We at **LBT POWER SA** thank you for giving us the opportunity to introduce our Company to your organisation.

We are able to offer your company several building techniques based on Cellular Lightweight Concrete technology, offering both stationary and mobile plants to meet various challenges and demands in building materials.

The following document represents three different solutions that could be incorporated into the standard constructional process. You will find general cost advantages, comparing our materials and techniques with the standard “brick and mortar” way of construction. We look forward to further discussions to create a strong and successful partnership.

### What is CLC (Cellular Lightweight Concrete)?

**Cellular Lightweight Concrete (CLC)** building systems have been successfully developed and implemented for more than 85 years to create cost-effective, functional and safe buildings all over the world. CLC is a product that is changing the future of industrial, commercial and residential development everywhere. It has proved its superior quality in virtually all climate conditions of the world.

**Non-autoclaved CLC** is primarily a mixture of cement, sand/fly ash, water, additives and pre-manufactured foam or air-entraining agent. CLC is generally air-cured. Curing might be accelerated by applying heat, steam or chemicals. A curing compound prevents excessive loss of water after casting and consequently increases strength.

CLC comprises myriads of tiny non-connecting air bubbles which give this material its incredibly diverse qualities and make it such a terrific insulator.

CLC is definitely one of the major achievements in the field of wall construction. It is a revolutionary material that offers a unique combination of strength, low weight, thermal insulation, sound absorption, unsurpassed fire resistance and unprecedented build-ability.

CLC for modern efficient buildings is superior to conventional masonry in virtually every way.

CLC in its chemical and physical properties has durability characteristics similar to normal concrete or stone with a workability better than wood.

CLC is a natural and non-toxic construction material, saves energy, and is friendly to your environment.
Cellular Lightweight Concrete can be manufactured as:

- precast structural blocks and panels,
- can be used to manufacture large walls or small walling elements, or
- can be grouted into permanent or removable formwork creating the most advanced technology and innovations in the industrial construction of low-cost and affordable houses, schools, clinics and other structures.

Lightweight Concrete Blocks

Lightweight blocks can be manufactured in different sizes hence the most popular sizes of LightBUILD (CLC) Blocks are 600 mm length x 300 mm height with a choice of 100 mm / 150 mm or 200 mm thickness. LightBUILD blocks can have different densities and levels of compressive strength to suit the specific project.

The recommended density (compressive strength) for load-bearing blocks is 1000kg/m3 (7MPa), for walls in steel-frame and reinforced concrete-framed buildings as well as for inner leaves of cavity walls – 800kg/m3 (3.5MPa) and for non-load bearing and partition walls – 600kg/m3 (2.4MPa).

LightBUILD foundation and bond beam blocks with densities 1400 – 1600 kg/m3 can be manufactured to create the complete quick-to-build walling system.

You can pretty much build the whole house structure with LightBUILD products. LightBUILD is designed to meet exacting quality standards as well as the requirements of the Building Regulations for internal partition walls, solid walls, cavity walls, separating walls, cavity and solid foundations, and beam and block floors. For fast and easy building, excellent acoustic and thermal resistance and a tough, durable, lightweight design, you’ll find LightBUILD is the answer.

Acoustic Insulation

LightBUILD blocks have natural acoustic insulation due to their aerated structures and have superior sound absorption properties in comparison with other materials. It reduces outdoor noise pollution and also saves costs by reducing costs of noise and echo proofing materials.

Moisture, Pest and Mould Resistant

LightBUILD blocks have much lower water retention or capillary action compared to the conventional bricks. LightBUILD blocks are also termite, pest, mould and fungus resistant and hence greatly improve the indoor air quality.

Earthquake Resistance

LightBUILD products have proven earthquake resistance due to its lightweight and porous structure. The structure has millions of tiny cells which cushions buildings from major force, preventing progressive collapse. Thus it saves lives and response time for rescue operations during earthquake.

Design Flexibility

It is easy to install with precision. It can be sawn, drilled, nailed, and grooved etc on site by Masons using simple working tools. Thus it saves on expensive labour cost as it does not require extra skilful and paid masons or hi-tech tools.

Environment Friendly

LightBUILD uses the least amount of energy to produce than any other masonry building material.
The manufacturing process is such that negligible gaseous, liquid or solid waste is released into the environment.

**Light Weight**
LightBUILD block is approximately 3 times lighter than conventional brick and thus results in:
- Great savings in foundation and structural costs due to decrease in overall dead load.
- Savings in handling and transportation costs.
- Better earthquake resistance.
- Possibility of additional floors on old structures.

**High Thermal Insulation**
- Due to the numerous micro pores in block, it has a very low thermal conductivity and makes an excellent thermal insulation material.
- It keeps interiors cooler in summer and warmer in winters
- Due to reduced cooling/heating loads, it reduces air conditioning/heating loads by as much as 25-30%.
- Due to reduced operational loads, it saves on electricity bills and conserves nation's fuel and environment.

