

A MULTI MODEL TRANSPORTATION COMPLEX

Bahia Bardeesi¹, Mohammed Fageha²

^{1,2}College of Architecture and Design, Effat University, Qasr Khuzam St., Kilo.2, Old Mecca Road. P.O.BOX 34689, Jeddah 21478, Saudi Arabia

Email: hbbardeesi@effatuniversity.edu.sa, mofageha@effatuniversity.edu.sa

Received: 30.03.2020

Revised: 28.04.2020

Accepted: 01.06.2020

Abstract

The city of Makkah is Allah's most sacred place, and it is the primary destination of Muslims around the world, where millions of pilgrims and visitors are welcomed every year. Thus, it requires new well-planned projects that reflect to the world its Islamic identity and its modern development. Thus, this work has proposed an architectural project as a solution to enhance the service quality in Kudai parking land for the visitors of Al Haram Mosque. The goals of the project are to achieve the maximum comfort of Al Haram's pilgrims and visitors and to introduce better public transport services. Case studies of similar types of projects have been analyzed. Site analysis and corresponding design responses were conducted. In this work, for the proposed multi model transportation complex the estimated total net area is 17640 m² and the gross floor area is 25200 m². The multi model transportation complex will comprise few zone such as bus station, retail and recreation, history and heritage center, hygiene facilities, clinic, administration and services. This project is expected to solve the massive unorganized situation and chaotic pattern of public parking and buses in the area that does not reflect the city image of the holy Makkah.

Keywords-- megastructure, design, building, concept, city, Saudi Arabia

© 2020 by Advance Scientific Research. This is an open-access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)
DOI: <http://dx.doi.org/10.31838/jcr.07.08.36>

INTRODUCTION

Makkah is the most sacred state in the Arab world. Every year, the city receives more than 4 million Muslim pilgrims from all over the world during the Holy Pilgrimage period of Islam [1]. In addition, the Makkah City is approaching another momentous occasion in its development, with the building of the Grand Mosque's third extension and as well as other large-scale projects development around the town [2].

Thus, this development together with the growth of Muslims travellers around the world to Makkah is anticipated to increase in the near future. In this relation, Makkah's requirement for a decent transport scheme is essential to ensure the safe and effective movement of the increasing number of travellers and tourists during the pilgrimage period [3].

From the 1980s, visitors to the Holy Mosque of Makkah used to park in the surrounding area and other visitors from different parts of the country used to use the old public buses known as the Khat Al- Balad service [4]. Later, before the end of the 20th century, new expansions and developments of the Great Mosque of Makkah (Al Haram) were applied, so the government banned people from parking in the central areas around the Mosque [5].

Furthermore, a government transportation corporation was also set up, providing terminals and bus journeys from all Saudi regions to Al Haram area [6]. At the beginning of the 21st century, many sites in Makkah were dedicated to acting as parking spaces for visitors to Al Haram such as Kudi and AL Resaifa parking lands [7].

These sites are now receiving a huge number of people, and most of them are complaining about the current situation. Although the government has tried to organize the flow of cars and provide other services, unfortunately they do not offer the optimum solutions [8].

Thus, this work proposes the development of a multi model transportation complex (Kudai complex) at Kudai, Makkah, which is the nearest spot to Al Haram mosque.

This station consists of parking building, bus station, public square, restaurants and shops. This project will include all the facilities required to serve the Holy Mosque's pilgrims and visitors.

CASE STUDIES

For this work, three case studies have analysed in this work. The case studies analysed are:

- Collins Park Garage
- Marrakesh Central Bus Station
- Abu Dhabi Central Market

Collins Park Garage

Collins Park Garage is located at Miami, Florida, USA (Figure 1). It was designed by architect Zaha Hadid. The site area of this park garage is 24100 m².

This project is a building that includes 17,000 square feet of retail space, 480 parking space, public event space, weekend food markets or outdoor movie projections. The project is aimed at LEED SILVER certification. It is located within the neighbourhood of Collins Park, the facility serves the major buildings of the area including the Miami Beach Convention Center, Lincoln Road Mall, Bass Museum, City Library.

The concept of the project is to bring the street into a building and make it into an urban space. It aims to improve both strategically and creatively infrastructure, resident mobility and additional parking. A continuous vehicle circulation path that suits its purpose, yet provides the users with a unique experience and a degree of fun. Tilted floor plates formed from the spiralling ramps to create unique viewpoints when viewed from different angles.

The design of the balustrades in the façades considered the safety of cars and users, and it also considered the adjacent neighbours to provide pleasant views by hiding the cars through additional high balustrade screens.



Figure 1. Collins park garage

Marrakesh Central Bus Station

Marrakesh Central Bus Station is located at Marrakech, Morocco (Figure 2). It was designed by Narrow minded Architects, BOM Architects. The bus station has a gross floor area of 10000 m². The project consists of three terminals, a volumetric division that places importance on the human scale and provides an effective method of occupying and activating the entire site. The design prioritizes efficiency and order, focusing on the independence of all transport flows, spatial continuity and interdependence of all buildings, creating a vibrant, green footpath linking multiple infrastructural compounds. The main areas of Marrakesh Central Bus Station are terminals, public parking, bus parking and open green space. The separate terminal buildings can serve people from different destinations and can be more controlled and organized.



