



A NAME TRULY CAST IN CONCRETE



PRESTRESSED HOLLOW-CORE WALLS

■ **RETAINING WALLS**

■ **SECURITY WALLS**

ECHO PRESTRESSED HOLLOW-CORE RETAINING WALLING (EPRW®)



■ INTRODUCTION

A retaining wall is a structure designed and constructed to resist lateral soil pressure when the desired change in ground elevation exceeds the soil's angle of repose.

Two basic design concepts – CANTILEVER and GRAVITY - are used for the construction of Echo prestressed hollow-core retaining walls.



■ THE CANTILEVERED WALL SOLUTION

This concept is a freestanding EPRW® with no lateral support at the top end of the wall and no mechanical soil stabilisation. These walls cantilever loads to large structural footings, converting horizontal pressures from behind the wall to vertical pressures on the ground. The walls require rigid concrete heel-and-toe footings which are cast below ground to resist the overturning moment. This design limits the height of the wall to 5,0m maximum.

■ THE GRAVITY WALL SOLUTION

Gravity retaining walls are constructed on and with soil stabilised with man-made materials. This type of structure is able to retain the earth behind it by virtue of its weight. Gravity retaining walls have a degree of flexibility that allows them to with-

stand minor differential settlement without incurring structural damage.

Gravity walling can be constructed in almost any situation where a rapid grade change is desired. Gravity walling confines the soil or other fill material as a reinforcing mass. This walling solution can also be used in cut-and-fill applications.

■ GRAVITY WALL DESIGN CONSIDERATIONS

A gravity retaining wall must have sufficient weight and width to prevent external forces from overturning or shifting the wall. The wall must form an integral whole, ie, the individual slabs must function as a single unit to create a wall sufficiently stable to handle the external forces that might cause it to collapse and the internal forces that might cause it to lose shape.



EXTERNAL STABILITY

External stability of an EPRW® is achieved by designing to four potential external failure modes:

- Global stability : FSgl=1.5
- Base sliding : FSsl=1.5
- Overturning : FSot=2.0
- Bearing capacity : FSbc=2.0

INTERNAL STABILITY

Internal stability refers to the capacity of individual Echo prestressed hollow-core slabs forming a single integrated wall.

The wall must be designed so that the individual slabs do not pull out, separate, or slide apart.

This is achieved with either of the following options.

- 1) Echo's standard edge profile: Grouted joints with key-formed slab edges.
- 2) Echo's adapted edge profile: Tongue-and-groove (T&G) interlocking profiles.

The Echo Prestress retaining wall (EPRW®) concept, either on its own or in combination with geogrid is as effective as more costly alternatives such as: cast in-situ walls; steel-reinforced concrete retaining walls; modular-block walls; or gabion basket walls.



ADVANTAGES

- Increased productivity and reduced on-site labour. This wall solution is three times faster than traditional in-situ construction.
- Efficient light-weight sections. Depth and reinforcing configurations can be varied to suit wall height and load requirements.
- Openings for air conditioning ducts and other services are easily accommodated.
- Controlled factory production yields durable and aesthetically pleasing finishes.
- Panels can retain fill material up to 10m as specified by the principal engineer.
- Unlike retaining block walls, which are constructed at an angle, prestressed walls are 100% vertical, thus saving

