Index to section F:

In terms of geometric resolution, rhythm and repetition:

Since Islamic architecture is typically characterized by the use of geometry, rhythm and repetition, it was decided from the very onset to use these principles as the basis for design.

Based upon the significance of the number 19, (please refer to Section-E, pg 7), it was decided to have 19 exhibition spaces. After drafting the historical narratives and forming basic sketches for each exhibition space, the information presented itself in the following format:

Exhibition 1: An introduction to God
Exhibition 2: The origin of creation
Exhibition 3: Heaven - Man's original abode
Exhibition 4: Adam (AS) - Descent to earth
Exhibition 5: Noah (AS) - Escape with the ark
Exhibition 6: Abraham (AS) - The incident of the idols and the fire
Exhibition 7: Moses (AS) - Birth and escape via the parting of the sea
Exhibition 8: Jesus (AS) - Birth, ascension, 2nd coming and demise
Exhibition 9: Muhammad (SAW) - Birth and background

The life of the Prophet Muhammad (SAW) in detail:

Exhibition 10: Early life
Exhibition 11: First revelation in the Cave of Hira
Exhibition 12: The years of sorrow
Exhibition 13: Me’raj - the miraculous night-journey
Exhibition 14: Welcome to Medina
Exhibition 15: Battle at Badr
Exhibition 16: Battle of the Trench
Exhibition 17: The Treat and the Conquest of Mecca
Exhibition 18: Intermediary battles and invitation to Kings
Exhibition 19: Farewell sermon and demise

From this analogy came the introduction to two very separate concepts, which later manifested itself into two very distinct buildings. The following illustrations portray this graphically:

Fig. 1. Concept for Building-A: An introduction to the Messenger's of God

The form of a circle was used to indicate:
The purity and perfection of God
The purity and piety of the Messengers of God
The link to Islamic notions of pure geometry
The cycle of life within the cycle of time

Since the exact dates between Prophets is not known and is not mentioned in the Quran, the circular bubbles representing the individual Messengers are arranged equidistantly apart from one another, generated from a central point. This generating centre is depicted by the Ka'ba, which is believed to be the centre of all light and guidance, as well as the geographical centre of the world, and in more common terms, the focus of the global umman.

This layout also emphasizes the close link between God and the first man, Adam (AS), and the close link between Muhammad (SAW) and God.

a quest of the spirit
Once again, circular bubbles set equidistantly apart, generated from a common point, the Ka’ba, had been implemented. The general idea was to use the form of a cube to:

- Depict the rigid rules of Islam to the outside world
- To create a contrasting façade to the internal world

Internally, the beginnings of a circular route was developed:

- To implicate the life cycle of the Prophet (SAW)
- To implicate the general cycle of life and time
- To implicate the purity of the life of the Prophet (SAW)
- To implicate the consistent ‘straight path’ a believer should be treading
- To create a simple, identifiable circulation route throughout the Exhibition Centre

The concept thus brings in the application of using pure geometry, as well as imbuing the theme of rhythm and repetition which are typical Islamic traits. The spinning motif is to some extent also portrayed.

From these early sketches, coupled with the individual conceptual sketches for each space, (refer to Section E), the overall external forms developed into their final stages as depicted below:
The elevations illustrated depict a play with volumes and masses as a consequential result of designing from the inside-out. Whilst the external facades are characterised by bland volumetric walls, the section gives an indication of a contrastingly different internal environment. The internal world is thus celebrated, as can be noticed from the sphere embedded within the cube: the sphere was an internal requirement, whilst the consequential cube surrounding it was added for structural purposes. The exterior of this cubic form is a bland two-dimensional flat surface, displaying a phenomenal volumetric proportion within the overall façade. Thus the theme of ‘wall’ architecture has been maintained to portray the Islamic spirit of a celebration of the internal world. This theme can be further noticed when viewing the overhanging volume in the west and east elevations, whilst the internal environment relates to this within the confines of a human scale.
The above plans depict the following themes:

- **The spinning motif**: The plan is generated from the innermost ring surrounding the Ka’ba at centre. From this ring is generated the form of the walls along both the external and internal rings, as well as the internal circulation route. The six walls protruding outwards are derived from the cardinal points of the inner circle.

- **Repetition**: The protruding walls terminating into beams holding glazed minarets, as well as the overall forms of each segment, distinguished by time-tunnels placed equidistantly apart from one, another depicts the theme of repetition. The repetition enhances the overall rhythm, which in turn enhances the theme of the spinning motif.

- **Celebration of the internal world, contrasted by a bland volumetric external world**

- **Geometric forms influencing overall design rationale**

- **Qibla orientation**: Respect for the qibla axial route resulted in the building taking upon a linear form along its northern and eastern edges. Thus the entire form of the building adapted and orientated itself in order to emphasize the qibla. All toilet facilities were designed so as not to face the qibla as part of a customary requirement of the qibla.
1. Design influenced by geometric forms, repetition and rhythm (fig. 7.)

