

# César Pelli



## Petrona Towers

1998

# Architect

**César Pelli**, born October 12, 1926 in San Miguel de Tucumán, Argentina.

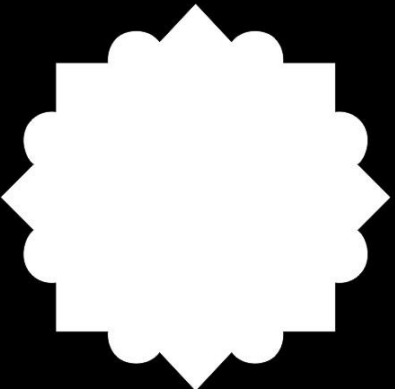
His many awards include the **1995 AIA Gold Medal**.

Pelli completed his studies at the School of Architecture, at the **University of Illinois** at Urbana-Champaign

He emigrated to the United States in **1952** and became a naturalized U.S. citizen in **1964**

Pelli served as **dean of the School of Architecture at Yale University** from 1977 to 1984

Perhaps his most famous work : Petronas Twin Towers.





# Other Projects



**Wells Fargo Center** (formerly *Norwest Center*), Minneapolis



# Other Projects



**Key Tower**, Cleveland, Ohio, USA





# Other Projects



100 North Main Street (formerly **Wachovia Center**), Winston-Salem, North Carolina





# Other Projects



Cheung Kong Center





# Other Projects



Cheung Kong Center





# Other Projects



Zurich Tower



# Other Projects



Goldman Sachs Tower, Jersey City,  
New Jersey



# Other Projects



Torre de Cristal, Madrid, Spain





# Petronas

COMPANIES INVOLVED

Architect: **César Pelli, Djay Cerico**

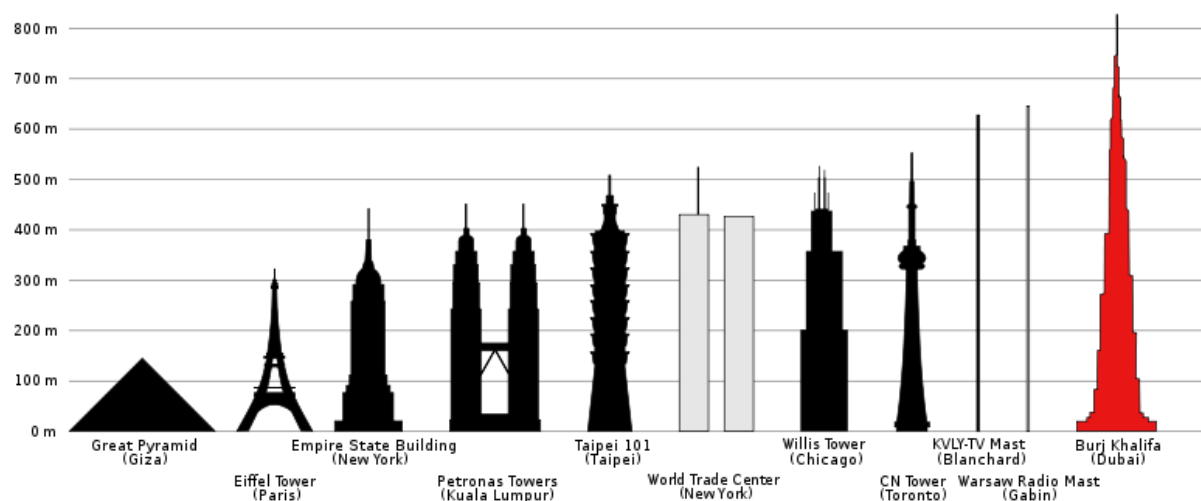
Structural engineer: **Thornton Tomasetti**

Contractor ( PM **Dr. Mahathir Mohamad** idea of having two separate contractors to create competition)

Tower1: **Hazama Corporation**

Tower2: **Samsung Engineering & Construction**

Developer/ Owner: **KLCC Holdings**



# Petronas

## an introduction

Location: Jalan Ampang, Kuala Lumpur, Malaysia

Construction: 1992 – 1998

Floor count: 88

Floor area: 395,000 m<sup>2</sup> (4,252,000 sq ft)

