

THE MOSAIC

modern | metamorphic | modularity

1 INTRODUCTION

The Mosaic is a new generation green residential home for metropolitan cities. It is the epitome of sustainable metamorphic design. The Mosaic is inspired by Lego - Lego bricks come in standard sizes to facilitate fabrication but when put together, create intricate, beautiful architecture limited only by one's imagination.

2 DESIGN MOTIVATION

The modern metropolitan city recognizes the need for an urban green home with an intricate balance between sustainability, style and social consciousness. The modern city faces space constraints with high development intensity. The Mosaic aims to spearhead future residential development by providing sustainable design with high buildability and configurability, while simultaneously promotes social interaction and consciousness. Our design rests on efforts to maintain an equilibrium between sustainable design, construction practices and the needs of the residents.

3 CONCEPT

The Mosaic utilizes a modular concept suitable for volumetric construction and/or off-site pre-fabrication. Inspired by Lego, each apartment unit represents a 'detachable Lego brick' connected to the floor slab at every level. The bricks can be assembled or rearranged and stacked at each platform, supported by a strong core that runs in the middle of the building. The Mosaic allows for different stacking configurations to suit the site context.

As Lego toys are designed with a given number of bricks to complete a structure, the Mosaic is similarly designed with the intention of educating residents the issue of resource scarcity, the need for sustainability and to accommodate the environment - inculcating a sense of responsibility through architecture.

There are 3 main configurations of apartment distributed across the different storeys of the building. This is suitable to cater for a diversify group of people living in urban areas.

Type A: the standard rectangular module suitable for singles/married couples;

Type B: a larger square module suitable for small families; and

Type C: the largest dual-storey module for multi-generation families.

4 LAYOUT

The building follows a square floor plate with a central core with different modules [apartment units] stacked along its perimeter. There are two voids extending from ground level, providing natural ventilation. This layout allows for different configurations including 8-unit floor, 10-unit floor and 12-unit floor. 2 Mini breakout spaces for community interaction are also available at each floor - situated at both sides of the central core.

5 INDIVIDUAL MODULE

Type A Unit: approximately 90m² or 969ft² with 2 to 3 rooms

Type B Unit: approximately 105m² or 1130ft² with 3 to 4 rooms

Type C Unit: approximately 181m² or 1948ft² with 4 to 5 rooms

The drywall partitions, panels and curtain wall are standardized and able to be pre-fabricated for greater buildability. This also reduces wastages and lowering the carbon footprint. In addition, each unit is also offered a balcony with greeneries.

6 AMENITIES

Amenities include pool, gym,, multi-purpose rooms, sky park, sky garden, provision of spaces at the 2nd storey for shops selling necessities and f&B outlets catering to the residents.

7 PASSIVE DESIGN FEATURES

- North-south orientation: the building is primarily oriented towards N-S to reduce solar heat gain.
- Stack effect: air-gaps/air-pockets between units, together with the voids, facilitates a stack effect which cools the circulation and corridor spaces
- Stacked 'lego configuration': ensuring most units do not received direct solar radiated heat but diffused natural lighting instead, reducing energy needed for cooling.

- Site orientation: optimized to reduce solar heat gain while providing ample views for most unit.
- Greenery: dedicated sky gardens are provided on the 13th, 24th and 35th storeys.
- Green respiration: plants: at individual units and gardens reduces urban heat island effect, cools the surrounds and improve air quality.
- Localized mass in units: internal concrete mass in individual units absorbs heat during the day and releases heat during the night, reducing energy load for cooling.
- Low-e double glazing to reduce solar heat gain and cooling load.
- low VOC paint with less pollutant emissions.

8 ACTIVE DESIGN FEATURES

- Rainwater harvesting for watering of plants including auto irrigation
- Amorphous PV on sun-facing facade converts heat into energy
- Solar heating for pool and shower facilities
- T5/LED lighting with motion sensors at corridor areas for efficiency
- WELS sanitary and water fittings to decrease water consumption
- Recycling bins and double chute system to promote recycling
- Bicycle and electric car charging and parking lots
- regenerative lift with sleep mode which consumes less energy

9 ENGINEERING FEASIBILITY

The Mosaic adopts a core and frame C&S system, allowing the modules to be slotted into the frame and also stacked. This provides for efficient load transport via the central core floor slabs and columns and also optimizing CFA. The size of individual modules - its internal partitions and installations - are suitable for pre-fabricated and transportation.

10 ENERGY SAVINGS

There is high energy savings potential in the Mosaic. The heating and cooling load is greatly reduced by the combination of passive and active design. The usage of renewable energy also channels the energy absorbed by the building into useful energy utilizable by users. In addition, motion sensors in staircases and common

areas also help to save electricity while dimmer lighting control encourages residents to reduce energy use.

11 INTERIOR FINISHES

The modules also provide for a selection of sustainable interior finishes, including crushed bamboo board, unfinished timber paneling, cork tile veneer and natural fabrics from plants, including cotton, linen, wool, alpaca, mohair or cashmere instead of man-made fibres. This encourages self-selecting sustainable behavior in residents.

12 MODULARITY

The design is highly scalable and can be implemented in different configurations for varying site context. In terms of large scale implementation, economies of scale can be reaped - together with increased buildability - as the modules can be pre-fabricated in bulk, reducing the total cost and wastages for construction.

13 RESIDENT ENGAGEMENT

We believe in "a building that benefits users and users who benefit the building". A complete urban green residential building and a sustainable lifestyle depends on more than just the design. It requires the collective effort of the residents - with resident-driven energy conservation measures. We propose a green program of which a BMS system will monitor the energy savings of individual units and display the energy savings at every level, with simple measures to improve the amount of energy saved. Incentives can be given to enhance participation.

14 BCA GREEN MARK PLATINUM

The Mosaic is able to achieve the BCA Green Mark Platinum award based on the Green Mark for new residential buildings. The Green Mark score tabulation according to the proposed passive and active design is as follows:

Part 1: Energy Efficiency:	Est. 60 points out of 87
Part 2: Water Efficiency:	Est. 14 points out of 14
Part 3: Environmental Protection:	Est. 27 points out of 41
Part 4: Indoor Air Quality:	Est. 6 points out of 6
Part 5: Other Green Features:	Est. 7 points out of 7
Total:	Est. 114

15 WASTE REDUCTION

The Mosaic also encourages waste reduction behavior by providing recycling bins at common areas as well as incorporating. The dual chute pneumatic refuse collection systems allows for different disposal of recyclable and non-recyclable items, encouraging green behavior in residents and improving hygiene.

16 PROPOSED PLANTS AND GREEN PLOT RATIO

The proposed green plot ratio is 3.55 based on our provisions, and the proposed plants with suitable maintainability, hydration and respiratory capabilities include:

- Manila Grass
- Ixora 'Super Queen'
- Lantana Camara 'Hybrida'
- Giant False Agave
- Desert Rose
- Pygmy Date Palm
- Great Plum

17 CONCLUSION

The proposed design aims to integrate itself with the surroundings of metropolitan city, providing a sustainable home for people living in these cities. By utilizing strategies of modularity and metamorphic design, the team has created an ideal urban green home for modern urban dwellers.