King Fahad National Library
Riyadh, Saudi Arabia

Architect
Gerber Architekten

Client
Arriyadh Development Authority

Design
2004-2006

Completed
2013
King Fahad National Library
Riyadh, Saudi Arabia

I. Introduction

Located along the busiest artery of Riyadh, King Fahad National Library (KFNL) is a cuboid-shaped thin building surrounding an existing marble-clad edifice with arches and a golden dome. Located in one of capital’s most coveted areas of real-estate development, this national complex offers a generous and very popular public plaza, and will soon be served by a metro station. The square-shaped composite building is monumental yet low compared to surrounding commercial blocks and towers, and is recognisable by a distinctive filigree sun-protection textile system that is generously illuminated at night. The third-floor reading area is a spacious semi-public space that ties the new steel and glass extension to the entire former roof of the existing building, in total a reading “landscape” with ample daylight and sun-protected transparency; a lofty interior that is introspective, yet visually connected with the fast-paced and ever-changing urban scene outside.

II. Contextual Information

A. Brief historical background

• The old library building, incorporated in the new project, was completed in the 1980s.
• First competition for KFNL was launched by the Arriyadh Development Authority (ADA) in 1999, on a different site.
• Second competition on current site was launched in 2001. Gerber Arkitekten (GA) won first prize in 2002.
• Third and current design was proposed in 2004.
• Construction started in 2007.
• Construction ended in 2013.

B. Local architectural character

Traditionally, the architecture of Saudi Arabia in general and the Province of Najd in particular is load-bearing rammed earth/mud brick construction. The original tribal nature of society favours tent living and military fortifications. Building forms are simple and forbidding, with a minimum of openings to the outside. Sedentary architecture blends well with the land and distant mountains. Nomadic tents offer a resilient and ever-adapting spatial context for a very conservative and communal mode of life.

C. Climatic conditions

The Province of Najd has a desert climate, with cold winters and a very harsh sunny and dusty season more than seven months per year. Temperatures reach 50°C in the shade, with a prevailing dry desert environment.

D. Site and surroundings

In contrast to what Saudi Arabia is known for traditionally, Riyadh is a car-addicted city with a gridded street-structure. Growing out of a dense fort, the sprawling capital of Saudi Arabia was conceived by Greek planner Doxiadis. The first generation of modern buildings are low-rise concrete structures – white or sand
coloured – with token nods to traditional forms (arches, retaining walls, claustra walls…). Since about a
decade ago, zoning regulations were changed to allow high-rise construction, which has totally redefined
the urban skyline, starting with the nearby Faisaliyya tower and hotel complex, and Kingdom Tower. As real
estate is opting more and more for glamorous architecture and shiny glass towers, Riyadh is beginning to
look more like Los Angeles or Dubai.

Considering its harsh climate and car-dependent mobility, the capital of the Kingdom of Saudi Arabia (KSA)
is not known to be friendly to pedestrians. Apart from the busy old markets and nearby lush gardens of Old
Riyadh, the city is lacking in public space and pedestrian connectivity. Nevertheless, water desalination and
the maturing of street landscapes is increasingly greening a few central parts of the gridded city.

KFNL is located between two north/south arteries of Riyadh: the prime King Fahad Road, a mandatory high-
speed avenue for cross-town car movement, and Olaya Street, a busy commercial boulevard that will soon
have a metro line. Traffic flow is busy, with a constant hum of speeding motorists. In contrast to the low-rise
volume of KFNL, and its unique and generous green plaza, these flanking arteries are magnets for high-rises
and shopping malls.

E. **Topography**

The site is flat with no perceptible change of level.

III. **Programme**

A. **History of the inception of the project**

The project started as a competition on another site and ended as an extension of the existing smaller Old
Library built in the 1980s. The adjacent enclosed amusement park was relocated to allow for a new public
plaza-garden.

