

A NAME TRULY CAST IN CONCRETE

ECHO

®

ECHO PRESTRESS DURBAN (PTY) LTD



INTRODUCTION TO ECHO PRESTRESS

In today's world of innovation and fast tracking, the Echo Prestress hollow-core slab system is the preferred flooring solution.

Besides the obvious advantages of simpler, faster construction, not to mention a more durable end product, the secret of applying the flooring solution successfully is in the pre-planning. Get Echo Prestress involved at the concept stage. The Echo Group of companies has a track record spanning 30 years in S.A. and more than 60 years in Europe. Make use of our advice and design input – it comes at no charge and is guaranteed to result in an overall cost saving.

Set out in this brochure are several examples demonstrating the versatility and multi-purpose functionality of the prestressed hollow-core slabs. Applications covered include floors, security walls, reservoir roofs, retaining walls and warehouse walling, multi-storey floor applications to residential, commercial and industrial buildings, as well as suspended ground floor slabs in clay areas and a foundation system for social housing.

Services offered:

Echo Prestress provide: Lining, levelling and grouting services. Echo provide an engineer's certificate for the floor slab only.

The design is done in accordance with SANS 10100-1 and SANS 10100-2.

Echo Prestress Durban are an ISO 9001 certified company and are members of the CMA (Concrete Manufacturers Association).



