel and maximum allowable box width</i> |           |



## 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)
  - BS EN 13331 (parts 1 & 2) 2002: Trench Lining Systems
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.
2. 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/m<sup>2</sup> 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.
3. In the interests of design economy, overdig has not been allowed for in the design calculations. The contractor must therefore ensure that the excavation process is controlled accordingly (see also the residual risk assessment sheet).
4. As soon as the formation level is exposed, it is recommended that blinding concrete should be placed immediately to prevent degradation of the base.
5. The contractor should use a suitable “Bond break” medium such as visqueen, between the concrete and box panels 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           |
| Unsupported ground at ends of trench | 2           |
| Working at Height & Access/Egress    | 2           |
| Ground movement                      | 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. In addition if ground is found to be hard the Contractor is to take care when installing box as application of excessive force may result in box damages which may be chargeable. If ground contains cohesive material the Contractor is to take care when extracting box due to self-weight and suction effects inherent to cohesive material. Lifting capacity of onsite machinery is to be assessed prior to starting the extraction process.
4. Surcharge: A uniform surcharge of 16kN/m<sup>2</sup> 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): In the interests of design economy, overdig has not been allowed for in 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. Unsupported ground at ends of excavation (*Applicable if Endsafe Closure Panels not utilised*): The ends of the excavation should be battered back a safe angle on all faces to ensure stability of the unsupported ground. Alternatively, End Closure Panels could be utilised to close off the ends of the excavation. **Trench sheets should not be placed against the box struts.**
7. 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.
8. 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.



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Excavation Support

Technical Services Department  
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Ref No MIX-0W-MB-B25-20

Solution 2.5m Backhoe Manhole Box  
2.0m Deep

Rev No C02  
For Construction

Prepared By SPT Checked By VM Date 11/05/2023

Sheet No 1 of 2

### Box details

|                  |                          |              |
|------------------|--------------------------|--------------|
| Dig Depth        | 2.00                     | m            |
| Box Type         | Backhoe 2.5m Manhole Box |              |
| Box make-up      | Base only                |              |
| Clearance below  | 1.18                     | m            |
| Strut type       | Backhoe (Fixed)          |              |
| Strut Length     | 2.23                     | m Pin to pin |
| Endsafe required | Yes                      |              |
| Endsafe Type     | 3.5m (60mm thk)          |              |
| Endsafe Panels   | Base Only                | Both sides   |

|                   |      |   |
|-------------------|------|---|
| Box Height        | 2.00 | m |
| Box Length        | 2.50 | m |
| Box Width         | 3.50 | m |
| Clearance on plan | 2.30 | m |

External 3.38 m Internal

### CO<sub>2</sub>e for this Hire

|                  |      |    |
|------------------|------|----|
| Total Box Weight | 1105 | kg |
| Base Unit Weight | 1105 | kg |
| Top Unit Weight  | -    | kg |
| No. of Top Units | -    |    |

|   |        |                             |
|---|--------|-----------------------------|
| + | 0.0145 | kgCO <sub>2</sub> e/kg/week |
|   |        | Equipment (A1 - A3)         |
|   | 0.015  | kgCO <sub>2</sub> e/kg/hire |
|   |        | Transport (A4)              |

### Soil parameters

based on Mixed Parameters (refer to table of suitable/unsuitable ground conditions).