**Fire Resistance**
High Fire rating – rated to a minimum 2 hours for 75 mm thick panel. Products can be used in construction of firewalls and buildings with the strict requirements to fire rating properties. No obnoxious or toxic fume emission – no health hazards if product is subjected to heat such as in case of fire.

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**Case Study**
*LightBUILD (CLC) blocks v/s Conventional Bricks or Concrete Blocks*

Do not directly compare the price of 1 m² of CLC with 1 m² of clay bricks, concrete blocks, concrete masonry units (CMU), etc. **CLC** is not just another block or brick in the wall, **CLC** is a revolutionary walling material - in fact a complete walling system - with outstanding advantages against ordinary clay bricks or concrete blocks.
Therefore, compare the ready-installed wall of CLC with a wall of clay bricks, concrete blocks, CMU, etc. The ready CLC wall considers all benefits, such as:

**Savings in Cost of Structure**
- LightBUILD blocks (800kg/m3) are one third lighter than conventional clay bricks or CMU (1950kg/m3 – 2400kg/m3), thereby reducing the dead weight of the structure drastically.
- Light weight structure decreases construction cost due to reducing steel, Cement and Excavation.
  
  Our Case Study Shows Following Results
  
  Reduction in steel = 15%
  Reduction in cement = 10%

- Due to reduction in dead weight, reduction in consumption of steel and cement and lesser excavation for foundations, construction time is reduced which in turn results in savings in labour cost and overheads.

**Savings in Labour Cost**
LightBUILD blocks (600 x 300 x 200) are about 22 times bigger than the size of the conventional bricks (220 x 105 x 70). There are 55 bricks in 1m2 of single leave wall and 110 bricks in 1m2 of cavity wall.

Bigger block size and less weight (around 28kg) lead to fast laying. Using thin-set mortar in 2mm joints avoids the time consuming handling and mixing of conventional mortar.

There is no need for the second wall when building with LightBUILD (600 x 300 x 200 or 150) blocks, no need for wall ties, wall cavity trace or cavity closers.

Our Case Study shows that installation of LightBUILD blocks is **2.5 times faster for single leave wall** using large LightBUILD 600 x 300 x 100 blocks and **7 times faster in comparing with brick cavity wall** using LightBUILD 600 x 300 x 200 blocks.

There is overall 50% time saving when using lightweight blocks which leads to substantial labour cost savings.

**Savings in Mortar**
Bigger block size means less number of joints. Less joints results in lesser quantity of mortar for building.
Our Case Study Shows that brickwork mortar consumption per m3 with 1:6 cement to sand ratio – 1.35 bag of cement against to 0.5 bag when using LightBUILD blocks. There is overall 60% reduction in use of Mortar.

**Savings in Plaster**
LightBUILD blocks have uniform shape and texture, which gives even surface to the walls. There is overall 35% reduction in the cost of plastering.

**Reduction in Wastage**
Unlike conventional clay brick which are prone to breakages, LightBUILD blocks have lower breakage rate. Furthermore all waste can be recycled back to the manufacturing process. There is over all 65% reduction in cost due to practically no wastages in the input cost.

**Reduction in Operation Cost**
LightBUILD blocks are resistant to thermal variations. It reduces total load of refrigeration and air conditioning. Though initial installation cost may remain the same, LightBUILD blocks reduce operation and maintenance cost drastically. Up to 30% of Air-conditioning Load, both heating and cooling load will come down.

**Input of LightBUILD blocks at glance**

<table>
<thead>
<tr>
<th>Description</th>
<th>Saving</th>
<th>Overall Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving in cost of Structure</td>
<td>12%</td>
<td>3%</td>
</tr>
<tr>
<td>(Steel, Cement, Excavation, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saving in Labour Cost</td>
<td>50%</td>
<td>15%</td>
</tr>
<tr>
<td>Saving in Mortar</td>
<td>60%</td>
<td>1%</td>
</tr>
<tr>
<td>Saving in Plaster</td>
<td>35%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Saving on Wastage</td>
<td>65%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Savings due to less power load</td>
<td>25%</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Overall Savings</strong></td>
<td></td>
<td><strong>32%</strong></td>
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</tbody>
</table>

**Lightweight Precast Large-Panel System**

The concept of precast (also known as “prefabricated”) construction includes those buildings where the majority of structural components are standardized and produced in plants in a location away from the building, and then transported to the site for assembly.

These components are manufactured by industrial methods based on mass production in order to build a large number of buildings in a short time at low cost. Where volumes are large enough, a manufacturing plant can be implemented on site to produce all the precast panels required.
Precast panels are manufactured from steel-reinforced cellular concrete. The combination of steel reinforcing and cellular concrete results in a strong but lightweight panel. Lightweight Concrete with densities 1200 – 1500 kg/m³ is used for this application that will reach 10 – 25 MPa in compressive strength after 28 days.

Buildings made from LightBUILD precast wall panels are sustainable and low-maintenance. The panels can be cast in many architectural styles and exteriors can be customised using a variety of cast-in finishes, as well as conventional brick, stucco, stone or siding overlays.

On installation, all connections from the panels to the slab and from panel to panel can be welded or bolted, for maximum durability and strength.