- 1999: ADA invites Eckhard Gerber to take part in an international competition to build a new national
  library in Riyadh, on a plot located at the capital’s periphery.
- 2001: Competition site was no longer available; second competition was called for. In its first stage,
  the focus was the urban design study to the new (and current) site on King Fahad Road in the centre of
  Riyadh.
- May 2002: Gerber Architekten win first prize in this second competition, which proposes to surround Old
  Library with a transparent and modern 100 m³ volume.
- November 2003: Design commissioned by the ADA, and contract signed by the Joint Venture of Gerber
  Architekten and Saud Consult.
- Early 2004: With sharp rise in steel prices, design is revised, and Thomas Lücking and Eckhard Gerber
  presented “horizontal” design concept similar in appearance to the Library that exists today.
- June 2004: After concepts were explored for surrounding membrane,, new design concept was accepted
  by ADA.
- 2005-2006: Development of building structural details, functional variants, loadbearing structures for
  roof and facades, shading variants, membrane configurations, glass elements and other details, all leading
to construction drawings.
- 2006-2007: Numerous exploratory trips with ADA and KFNL senior staff exploring library buildings
  across Europe, with workshops and interim presentations; production of a succession of new facade
  models including at scale 1:1.
• December 2007: Start of construction work.
• 2013: New complex begins to be equipped and first books start to be moved in.

B. **How were the architects and specialists chosen?**

In the process of preparing for the international competition in 1999, ADA came across an article in a French publication, Nouvelles Alexandries, showcasing the world’s best library projects. This article featured Eckhard Gerber’s State and University Library in Göttingen, Germany, (1993), as one of the most significant international library buildings of the 20th century.

C. **General programme objectives**

According to Mr Mohammed Alhusaini, IT General Manager, a national library is charged with acquiring duplicate copies of every book that is published within the national borders of a country. It also hosts historical and other specialised archives and donated collections. Most of those are kept in closed stacks, and are accessible to registered and academic researchers. Books published elsewhere that cover KSA and other Arab countries are also acquired and are kept in open stacks for general library users.

Broadly speaking, the architect of the project, Mr Thomas Lücking, understands one of many roles of a national library is to preserve culture and document tradition. In this vein, keeping the old library building is understood as an act of preserving Saudi tradition and local site memory.

From the outset, in earlier concepts as with the final built scheme, reading spaces were accorded a prominent place in the spatial hierarchy. More on this is elaborated in the sections that follow.

D. **Functional requirements**

Based on the preceding two cycles of competitions and the shift of site from a peripheral one to the actual site of the Old Library, it was decided jointly with the client to incorporate the latter in the new National Library project. This added two layers of constraints to the project:

• The Library as an institution had to remain somehow functional during construction. The logistics of this for staff were reasonably complex yet achievable.
• Construction works were also constrained not just by the mere existence of a building to be incorporated within the new one, but also by the presence of a functioning institution in the middle of the site.

Beyond the site, the project client, ADA, is in charge of all major projects in the capital, inclusive of the forthcoming underground transit line along Olaya Street. Consequently, KFNLP became part of yet a more multi-layered urban upgrading project along with other select locations across the city. Family-oriented public space (the new plaza-garden), a national facility (the Library) and urban mobility (the future Olaya Street metro stop) are three ingredients of one integrated public-sector vision that races ahead of ongoing private real-estate speculation.

Other secondary ingredients mandated by the ADA include ground-level resting facilities for bus and taxi drivers, prayer spaces for the public within the plaza-garden, restaurants and boutiques (still in progress).

Overall gender considerations played a role in shaping the new building. In keeping with local practices, women researchers are provided with an exclusive wing accessed separately from King Fahad Road. This allows them to freely use the facility without having to follow a strict dress code while in their own quarters.
However, young women are constantly using the main third-floor reading space without any noticeable sense of unease on their part or that of male users.

IV. Description

The diagrams provided by GA are excellent in explaining both the phasing of construction and the relationship between old and new parts of KFNL. The outcome is remarkably simple, with good orientation and spatial legibility within the complex.

A. Building data

Total areas:
Site: 59’558 m²
Combined floor area (including basement, ground floor and all upper floors): 86’632 m²

Breakdowns:
Ground floor area: 14’618 m²
Old Library: 27’547 m²
Underground parking: 16’560 m²

B. Evolution of design concepts

Response to physical constraints

The project concept evolved from a “fortified” courtyard layout in the first competition of 1999 to a veiled glass box in the final outcome. Half of the rectangular site is occupied by the Library building while the other half is the public plaza-garden. All four facades are identical, a puzzling choice at first given the strong impact of the Saudi sun. But this is masterfully resolved by the 3D tensile elements that provide zero sun penetration while providing ample transparency and commanding views of the plaza and the surrounding urban skyline.

Response to user requirements

“A public building needs to be open, visible and accessible.”