| Depth             |      | Description            |       |                                       | $\gamma$        | $\gamma_{sat}$  | $\phi$   | $\delta/\phi$ | c or $c_u$      | $a_w/c_u$ | $K_a$ | $K_p$ | $K_{ac}$ | $K_{pc}$ |
|-------------------|------|------------------------|-------|---------------------------------------|-----------------|-----------------|----------|---------------|-----------------|-----------|-------|-------|----------|----------|
| m BGL             |      |                        |       |                                       | $\text{kN/m}^3$ | $\text{kN/m}^3$ | $^\circ$ |               | $\text{kN/m}^2$ |           |       |       |          |          |
| 0.00              | 2.00 | MADE GROUND - Granular |       |                                       | 18              | 21              | 32       | 0.00          | 0               | 0.00      | 0.31  | 3.25  | 0.00     | 0.00     |
|                   |      |                        |       |                                       |                 |                 |          |               |                 |           |       |       |          |          |
|                   |      |                        |       |                                       |                 |                 |          |               |                 |           |       |       |          |          |
|                   |      |                        |       |                                       |                 |                 |          |               |                 |           |       |       |          |          |
|                   |      |                        |       |                                       |                 |                 |          |               |                 |           |       |       |          |          |
|                   |      |                        |       |                                       |                 |                 |          |               |                 |           |       |       |          |          |
|                   |      |                        |       |                                       |                 |                 |          |               |                 |           |       |       |          |          |
|                   |      |                        |       |                                       |                 |                 |          |               |                 |           |       |       |          |          |
| Groundwater Level |      | 10.00                  | m BGL | Consider water filled tension cracks? |                 |                 |          |               |                 | No        |       |       |          |          |

### Surcharges

|                               |                   |    |                   |   |   |   |   |   |   |  |  |
|-------------------------------|-------------------|----|-------------------|---|---|---|---|---|---|--|--|
| Uniform surcharge, $q_{udl}$  |                   | 16 | kN/m <sup>2</sup> |   |   |   |   |   |   |  |  |
| Local surcharge (No.)         |                   | 1  | 2                 | 3 | 4 | 5 | 6 | 7 | 8 |  |  |
| Type ( <i>Strip or Area</i> ) |                   |    |                   |   |   |   |   |   |   |  |  |
| Surcharge, $q$                | kN/m <sup>2</sup> |    |                   |   |   |   |   |   |   |  |  |
| Depth, $x$                    | m                 |    |                   |   |   |   |   |   |   |  |  |
| Offset, $A$                   | m                 |    |                   |   |   |   |   |   |   |  |  |
| Width, $B$                    | m                 |    |                   |   |   |   |   |   |   |  |  |
| Length, $L$                   | m                 |    |                   |   |   |   |   |   |   |  |  |

### Moments

|                                  |           |        |      |
|----------------------------------|-----------|--------|------|
| 1 @ strut level                  | Allowable | Actual | OK?  |
| 2 @ underside of strut housing   |           |        |      |
| Kicking Moment 1, M3,1 (kNm/end) | 58.7      | 13.5   | PASS |
| Kicking Moment 2, M3,2 (kNm/end) | N/A       | N/A    | N/A  |
| Bowing Moment, M1 (kNm/m)        | 43.6      | 11.8   | PASS |
| Endsafe Panel Moment (kNm/m)     | 29.5      | 23.6   | PASS |

### Struts

|    | Level | Load <sub>allow</sub> | Load <sub>actual</sub> | OK?  |
|----|-------|-----------------------|------------------------|------|
|    | m BGL | kN                    | kN                     |      |
| F1 | 0.135 | -121.7                | -19.1                  | PASS |
| F2 | 0.735 | 126.5                 | 45.2                   | PASS |
| F3 | N/A   | N/A                   | N/A                    | N/A  |
| F4 | N/A   | N/A                   | N/A                    | N/A  |

### Notes

Design also applicable in cohesive ground with minimum strength of Soft to Firm (a minimum cohesion of 30kN/m<sup>2</sup>). Please refer to the drawing for further information on ground conditions suitable for this design.

Groundwater not considered.

Maximum depth = 2.00m.

Endsafe Panel optional.