Typical applications of Echo Prestress



Medium rise load-bearing masonry structures



Cathedrals



Residential



Commercial



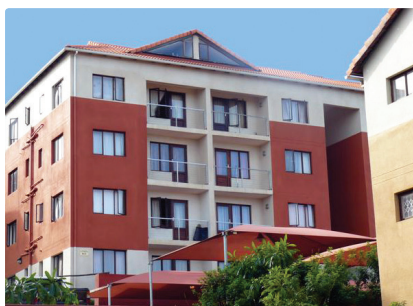
Offices



Townhouses



Educational Institutions



Affordable Housing

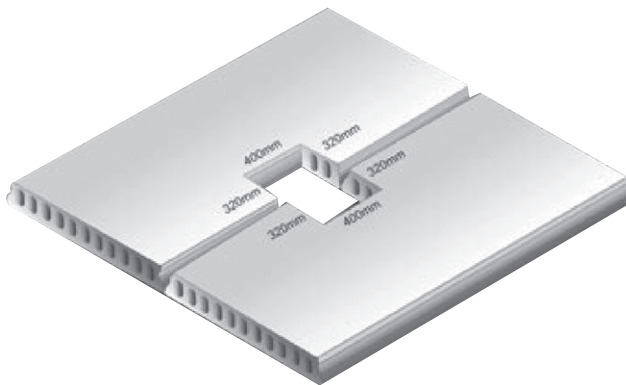


Industrial

Structural Details

1	Manufacturing method	Prestressed / slipformed
2	Slab depths available	120mm, 150mm, 170mm, 200mm, 250mm
3	Temporary support	Generally no temporary support required except for special applications and / or design requirements.
4	Standard slab widths available	1200mm
5	Non-standard widths available	Manufactured in 100mm increments
6	Product weights kg/m ²	Slab depth Slab only Slab & joint Slab, joint & 40mm screed
		120mm 222kg/m ² 237 kg/m ² 337 kg/m ²
		150mm 253 kg/m ² 270 kg/m ² 370 kg/m ²
		170mm 275 kg/m ² 294 kg/m ² 394 kg/m ²
		200mm 306 kg/m ² 328 kg/m ² 428 kg/m ²
		250mm 358 kg/m ² 385 kg/m ² 485 kg/m ²
7	Minimum recommended characteristic strength of concrete at transfer. <i>* Clause 5.1.5.1 of SANS 10100-1Ed 2.2 shall apply</i>	35MPa for 120mm, 150mm, 170mm and 200mm deep slabs. 45MPa for 250mm deep slabs
8	Minimum recommended characteristic strength of concrete at 28 days. <i>* Clause 5.1.5.1 of SANS 10100-1Ed 2.2 shall apply</i>	50MPa for all slab depths.
9	Recommended limits on span/depth ratios for hollow core slabs.	For roof slabs a span to depth ratio limit of 50 is suggested. For floor slabs a span to depth ratio limit of 45 is suggested. Note: When, 1) fire endurance, 2) openings, or 3) sustained live loads do not control the design.
10	Prestressed reinforcement	Wire: Tripple indented low relaxation 5.0mm Strand: Stabilized 9.3mm and 12.5mm
11	Fire resistance level (FRL) of a floor is specified in the building codes as the period in minutes during which the floor must retain it's: <i>* Clause 7.3 of SANS 10100-1Ed 2.2 Table 46 - Fire Resistance of Prestressed Concrete Floors shall apply</i>	Structural adequacy: 180minutes Integrity: 90minutes Insulation: 90minutes
12	Suggested slab bearings	On brickwork – 100mm. On steel and concrete – 75mm
13	Cantilevers	Suggested cantilevers are limited to the following: 120mm – 1 080mm 150mm – 1 350mm 170mm – 1 360mm 200mm – 1 500mm 250mm – 1 875mm
14	Weight saving	30% lighter than a solid slab of the same depth.
15	Higher strength materials (both for concrete and steel)	The higher strength steel is tensioned and anchored against the concrete which produces a number of desirable effects: <ul style="list-style-type: none"> • The prestressing tends to neutralise tensile stresses and strains induced by the load. • The full concrete section becomes active in resisting the load. • Higher strength concrete may be used to obtain a more economical hollow-core section, than with reinforced concrete.
16	Hollow core slab deflections Total deflection is defined as the upward camber of the slab due to the eccentricity of the pre-tensioning less the downward deflection due to applied loads, including the long term effects of prestress loss, creep and shrinkage.	Final long term deflection • Span / 250 Variable long term live movement • Span / 500 Overall long term movement • Span / 500
17	Service holes	Up to 90mm may be made in the panel on site.
18	Service holes larger than 90mm	Should be referred to the design engineer and should be formed by Echo in the factory. These holes require more specific strengthening.
19	Skylight and stair openings	Are formed by specifically fabricated steel hangers which are supplied and erected by Echo. (Refer to the sketch on Page 4)
20	Open cores	The tops of the hollow-cores can be opened to take steel when slabs are used in composite action with steel or concrete beams
21	Angled cuts	Angled / skew ends can be cut in the factory with a diamond tipped saw blade specifically manufactured to accurately cut an angle.
22	Installation	This service is provided by Echo and included in the price.
23	Grouting	This service is provided by Echo – materials supplied by the contractor/client.
24	Levelling screed / structural topping Not included in the Echo price, specifications available from Echo.	Suggested 40-50mm thick but note that in some areas additional screed may be necessary to level the positive camber in the units resulting in a thicker screed at the ends of the slab.
25	Soffit / ceiling finishes	Specifications available from Echo.

