



**CONSTRUCTION MANAGEMENT**

**BCM 544  
(CONSTRUCTION TECHNOLOGY IV)  
AP246 5P(PLK)**

**PREPARED FOR:  
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## 1.1 OBJECTIVE OF STUDY

The purpose we do this assignment and case study is to achieve this following objective:

- 1 To study the types of intelligent building dimension used at the building
- 2 To study the intelligent building system operation and process

## 1.2 METHOD OF STUDY

### 1.2.1 Primary Data

#### i. Observation

Observation that carried out of those building which is used system of the intelligent building

#### ii. Case study

To obtain a simple explanation by using a case from studies, to be acquired. Case study carried out in those building and also from contractors who managed the facilities by gathering all information through observation and interview.

#### iii. Interview

With interview skilled and experienced individual on report subject.

### 1.2.2 Secondary Data

#### a. Reading source

Reading resources from book or article that have relevance in intelligent building system

#### b. Electronic media

Obtain information through internet from related website. , this method use to obtain information particularly on theoretical part.



Kompleks Kerja Raya (KKR 2)

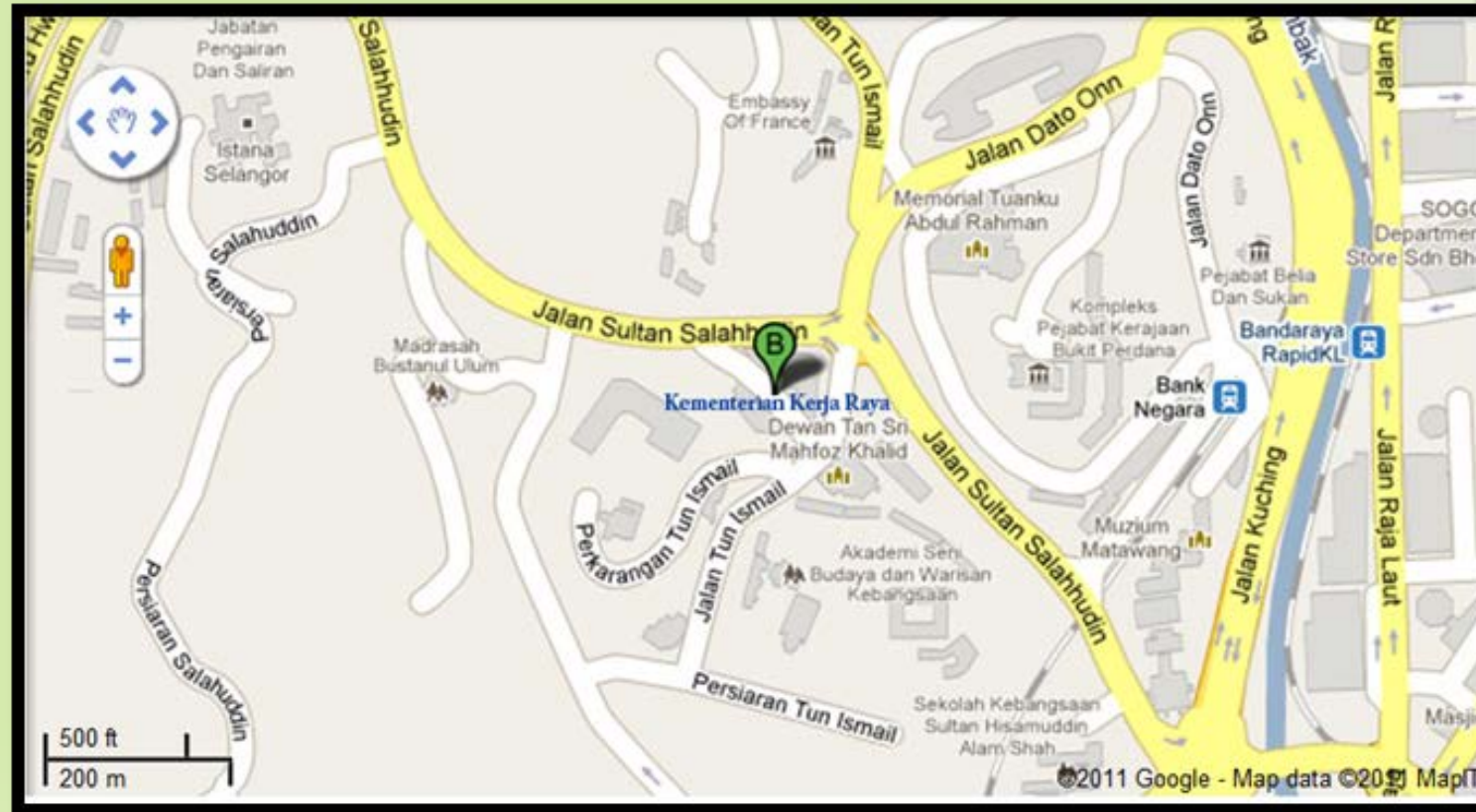
Kompleks Kerja Raya 2 (KKR2) is a 6-block office complex master plan on an existing 1 million sq ft site, strategically located at Jalan Sultan Salahuddin, Kuala Lumpur.