For more information on our carbon calculation, scan the below QR code





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Site 2.5m Backhoe Manhole Box

Scheme 2.0m Deep

Prepared By SPT

Checked By VM

Date 11/05/2023

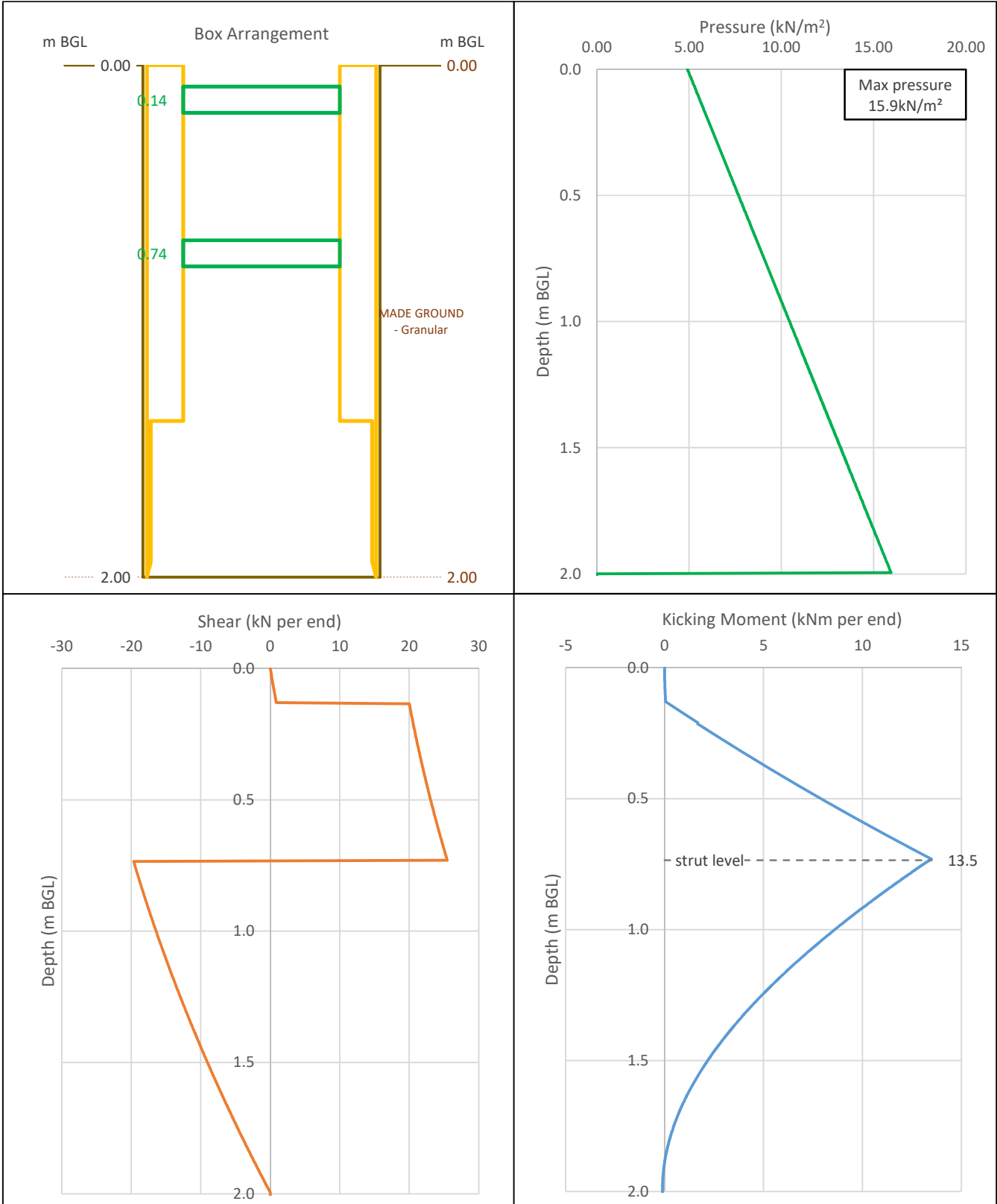
**Standard Solutions**

Ref No MIX-0W-MB-B25-20

Rev No C02  
For Construction

Sheet No 2 of 2

### Graphical Output



## 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 ✗ UNSUITABLE GROUND

|                                                 |                                 |
|-------------------------------------------------|---------------------------------|
| Well Compacted Made Ground                      | Very Loose or Loose Made Ground |
| Road Construction                               | Silt                            |
| Medium Dense, Dense or Very Dense Sand          | Very Loose or Loose Sand        |
| Loose, Medium Dense, Dense or Very Dense Gravel | Very Loose Gravel               |
| Soft-Firm, Firm, Stiff or Very Stiff Clay       | Very Soft or Soft Clay          |
| Rock                                            | Peat                            |

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

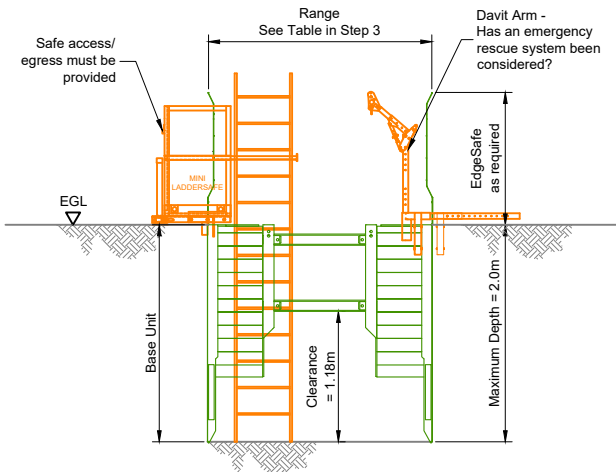
The standard solution indicated on this drawing is valid based on the below conditions. Should the site conditions and/or surcharges be unsuitable, please contact Groundforce for a site specific design.