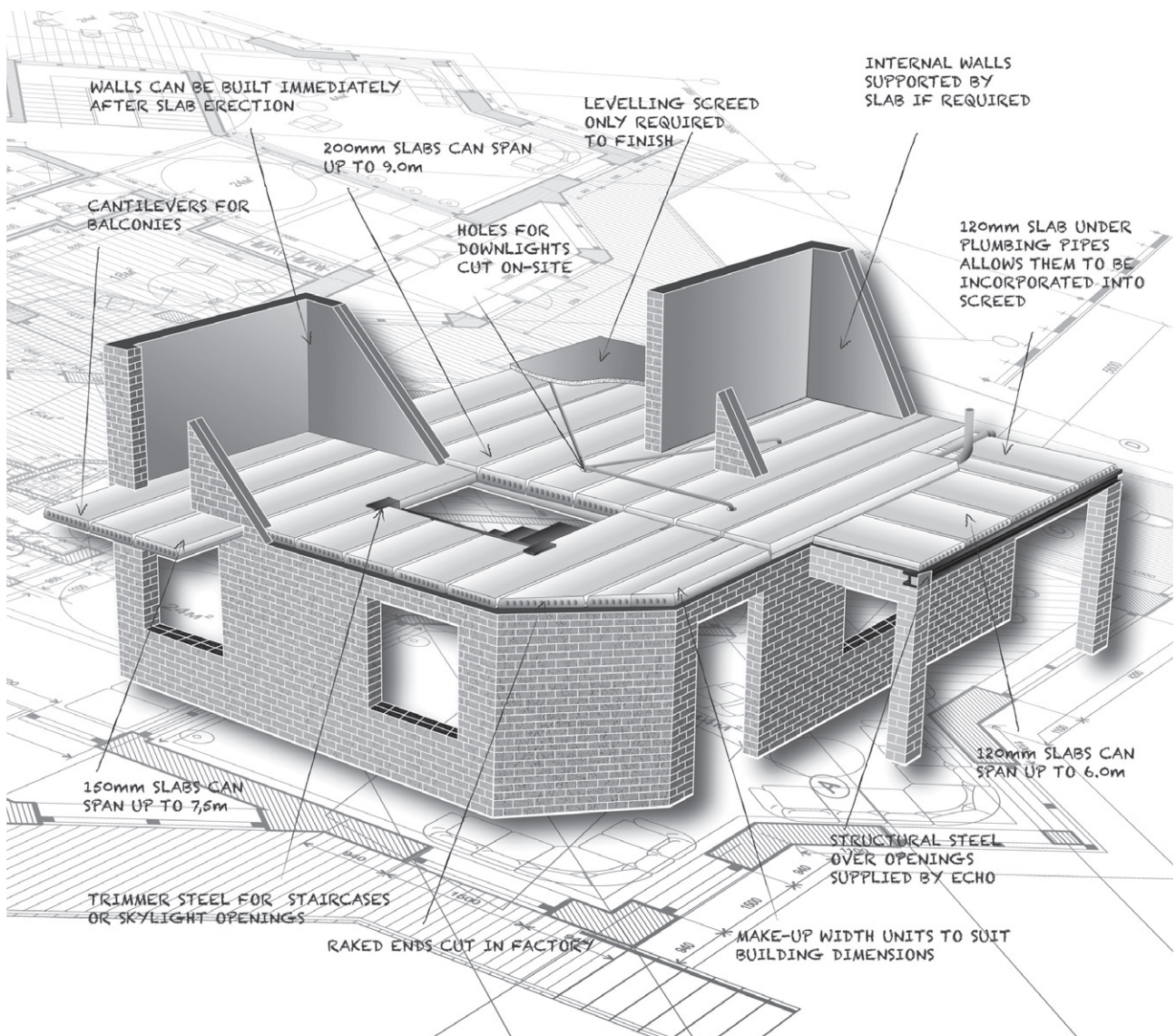
DESIGN OVERVIEW CONTINUED



Openings in Echo Prestress Slabs



Openings in Echo Prestress Slabs



Typical Slab Layout

LOAD / SPAN TABLES

In addition to the superimposed load shown, these tables include an allowance for the self weight of the unit and 1.5kN/m² for levelling screeds and finishes.

The details provided below are basic – should in depth design details be required, refer to www.echo.co.za click on Echo Prestress Technical Details - Load / Span Tables

120mm

Depth mm	Width mm	Self weight Kg/m ²	Reinforcement	Superimposed loading in kN/m ² with limiting clear span in metres								
120	1 200	222		0.75	1.5	2.5	3.0	4.0	5.0	7.5	10.0	kN/m ²
			Min	5.5	5.1	4.6	4.4	4.1	3.8	3.3	3.0	Metres
			Max	6.8	6.4	5.9	5.6	5.2	4.9	4.3	3.9	Metres

150mm

Depth mm	Width mm	Self weight Kg/m ²	Reinforcement	Superimposed loading in kN/m ² with limiting clear span in metres								
150	1 200	253		0.75	1.5	2.5	3.0	4.0	5.0	7.5	10.0	kN/m ²
			Min	6.2	5.7	5.2	5.1	4.7	4.4	3.8	3.5	Metres
			Max	8.6	8.0	7.4	7.1	6.6	6.2	5.5	4.9	Metres

170mm

Depth mm	Width mm	Self weight Kg/m ²	Reinforcement	Superimposed loading in kN/m ² with limiting clear span in metres								
170	1 200	275		0.75	1.5	2.5	3.0	4.0	5.0	7.5	10.0	kN/m ²
			Min	6.7	6.1	5.6	5.4	5.0	4.7	4.2	3.7	Metres
			Max	9.2	8.7	8.0	7.7	7.2	6.8	6.0	5.5	Metres