KKR Tower provides 37-levels of accommodation for Jabatan Kerja Raya (JKR). The tower creates a centralized location for JKR's growing workforce while uplifting JKR's image. The 'diamond' facade concept represents Kompleks Kerja Raya's role as 'a diamond in the crown of the Malaysian construction industry' by being a 'Diamond in KL City'.

# Summary of Project

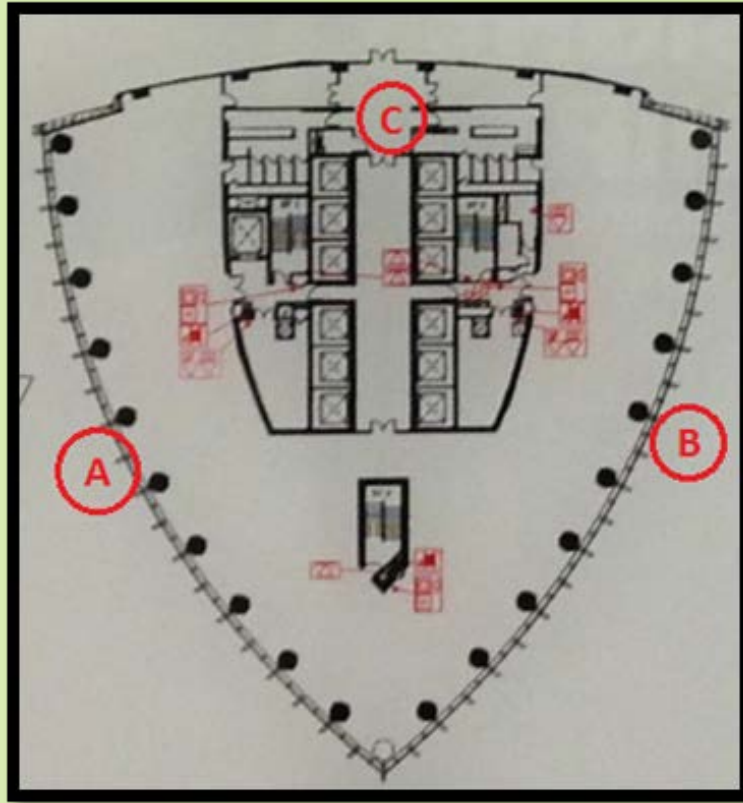
<b>Title of Project</b>	<b>Cadangan Pembangunan 1 blok Pejabat 38 tingkat termasuk 7 Tingkat Podium Dengan 2 Tingkat Basement (Kompleks Kerja Raya 2) Di lot pt 67 Seksyen 60, Jalan Sultan Salahuddin ,Kuala Lumpur.  Untuk Tetuan: Kementerian Kerja Raya</b>
<b>Client</b>	<b>Kementerian Kerja Raya</b>
<b>Architect</b>	<b>GDP Architect</b>
<b>C&amp;S Engineer</b>	<b>ARUP Sdn. Bhd.</b>
<b>M&amp;E Engineer</b>	<b>ARUP Sdn. Bhd.</b>
<b>Quantity Surveyor</b>	<b>NORTHCROFT LIM Sdn. Bhd.</b>
<b>Landscape Architect</b>	<b>Metropolis Design Consultant Sdn. Bhd.</b>
<b>Contractor</b>	<b>Ahmad Zaki Sdn. Bhd.</b>
<b>Construction Cost</b>	<b>RM 309,400,000.00</b>
<b>Construction Period</b>	<b>01/11/2009 -01/11/2013</b>