Elevators: 78

Cost :US\$1.6 billion

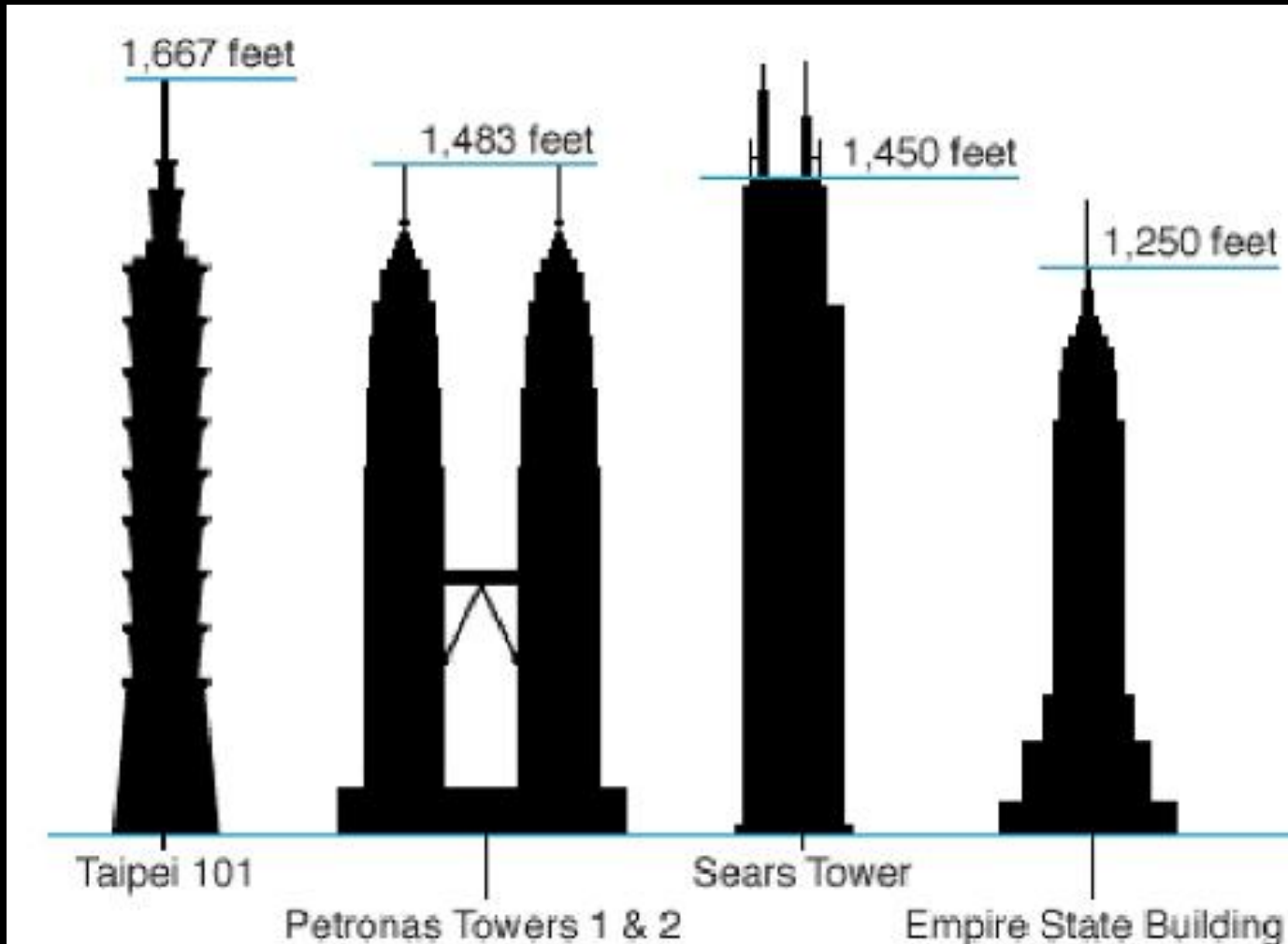
Were the world's tallest buildings from 1998 to 2004, when their height was surpassed by Taipei 101

From 2001, the towers remain the tallest twin buildings in the world

Previous record set by Willis Towers (formerly known as Sears Towers) as its antennas(a non architectural feature) are not included in recording total height, though its numbers of floors (110) and floor area is much higher



# Petronas



# Brief

functional requirements were

- **218,000 square metres** of floor space **for office** in each of the towers
- **concert hall**
- **a six-storey shopping and entertainment complex** to include two department stores shops, restaurants, cinemas, an art gallery, a specialized library
- **four-storey underground car park for 5,400 cars**



# Brief

**Malaysia**, one of the major south-east economy wanted it to put itself on map by breaking US monopoly on mega-structures.



“To create pair of joint skyscrapers, to house office of **Petronas**, short form of Petroliam Nasional Berhad, Malaysian-owned oil and gas company”

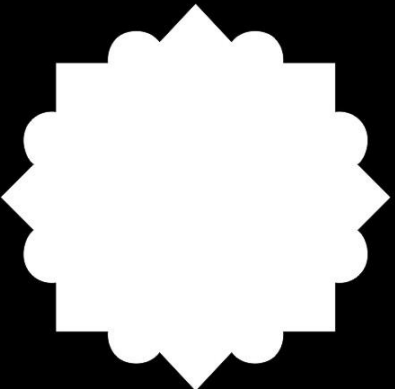
Then, prime minister **Dr. Mahathir Mohamad** wanted an iconic structure to depict countries dominance.

“**Tall**

yet **Malaysian**”

(Islamic influence)

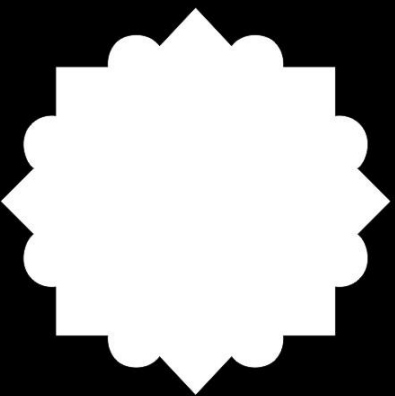
(60.4% Islamic, 19.2% Buddhist, 9.1% Hindu)



# Site



Kuala Lumpur, Race Course



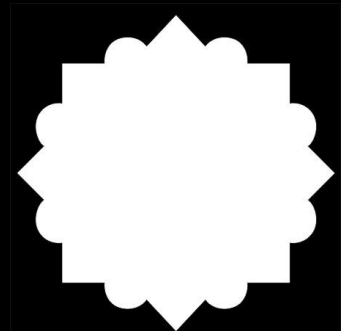


# Site Kuala Lumpur City Centre 37 + 63 acres



1. Petronas Towers I & II
2. Concert Hall
3. Suria KLCC Retail Complex
4. Office Tower (Menara Maxis, Menara Esso)
5. Mandarin Oriental Hotel
6. Future Buildings

N  
↑  
0 500 FT.  
150 M.





# Site Kuala Lumpur City Centre 37 + 63 acres



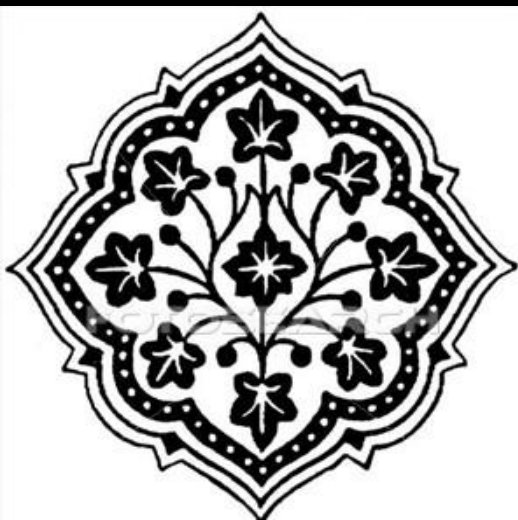
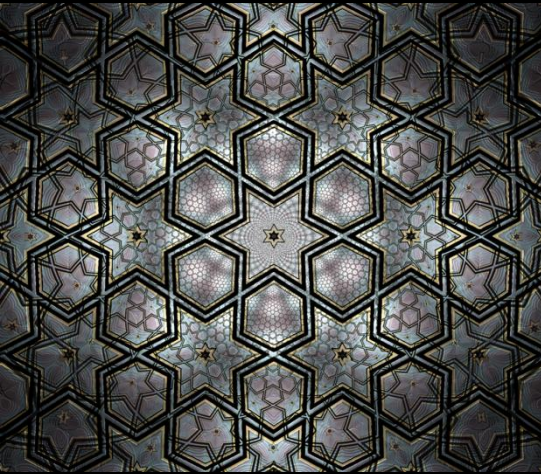
Master plan