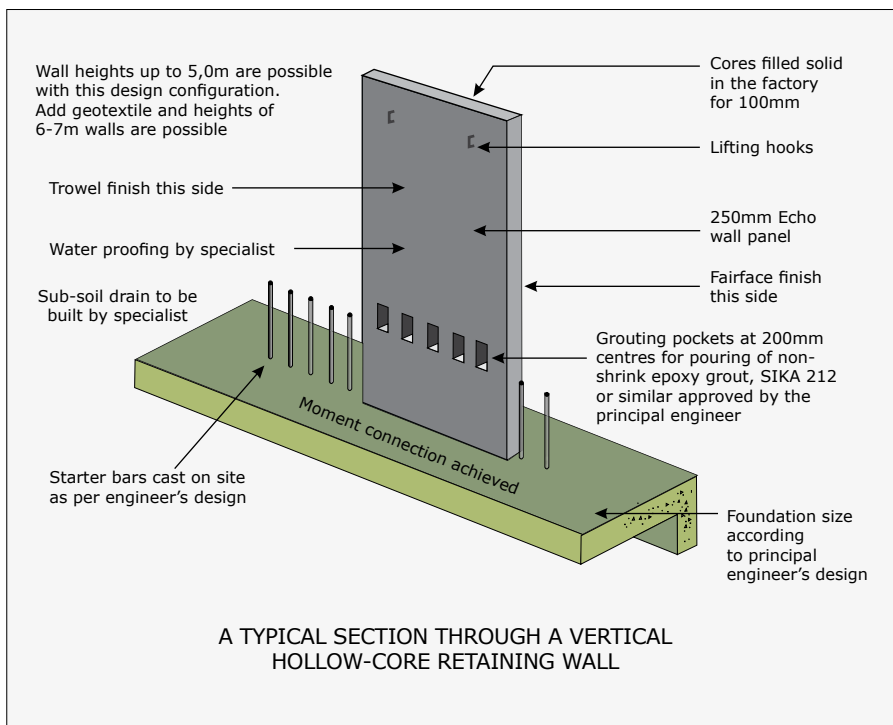
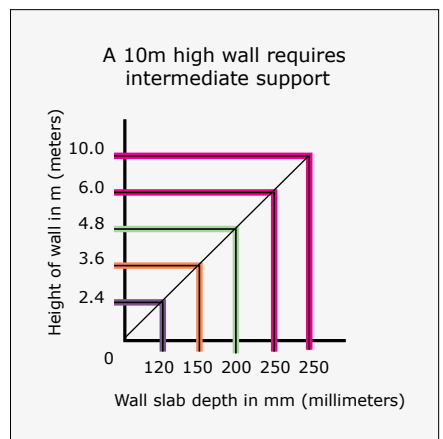
substantial land for development purposes.

- Echo offers full turnkey retaining or security wall solutions.

NORMATIVE REFEREE

- SANS 10400-K: 2011, Edition 3
- SANS 10400-H: 2012, Edition 3
- SANS 207: 2011, Edition 1
- SANS 10400-A: 2010
- SANS 10400-B
- SANS 10400-H
- SANS 2001 – CC1:2007 Edition 1
- BS 5896
- BS 8002
- BS EN 1897
- BS EN 13738
- SANS 1200 D
- SANS 2001
- SANS 10100-1
- SANS 10100-2
- SANS 10162-1
- SANS 10162-2.