The cellular concrete technology in LightBUILD precast wall panels creates a lightweight panel that installs with smaller jobsite equipment, however services of cranes is necessary when loading large panels on the truck and on panel installation.

Precast Large Panel System offers all benefits of Cellular Lightweight Concrete and drastically increases the speed of construction.

Case Study
LightBUILD Large-Panel v / s Conventional Bricks and Dense Concrete

Materials Savings
LightBUILD panels (1200kg/m³) are two times lighter than conventional dense concrete panels. This technology requires no stone and can be easily modified according to the local cement and aggregates to meet the project requirements.

Cellular Lightweight Concrete panels perform their functions well at considerably lower dimensions, so the thinner walls may be manufactured utilising less materials, resulting in lower costs.

Due to reduction in dead weight, reduction in consumption of steel and cement and lesser excavation for foundations, construction time is reduced which in turn results in savings in labour cost and overheads.

Savings in Labour Cost
Local unskilled labour can be used for installation under trained supervisors. Erection time decreases drastically due to large size of panels. 7 to 10 buildings can be built in the time it takes to build 1 such building using standard “brick and mortar” method.

Savings in Plaster
LightBUILD panels have uniform shape and have all finishes, so minimal plastering is required. There is overall 65% reduction in the cost of plastering.

Reduction in Wastage
Prefabricated panel systems completely eliminate the on-site wastage from the input costs.
### Input of LightBUILD Large-Panels at glance

<table>
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<tr>
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<th>Overall Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Material Savings &amp; Saving in cost of Structure (Steel, Cement, Excavation, etc.)</td>
<td>15%</td>
<td>4%</td>
</tr>
<tr>
<td>2. Saving in Labour Cost</td>
<td>75%</td>
<td>23%</td>
</tr>
<tr>
<td>3. Saving in Mortar</td>
<td>60%</td>
<td>1%</td>
</tr>
<tr>
<td>4. Saving in Plaster</td>
<td>65%</td>
<td>1%</td>
</tr>
<tr>
<td>5. Saving on Wastage</td>
<td>100%</td>
<td>1%</td>
</tr>
<tr>
<td>6. Savings due to less power load</td>
<td>25%</td>
<td>12%</td>
</tr>
</tbody>
</table>

**Overall Savings**

| Overall Savings | 42% |

### Lightweight Precast Wall Components

Another simple yet cost effective modular building system which facilitates the inexpensive and speedy construction of affordable housing is Lightweight Wall Component System. This system could be ideal for structures from simple one-bedroom homes to multi-roomed buildings of over 240m².

Aesthetically there is no difference between a dwelling built with our system and those built with traditional bricks and mortar. As shown the only significant difference lies in the construction of the walls, which are made from concrete panels – Cellular Lightweight Concrete panels are bolted or welded together to form the internal and external walls of single and double storey dwellings. The modularity of the system allows for assorted window and door sizes and various configurations thereof.

![Image of LightBUILD系统](image)

All LightBUILD wall components are manufactured under strict factory conditions. The concrete panels are produced in steel moulds which ensure not only speed of production but consistency and proper quality control.

Depending on the finishes required for structures, between three to five times as many structures can be constructed as those constructed using traditional building materials and methods.

Wall Component System incorporates all characteristics of Cellular Lightweight Concrete and all major benefits of Large-Panel System. However the wall components are light in weight which eliminates the need for use of heavy loading cranes and expensive machinery.
Case Study
LightBUILD Wall Components v/s Conventional Bricks and Dense Concrete

System is Cost effective – very little skilled labour is required in the construction and labour from local communities can be used for the construction purpose.

Wall Components are quick and easy to erect; 30 m² house can be completed within 6 hours, excluding foundations and floor slab.

**Input of LightBUILD Wall Components at glance**

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<td>4%</td>
</tr>
<tr>
<td>2.</td>
<td>Saving in Labour Cost</td>
<td>62%</td>
<td>18.5%</td>
</tr>
<tr>
<td>3.</td>
<td>Saving in Mortar</td>
<td>60%</td>
<td>1%</td>
</tr>
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<tr>
<td></td>
<td><strong>Overall Savings</strong></td>
<td></td>
<td><strong>37%</strong></td>
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</table>

**LBT POWER SA** is a South African research-based, engineering and manufacturing company providing industry solutions and services based on Cellular Lightweight Concrete technologies to the wide range of industrial and environmental applications.

Through the collaborative scientific research and engineering we offer solutions and packages to all forms of business in South Africa who would like to use our techniques to manufacture products or offer services using Cellular Lightweight Concrete technology, providing them with all necessary equipment, expertise and extensive on-side technical support and after-sale service.

We are able to plan, design and build any size of stationary plant to manufacture the precast Cellular Lightweight Concrete products or mobile production plants to use it on constructional field for various grouting applications.

For more information regarding our business, products and services or for business opportunities we offer please contact Paul at (c) +27 82 828 6349, (t) +27 11 795 3079, (f) +27 11 794 4343 or email pauld@lightbuild.co.za