### ✓ PERMITTED (within the zone of influence\*) ✗ NOT PERMITTED (within the zone of influence\*)

|                                                                                 |                                                                                  |
|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Plant up to 30t (10kN/m <sup>2</sup> )                                          | Plant exceeding 30t (including cranes)                                           |
| Live roads up to and including Principal (A) roads, site access or closed roads | Railways, motorways and trunk roads                                              |
| Simple boundary walls less than 1.0m high                                       | 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)

## 4 TYPICAL SECTION

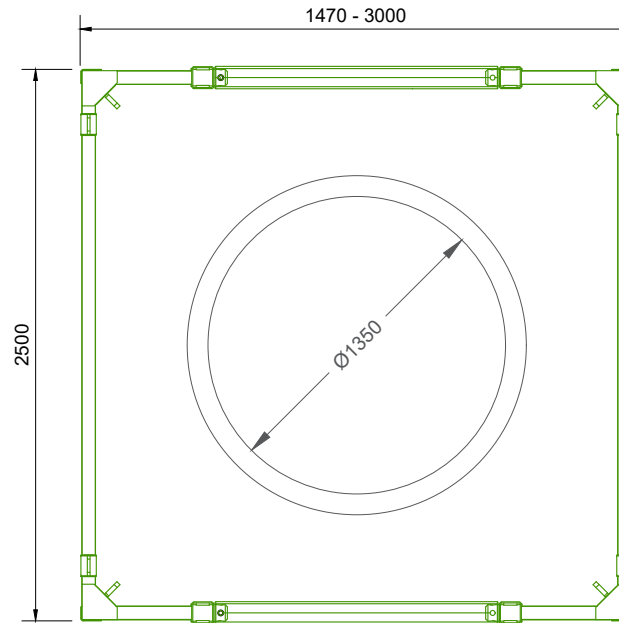


**Maximum Allowable Dig Depth = 2.00m**



**IF YOU ARE IN ANY DOUBT...ASK!**

## 3 EQUIPMENT



| SPECIFICATION                  | 2.5m Backhoe Manhole Box |
|--------------------------------|--------------------------|
| To Suit Manhole Ring Size (mm) | 1050/1200/1350           |
| Plate Length (mm)              | 2500                     |
| Plate Thickness (mm)           | 60                       |
| Clearance Between Struts (m)   | 2300                     |
| External Width (mm)            | 1470 - 3000              |
| Internal Width (mm)            | 1350 - 2880              |
| Strut Length (mm)              | 250 - 1800               |
| Plate Height (mm)              | 2000                     |
| Strut Clearance Height (mm)    | 1180                     |
| Weight (kg)                    | 964                      |