**Geomeric Rationale:**

Since Islamic architecture strongly suggests the use of pure geometric forms, the illustration alongside depicts the influence of geometry upon the design. The use of pure forms were taken and accordingly cut-away to accommodate the internal requirements of the brief.

The use of geometry and a geometric grid consequently positively impacted upon implementing the themes of repetition, rhythm and the spinning motif.

Illustration 16 became the basis for the overall design. This coupled with the conceptual sketches of the individual internal spaces, (refer to Section E), formed the basis for a suitable design concept to be generated.

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**Illustration 16**

- A quest of the spirit
The process towards attaining a suitable form:

1. Introduction:
The finalised form as depicted alongside was derived through a process of trial and error, using basic geometry, repetition, rhythm and the spinning motif as its primary objectives. However, the form was also influenced by many other considerations, such as design suitability, functional requirements and technical aspects as will be discussed below:

(fig.'s 8-10).

2. The functional requirements of the brief and basic scaling:
The brief stipulated to accommodate a total capacity of 120 people, as a minimum, within the entire exhibition centre, with the maximum area set at 3500m², due to financial restrictions. Since the building fell into the Class C2 category, the requirements of a minimum of 15m² per person, with minimal displays, were thus suitable. Upon viewing Building-A, a population of 56 people was taken care of. Thus Building-B would require accommodating for the remaining 64 people, with 10 exhibition spaces to fulfill the purposes of the narrative. (Refer to pg.2). The form thus aptly suited this task, by generating 2 exhibition spaces on the 2nd floor level, 6 exhibition spaces on the 1st floor level, and 2 exhibition spaces on the ground floor level. However, this meant that the minimum exhibition space size would have to be 75m² (15m² x 5), thereby accommodating 25 people, whilst the larger exhibition spaces would have to be 117m² (64-25 = 39 / 5 exhibits = 7.8 x 15m² per person = 117m² per larger exhibition space at minimum), thereby accommodating the remaining 39 people.

( Please note that the above were taken as the minimum requirements thereby checking whether the applicable form was suitable via a constant trial and error process).

3. Implementing scale to the form, and its consequent impact on site:
The form was proportionately scaled to the above mentioned criteria, with the smallest exhibition spaces being 75m², resulting in the larger exhibition spaces being 117m², (by scale factor), thus enabling an approximate 22.5 m² per person including minimal displays. Thus the form in terms of minimal space as per regulation was adequate. In terms of the framework, the form aligned itself along important axial routes, and further suitably contrasted the circular forms of the both the adjacent Jamaat Khana and Building-A. Slight adjustments had to be made on site to fully incorporate the new form, but these were not major, and were thus seen as negligible within the design phase.
4. Fire: (Fig. 11)

From the very onset of the form, fire regulations were considered in order to easily accommodate for it in the later design stages.

- The building was intended, as depicted, to be compartmentalized into 8 distinct zones, separated by fire walls. This would work advantageously in the event of a fire, since the fire would be contained within a particular zone, thereby limiting its spread. The ventilation requirements of this type of compartmentalized volumes within the area range of 150m², and the volumetric range of 500m³, would not require a sprinkler system, (as per SABS 0400, 1990). Thus only the double volumes exceeding the above would require a sprinkler system, which would ultimately reduce costs.
- Fire hydrants and fire hoses would be allocated along the cardinal passages, as indicated in red alongside. The distances would be within a 30m radius, thereby accommodating for maximum reach of hoses. When the form was scaled, it was found that this aspect was maintained.
- The form also allowed for fire exit routes along the ground floor, allowing for adequate exit within a 45m radius along the diagonals of the building, as indicated in black.
- The overall circular circulation route, coupled with the regular rhythm of the form, allow for easy identification of the exit passages, repeatedly portrayed along each of the cardinals.
- The overall fire layout will be explained in detail later, and this is merely an illustration to indicate that the form took into account basic fire regulations from the very onset.

5. The impact of the compartmentalization within the form: (Fig. 12)

- Storm water drainage was conceptualized as to allocate two adjacent zones to drain towards a common point.
- Independent tunnels would link zones to one another. The tunnels were decided to be glazed since they were within the general shade of the building, and would allow viewers to easily distinguish different zones, and furthermore have many symbolic interpretations as will be discussed later. The placing of tunnels equidistantly from each other, generated via a common centre, perpetuates the theme of rhythm and repetition, as well as the spinning motif.
- Compartmentalization introduced fire walls, as depicted alongside, which consequently gave rise to cavity walls, with insulation placed along its innermost brick course. Since Islamic architecture is typically portrayed by ‘wall’ architecture, the adoption of cavity walls further increased the massing of the walls, which assisted in creating the play with large volumes.