200mm

Depth mm	Width mm	Self weight Kg/m ²	Reinforcement	Superimposed loading in kN/m ² with limiting clear span in metres								
200	1 200	306		0.75	1.5	2.5	3.0	4.0	5.0	7.5	10.0	kN/m ²
			Min	7.2	6.6	6.1	5.9	5.5	5.1	4.5	4.1	Metres
			Max	10.3	9.6	8.9	8.6	8.0	7.6	6.7	6.1	Metres

250mm

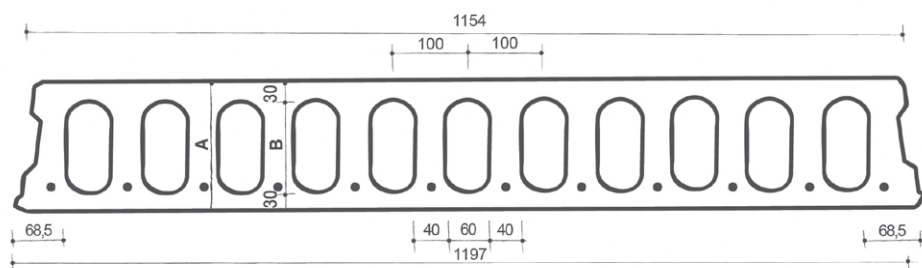
Depth mm	Width mm	Self weight Kg/m ²	Reinforcement	Superimposed loading in kN/m ² with limiting clear span in metres								
250	1 200	358		0.75	1.5	2.5	3.0	4.0	5.0	7.5	10.0	kN/m ²
			Min	9.2	8.6	7.9	7.6	7.2	6.8	6.0	5.5	Metres
			Max	13.0	12.2	11.4	11.0	10.4	9.8	8.8	8.0	Metres

Standard Slab Section

Slab Depths

120mm	A - 120mm
	B - 60mm
150mm	A - 150mm
	B - 90mm
170mm	A - 170mm
	B - 110mm
200mm	A - 200mm
	B - 140mm
250mm	A - 250mm
	B - 190mm

CROSS SECTIONAL DIMENSIONS



Prestressed Concrete Design Details

COMPOSITE CONSTRUCTION

Introduction

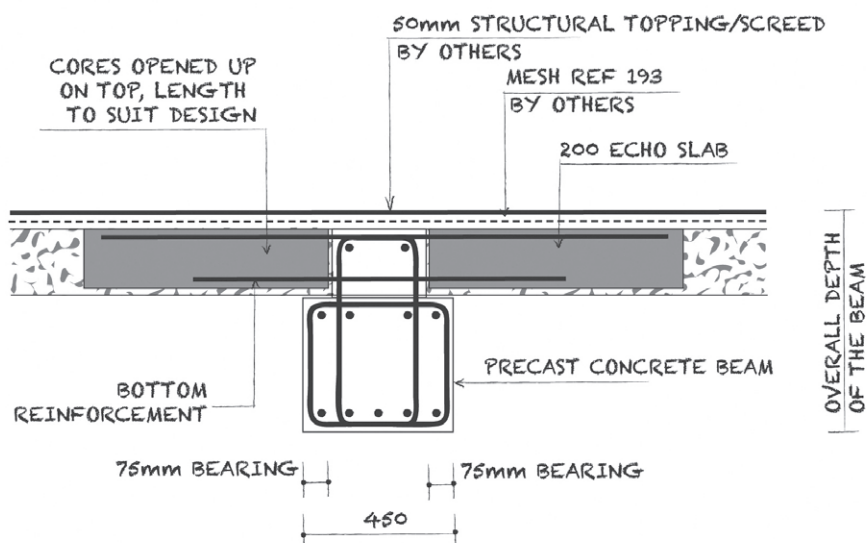
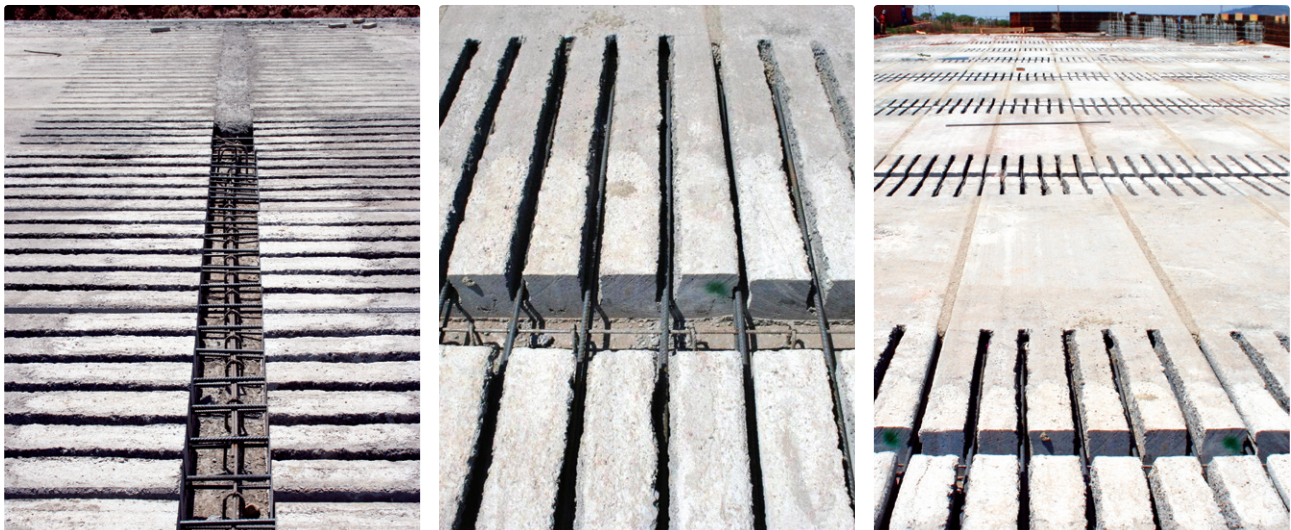
The term composite refers to structures where prestressed slabs and in-situ concrete work together to form an integral structural component. The prestressed slab can be made composite with supporting beams to increase the overall structural depth of the supporting beams.