Malaysian =

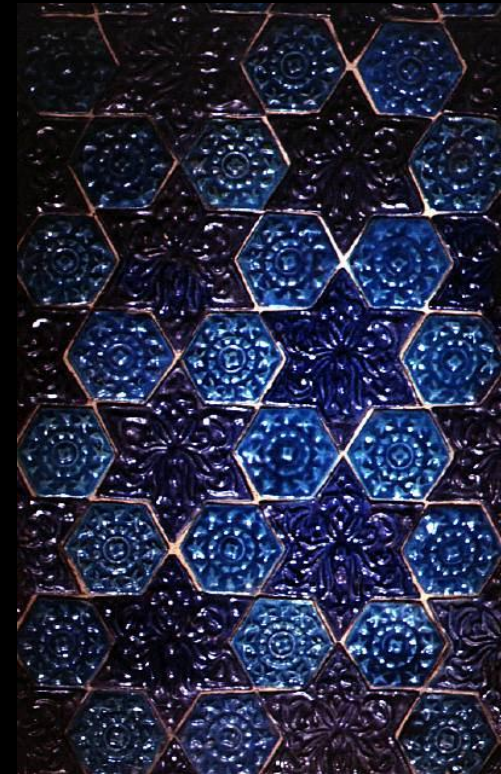
Islamic =

Geometric Shapes



Challenge:

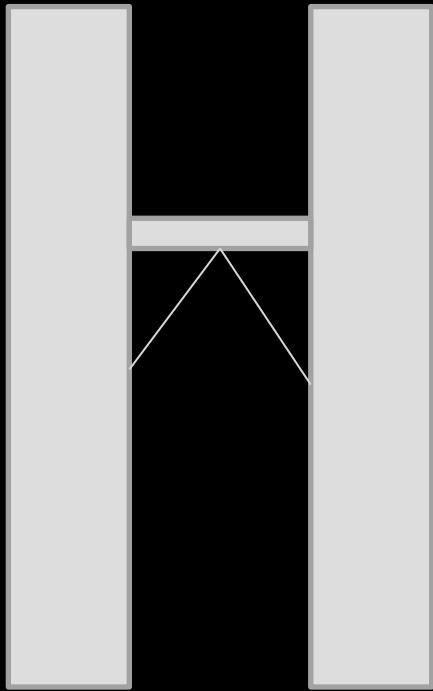
to *translate* all this  
into a skyscraper





# Initial iDEA

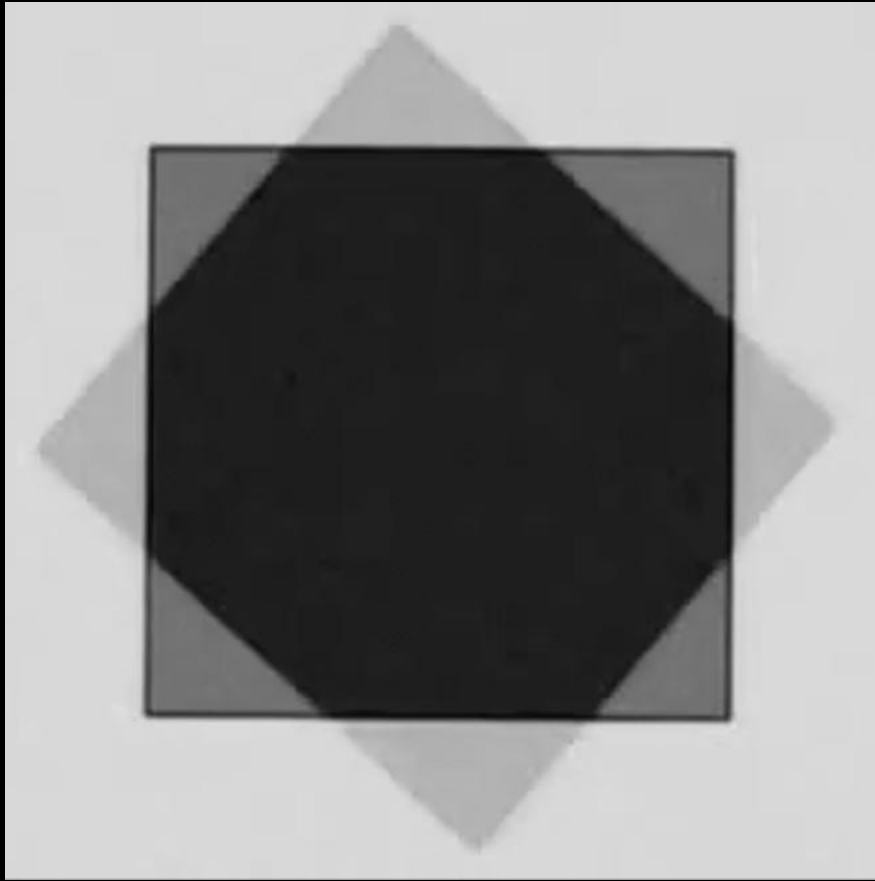
2 skyscrapers with **skywalk** at mid height



Depiction of an “**Islamic Gateway**”

