

# Engineered Structural Concrete Floors



Stiffened Floor Slabs  
Suspended Slabs  
Foundation Supported Slabs

 CUPOLEX®

# Engineered Concrete Structural Slabs

## APPLICATIONS

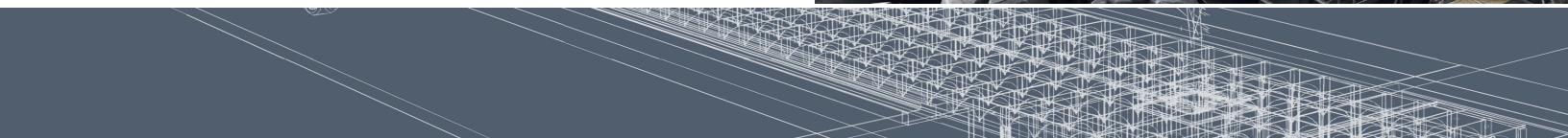
- Unsuitable ground conditions such as very low bearing pressures
- Expansive/swelling soils
- Predicted post construction settlement of the sub-base
- Bridging over public stormwater and sewer lines
- Slope stability issues

Traditional old-fashioned void forming systems for in-situ ground slabs and beams, sub-slab gravel drainage layers, and lightweight or imported engineered fill are increasingly being replaced by engineered CUPOLEX® structural systems: a quicker and less labour-intensive alternative. A trend that is encouraged by the emphasis on fast track build programs, lowering construction costs and a shortage of skilled tradesmen. Reacting to this trend, CUPOLEX® has developed a complete design and supply service for an extensive range of slab formwork systems.

Over the past 3 decades, the idea of placing concrete over CUPOLEX® permanent void forms has become an increasingly popular foundation method, not only for site conditions involving challenging soils, but replacing conventional slabs that are not very well known to provide healthy interior environments. Building designers and developers strive to assure better results and protect themselves and their product from criticism and failure. They are constantly facing challenges when designing and installing slabs on ground including the following:

- Structural failure
- Slab curling and shrinkage
- Reducing the environmental impact of building
- Lowering building costs and the carbon footprint
- Reducing the cycle time of building
- Post construction settlement of soil below structures
- Reducing aggregate use and the use of importing and engineering fill
- Seeking alternative designs to not using lightweight fill or EPS fill to reduce dead loads on structures
- VI, radon, moisture and mould prevention
- Expansive and challenging soil conditions
- Accumulating points for LEED certification

Sites with soils with very low bearing capacity, high compressibility, or that are highly expansive typically require remedial treatment. A special slab design such as a structural reinforced slab, a slab that includes stiffening beams or a slab not directly supported by the soil such as on a beam/pile or stem wall foundation may be required.



## STRUCTURAL RIBBED CONCRETE SLABS

CUPOLEX® engineered floor slabs can be designed to be fully or partially suspended on piles, stem walls or grade/edge beams. Additional reinforced internal ribs are integrated in the slab by using the PONTEX® connecting forms, the structural CUPOLEX® accessory to provide a structure capable of spanning between foundations or piles.

The innovation of PONTEX® was introduced to the CUPOLEX® system to advance the aerated floor technology one step further. It has revolutionized the conventional application of traditional thickened concrete slab construction by: reducing the amount of excavation; reducing or eliminating the need for imported materials, aggregates or engineered sub-grade; reducing the amount of concrete and reinforcing steel; and reducing labour costs. The CUPOLEX-PONTEX® engineered technology is at the forefront of conventional structural concrete slab construction.