## 5 SELECT SUITABLE END SUPPORT

The ends of the excavation should be **battered back** to a safe angle of repose (to be determined by the contractor) to ensure the stability of the unsupported ground. Alternatively, **EndSafe End Closure Panels** can be used to close-off the ends of the excavation to safely retain the ground and prevent loose material from being accidentally dislodged into the excavation.

| SPECIFICATION                  | 1.5m EndSafe | 2.0m EndSafe | 2.5m EndSafe | 3.0m EndSafe |
|--------------------------------|--------------|--------------|--------------|--------------|
| Plate Width (mm)               | 1500         | 2000         | 2500         | 3000         |
| Plate Thickness (mm)*          | 60/107       | 60/107       | 60/107       | 60/107       |
| Plate Height - Base Panel (mm) | 2600         | 2600         | 2600         | 2600         |
| Maximum Box Width (mm)         | 1500         | 2000         | 2500         | 3000         |
| Weight - Base Panel (kg)*      | 305/430      | 395/555      | 490/680      | 585/800      |

\*EndSafe panels are available in different thicknesses depending on required capacity



Base Panel

## 6 USE OF CHAIN ATTACHMENT POINTS

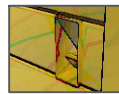
All boxes are equipped with two types of chain attachment points.

**Handling points** as the name suggests are provided at various locations around the box panels to enable them to be slung for assembly purposes in both horizontal and vertical planes.

**Lifting points** are much heavier duty constructions designed to take the full weight of the box including extraction forces when pulling them out of the ground. These points are located in the top of the box panels and are denoted by red paint.

Note:

- Lifting points can be used for handling purposes but handling points must not be used for lifting assembled boxes.
- Chain attachment points have been designed in accordance with BS EN 13331-1:2002 clause 7.4.
- The chain attachment points are considered as part of the load. Therefore no certification is required for these points under LOLER.



Handling point



Lifting point

## RESIDUAL RISKS

- 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.
- 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/unloading, installation and removal of the equipment.
- Ground conditions:** Should the ground conditions differ from those stipulated, excavation should stop immediately and a site specific temporary works design be obtained. Any immediate hazards should be made safe by backfilling if necessary.
- Surcharge:** Prior to commencing excavation, the competent person selecting the standard solution should ensure that no excessive surcharges are present.
- Accidental excavation (Overdig):** Care should be taken during excavation to ensure that maximum allowable dig levels are not exceeded.
- Unsupported ground at ends of excavation:** Ground should be battered back to a safe angle of repose or suitable EndSafe panels should be used.
- 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.
- 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.

## Notes

- 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.
- For the applicability of the standard solution, refer to the "Ground Conditions" and "Site Conditions & Surcharges" boxes opposite.
- The excavation must be open for less than 12 weeks.
- 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.
- 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.
- Assumed Installation Method: Dig and Push (See Groundforce Installation & User Guides).
- Removal is the reverse of the installation process ensuring material is backfilled and compacted in layers as extraction proceeds.
- A general surcharge of 16kN/m<sup>2</sup> 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.
- The excavation support design does NOT allow for standard BS8002 overdig. The contractor MUST ensure the excavation process is controlled and monitored at all stages to avoid overdigging.
- This design is not suitable for use with any other supplier's equipment and no liability shall be accepted by Groundforce for such use.