PM believed that the idea **wasn't Malaysian enough** to satisfy the brief

# PM's Input



Floor plan based on two  
**interlocking squares**

This represents order and  
harmony

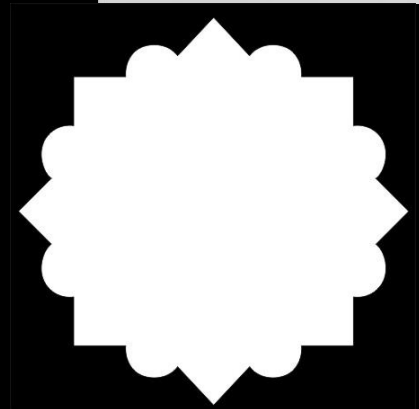
# Pelli's Modifications



Floor plate designed by PM wasn't giving the desired floor area

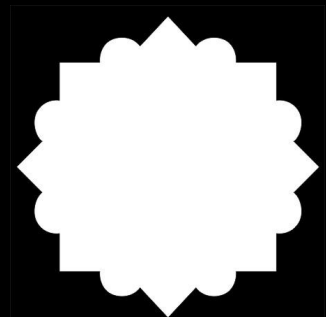
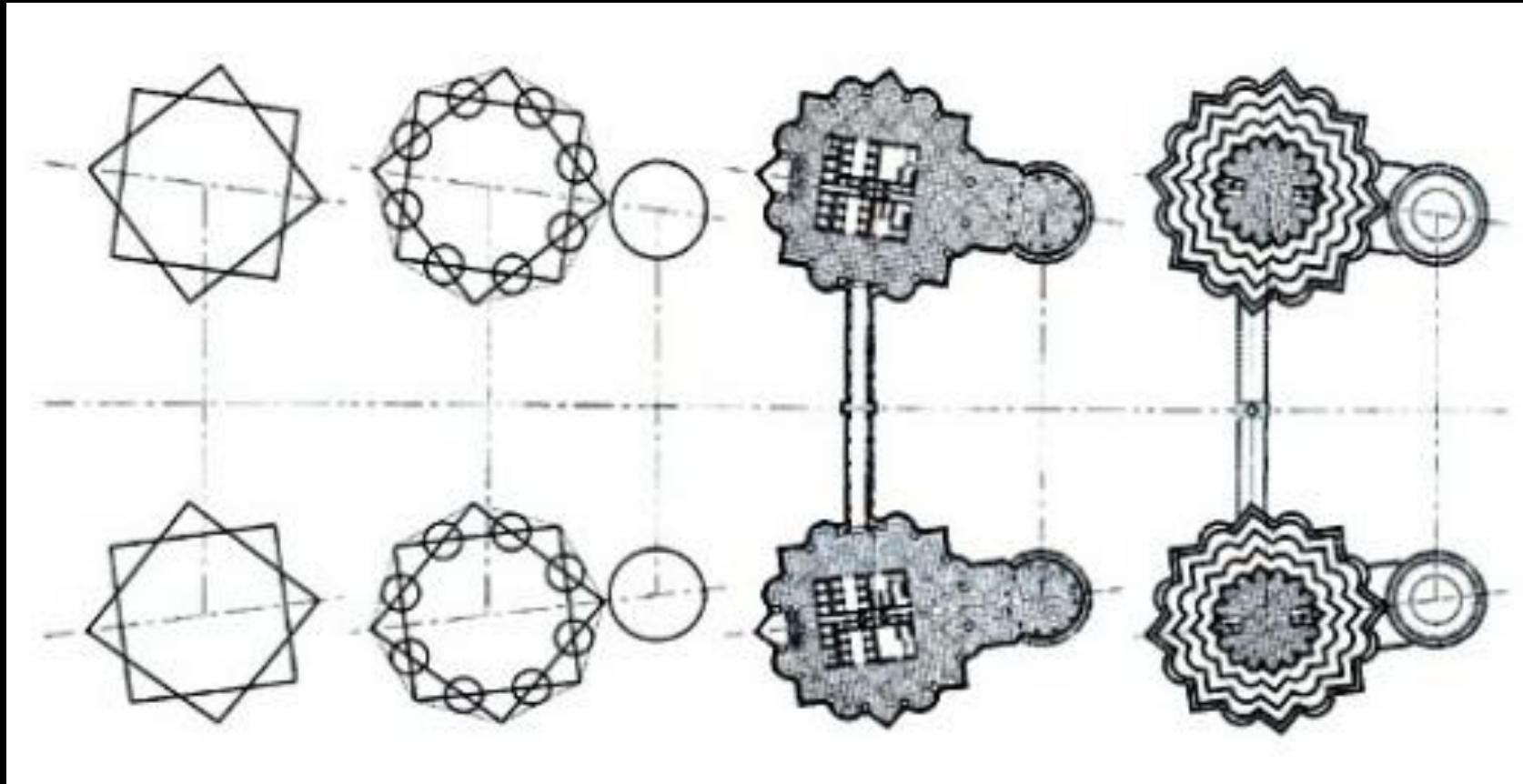
Cesar Pelli, **embellished the floor** plan with **semi-circular scallops**.

The finalising of design took 8 months .





# Pelli's Modifications



# My Interpretation

Success in making skyscraper Islamic

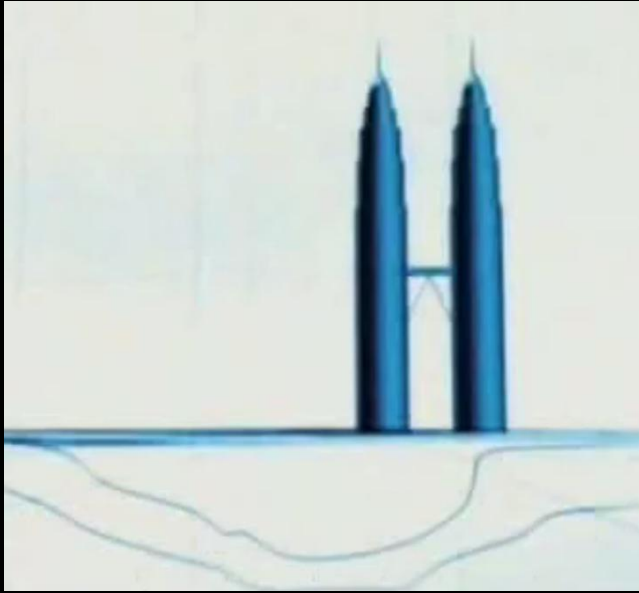


**1<sup>st</sup> impact :** Pelli's initial idea of having a skywalk in between two giant towers to give an appeal of an **ISLAMIC GATEWAY**