# Location of Construction Building



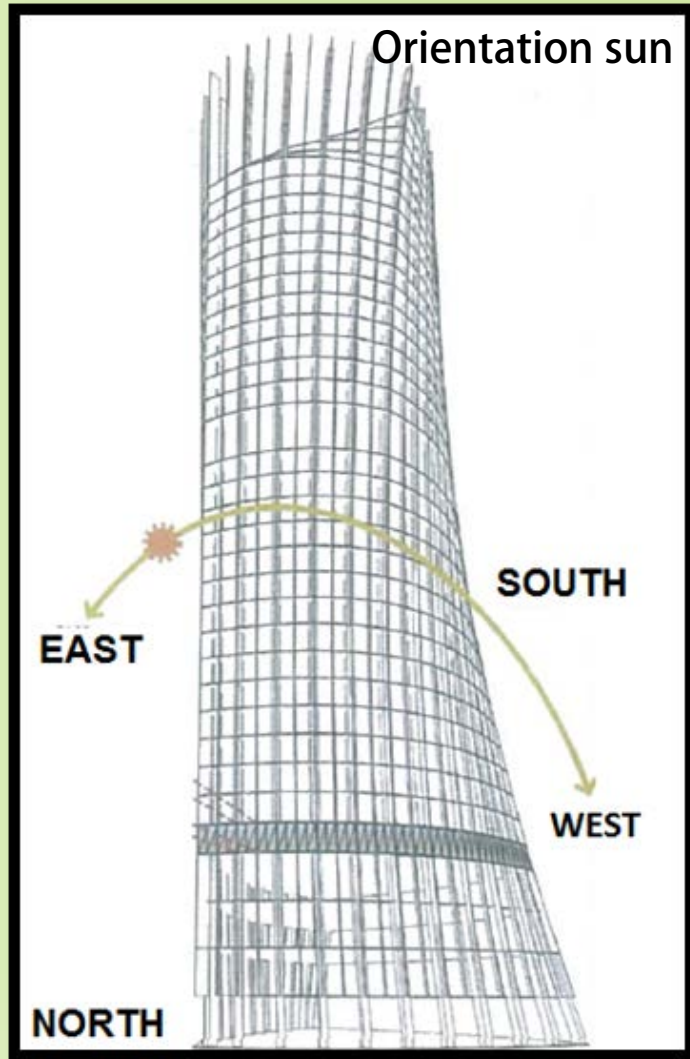
# Design Principles and Characteristic

# Design Parameters



The 'diamond' façade concept represents Kompleks Kerja raya' s role as 'diamond in th crown of the Malaysian construction industry' . KKR2 tower comprises three facades. 'A' & 'B' are mirrored with 'C' at rear.

# Design & Construction Consideration



These rectangular frames are also split diagonally resulting in upper and lower triangular glass components 6284 numbers including upper level roof angled pieces. Tilting these triangles inwards within frame allows an incremental response to the shifting geometry, level by level to create a curve facade. These triangular insulated glazing units comprise 3 pieces of glass at top and bottom.

