GREEN BUILDING DEVELOPMENT
THE MRCB WAYS

8 DEC 2012 (MGBC)

A GREEN INITIATIVE BY MRCB
A city-within-a-city concept, designed by the renowned architect, late Dr. Kisho Kurokawa, who also designed KLIA. It was opened on 16 April 2001. It has been divided into 14 land parcels.

Used to be a 72 acre (290,000 m²) marshalling yard with godowns, sheds, living quarters, office building and facilities for locomotive cleaning by Keretapi Tanah Melayu Berhad.

The first development constructed whilst the railways are in operations. 6 million sqft buildable space by constructing a deck over the active railway lines.

Kuala Lumpur Sentral evolved into a RM15 billion development, takes pride as an extremely high potential Central Business District, well-positioned to offer state-of-the-art solutions and value for business advantages of local, regional and international brands.

Most concentrated Green Buildings in the country in one place – 348 Sentral, Platinum Sentral, Nu Sentral Retail Mall, Menara Nu, Menara Perdana, Q Sentral Office Tower, The Sentral Residences Luxury Condominiums.

Designed to reflect the characteristics of a global city where work, live and play co-exist in a harmonious environment.

Unique value-proposition i.e to create an efficient ‘transportation-hub’ and build an exclusive urban centre around it (the nucleus) comprising of integrated commercial and residential properties.
KL SENTRAL

PLANNING PRIOR TO 2008

NON GREEN - DEVELOPMENT
<table>
<thead>
<tr>
<th>PHASE 1</th>
<th>PHASE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• GFA of 787,700 sq. ft.</td>
<td>• GFA of 845,800 sq. ft.</td>
</tr>
<tr>
<td>• 3 blocks</td>
<td>• 4 blocks</td>
</tr>
<tr>
<td>• Development value of RM255 mil.</td>
<td>• Development value of RM324 mil.</td>
</tr>
</tbody>
</table>

• Major tenants include technology and communications companies, MNCs and Government agencies

**Strata Office Suites**
SUASANA SENTRAL CONDOMINIUMS

- GFA of 918,700 sq. ft.
- 2 blocks comprising 400 luxury units
- A joint venture between MRCB and CapitaLand Residential Limited, Singapore
- Development value of RM249 mil.
HILTON KUALA LUMPUR & LE’ MERIDIEN

- GFA of 997,800 sq. ft.
- Two 5-star international hotels with 932 rooms owned by Daito Asia and Daisho Asia, Japan
- Hilton KL won Best Hotel in Fiabci International 2007 Award
- Development value of about RM1 bil.

Daito & Daisho
1 SENTRAL

- GFA of 454,200 sq. ft.
- Developed by KL Sentral & MRCB for Lembaga Tabung Haji
- Major tenants include MRCB and PriceWaterhouseCoopers
- Development value of RM161 mil.
- GFA of 1,417,000 sq. ft.
- Lifestyle Centre with F&B facilities
- Houses fitness and spa centre, food court, restaurant and alfresco dining facilities
- Development value of RM80 mil.
SUASANA LOFT CONDOMINIUM

- GFA of 918,700 sq. ft.
- 2 blocks comprising 600 luxury units
- A joint venture between MRCB and UMLand
- Development value of RM351 mil.
CORPORATE OFFICE TOWERS

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- GFA of 1,515,000 sq. ft.
- Tower A developed by UEM Group
- Tower B developed for Malaysian Industrial Development Authority (MIDA)
- Tower C developed for Suruhanjaya Syarikat Malaysia (SSM)
- Tower D developed by Quill Realty
- Development value of RM610 mil.
As a construction company, MRCB has an obligation to help create awareness on global warming. We have decided to adopt a more proactive approach by incorporating sustainable elements in our property development.

Since 2008, MRCB has incorporated green building requirements into our Kuala Lumpur Sentral development, utilising international green building certification standards, notably, the US based Leadership in Energy and Environmental Design (LEED), Singapore’s BCA Green Mark and Malaysia’s Green Building Index (GBI) for all its new development in Kuala Lumpur Sentral (Nu Sentral, Kuala Lumpur Sentral Park and 348 Sentral).

Moreover, we also encourage our clients and partners in going green with their developments, and these have resulted in several of them adopting green certifications.