**2<sup>nd</sup> impact:** floor plates derived from Islamic geometric patterns

**3<sup>rd</sup> impact:** line of symmetry

# Challenges in CONSTRUCTION



Detailed site study showed that structure proposed was standing on the edge of depression in sub surface



The towers were shifted 60 m towards the depression and enormous piles were laid on the hard bed bedrock (120 m deep)



# Challenges in CONSTRUCTION

## building of **Foundation Slab**

The whole concreting of the slab had to be done in one go which meant

- 52 hrs of concreting w/o a break
- Truck load every 2 ½ minute

**Monsoon strike** in between



# Challenges **in CONSTRUCTION**

replacing **Steel with reinforced concrete**

- Malaysia has a shortage of steel and importing it would have blown the budget out of proportion.
- Concrete required to serve this purpose was of grade **140 Mpa**

## **16 CONCRETE PILLARS**

Along the curvature supporting by ring of beams



# Vertical Circulation

## DOUBLE ELEVATOR

The floor area was too small to accommodate too many space for shafts , so **double elevators were employed**.

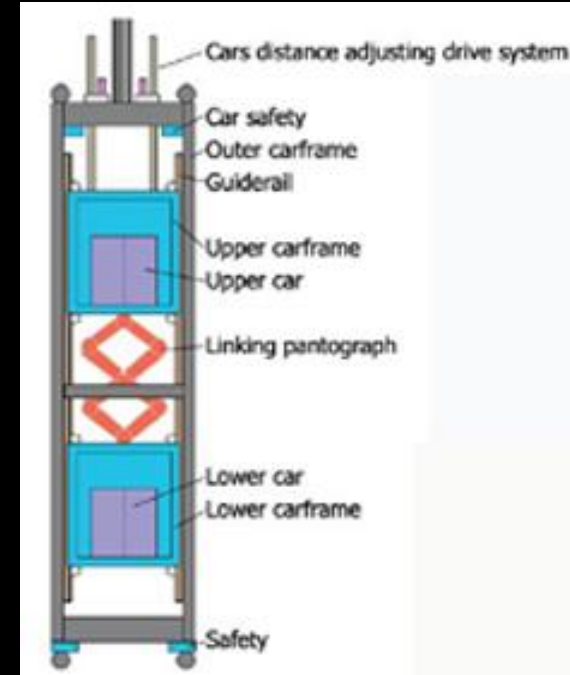
Passengers that want to go

- **Odd** level stay at lobby
- **Even** level climb one level up using escalators

