EARTH
STRUCTURES

SRE Structural Design
Revised 2019

This document describes the structural parameters of modern Stabilised Rammed Earth (SRE) walling. It is based on experience constructing walls for over 1350 buildings by the Earth Structures Group since 1992.

DESIGN PARAMETERS

For your computations allow for the following:

- Wall thickness either 300, 400 or 450mm
- Unconfined compressive resistance of 7.5mpa
- Wall density of 2100kg/m3

SRE AS A LOAD BEARING WALL

Most of our buildings use SRE as a load-bearing structure for roof loads and extended face-wall loads such as verandah plates, floor beams etc.

In the event of specific point-loads such as intersecting beams that land at the end of a SRE wall then you may require the additional load resistance of a steel column. See **Cast-in Steel Columns**.

HOLDING DOWN ROOF LOADS

Typically use a continuous wall plate for trusses to land on held down with cast-in 12mm bolts, 600 embedment @ 900 centres.

CONTROL JOINTS

SRE walls are built as a series of interlocking fully articulated panels. Control joints between these panels must be at a maximum 3800mm.

LINTELS

For all SRE loads over openings the most effective and architecturally acceptable lintel is the steel tee lintel bolted into openings.

Cast-in lintels that have the flange of the lintel bearing on each wall appear more suitable but in fact they create weak moments where the lintel seats within the opposing walls (the voids left for the seats are problematic).

In summary, we have never experienced problems with the bolted-in lintel system as it accommodates a fully-articulated panel concept (unlike cast-in lintels)

TIMBER CAST WITHIN SRE WALLS

Under no circumstances cast timber within SRE walls. Timber shrinks, twists and is very difficult to incorporate within our form-work.

ATTACHING FACE-WALL LOADS TO SRE WALLS

Use either 12mm Chemical Anchors or Anchor Bolts (normally at 600 centres with min 150mm embedment). Bolts must be used min 200mm from wall ends including control joints. Intersecting steel or timber beam ends can be attached using cleats bolted to walls using the same chemical or screw anchor bolts.

STEEL REINFORCING BARS

SRE walls DO NOT TOLERATE VERTICAL STEEL REINFORCING BARS. This is because SRE shrinks slightly and embedded steel reo bars create shrinkage resistance (cracks) that compromise the ultimate stability and strength of the walls.

When you design SRE buildings, allow for the mass (see **Design Parameters**) of the panels including their design compressive and tensile resistance. We have NEVER had issue with tensile loads breaking or cracking SRE walls (except when embedded reo bars were used).

CAST-IN STEEL COLUMNS

In the event that a point load is so great that a face-bolted cleat will not bear the weight, then you may need to incorporate a cast-in steel column with a “face cleat” onto which the intersecting beam/truss can be fastened.

Remember cast in columns must be set at minimum 600mm from a wall end or a control joint. This is to minimise the chance of the vertical beam itself causing a vertical resistance crack.

Remember we cannot build around **pre-erected horizontal portal beams or trusses.** Our manufactured form-work is very precise and expensive so cutting form-work to accommodate intersecting horizontal beams is not possible.

UN-BRACED WALLS

In some cases, we will be required to build un-braced walls that extend out from the building into the garden (common with spine walls that continue out from the building)

Use 90mm SHS posts cast-in the centre of each panel with min 600mm between the wall ends and the posts. Using posts rather than vertical reo decreases the chance of resistance shrinkage cracking.

GENERAL

Please call your local Earth Structures Group member (see Contacts) for any assistance with the design of these walls. We will do our best to find a worthwhile outcome for your situation.