These include Platinum Sentral (BCA Green Mark Platinum) CIMB Office Tower (BCA Green Mark Gold); Perdana Sentral Office Tower (Leed Silver); and St. Regis Hotel and Residences (GBI Gold).
KL SENTRAL

PLANNING AFTER 2008

ALL BUILDINGS ARE DESIGNED TO BE GREEN BUILDINGS
Perdana Sentral

- GFA of 1,300,000 sq. ft. (Nu Sentral)
- GFA of 641,000 sq. ft. (Perdana Sentral)
- A joint development between Pelaburan Hartanah Berhad & MRCB
- Development value of RM1.4 bil.
Aloft Hotel & Office Towers

- GFA of 350,000 sq. ft. (hotel)
- GFA of 840,000 sq. ft. (office)
- Boutique business hotel & 2 office towers
- A joint venture between MRCB & ASEANA Properties Limited (UK)
- Development value of RM859 mil.
Menara CIMB

- GFA of 834,000 sq. ft.
- Headquarters for CIMB’s investment banking group
- Development value of RM404 mil.
KL Sentral Park

- GFA of 982,000 sq.ft.
- Combines lifestyle facilities with campus office
- Developed by MRCB
- Development value of RM678 mil.
- Completed in 2011
MENARA SHELL & ASCOTT SENTRAL

- GFA of 1,000,000 sq. ft.
- Developed by GSB Sentral SB
- 1 block office suites for Shell HQ
- 1 block serviced apartment
- Development value of RM914 mil
• GFA of 1,400,000 sq. ft.
• Proposed for Grade A office suites
• A joint venture between MRCB, and Quill
• Development value of about RM1 bil.
St. Regis Hotel & Residences

- GFA of 1,000,000 sq. ft.
- Development of St. Regis Hotel and Residences
- Development value of about RM1 bil.
The Sentral Residences

- GFA of 1,400,000 sq. ft.
- Proposed luxury apartments
- A joint venture between MRCB and Quill
- Development value of about RM1.2 bil.
GREEN FEATURES OF THE DEVELOPMENTS
PLATINUM SENTRAL

The design takes into consideration the building orientation and façade so as to maximise in capturing daylight all day throughout the year.

Platinum Sentral is equipped with photovoltaic cells as a mean in ensuring energy sustainability.
PLATINUM SENTRAL was designed with a good day lighting system. The design involves:

- Orientation & space organization
- Shape & size of glazing
- Internal ceiling wall, partition & floor surface properties
- Color contrast between windows and internal adjoining walls & ceilings
- Protection from solar gain or glare
- Optical, solar & thermal properties of windows

This resulted in over 80% of the floor area getting direct sunlight.
- **Specific selection of Glass** with consideration of U-Value, SHGC, application of Low E coating to enhance OTTV
- **Screen/Louvers** for **Shading Optimization**
- **Dramatic custom-designed timber sun-shades** is a daring showcase of the innovative use of local materials/content for the building

**Tubular and chequered sun shading louvers at external glass** reduces excessive heat transferred

**Use of louvres as external sunshading devices** (primarily to east and west-facing facades)
Optimise Energy Performance - PLATINUM SENTRAL AND ALL GREEN BUILDINGS

The design is anticipated to energy savings from baseline building as per Ashrae 90.1 2004. The strategies included in the design are as follows;

1. Energy efficient lighting - T5 light fittings/LED c/w high frequency electronic ballast
2. Day light responsive sensor to control light by dimming or switch off
3. Demand control ventilation – CO² sensors
4. Optimised lighting layout with reduced lighting power density but meeting minimum lux level standards
- Selection of efficient sanitary fitting under ‘Excellent’ Water Efficiency Labeling Scheme (WELS).
- Provision of water sub-metres to monitor water usages for irrigation, water features and domestic water usage and linked back to the BMS.
- Rainwater harvesting system to reduce usage of portable water for landscape irrigation throughout the entire site.
- A good filtration system is incorporated to the irrigation system.
- Rain sensors will be provided as part of effective site irrigation system (100% automated irrigation).

This is particularly inherent in PLATINUM SENTRAL and 348 SENTRAL.
It transports solid waste (garbage) pneumatically at high speeds via reticulated pipes to a central plant where it is stored in sealed containers (sometimes compacted) before it is carted away for disposal to a landfill.

**Advantages**
- Hygienic - no more exposed filth and contamination
- Environmentally Healthy - no more bad odours
- Convenient - regular round the clock waste removal

- This feature is incorporated into Lot G’s NU SENTRAL RETAIL MALL
This feature to be made available at PLATINUM SENTRAL has the following advantages:

- Save fuel and reduce CO concentration in air
- Improves vehicle movement inside car-park thus save time
- Eases traffic congestion
- Utilizes parking space effectively
Featured throughout the development in KL Sentral development, trees planting is carried out for the purpose of providing shade, which reduces cooling costs.

**Wall sheltering, where shrubbery or vines are used to create shades and promote natural ventilation.**

**Green roofs** that cool buildings with extra thermal mass and evapotranspiration.

Reducing the heat island effect with pervious paving, high albedo paving, shade, and minimizing paved areas.

