

EARTH

STRUCTURES

STABILISED EARTH WALL

400 or 450mm Thick Insulated Stabilised Earth Wall (ISE)

PART I GENERAL100

101 Scope

The work of this section includes but is not limited to supplying and installing a complete system of monolithic stabilised earth walls exclusively by a member of the **Earth Structures Group (ESG)** using the Stabilform or PERI Duo formwork system and also includes:

Formwork

Earth materials

Insulation materials

Stabiliser pins

Cement

Waterproofing of admixture

Sealing of completed walls

Testing of materials by NATA approved laboratory

102 Related Work

Co-ordinate and co-operate with the following trades:

Site Preparation – Excavation

Concrete

Structural Steel

Carpentry

Plumber

Electrician

Mechanical Services

Wall Surfacing trades

103 Quality Assurance

Perform the work solely under the direct control of a member of ESG, see clause 101, who will select the trades people for the work and ensure that the work complies with the requirements of relevant Statutory authorities.

104 References

Comply with applicable portions of the following Australian Standards :

AS 1141.51 1996 Unconfined compressive strength of compacted materials

- 2 Elapsed time between addition of cement and compaction.
- 3 Date moulded.
- 4 The dry density corresponding to the maximum point on the moisture content/dry density curve as the “modified maximum dry density” in tonnes per cubic metre to the nearest 0.01
- 5 The percentage moisture content corresponding to the maximum dry density on the moisture content to the nearest 0.5.
- 6 The percentage of oversize material retained on the 19mm sieve or the 37.5mm sieve on which the materials is retained whichever is applicable, to the nearest 1.
- 7 When required, the plot of dry density against moisture content.

1. UNCONFINED COMPRESSIVE STRENGTH OF COMPACTED MATERIALS TO AS 1141.51 - 1996.

Samples to be retained in the mould for 12 hours and air cured in an open environment for 7 days.

Test results on the specimens to include:

- 1 Material retained on the 19.0mm sieve as a percentage of the moist mass in the original sample.
- 2 Details of replacement of coarse material, if applicable.
- 3 When a binder is used, elapsed time between addition of the binder and compaction.
- 4 Moisture content at which specimens were compacted.
- 5 Details of curing.
- 6 Moisture content of specimens on completion of testing.
- 7 Compactive effort applied, method of compaction, and number of layers.
- 8 Dry density of specimens as compacted, to the nearest 0.01 t/m³ and if required percentage of maximum dry density of each specimen.
- 9 If required, the laboratory moisture ratio of the material prior to compaction.
- 10 The normal height and diameter of the specimens, in millimetres.
- 11 Unconfined compressive strength, as the average of the strength of two test specimens to the following precision:
For UCS less than 1.0 Mpa, report to the nearest 0.02 Mpa.
For UCS between 1.0 Mpa and 2.0 Mpa, report to the nearest 0.1 Mpa
For UCS greater than 2.0 Mpa, report to the nearest 0.2 Mpa.
- 12 When a binder is used, the method of preparation of the test sample.
- 13 Reference to this Australian Standard, ie AS1141.51.

CONFORMANCE TESTS

Characteristic adjusted compressive strength test: to CSIRO Bulletin 5 Fourth Edition, Appendix E - Method For Determining Compressive Strength. Samples to be taken from batch being placed on construction site. *One specimen shall be compacted for each test. Specimens shall be compacted in a 90mm diameter x 200mm high cylinder.* Samples to be retained in mould for 12 hours and air cured in an open environment for minimum 7 days.

Report to include:

- 1 Identification of project and the manufacturer of the specimens.
- 2 Date and location of sampling if possible.
- 3 Identification of particular wall sample was used to construct.
- 4 Date of test.
- 5 Cement content by volume.
- 6 The compressive strength, in megapascals, of each specimen.
- 7 Aspect ratio of each specimen.
- 8 The adjusted compressive strength of each specimen.
- 9 The characteristic compressive strength.

Soil evaluation criteria: To CSIRO Bulletin 5 Table 2.2.

PART II MATERIALS200

201 Materials

1. Materials may be gravels, laterite soils and soil blends.

Soil contents:

Organic content	Less than 2%
Clay and silt content	Material below .075mm to be below 20%
Sand content	Material between .075mm and 4.75mm to be not less than 50%
Gravel content	Material between 4.75mm and 75mm to be above 30%
Not more than 5% to be retained on 37.5mm screen size.	
Cement content by volume shall be 6% minimum to 10% maximum determined by Mix Design and Strength Evaluation test.	

1. Materials may also be:

Recycled crushed brick rubble

Crushed building rubble ex nominated supplier to suppliers standard.

Cement content shall be no less than 10%. Proportion to be determined by Mix Design and Strength Evaluation test.