Each shaft had 2 double elevators, 56 in total

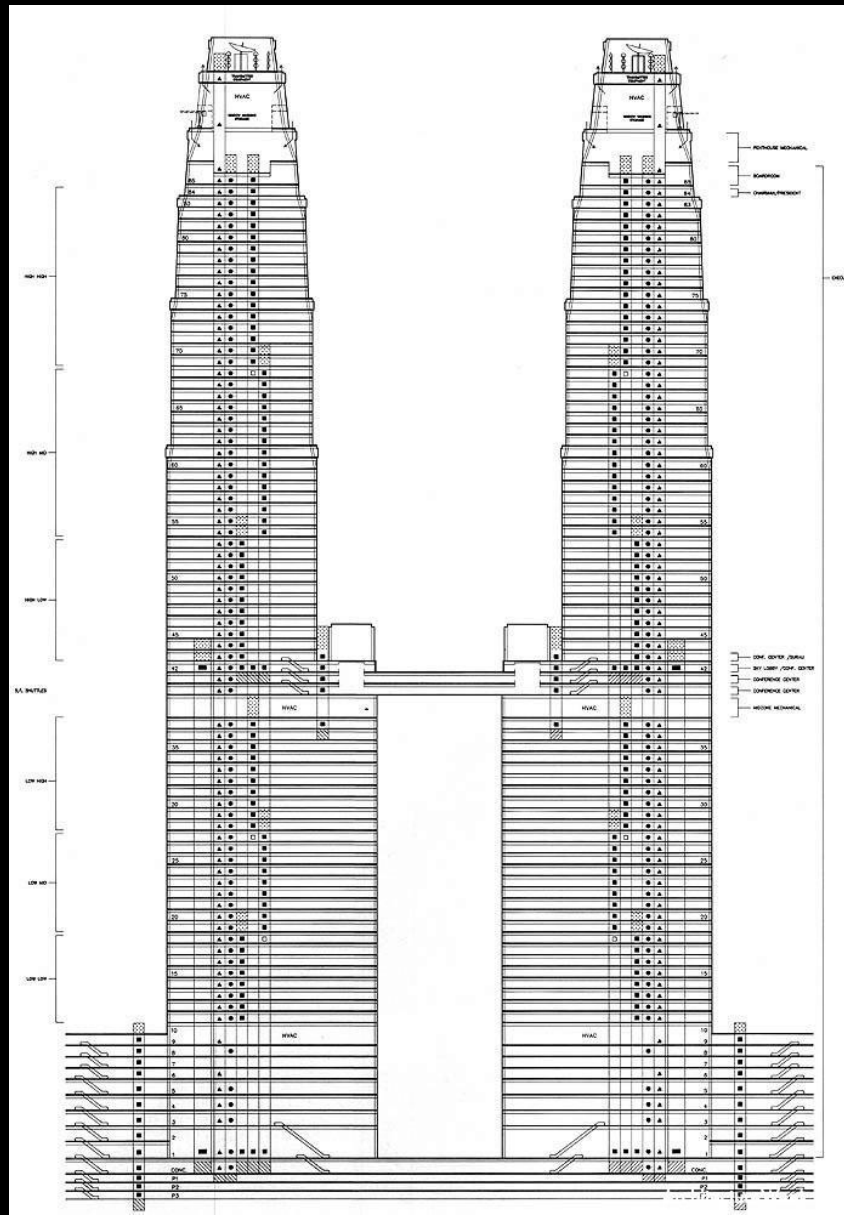
## EXPRESS ELEVATOR

This goes half way up, called the sky lobby



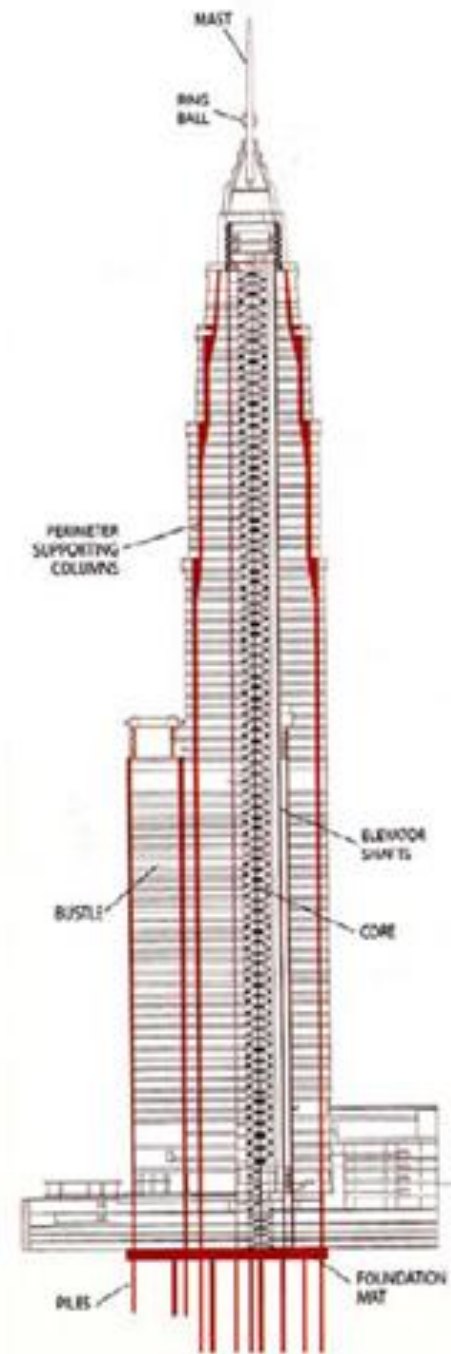
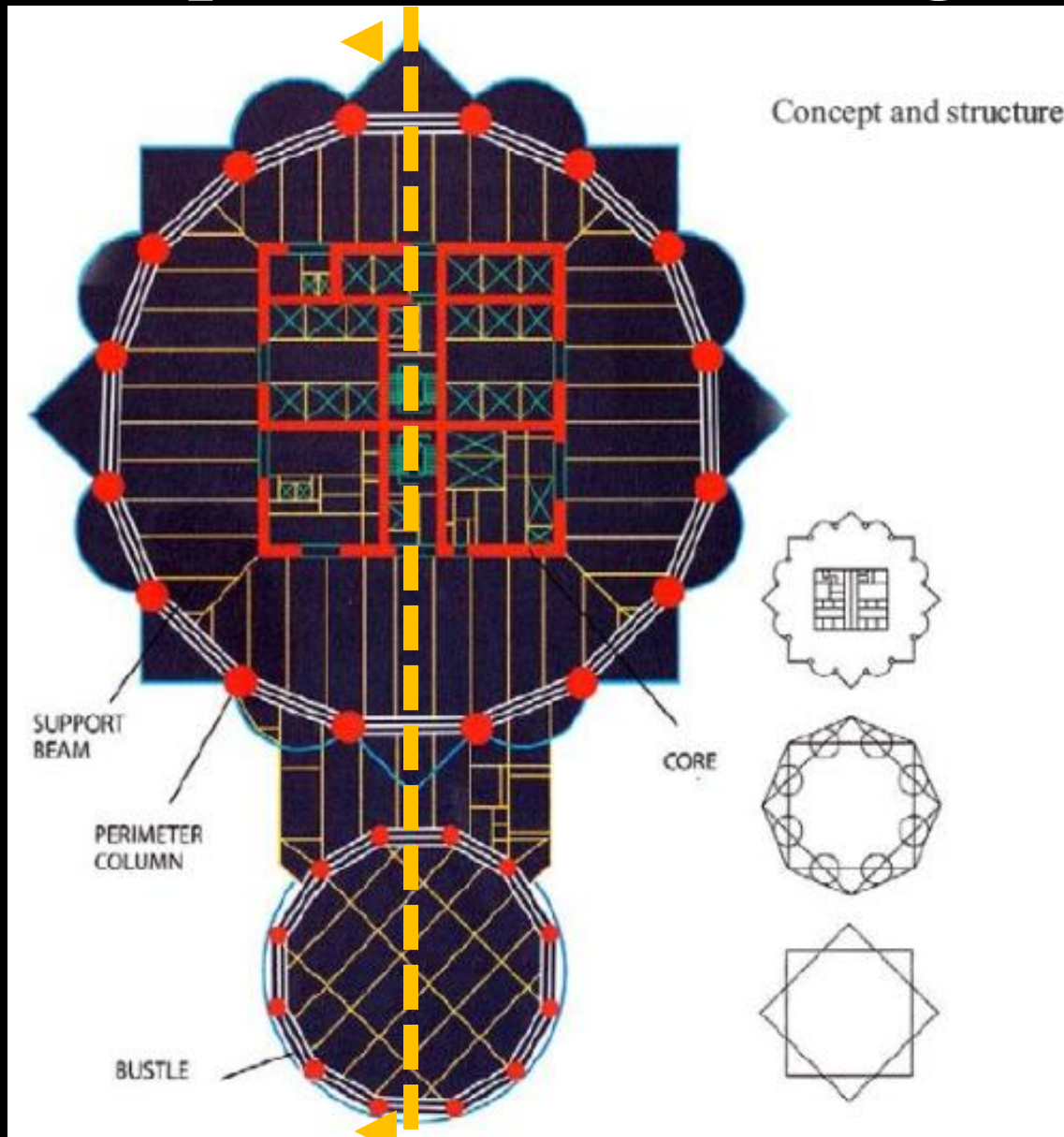