HANDLING ORIENTATION - VERTICAL

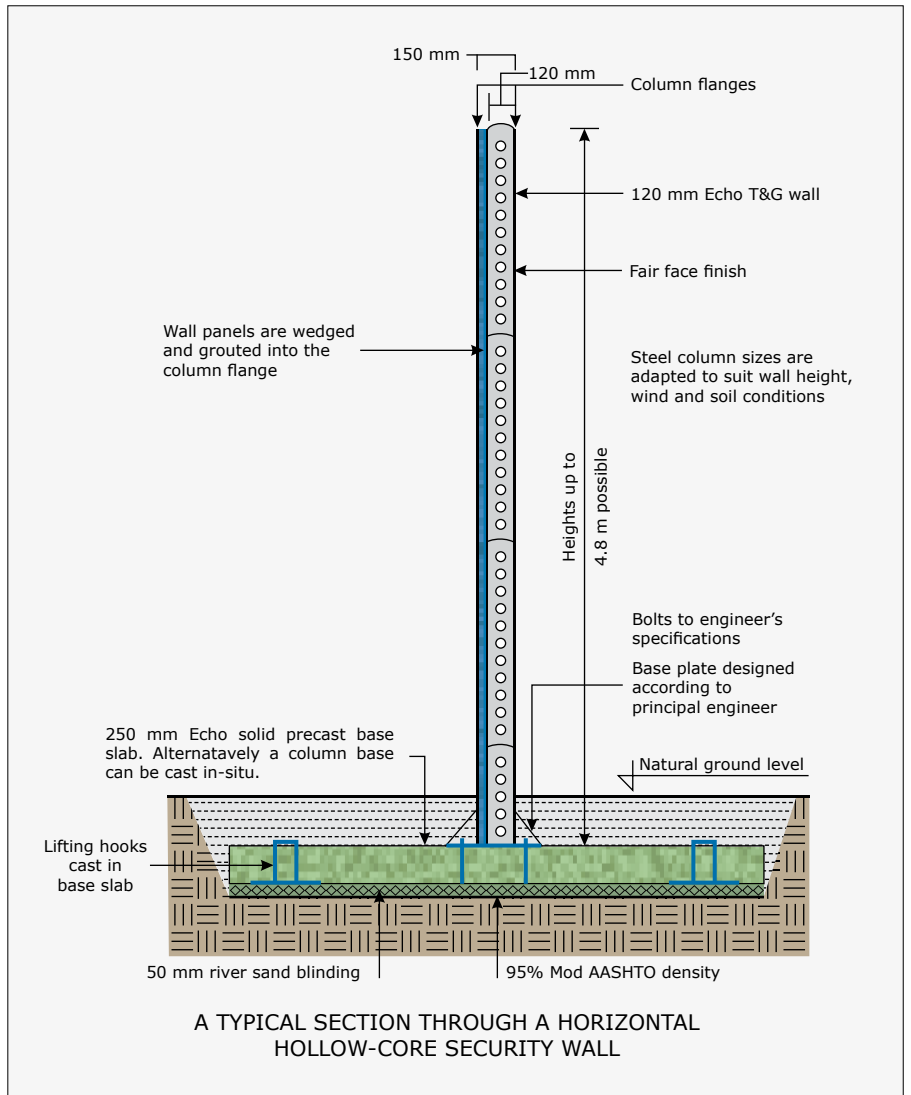


ECHO PRESTRESSED HOLLOW-CORE SECURITY WALLS (EPSW[®])



INTRODUCTION

Echo security walls are not comparable with other walling products. In a class of their own, they protect high-value properties of strategic significance such as airports, military bases, industrial and commercial parks, mines and prisons – in fact any operation that requires over-the-top security. 50MPa concrete and prestressed steel on both sides of the panels ensure robust and impregnable walls. Handling orientation is horizontal and panel jointing is based on a tongue-and-groove shear-key connection.





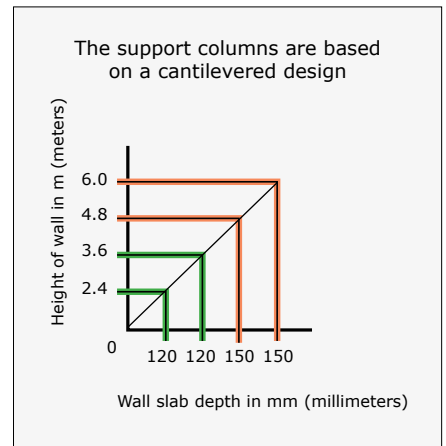
■ DESIGN CONSIDERATIONS

- The soil quality - suitable for soil conditions with a minimum 100KPa bearing pressure.
- Wall panels are typically 120mm or 150mm deep.
- Wind resistance (Project specific).
- Water drainage weep holes supplied by Echo.
- Typical centre-to-centre dimension is 6.0m.
- Wall accessories (razor wire; electric wires, cameras etc).
- Height specifications vary from 2,4m – 4,8m with a 0,6m section below ground for added security.

■ ADVANTAGES

- 1) This is the only precast concrete wall constructed with 50MPa concrete and reinforcing on both sides of the panels. Echo walls are virtually impregnable and cannot be scaled or broken without generating considerable and detectable disturbance.
- 2) Speed of construction beats conventional brick or in-situ methods.
- 3) Wall panels can be dismantled and re-used because they are not grouted but assembled with tongue-and-groove shear key joints instead.

■ HANDLING ORIENTATION - HORIZONTAL





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