The design by GA strives to maintain visual interconnectivity and ease of access across the whole complex. Upon arrival, a monumental lobby, extending the Olaya Street plaza-garden, and with the full interior height of the building, offers the first-time visitor a clear sense of where to go: circular reception desk, elevators up to the main reading level and librarian station, or the monumental escalators. Another visual connector that is subtle but very significant is the direct axial view that the main entrance commands via the Old Library ground floor; as such, the main access on the side of Olaya Street and the plaza is directly connected to the other side of the complex, the women’s entrance on King Fahad Street. Everything is in place, and the whole is legible. The institution exudes clarity and directness from the first moment.

If one lingers in the reception lobby, or takes the dizzyingly long escalator, one is rewarded with a transparent interior façade/x-ray of a working institution. Right above the entryway, in the eastern wing of the new extension, is a transparent panorama of the functioning of the Library.
On the first floor, one sees the whole process of books arriving in boxes to be sorted and catalogued, then carted off to their final shelving.

Above this on the second floor, the Library administration is revealed in a horizontal hierarchical chain.

And on the third floor is the main reading space, spacious, bright and panoptical. From there, one maintains a strategic understanding not just of the spatial organisation of the complex, but also of the process of work from the moment a book is received by the Acquisitions Department till it finds itself at the disposal of researchers in one of countless, thematically zoned shelf units.

In contrast to this ultra-modernist transparency, the Old Library is designated for the closed stacks, a “treasure chest, a knowledge storehouse”, in the words of the architects. The linear floor-plates on all four sides of the new addition connect to the octagonal former roof of the Old Library via bridges. As a culmination, the third-floor reading area is where the old and new merge into one platform, unified by material and light.

_Purely formal aspects_

Formal aspects of the KFNL – building form, colours, material, details, lack of ornament, etc. – all err on the side of simple, and yield to one exuberant moment: the facade. As is elaborated in the section below, this is a feat of technology very much in tune with environmental considerations. But it does not shy from declaring itself as the unique ornamental aspect and distinctive trademark of the Library complex. Mr Thomas Lücking, the architect of the project, confirms that it has an ornamental agenda, and he references nomadic tents and veiling. There are even moments when the double curve of one tensile fabric resembles a component of a muqarnas, or the interplay between two components creates an arch shape. But these are all over and above the fact that the system is a precisely engineered and crafted sun-shading outer layer. Environmental control first; cultural reference second.

_Landscaping_

As with the building, the space around the Library complex is an open, urban paved plaza. This is a new feeling for Riyadh. There are no fences, gates or vertical features, except of course the palm trees and an occasional pop-up fountain. Instead, the plaza is a strong horizontal plane that defines its boundaries by being slightly raised above asphalt and sidewalk levels. It has two spacious grass patches – oases – that are sunken about 40 cm beneath the plaza level. Their geometry and disposition give the impression of more green than is actually the case: again, a testament to the sustainable bias of the design.

Although the plaza gives importance and reverence to the KFNL, it remains inviting in its own right. On weeknights and weekends, the place comes to life with families and children. Right in the middle of the busiest part of the Saudi capital, teens and young men often play football in the sunken green areas, while children run around and cycle all over the paved areas. This is to the credit of the architects, for this combination of social vitality and formal austerity is not easily achievable.

The Library is accessed from the plaza at the same level. The same granite paving continues into the ground-level lobby.

**C. Structure, materials, technology**

With temperatures reaching 50°C in the shade, DS-Plan, sub-consultants, supported the construction of the KFNL in the field of energy design, building physics and building services. The building is one of the first
low-energy buildings in Saudi Arabia. They have designed a green building with a built-in high level of solar protection. In cooperation with the architects and the structural designer, a holistic approach has been developed for a sun-protection concept which reacts to climatic conditions and the course of the sun.

Structural systems and materials

The new addition is a simple steel frame and glass enclosure in contrast with the existing marble-clad Old Library.

The outer facade layer is of very elegant stretched fabric, using steel struts and cables, which provides 100% sun-screening to a totally transparent outer building. (More on this below).

Everything is covered by a new roof, punctuated by skylights with daylight technology under which white membranes gently distribute the indirect daylight throughout the entire interior.