# Vertical Circulation



Section showing vertical circulation

# Layout & Design



Section

# Plan

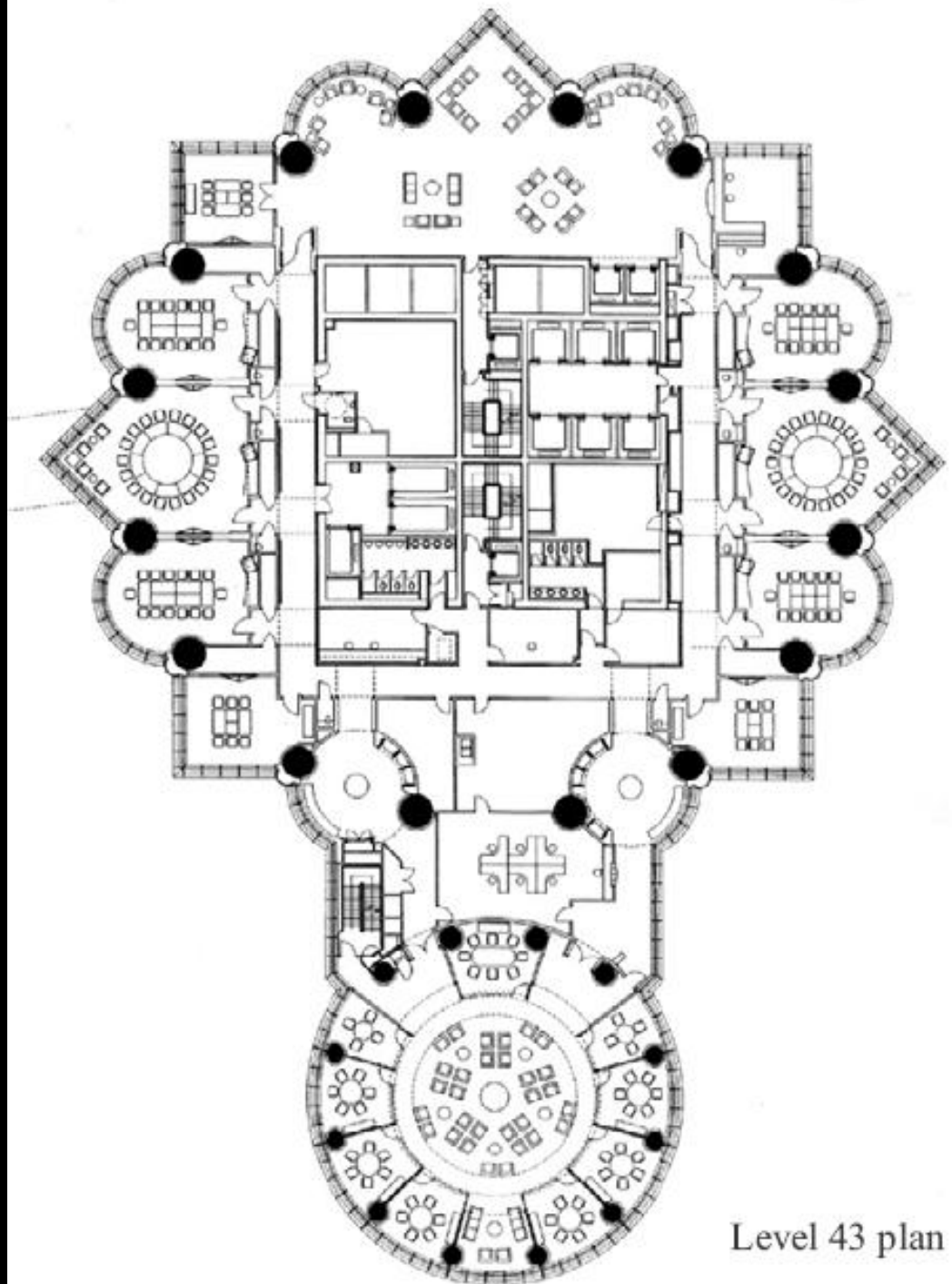
## The core:

23 X 23 meters and occupies approximately **23%** of the floor space

The core contains lifts, staircase, MEP shafts and toilets.