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<sub>2</sub>e FOR THIS HIRE

kgCO<sub>2</sub>e per kg of equipment per week  
Steel = 0.0145, Aluminium = 0.0358  
+ Raw Material Supply (A1), Transport (A2), Manufacturing (A3)  
kgCO<sub>2</sub>e per kg of equipment per hire  
= 0.015 - Transport to and from site (A4)



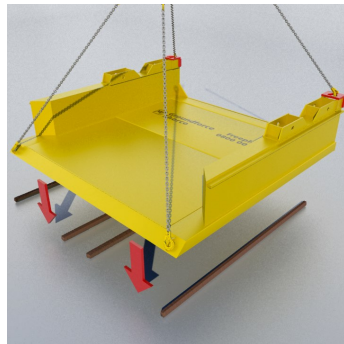
**Vp** **Groundforce Shorco**  
**Standard Solutions**

**2.00m Deep Mixed Ground No Groundwater 2.5m Backhoe Manhole Box**

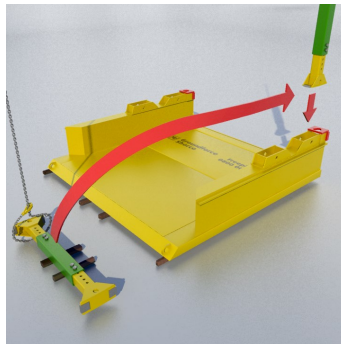
MIX-0W-MB-B25-20

C02

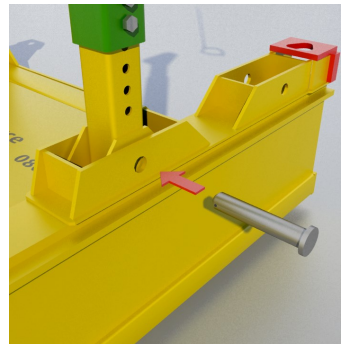




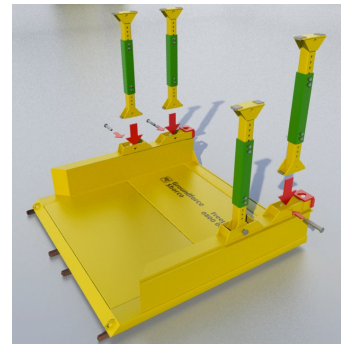
1. Position the first plate on firm level ground and orientate with the strut sockets facing upwards.



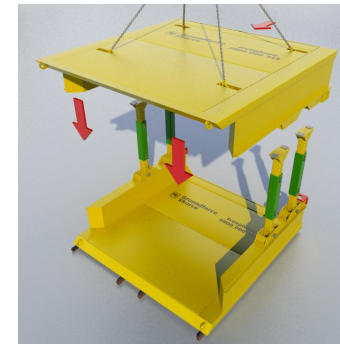
2. Pre-assemble the struts to the required length and locate into the strut housing.



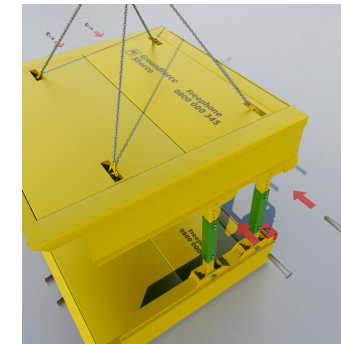
3. Insert a pin and 'R' clip. Fit the pin from the outside as shown. Fit an 'R' clip through the pin on the inside.



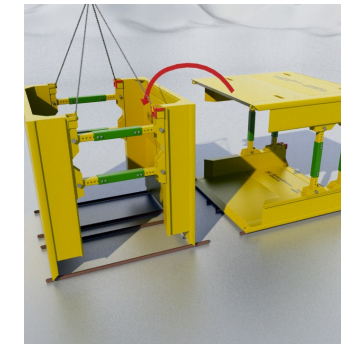
4. Repeat for all four struts



5. Lift and invert the second panel using the handling points and manoeuvre into position above the other panel. Lower the panel towards the four struts.