East west glazing orientation, facade A&B enables this play to façade design allowing natural sun shading by glazing detail and the external mounted 'fin' elements 1600 unique numbers 6.4 km long. Each fin acts as both shading and design feature expressing curvature and verticality.



# Design Elements Of KKR 2 Building



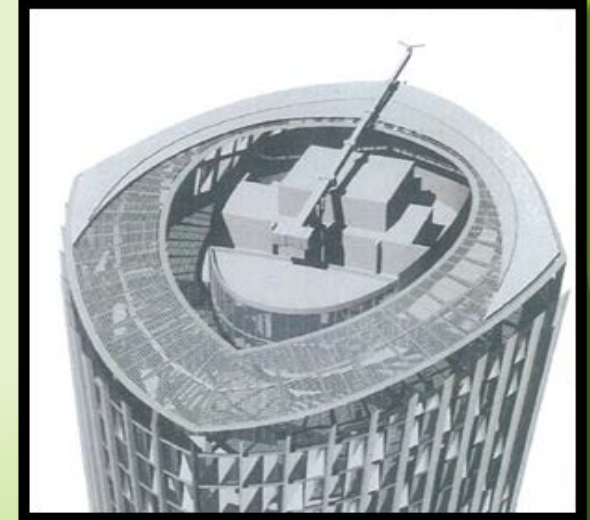
Terraced roof garden

Two building components create the 'roof' a terraced roof garden between level 32 & 35 and independent canopy above. Respectively they are key factors within the GBI initiative. The green roof, accessible at each level, enjoys fantastic views while sun shading is provided by louvered canopy above both canopy and 50% open glazing at front facades A&B allows both airflow and weather protection for visitors to arguable Kuala Lumpur highest garden.



# Crane for maintenance

Mean while at level 37 a centrally located building maintenance unit crane has a telescopic reach of 32 meters one of the longest in Asia.



# Columns of building



Front columns A1 & B1 are the straightest whereas A11 & B11 are the most angled to meet this curvature facade 'C' design curve facade C design curves in two planes a parabolic geometry. That structural design evolved from original structural design concept where columns were square, enabling a smooth curving geometry. A slip form reinforced structural core construction remains constant while the adjoining finger beams to slating columns shifts at every level, a further outer ring beam near slab edge, connects columns. A minimum of 600mm glazing zone between column and slab edge receives the 450mm depth glazing units.

# Design Process And Tools

The Kompleks Kerja Raya 2 (KKR 2) building used a skeleton frame because the system is commonly used in Malaysia and it is more suitable for a tall building. Even the skeleton frame is difficult to construct due to many structures members but the construction process is more faster because the project is used a formwork systems. The installation of formwork systems is easy to dismantle and used back for a next floor level with a short time period. Therefore, this site used 2 unit of supported static tower crane to make sure the material and tool easy to lifted. Besides that, during construction, concrete pump also have used to pump the concrete to above level with fast.