6. Approach: (Fig. 13)

- The form takes into account the approach towards the structure, via the use of diagonal recessed slits. This is characteristic of Islamic architecture, which celebrates the internal world and the point of arrival. By the usage of numerous narrow slits, it excludes the external world in contrast to the typical usage of large glazed external facades, which allows for visual communication to the inner world from the outside. This form of approach, via long, narrow openings, creates a sense of mystery, and allows the internal world to be consequently separated to the surrounding external environment.

7. Structure: (fig. 14-15)

- After the proportionate scaling of the form mapped onto the site was implemented, the form became more refined, and initiated the basic guidelines towards a basic structural grid layout.
- The form thus gave rise to the beginnings of a structural form along a basic columns and beam grid outline. The basis for the beginnings of the planning stage had thus been laid out.
8. **Services allocation:** (fig. 16).

The form took into consideration the provision for services, in the form of vertical shafts along the façade of the building, hidden by the escape fire routes. These shafts would be divided into four, one for each side. The division at this early stage was thought of as a way to cater for the separate zoning of services, namely:

- Water supply
- Sewage
- Electrical system
- Ventilation system

The service shafts would also be independently accessible from the exterior.

9. **Roof area**

The form gave rise to the implementation of a flat roof system. The roof area would need to be insulated, with pebbles strewn across the roof bed. Services such as air-conditioning would be placed on the roof. Photovoltaic cells would serve the advantages of covering roof surface, and absorbing energy. Parapet walls to be introduced to mask services on roof.
Since building-A links up to building-B via a bridge at 2nd floor level, the development of the plan is consequently explained from this level.

With the form of the plan suitably relating to numerous factors, as depicted above, the conceptual plans of Section F were coupled with the finalized form. The result was a plan characterized by an inward emphasis.

A continuous circular route was established, demarcated in red alongside, which ran its course throughout the building, thereby making the route simple and easily identifiable.

Glass is depicted as blue, and can be seen along the ring surrounding the internal core, thereby enhancing an inward orientation. Repetition of glass shelves along the inner ring creates a theme of rhythm.

Glass has been used as an element to portray rhythm and repetition along the external facades as continuous strip glass panels.

The central core became an important feature in emphasizing the internal world, coupled with the symbolic Ka'ba, placed at the centre of the space, as well as of the tiled world map on the floor. Light was intentionally left to pour onto the Ka'ba, and thereby symbolically, as well as physically light the rest of the interior space.

The central space is seen as a space of arrival, with concrete benches placed in a radial manner around the Ka'ba.

Exhibition 10- Early life; Exhibition 11- First revelation; Exhibition 12- The year of sorrow. (Refer to sketches / interpretations - Section-F).
Rhythm and repetition of geometric form is clearly visible. Fire escape routes are placed within a 30m radius of each other, and are also easily identifiable along repetitive cardinal locations. Greenery has been internally implemented along the overhanging slab of the 1st floor level, thereby completing the circular circumference along a square periphery. The idea of the Ka'ba at the centre of the world is portrayed clearly in the ground floor plan. Glazing can be seen as being minimal, since most of the lighting comes from skylights strategically placed on the roof level. The ground floor promotes socializing and intermingling due its many entrances and open nature within the central void. Entrances are recessed, and placed along the cardinal or diagonal planes of axes. The ground floor further hosts a refreshment area, with a surrounding garden, as well as a library area, which is accessed via the central core.

Exhibition 13: Me'raj – the miraculous night-journey
Exhibition 14: Welcome to Medina
Exhibition 15: Battle at Badr
Exhibition 16: Battle of the Trench
Exhibition 17: The Treat and the Conquest of Mecca
Exhibition 18: Intermediary battles and invitation to Kings
Exhibition 19: Farewell sermon and demise

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Fig. 20. South Elevation. Floating glass façade on the ground floor contrasts the heaviness of the walls and the parapet. It appears as if the building is floating on glass. Glazed strip at centre permeates throughout the façade. Light-weight stairs hidden by grooved vertical mouldings to emphasize verticality, and a sense of floating. New glass minaret installed for identification purposes as well as ventilation purposes. Strip glass inserted for aesthetics, lighting purposes and ventilation and thermal control. See minaret and strip glass details.
Fig. 21. West Elevation. Elevation depicts the floating feeling, as well as the play of volumes and forms. Structural elements are exposed at their ends, and yet hidden behind panelling at other times. Panelling seen as a form of decorative art and an abstract manner to portray a new spirit.

The form steps up and the minaret’s structural elements are exposed.