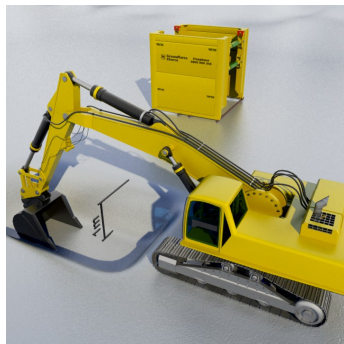


6. Carefully align all four struts such that the Rockers/Spring Spindles engage in the upper plate sockets. Fit pins and clips as above.



7. Using the red lifting points, tilt the box into an upright position. **Note:** all personnel should keep well clear during this manoeuvre.

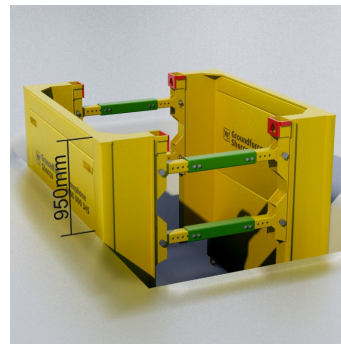
## Installation



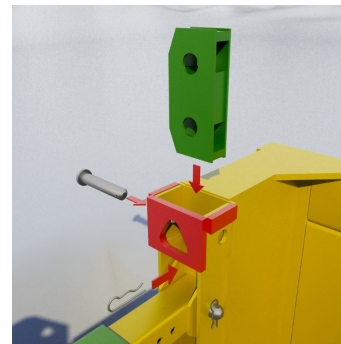
1. Excavate a nominal one metre deep guide trench.



2. Lower the assembled box into the guide trench. Push down on each corner of the box sequentially, but not more than 150mm increments.



3. Continue to dig and push in sequence until a 950mm upstand is left to provide a safety barrier.



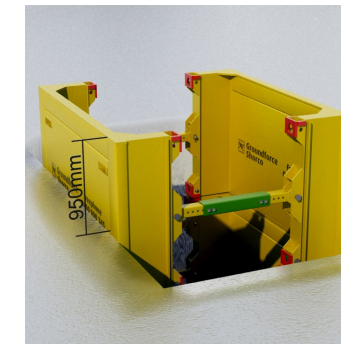
4. Insert the panel connectors and secure with pins and 'R' clips at all four corners.



5. Fit the top box by placing it on top of the base and securing the top box cassettes with a pins and 'R' clips.

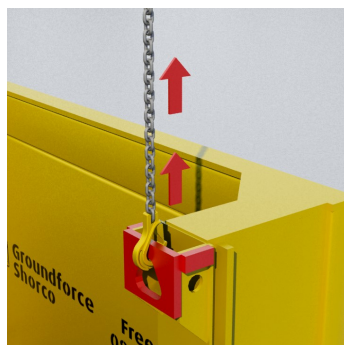


6. Excavate from within, taking care not to strike the box struts. Push down on each corner of the box sequentially, but not more than 150mm increments, until formation is achieved.



7. Upon reaching target depth, maintain a minimum 950mm safety barrier; either by leaving an upstand or by introducing edge protection. Endsafe panels can be introduced to close off the ends of the excavation.

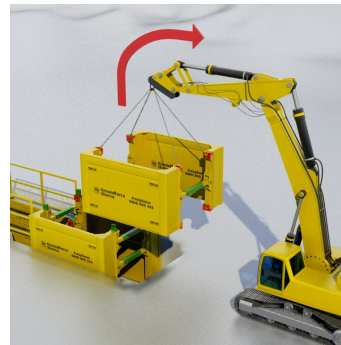
## Extraction



1. If edge protection is fitted, remove this and then using a single heavy duty chain, attach to each corner of the box in turn and lift by no more than 150mm each time. Backfill and compact in stages as removal progresses.