Design synopsis

As in any composite structure, the design principal is to bond separate elements together to form one element which by virtue of shear interaction is considerably stiffer than the two elements acting individually.

In the case of prestressed hollow-core concrete panels and concrete support beams this shear interaction is provided by steel stirrups projecting above the surface of the beam and transverse shear steel, which facilitates the transfer of the forces between the slab and the beam.

Precast beam design in composite action with prestressed slabs



Precast Beam Design in Composite Action with Echo Prestressed Slabs

The design of these "spine beams" have to be optimized to minimise the depth below the soffit of the slabs.

This can best be achieved by the design of the beam as a T-beam in its final stage.

To achieve this it is necessary to combine the precast floor slab with the precast /in-situ or steel beams.

Precast Stairs & Beams

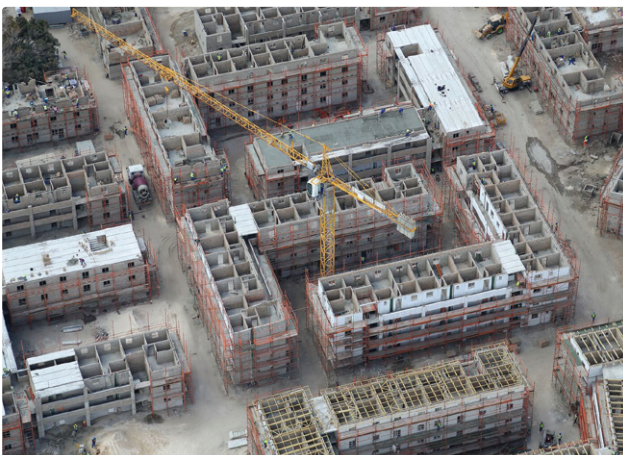


Security Walls



Echo hollow-core security walls are designed for high end security requirements. Each job is designed to suit specific requirements and can be used vertically or horizontally.

Mass Housing



Retaining Walls – Vertical Application



Echo Prestress retaining walls are commonly used instead of in-situ walls. Time and cost saving are a major advantage in addition to high quality and concrete strength. Each retaining wall is specifically designed to suit the project requirements. The foundation requirements also differ from project to project. Consult Echo Prestress at early design stage.

Retaining Walls – Horizontal Application



The retaining slabs are installed into the flanges of steel or concrete columns. The retaining walls of this structure were designed to withstand very high horizontal forces from within the building. This is a potato storage facility.



THE ECHO GROUP OF COMPANIES

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(Prestressed Hollow-Core Floors)

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