*a quest of the spirit*
Fig. 22. Diagonal Section. Indicates the celebration of the internal world, which is fully glazed to face the central core, thereby contrasting the external world, which is a ‘wall’ architecture.
Fig. 23. Cardinal Section. The internal world has a solid ground floor with upper floors glazed. The external facades are directly the opposite, with the ground floor glazed, so as to create a floating effect, with the heaviness of the upper solid walls. This lends to a play with materials, tension and play with structure.

*a quest of the spirit*
Fig. 24. Diagonal section in colour

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Ventilation and thermal comfort achieved by:

- The placing of a pond between Building A and B. The pond will always be in the shadow of Building A, and hence this cooler air will maintain a cooler eastern side to Building B. The afternoon sun will shine on the strip-glazed facades, thereby creating heat by radiation. These strip facades will play a role in creating a suction force due to their triple volume spaces. A mere implementation of louvers will vent the hot air towards the surroundings. In winter the opposite will take place, since a fan at the louver end of the glass strips will send the hot air back into the building.
- The glass minaret will be exposed to sun, and will heat up at a quick rate. Extractors amidst the minaret structures will vent all the hot air to the outer surroundings.
- Since passive ventilation will not only be sufficient, a fresh air handling unit with 8 general chillers, which will cool air in summer, and heat air in winter, will sufficiently cater for providing adequate thermal comfort, as well as ventilation.
- The above type of system only consists of a fresh air unit, and a chiller, which effectively costs 20% of a normal air-condition system. To further aid this simple system, night time cooling should be at double the volume in summer. In winter the opposite will happen, with double the hot air pumped in at night. This, together with insulated walls, roofs and exposed strip glass and water cooling principles would create an effective thermal and ventilation environment.

Fig. 25 indicates the passive system to be adopted, with the glazed-strip facades acting as towers with their triple volumes and louvers at the top.
Fig. 26 indicates the type of fresh air system to be used, with the fresh air handling unit, as well as the chillers to be allocated on the roof, and exposed. (Personal interview with Spoormaker and Partners).
Fig. 27-28. Glass-strip detail

Fig. 29. Steel clip-glass holding detail

Fig. 30. Front view of clip holding-glass detail
Fig. Depicting the inward-looking arrangement of the upper-storey exhibitions.

Fig. Depicts view towards the minaret and floating slab

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Fig. depicts new form of minaret with glass and steel. The minaret has extractors attached to it for thermal and ventilation purposes.
Figures depict old form versus new form. A new spirit is born.

A quest of the spirit
Fig. 1’s depict Bridge detail between Building A and Building B.
Fig. depicts a new form and a new spirit for Islamic architecture. A play with structure and volumes has resulted in rhythm and repetition, with fundamental structural elements exposed.

A quest of the spirit
South West Perspective showing view through strip glass and into building, with linking bridge in the background

Northern perspective with minaret in the background

a quest of the spirit
The repetition and geometry of the design, coupled with the use of local low-strength concrete blocks, has called for the segregation of fire zones. All openings within a 3m radius of emergency stairways are to comply to the standard one-hour rating policy. This has the added advantage of avoiding a sprinkler system, since the maximum area per zone is less than 150 square meters. For the double-volumed zones, with areas less than 300 square meters, especially for staircases of 10 steps or more, all will be designed for smoke avoidance in the combined stairwell. Smoke avoidance is to be carried out in the ventilation diagram. Due to the repetitive nature of the design, all fire components within an easy reach of 25 meters.

Simplified fire reticulation outline for a typical floor plan

a quest of the spirit
The repetition and geometry of the design, coupled with the use of low-strength concrete blocks, has called for the segregation of fire zones.

All openings within a 3m radius of emergency stairways are to comply with the standard one-hour rating policy. This has the added advantage of avoiding a sprinkler system, since the maximum area per zone is less than 150 square meters.

For the double-volumed zones, with areas less than 300 square meters, in particular zones 1 and 6, approximately 23 litres per second of air will be required in the event of a fire. This has been adequately catered for by the ventilation system. Please refer to this aspect in the ventilation chapter.

Escape routes are typically the main entrance routes into the structure. By providing three such entrances, escape routes are thus adequately catered for.

The rhythm attributed to the location of the fire escapes, hoses, and hydrants makes its location easily recognizable and found.

The farthest distance to be traversed is from the corner of Zone 5, reaching a distance of 45m to the outside. However, since there are three avenues of escape, this is within its jurisdiction.

Thin strips of clerestory windows, as can be observed in the elevations, are mechanized to open in the event of a fire, so as to allow for adequate ventilation requirements.

An early smoke detector will be incorporated into the scheme, and will be accompanied by a fire alarm system.

The simplified fire reticulation outline for the ground floor plan is shown above.

A quest of the spirit.