Building services, site utilities

A maximum of transparency with correspondingly high daylight autonomy can be achieved in combination with a nearly 100% fully shaded facade. In very warm regions, as in Saudi Arabia, solar protection must be used year-round. However, a very important characteristic for a building, so that its occupants feel comfortable, is the connection to the surroundings and transparency to the outside. The three-dimensional solar-sail arrangement for the King Fahad National Library has been developed using different simulation calculations. Instead of direct radiation, diffuse sunlight is reflected into the room. Thus the glass facade won’t receive direct sunlight at any time of the day.

With the cooling loads significantly reduced, the climate concept with floor cooling and displacement ventilation is optimised to deal with high temperatures so that a maximum level of energy efficiency and maximum comfort is achieved. The aim was to keep both cooling energy requirements and cooling loads as low as possible. As the glazing and solar protection influence the amount of daylight inside, there is a corresponding relationship between energy requirements for cooling and artificial lightning. The requirements for artificial cooling and ventilation can be reduced by more than 50%.

V. Construction Schedule and Costs

A. History of project design and implementation

See before.

B. Total costs and main sources of financing

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<th>Description</th>
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<td>Total actual cost</td>
<td>316,426,993 SAR /       equivalent to 84,370,511 USD</td>
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C. Qualitative analysis of costs

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<tr>
<td>Cost per square metre</td>
<td>4,443 SAR /             equivalent to 1,185 USD</td>
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VI. Technical Assessment

A. Functional assessment

In contrast to this ultra-modernist transparency, the Old Library is designated for the closed stacks. But this is still work in progress. The book-conveying system has not been installed, so it is not yet possible to have a closed-stack system for a building of this size and the potential number of books. So, currently, the Old Library is used as an open storage for back-logged new books, extra duplicates, and for sorting unusually large donated collections.

*Parts of the project feel underused, as if it has been recently moved into. Is KFNL over-designed?*

In the case of reading areas, this could be that the Saudi population has not yet realised the use value of their new National Library. The building has not been officially inaugurated due to the passing of King Abdullah.

A couple of wings (specifically open-plan floor areas) where department offices are to be located are still unfurnished. Other locations are furnished but are clearly not used. This could be due to one or a combination of the following:

- ADA acted as the client, based on requirements formally communicated by KFNL staff. So this suggests that where needs were not formulated in detail early on, certain zones of the design may not be based on an intricate staff organisation diagram, but rather a flexible open-plan arrangement to take any change of organisational structure, qualitative or quantitative, into account.

- Since the project has not been officially inaugurated, it is possible that it is not yet staffed to its maximum capacity or even to adequately manage launch requirements.

- Conservative social practices of gender segregation may also be a reason. Male administrators have male support staff; female administrators have female support staff. While the Library seems to have enjoy a mix of male and female users in the main reading room on the third floor, all the staff in the open areas are male. Female staff are only present in the women-only wing.

- Since the book-conveying system is not yet in place, and the books are not fully categorised and shelved, the Library is operating at a partial capacity. A visual estimate of the third-floor reading area (percentage of empty shelves and secondary circulation desks) suggests that the Library can take twice as many books as are currently there.

In a brief meeting with Mr Mohammed Alrashed, Director General of KFNL, he pointed out that the institution has many areas yet to be developed and activated, namely:

- Training programmes for staff and delegates
- Public lecture series
- Art and photo exhibitions
- Book fairs
- School visits for orienting young users of the Library.

It is indirectly understood that until official inauguration takes place by King Salman, the Library remains in “soft opening” mode.
B. Climatic performance

A few users (staff and visitors) pointed to an inconvenience of the floor-based displacement air system. For men wearing dishdasha and flip-flops, the cool undercurrent can be uncomfortable at times. Maintenance staff have devised responsive measures by adjusting the controls to mitigate this effect.

C. Ageing and maintenance problems

One incident of leakage in the main roof plenum is reported by the architect, being the result of a backed-up pipe causing a valve to pop out. The stretch fabric demonstrated a remarkable strength in holding the water, but the stain remains.

D. Durability and long-time viability of the project

In terms of planning and sizing of spaces, the above observation about the project’s current under-utilisation poses the opposite question: what is the growth strategy once the project reaches its full occupation in terms of books and human resources?

ADA’s design brief and GA’s response only provide for an institution that can keep growing and expanding spatially for a decade or so (an educated estimate). So this leaves one with the conclusion that, once filled to full capacity, digital technology will be the only way to grow. KFNL then will have a virtual counterpart to serve researchers and academics online, and possibly physical outposts (branches) in other cities and towns across the Kingdom.