A minimum of 8% cement by volume shall be used in reinforced earth walls.

C Compressive strength

Minimum characteristic compressive strength (Cca) of 2.5 Mpa.

D ESG Plasticure

To be added at a rate of between 0.125 and 0.75 litres per tonne (1000kg) of dry mix. Rate will be determined by specific mix designs.

E Anchors and Fixing

1. STRUCTURAL FIXINGS

Ramset Chem Set Injection System. Structural fixing should be located no less than 150mm from top or side edge of the stabilised earth wall. Holes should be drilled a minimum of 3mm larger than anchor diameter and be thoroughly blown out before injecting epoxy resin. Any overspill in visible areas will need to be wiped away immediately.

1. SECURING WALL FRAMES, WINDOW FRAMES, DOOR FRAMES.

Secure by one of the following means;
Ramset Ramplug Nylon Plug Fasteners
Hilti HRD-H Plastic Frame Anchors
Anchor Screw Bolts

1. FASTENING ALUMINUM WINDOWS, PIPES AND CABLES, TIMBER BATTENS AND COMPONENTS FOR ELECTRICAL AND PLUMBING INSTALLATIONS

Secure by one of the following means;
Hilti HPS-1 Impact Anchors
Ramset Nylon Anchors
Ramset Masonry Anchors

F Insulation
50mm Dow "Styrofoam" insulation sheet with an R Rating of 2.0

G Stabiliser Pins
Earth Structures Group compliance 8mm stainless steel staples, 280mm long with 30mm cobs at 600mm vertical and horizontal spacings.

PART III EXECUTION300

301 Examination

Inspect site conditions before starting work. Arrange with Contractor for rectification found necessary to facilitate wall construction. Start of work means total acceptance of conditions.

302 Damp proof course

Form a damp proof course (DPC) between the footings/slab surface and the stabilised earth walls, using an embossed plastic fabric strip suitable to the thickness of the wall.

Do not compromise the damp proof course with surrounding soil or pavement built up higher than the footing or slab surface.

303 Formwork

Place formwork in accordance with ESG written instructions and maintain in position for 12 hours after placement of material.

304 Insulation

Install insulation hard down onto DPC at slab level allowing 180mm between insulation and end-shutters, insulation and window sill surfaces and insulation and window edges. Insulation must end 600mm before the heads of walls.

305 Stabiliser Pins

Stabiliser pins must be installed at min 600mm vertical and horizontal increments. 30mm cobs must be hammered properly into freshly compacted wall material prior to the erection of subsequent insulation.

306 Vertical steel reinforcing

Avoid steel reinforcing wherever possible due to complications with vertical shrinkage along the embedded steel. Lag vertical steel reinforcing to prevent stabilised earth adhering to and shrinking along the bar.

307 Construction joints

Locate construction joints as shown on drawings. Form mechanical keys at each construction joint and fix 25 x 25mm bitumen impregnated foam strip to full height of wall. Foam strip to extend 100mm along floor or footing surface to ensure a complete seal at the bottom of the construction joint. Form 25mm v joint on both wall faces.

308 Chamfers

Form 45mm chamfer at ends of wall panels or exposed corners.

309 Electrical and other services

Seal electrical components to be cast in wall to prevent penetration of soil during compaction. Boxes to be located at heights specified. A minimum of 100mm cover should be allowed for cast in conduit, pipes, etc. Water pipes should be suitably lagged to prevent penetration by sharp stones during compaction.

Where conduits and pipes cross construction joints provide for a suitable means of absorbing movement without fracturing.

310 Placement and finish

Place blended material in forms in 200mm (maximum) layers and compact within two hours of blending.

Surface finish shall be generally consistent throughout to the colour and texture of an approved sample.

311 Construction tolerance

Finish work true and free from bulging in the wall surface. The maximum allowable deviation from true position shall be 8mm horizontally and 4mm vertically per 600mm formwork lift.

Trueness of surface and joints shall be in accordance with AS 3610, Class 3.

312 Anchors and fixing

Locate accurately penetrations required for connecting walls to structural frames, window and door frames and other installations.

Refer clause 201 E for types of anchors.

313 Sealing of stabilised earth walls

Internal walls: Seal with a water born acrylic sealer diluted sufficiently with clean water to allow deep penetration and clear low sheen finish.

314 Protection of stabilised earth walls

Emphasise to other subcontractors that the stabilised earth walls are off-form finished. It will be the builder's responsibility to remove any staining or markings on the walls caused by other trades or staining caused by leeching of hardwoods onto the walls.

315 Cleaning

Remove formwork and debris from each work area after stripping forms. Leave area clean to the satisfaction of the Architect.

316 Completion

Complete contracted work in accordance with contract documents and written variation orders issued by the Architect.