Cesar Pelli considered it to be a **very good ratio** for tall buildings

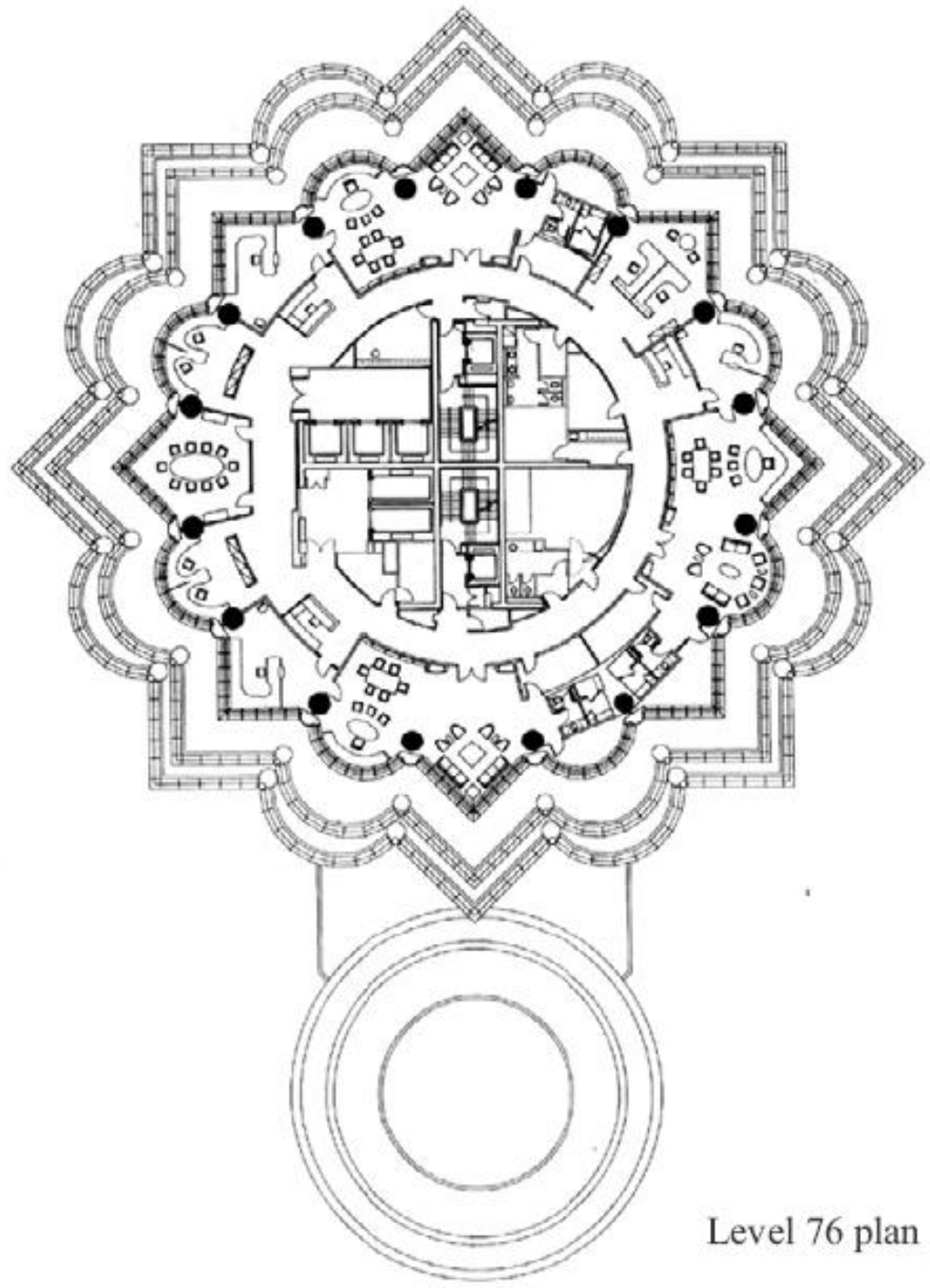
WTC had 15% of the floor area as core



Level 43 plan



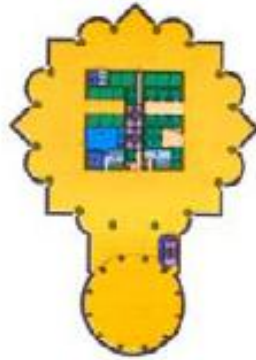
# Plan



Level 76 plan

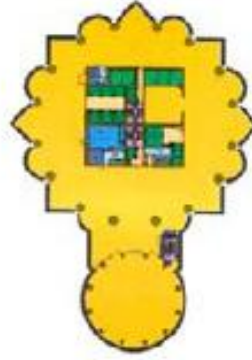
# Plan

TYPICAL LIFT BANK A



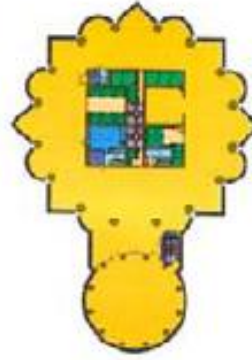
Level 8-10, 1,070 sq.m.

TYPICAL LIFT BANK B



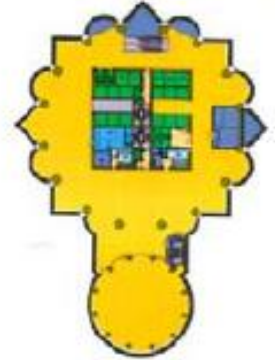
Level 28-30, 2,030 sq.m.

TYPICAL LIFT BANK C



Level 30-34, 2,030 sq.m.

TYPICAL LIFT BANK EXPRESS SHUTTLE



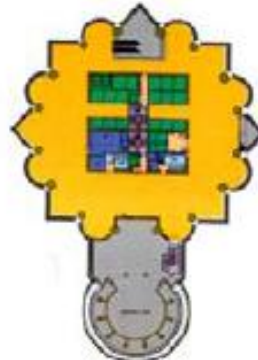
Level 40, 1,850 sq.m.

LIFT BANKS C, D, E & EXPRESS SHUTTLE



Level 41, 1,736 sq.m.

TYPICAL LIFT BANK D



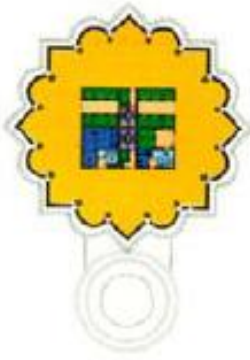
Level 43, 1,402 sq.m.

TYPICAL LIFT BANK E



Level 45, 1,483 sq.m.

TRANSFER FLOOR



Level 61, 1,286 sq.m.

TYPICAL LIFT BANK E



Level 76, 882 sq.m.

TYPICAL LIFT BANK E



Level 82, 608 sq.m.

WARRIOR SHUTTLE



Level 85-86, 882 sq.m.

# Facts

The cost per square meter in Petronas is estimated to be about **195 USD/ sq. m**

The maintenance cost is **1.5 USD/ sq. m**

Air conditioning required in towers is **30,000 TR**

Cesar Pelli was asked to adjust the orientation of the towers so that they are **directed towards the Mecca**. The toilets were located so that they oriented away from Mecca







The two towers are connected by a skybridge at the sky lobby levels on the 41st and 42nd floors for inter-tower communication and circulation.

**S  
k  
y  
  
b  
r  
i  
d  
g  
e**







A shopping and entertainment galleria connects the office towers at the base, integrating the entire complex.



# Entrance Lobby

Geometric design on  
the floor that features  
a **radial swirl of  
stainless steel**  
embedded in **black  
granite**

















# Users and Response

## Reason for coming to Petronas Towers:

Business	11%
Shopping	28%
Visiting	6%
Cultural	32%
Recreation	6%
Eating and drinking	17%



## Why do you like the Petronas Towers Complex?

The tallest building in Kuala Lumpur	25%
Islamic character	12%
Uses advanced technology	21%
Creates the Kuala Lumpur City Centre	12%
Combines several functions	24%
International / modern style skyscraper	6%



## Favourable elements of the complex

Towers	20%
Shopping mall	23%
Concert hall	27%
Art gallery	7%
Front plaza / garden	10%
Ground-floor interior design	3%
Top of the towers	10%





**Thank You**