**Maximising softscape, minimising hardscape.**

**Selection of type of trees.**

**Macro-climatic difference in one area could be up to 3° celsius.**
Heat Island Effect – GREEN ROOF

- To reduce heat build-up in the surrounding environment - Green roof is designed. **50% of the ROOF** is designed to have vegetation. This prevents heat absorption by the concrete and hard paving subsequently radiate the surrounding. The green roof will keep the surrounding ambient temperature low.

- This is featured at the **PLATINUM SENTRAL**
Big Ass Fan for Atrium Air Quality Improvement

- BAFs provide a cooling effect, via elevated air speed, without using any refrigerants.
- BAFs can be used to increase occupant comfort by providing a cooling effect via elevated air speed (high speed fan operation), destratifying the space (low speed fan operation), minimizing cold and hot areas, and providing an additional means of occupant control.
- A feature at 1 Sentral building, the lift provides energy efficient operation via **central panel control mechanism** (using part of the S-CRE solution).

- The lift is a destination-designated lift where a passenger is only allowed designated floors. It also enhance the security of the building.
<table>
<thead>
<tr>
<th>Development</th>
<th>Project Commencement</th>
<th>Green Certification</th>
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</thead>
<tbody>
<tr>
<td>Suasana Sentral Condominiums</td>
<td>2000</td>
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<tr>
<td>Hilton KL</td>
<td>2002</td>
<td></td>
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<tr>
<td>Le Meridien</td>
<td>2002</td>
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<tr>
<td>1 Sentral</td>
<td>2004</td>
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<tr>
<td>Plaza Sentral – Phase 2</td>
<td>Feb 2004</td>
<td></td>
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<tr>
<td>Sooka Sentral</td>
<td>Mar 2006</td>
<td></td>
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<tr>
<td>Suasana Loft</td>
<td>2006</td>
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<tr>
<td>Menara SSM</td>
<td>Feb 2007</td>
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<td>Menara MIDA</td>
<td>Feb 2007</td>
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<td>Mercu UEM</td>
<td>2007</td>
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<td>Quill 7</td>
<td>2007</td>
<td></td>
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<tr>
<td>Nu Sentral</td>
<td>Dec 2008</td>
<td>Yes</td>
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<tr>
<td>Perdana Sentral</td>
<td>Dec 2008</td>
<td>Yes</td>
</tr>
<tr>
<td>Menara CIMB</td>
<td>Mar 2009</td>
<td>Yes</td>
</tr>
<tr>
<td>Menara Shell</td>
<td>Apr 2009</td>
<td>Yes</td>
</tr>
<tr>
<td>Ascott Sentral</td>
<td>Apr 2009</td>
<td>Yes</td>
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<td>KL Sentral Park</td>
<td>Sep 2009</td>
<td>Yes</td>
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<tr>
<td>Aloft Hotel &amp; Office Towers</td>
<td>Oct 2009</td>
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<tr>
<td>The Sentral Residences</td>
<td>Nov 2011</td>
<td>Yes</td>
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<tr>
<td>St.Regis Hotel &amp; Residences</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Q Sentral</td>
<td>Dec 2011</td>
<td>Yes</td>
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<tr>
<td>Project</td>
<td>LEED (USA)</td>
<td>BCA (Greenmark Singapore)</td>
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<td>---------------------------------</td>
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<tr>
<td>Lot A - CLMB Tower</td>
<td>–</td>
<td>Gold</td>
</tr>
<tr>
<td>Lot B - Q Sentral</td>
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<tr>
<td>Lot C - St.Regis</td>
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<tr>
<td>Lot D - Sentral Residence</td>
<td>–</td>
<td>–</td>
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<tr>
<td>Lot E - Platinum Sentral</td>
<td>–</td>
<td>Platinum</td>
</tr>
<tr>
<td>Lot G - Nu Sentral &amp; Perdana Sentral &amp; 1</td>
<td>Pre-certified to Silver level certification</td>
<td>Compliance (self-declared). MRCB follows the BCA guidelines but there are no plans for certification.</td>
</tr>
<tr>
<td>Ascott Sentral</td>
<td>Pre-certified to Certified Level Certification</td>
<td>–</td>
</tr>
</tbody>
</table>
All the **new developments within Kuala Lumpur Sentral** have either obtained or are in the process of obtaining green certifications from the globally accredited bodies such as the USA LEED, Singapore’s BCA Green Mark and Malaysia’s very own Green Building Index.
## ENERGY EFFICIENCY