## Design Elements Of KKR 2 Tall Building



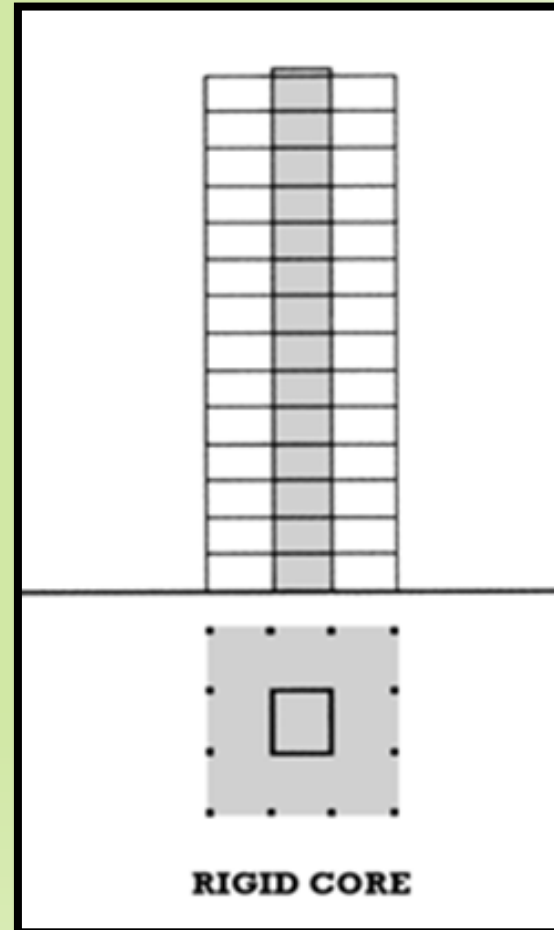
Each level is unique as unique as incrementally the geometry shifts upward the triangular footprint tapers upward into 'leaf shaped upper levels. There are 10 circular columns slating in two directions, mirrored at each side A&B of tower ranging from a 1400mm diameter at low levels to 800mm at highest.



# Key Component Of The Structure

## Rigid Frame and Core at Kompleks Kerja Raya 2 (KKR 2)

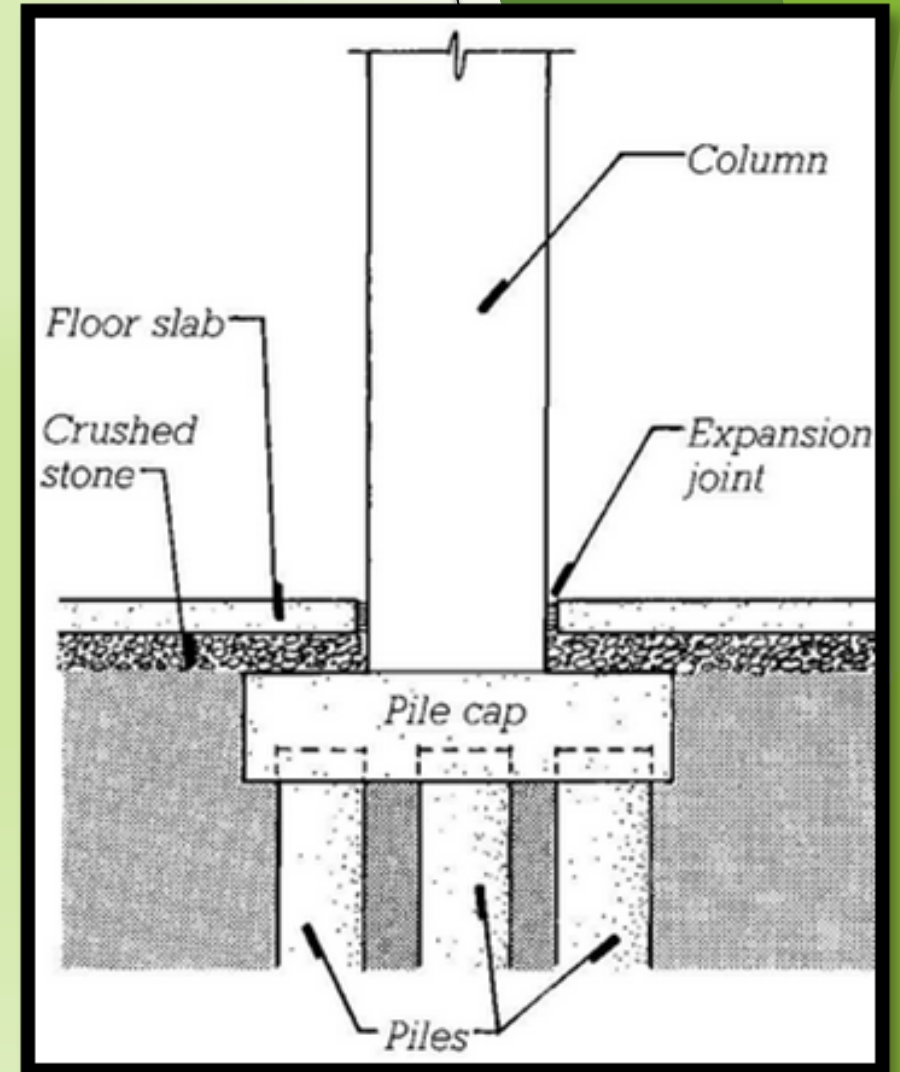
Rigid frame system as to achieving lateral stability in areas of low seismic activities, or somewhat less in height in areas of greater seismic activity Rigid frame structures may be less attractive option due to greater difficulty of their fabrication because of many structures member and the increased size of the beams and columns required. It combines with core structures to increase the lateral resistance. Core structures are the most commonly used system to stabilize tall buildings