2. Once the **lower box** is 950mm above ground level, the upper box can be removed. Remove the pins and 'R' clips to release the top box.



3. Attach a four leg lifting chain to the lifting points. Lift the top box clear and set carefully to one side. Unpin and remove the panel connectors from the lower box.



4. Using a single heavy duty chain, attach to each corner of the box in turn and lift by no more than 150mm each time. **Do not snatch the chain**



5. Continue to backfill and compact in stages.



6. Attach a four leg chain to the lifting points and lift clear of the excavation.



7. Fill in the remaining excavation.

| Rev | Date     | Comments    | Initial |
|-----|----------|-------------|---------|
| 1.1 | 13/01/20 | First Issue | ARL     |

Manhole box\_installation guide\_1.1\_EN\_13-01-20

# Manhole Box Equipment

# Installation Guide

To be read in conjunction with User Guides

## Do

- ✓ Inspect all components at start of every shift
- ✓ Assess weights correctly and use adequate and appropriately certified lifting equipment. Ensure hooks engage fully into lifting points prior to lifting
- ✓ Toe-out base boxes by 50mm
- ✓ Ensure all pins & clips are correctly fitted
- ✓ Use four panel connectors for upper box attachment
- ✓ Use only lifting or handling points for chain attachment
- ✓ Provide support over the full height of the dig
- ✓ Provide edge protection or handrails
- ✓ Push the plates at the corner positions only
- ✓ Keep personnel clear of excavator slewing zone
- ✓ Always use a banksman
- ✓ Locate underground services before excavating
- ✓ Lay box flat before dismantling
- ✓ Store assembled boxes on firm, level ground only or lay flat on their sides
- ✓ Use a secured ladder to enter or exit a box
- ✓ Always work from a safe area to avoid the risk of falls from height
- ✓ Non standard installation methods must be approved by a competent person
- ✓ Take care to avoid trapping fingers

## Do Not

- ✗ Use more than 4 No. Strut Components on spindle struts
- ✗ Exit the box into an unsupported area
- ✗ Use the struts to support trench sheets across the ends of the box
- ✗ Adjust the struts without laying the box down and removing the top plate
- ✗ Push plates down by more than 150mm at a time
- ✗ Snatch the chain whilst extracting the box
- ✗ Use handling points for lifting or pulling
- ✗ Climb on the struts – always use a secured ladder
- ✗ Hang/store materials on the struts
- ✗ Excessively force the box into the ground
- ✗ Permit personnel in the box during installation
- ✗ Accidentally strike the struts
- ✗ Drag the box by any means
- ✗ Use more than two top boxes unless approved in writing by Groundforce
- ✗ Store/stack plates more than 6 plates high
- ✗ Fly the boxes above the base of the excavation unless approved by a competent person
- ✗ Enter an unsupported trench

## EXCAVATION TRAINING AVAILABLE

Train your team with **Groundforce Training Services**

• Nationwide training locations • EUSR accredited • Flexible courses

☎ 0800 023 2663

## FULL USER GUIDE AVAILABLE

from the **Groundforce Technical Library**

[www.vpgroundforce.com/technical-library](http://www.vpgroundforce.com/technical-library)



A video showing a typical box installation method is available to [watch now](#) on our YouTube channel.



## 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: MIX-0W-MB-B25-20 C02**
- **Drawing(s): MIX-0W-MB-B25-20 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 <i>BSc (Hons) MEng (Hons) GMICE</i> |
|                   |                                                                                   | Date: 23/05/22                                                |
| 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 <i>MEng MSc GMICE</i> |
|                   |                                                                                     | Date: 23/05/22                               |
| 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 <i>MEng (Hons) CEng MICE CMgr MCMI</i> |
|                   |                                                                                     | Date: 23/05/22                                               |
| Title / Position: |                                                                                     | Head of UK Engineering Design                                |

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