| Building Envelope – EETV: | • Enhances overall thermal performance  
• Project is able to achieve an average Envelope Thermal Transfer Value (EETV) of 40W/m² and lower (Maximum permissible EETV = 50W/m²)  
• Shading coefficient of 0.27, 0.44 & 0.63 (minimal)  
• U-Value of Glass designed for 1.5, 1.989 and 5.395 W/m²K |
| Air Conditioning System | • Project uses District Cooling System  
• AHU System is design at 0.4W/cubic metre per hour (CMH)  
• CO₂ sensors are designed for regulating outdoor airflow |
| Artificial Lighting | • Provision of Energy Efficient Lighting, such as Light-emitting Diode (LED) and T5 fittings. Savings of 46% better than code of practice |
| Ventilation in Car parks | • Mechanical ventilation system coupled with CO sensors |
| Ventilation in common areas | • Toilets and staircases are mechanically ventilated  
• Atrium is naturally ventilated, with the aid of mechanical ventilation system |
| Lifts and Escalators | • Lifts with AC Variable voltage and Variable Frequency Motor Drive (VFD)  
• Dual speed mode coupled with motion sensors |
| Energy efficient practices and features | • Provision of motion sensors for all toilets and staircases (0.18% savings)  
• Ductless Mechanical Ventilation System is designed to achieve 0.83% savings  
• Heat Recovery Wheel System is designed for pre-cooling and removing moisture from the fresh air entering the building (3.34% savings)  
• Photo sensors to maximise the use of day-lighting |
| Renewable Energy | • Provision of 1% replacement of electricity (based on the total electricity consumption including tenants’ usage) |
### INDOOR ENVIRONMENTAL QUALITY

| Thermal Comfort | • Indoor air temperature (22.5 to 25.5°C) and Relative Humidity (less than 70%) is specified in Mechanical & Electrical Engineering (M&E) tender |
| Noise Level     | • Sound level is specified in the M&E tender |
| Indoor Air Pollutants | • Project uses low VOC paint for all internal wall areas |
| High Frequency Ballasts | • Provision of high frequency ballast for all fluorescent luminaries |

### OTHER GREEN FEATURES AND INNOVATIONS

| Pneumatic Waste Collection System | • Waste stored in sealed containers before it is disposed to landfills  
• Hygienic, environmentally friendly and convenient |
| Siphonic Drainage System         | • Applicable to all areas: roofs (flat and metal roof), terraces, atrium roof and landscape podium |
| Condensate Water Collection from AHU | • Condensate Water Collection from AHU |
| Car-park Guiding System           | Advantages:  
• Save fuel and reduce CO concentration in air  
• Improves vehicle movement inside car-park thus saving time  
• Eases traffic congestion |
| Anti-corrosion coating for Coil   | • More efficient operations |
| Dedicated paper recycling chute   | • Proper segregation of paper waste |
| Education corner                 | • Environmental awareness including building features and Energy Efficient Systems |
## WATER EFFICIENCY

<table>
<thead>
<tr>
<th>Water Efficient Fittings</th>
<th>Use of “Good” rating shower taps, shower heads, basin taps and sink/bib taps based on Water Efficiency Labeling Scheme (WESLS).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water usage and Leak Detection</td>
<td>All sub-meters are linked back to the Building Management System (BMS)</td>
</tr>
<tr>
<td>Water efficient irrigation and landscaping</td>
<td>Rainwater harvesting system with filtration</td>
</tr>
<tr>
<td>Irrigation System</td>
<td>Rain sensors (100% automated irrigation)</td>
</tr>
</tbody>
</table>

## GREENERY

<table>
<thead>
<tr>
<th>Green Fixtures and Fittings</th>
<th>Environmental friendly product certified under The Singapore Green Labeling Scheme (SGLS):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Drainage cell/carton for landscape : Use of “Versicell” or equivalent subsoil drainagecarton (SGLS Certified)</td>
</tr>
<tr>
<td></td>
<td>- Ceiling board : Use of “Armstrong” or equivalent ceiling board (SGLS Certified)</td>
</tr>
<tr>
<td></td>
<td>- Office Floor Carpet Tiles : Use of “Interlace” or equivalent office floor carpet tiles (Green Star certified)</td>
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<tr>
<td></td>
<td>Products with at least 30% recycled content by weight/volume:</td>
</tr>
<tr>
<td></td>
<td>- Ceiling Plaster Board for function areas/prayer rooms/last office levels</td>
</tr>
<tr>
<td></td>
<td>- Corian Acrylic Solid Surfaces for pantry</td>
</tr>
<tr>
<td></td>
<td>- Phenolic resin substrate system partition for toilet cubicles</td>
</tr>
<tr>
<td></td>
<td>- Modules for Green Wall system with recycled content</td>
</tr>
<tr>
<td></td>
<td>Calculated Greenery Provision (GnP) is rated at 2.21</td>
</tr>
<tr>
<td></td>
<td>Provision of compost recycled from horticulture waste is specified in the landscape tender</td>
</tr>
</tbody>
</table>
THANK YOU

A GREEN INITIATIVE BY MRCB