# Foundation structure

Kompleks Kerja Raya 2 (KKR 2) used bored piles as a foundation for the building. The construction for bored pile work took 6 months. There are two elements for bored piles which pile cap and the pile. Bored piles can be constructed using a number of methods. The simplest method is using an auger to remove the soil and replace it with concrete and reinforcement.

Bored pile and pile cap





# Vertical and Horizontal Loading Systems

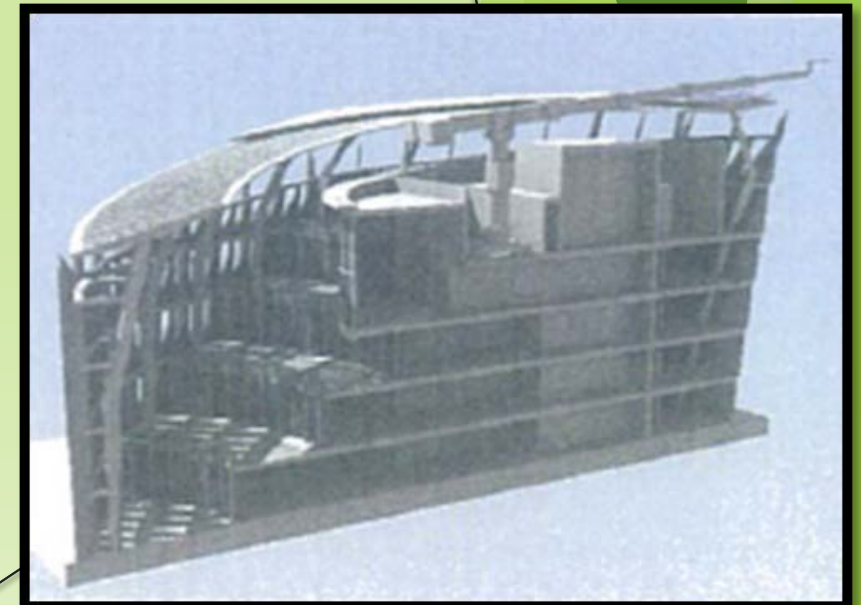
## Skeleton Frame System- Reinforced concrete

One of the great technological changes of the nineteenth century was the introduction of skeleton framing as the common method of supporting large buildings. Skeleton frames, which use a system of columns and beams to support a building's interior floors and exterior walls. Skeleton frame system is commonly used in Malaysia. The Kompleks Kerja Raya 2 (KKR 2) building used a skeleton frame because the system is commonly used in Malaysia and it is more suitable for a tall building. Even the skeleton frame is difficult to construct due to many structures members but the construction process is more faster because the project is used a formwork systems



# Roof Steel structures

The structure component used roof at Kompleks Kerja Raya (KKR 2) is steel structure. The members of steel structure are made of steel and are joined by welding, riveting and bolting. Because of the high strength of steel, these structures are reliable and require less material than other types of structures. Fabrication and installation of steel structures are realized through industrial methods.



## Façade of the Building















# **Main Materials And Finishes**

# Planning And Controlling









