

## CONTRACTOR CHECK LIST FOR A SAFE TERRAFORCE RETAINING WALL

### 1 RETAINING WALL DESIGN

#### 1.1 Drawings and specifications

- Construction drawings clearly specifying geometry, drainage, backfill material, reinforcing, foundation of wall etc;
- Ensure that drawings contain all the necessary detail and that all materials and construction processes are clearly specified;
- In the case of anisotropic geotech materials, the direction in which the fabric is to be laid must be clearly specified;
- Prepare and issue technical specifications;
- Fill materials specifications; use material specific and standardised earthworks specifications; (SANS 1200)
- Specify limitations on compaction directly behind the blocks;
- Specify as shown on the drawings:
  - design surcharge loading;
  - surface drainage requirements;
  - limitations on the positioning of services and surcharges.

#### 1.2 Design review

An independent design review by an experienced geotechnical engineer or competent person is required for:

- Walls that will be constructed on clayey soils;
- Walls with limited deflection tolerances;
- High walls;
- Walls carrying large surcharge loads;
- Overall embankment stability should also be confirmed by a specialist.

Terrasafe design services are available to assist users of Terraforce products (<https://www.terraforce.com/terrasafe-design-services/>).

### 2 CONSTRUCTION

#### 2.1 Investigation

- Ensure that the site conditions investigated and recorded prior to design are verified by inspections during construction;
- Verify foundation and cut-face soil properties when excavated;
- Photo records of embankment and existing structures should be obtained prior to and during excavation/construction;
- Contractor must ALWAYS act in accordance with the latest OHS ACT (Health and safety act).

## 2.2 Re-design

- Re-design and re-issue drawings if changes to the retaining wall system was not foreseen at the design stage.

## 2.3 Materials

- Ensure correct materials are utilized;
- No fine grained (not free draining) or moisture-sensitive soils (soils that soften or swell on wetting) in the backfill/reinforced soil zone (a grading analysis of the backfill material should be approved by the specifier);
- Ensure fill material particle size and Atterberg Limits testing and the necessary inspections and site control during construction;
- Tests as required by the particular specification or the standardised specifications to determine the properties of the backfill material and compaction achieved (a grading analysis of the backfill material should be approved to specification);
- Mod AASHTO maximum dry density determinations should be carried out for fill material and in-situ soil below the proposed foundation, if variable from different sources.

## 2.4 Monitoring

The construction work must be monitored for quality assurance purposes by the design engineer. The following are essential requirements for issuing a Completion Certificate:

- A list of required quality checks and testing should be agreed to prior to construction;
- Design engineer/project manager to ensure that testing is carried out and placed on record for future reference;
- Design engineer/project manager to ensure necessary inspections, site control and construction monitoring during construction;
- This supervision process must also include:
  - Approval of the specified material and samples;
  - Density/compaction tests and foundation and backfill materials;
  - Approval of backfill material grading analysis;
  - Concrete strength tests.

## 2.5 Construction tolerances

- Reinforced soil structures should be erected to the construction tolerances detailed in Table 2-1.
- Blocks, when being laid, should be levelled in the width and in the length of the blocks before the next row is placed.

1	2
Location of plane of structure	Tolerance $\pm 50$ mm
Verticality	$\pm 5$ mm per metre height (i.e. 40 mm per 8 m)
Bulging (vertical) and bowing (horizontal)	$\pm 20$ mm in 4,5 m template
Steps at joints	$\pm 10$ mm
Alignment along top (horizontal)	$\pm 15$ mm from reference alignment

Table 2-1 - Usually accepted tolerances for faces of retaining walls and abutments

## 2.6 Whole block crushing strength

Table 2 2 - Usually accepted block tolerances and crushing strenght

Compressive Strength	Average 13 MPa / Min 11 MPa
Recommended dimensional tolerances. (Compare to local statutory requirements)	Length +/- 3mm
	Width +/- 3mm
	Weight +/- 3mm

Contractor to ascertain that the blocks supplied comply with the specification in the tender document.

**In cases where the crushing strength has not been tested or specified, it is advised to appoint a design engineer with adequate experience to decide on whether or not the lower rows of blocks need to be filled with concrete or reinforced concrete.**

## 2.7 Completion certificate

The following should be certified:

- Completed in accordance with the drawings & specifications;
- The wall fulfils the design intent.

The following should be specified:

- Maximum loading & limitation on wall height;
- Maintenance and monitoring for long-term stability;
- Include design assumption regarding future use of the areas above and below the wall, including the possibility of future excavations or service trenches below or in front of the toe of the wall.

## 2.8 Health and safety

- Contractor should open a Health & Safety file in accordance with legislation and have it available on site during construction.
- Before and during construction and excavation, the embankment should be inspected for cracks above to prevent injury to workers.

## 2.9 Test results

- Once the required testing has been agreed to between parties, these tests should be concluded in the presence of an engineer (if possible) by a suitably registered engineering lab.
- A location plan of the test positions should accompany the test results for future reference.
- Samples and test results of all materials should be provided to the engineer prior to construction for his/her approval.

## 2.10 Setting out of the works

The setting out of the works should preferably be done by the developer/owner/main contractor and not by the block installer.

## 3 MONITORING, MAINTENANCE AND RESTRICTIONS

All reinforced soil-structures should be subjected to a regular programme of inspection and maintenance and records of the inspections and any maintenance carried out should be kept by the end user.

### 3.1 Monitoring and maintenance

It is particularly important that reinforced soil-structures should be inspected for indications of:

- Excessive settlements, either even or differential;
- Horizontal displacements of the facings;
- Damage to the facings;
- Evidence of drainage problems in, around or under the reinforced soil mass;
- Opening of facing joints or joints between one structure and another;
- Cracking within the earthworks adjacent to the structure.

The following should be monitored (checked periodically) and maintained to ensure they function properly:

- Subsoil drains, weep holes or other drainage outlets;
- Surface drains;
- Irrigation piping and fittings;
- Water bearing services placed behind the wall.

### 3.2 Restrictions

The following restrictions shall apply:

- No excavations in front of the wall that can affect stability of wall;
- Limit surcharges behind the wall to which the wall was designed for; and
- Walls shall not to be extended beyond the original design height, without the approval of the engineer.





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