In terms of construction and systems, KFNL seems to be in an excellent shape. A tour of basement electro-mechanical facilities showed a very competent and pro-active staff and near brand-new conditions. Public areas and departments are in a very good condition three years into use.

K. Interior design and furnishing

GA proposed for KFNL a carefully selected set of furnishings that are high-quality and restrained in materials, colours and textures. The overall mood is consistent and comfortable, surprisingly simple and borderline “cold” by Arabic standards. The cool and neutral tones are in keeping with the steel and glass construction, and in contrast with the harsh desert climate.

VII. Users

A. Description of those who use or benefit from the project

According to Mr Mohammed Alhusaini, IT General Manager, KFNL serves three groups of users:

- Registered researchers;
- Academic researchers;
- Book copyright registration (ISBN and ISSN).

During construction, there were slight disruptions for the first two groups. Overall, the Library coped by reducing new book acquisitions to be able to keep up with backlog.
In addition to these groups, the spacious and naturally lit third-floor reading area seems to be gathering popularity among university students who are not happy with their home-base facilities.

**B. Response to project by clients, users, community, etc.**

What do architectural professionals and the cultural “intelligentsia” think about the project?

Talking to two non-KSA architects based in Riyadh, both thought the project was decent but “trendy” in a 1970s way – owing to its screen facade. Neither seemed aware of the Library’s energy-efficient design.

**What is the popular reaction to the project?**

There seems to be an understated sense of pride. Most people are just plain delighted by the generous plaza-garden which is busy with families and children evenings and weekends.

**VIII. Persons Involved**

List prepared by GA on 13 April 2016

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<th>Role</th>
<th>Organisation</th>
<th>Name</th>
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<tr>
<td>User</td>
<td>King Fahad National Library</td>
<td>Mohammed AlRashed</td>
<td>Director General</td>
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<td></td>
<td>Mohammed Alhousaini</td>
<td>GM IT</td>
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<td>Taha Mouse</td>
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<td>Client</td>
<td>Arriyadh Development Authority (ADA)</td>
<td>Waleed Alekrish</td>
<td>Director, Projects</td>
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<td>Khalid AlHazani</td>
<td>Director, Architecture</td>
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<td>Thomas Ciolek</td>
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<td>Joint Venture Partner</td>
<td>SaudConsult (Engineering)</td>
<td>Khurram Karamat</td>
<td>Vice President</td>
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<td>Nadeem Sheik</td>
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<td>Gerber Architekten</td>
<td>Prof. Eckhard Gerber</td>
<td>Owner</td>
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<td>Thomas Lücking</td>
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<td>Jurenka Michael</td>
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<td>Ralf Wagner</td>
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<td>Site Management Team</td>
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<td>Mohammed Faisal</td>
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IX. Bibliography

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http://www.kfnl.org.sa/Ar/Pages/default.aspx

Online press and media:


Online design reviews:

See: http://www.archdaily.com/469088/king-fahad-national-library-gerber-architekten

King fahad national library by gerber architekten, *designboom*, 19 January 2014

Books:


Abdul-Halim Jabr
May 2016
LEVEL 0 & PLAZA

Gerber Architekten international GmbH

MEMBRANE FACADE

Gerber Architekten international GmbH
The old library building, from the 1980’s, was supposed to be demolished. The architect decided to integrate the old building into the new design, in a manner that would deliver optimal standards of quality in terms of urban design.

The square new building in the centre of the urban park looks open and light, and is tied into the urban space despite its size.
The key element of the façade is a cladding made up of rhomboid textile awnings. Inserted white membranes, supported by a three-dimensional, tensile-stressed steel cable structure, act as sunshades and interpret the Arabian tent structure tradition in a modern, technological way.

The new building encloses the old one protectively, following monument preservation principles. The cruciform existing building, topped by a dome, is concealed inside the new building.
The membrane façade, which was optimised in relation to the local sun path by means of complex, three-dimensional light refraction, combines the required protection from the sun with maximum light penetration and transparency.

The main entrance hall is on the ground floor, which also houses exhibition areas, a restaurant and a bookshop.
The old building, which now operates as an internal stack, formes the centre of knowledge within the new library.

The entire former roof of the old building, which occupies an extensive area, now provides a reading space covered by a new roof, punctuated by skylights under which white membranes gently distribute the light throughout the entire interior.