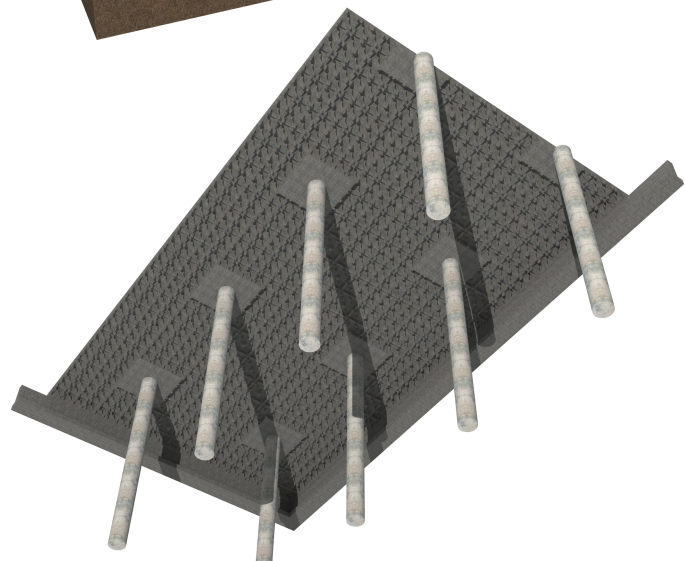
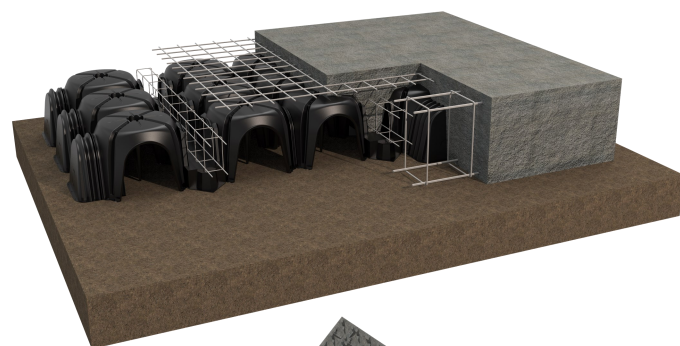
The PONTEX® forms when combined with CUPOLEX® create ribs so that CUPOLEX® floors become self-bearing. If the soil is unsuitable to hold the slab load design, PONTEX® forms are used which in turn will create a one directional or a two directional structural ribbed slab.



**The CUPOLEX® - PONTEX® floor slab can be designed to be fully or partially suspended on piles, stem walls or grade beams. Additional reinforced internal PONTEX® rib beams provide a structure capable of spanning between foundations or piles.**

## DESIGN FEATURES

- There are significant cost savings to the builder, designer, and their client by using an engineered CUPOLEX®-formed concrete slab
- A well engineered CUPOLEX®-designed structural slab for residential, industrial, commercial, and institutional applications can provide many advantages for the sustainability, constructability and economics of the project in contaminated sites or with challenging and/or low bearing soil conditions.
- One-way or two-way stiffened slab-on-grade with integrated perimeter and interior grade beams or drop panels
- Can be designed for long spans up to 10m (30ft)
- Pile or pier numbers may be optimized to limit additional costs
- CUPOLEX® structural slabs can be designed to be supported by any deep foundation system such as concrete, steel or timber piles, caissons, geo-piers, stem walls, and grade beams
- Each structural CUPOLEX® floor slab is specifically designed to suit site conditions





## Structural Reinforced Concrete Floor Slabs

We identify areas where contemporary slabs and foundations call for improved designs to accommodate for ground movement or poor load-bearing soils.

The CUPOLEX® system is a proprietary patented plastic concrete forming system manufactured by Pontarolo Engineering Inc. The concrete forms are part of a design package provided by CUPOLEX®. CUPOLEX® designs the concrete slabs by sustainably engineering the geometry of concrete using CUPOLEX® structural dome methodology. On a site-specific basis, CUPOLEX® engineers select the type and size of CUPOLEX® forms necessary to meet the required loading and application that will provide the ultimate performance for your project. PONTEX® forms may be included in the design to provide a stiffer ribbed slab. The forms are supplied to contractors by CUPOLEX® to assemble the formwork and the concrete cast-in-place slabs, as to the design and specifications provided by the CUPOLEX® design engineers.

CUPOLEX® and PONTEX® forms are engineered and manufactured to meet your site specific requirements such as varying elevation, providing ribbed slabs or post-tensioned slabs, special requirements for delivery and logistics, supporting working-load capabilities and any special impact resistance during installation and placement of the concrete.

### CUSTOMIZED DESIGN PACKAGE

- **Value engineering**  
CUPOLEX® engineers review each project, provide value engineering, and identify the type and size of CUPOLEX® and PONTEX® forms for every project
- **Preliminary drawings**  
Design coordination, conceptual designs, sections and details provided to designers
- **Engineered design drawings**  
Issued for construction (IFC) and supported with FEA structural calculations, PE stamp, construction documents and specifications
- **CUPOLEX® installation shop drawings**  
Issued to contractor with detailed CUPOLEX® formwork installation procedures
- **On-site Support**  
Construction training and inspections, with completion statements and regulatory compliance reporting where required