Figure 2. Marrakesh Central Bus Station

Abu Dhabi Central Market

Abu Dhabi Central Market is located at Abu Dhabi, United Arab Emirates (UAE) (Figure 3). It was designed by architects Foster and Partners. This site area is 607 000 m² and the built up area is 27000 m². The market place follows a tartan grid pattern forming a network of retail and circulation spaces with one circulation shaft cutting vertically through the building to provide access from the basement car parks to the upper levels. It is a retail center that captures both Abu Dhabi's tradition and modernity for residents and visitors and creates a unique shopping environment. The use of traditional Arabic Mashrabiya along the building's façades. The cladding is a reddish color to match the color of the sand in the Liwa Desert of the UAE. The building also has an accessible roof garden with open cafes and sitting areas. The internal square can be enclosed by sliding roof panels to allow control of the internal environment. The walls are richly textured and patterned, with louvres and ornate details in wood, and use a repeated octagonal motif that is particularly well suited to the monumental scale of the building. Sun protection glass is mounted in Arabic-style stars and polygons in steel frames. The central market main zones consist of retail shops, green space and services



Figure 3. Abu Dhabi Central Market

PROGRAM ASSUMPTION AND SPACE DETAILS

For the proposed multi model transportation complex, based on Table 1, the estimated total net area is 17640 m² and the gross floor area is 25200 m². The multi model transportation complex will comprise few zone such as bus station, retail and recreation, history and heritage center, hygiene facilities, clinic, administration and services. The details of each zone is shown in Table 1.

Table 1. Space details

Zone	Area (m ²)
Bus station	5644.8
Retail and recreation	5292
History and heritage center	3528
Hygiene facilities	705.6
Clinic	529.2
Administration	529.2
Services	1411.2
Total net area	17640
Gross floor area	25200

SITE ANALYSIS

The site was created in the year of 2000 as a parking lot to serve the Holy Mosque visitors. The site is well known as a parking facility for residents of Makkah and other visitors to Haram. It was and still exists as a bus station around Al Haram's central area. The site is owned by The General Presidency for the affairs of the Grand Mosque and the Prophet's Mosque. The project size area is 20000m². The total size of the land is 9325688 m². The shape of the land is irregular (Figure 4).

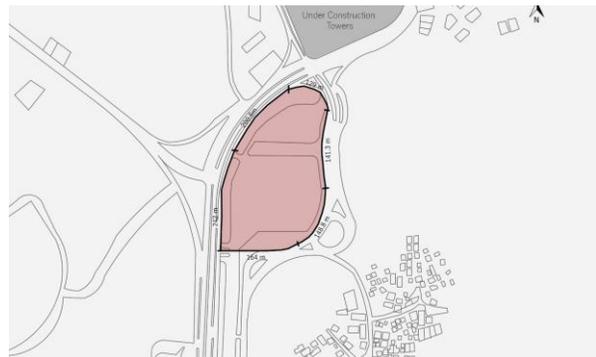


Figure 4. The site

The site has several regulation as follows. The floor are ratio is 10%. The building foot print is 80%. Furthermore, the allowable heights toward the main street (Ajyad) is the ground floor with a maximum of 22 floors. In addition, the entrance and exist point should be from the main commercial road and the service entrance should be from the sub roads. It is not allowed to have

any exits or entrances in front of crossroads and the minimum distance between the edge of the site in front of the cross roads till the entrance of the building is 35 m to avoid traffic impacts.

The site was chosen for easy access from different regions in and outside Makkah. The site meets high volumes of visitors from Makkah and other adjacent cities from the analysis. Visitors from Jeddah and Madinah cross the 3rd Ring Road to reach the site. Additionally, residents of Al Taif can reach the site through the King Khalid road and then pass through the 3rd Ring Road. Accessibility between the site and Al Haram is via Ajjad Road and Kudai Tunnel. Figure 5 shows the figure shows the general accessibility to and from the site.

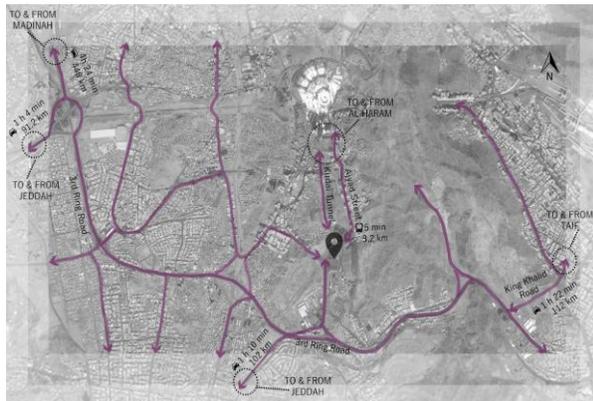


Figure 5. Accessibility to and from the site.

Based on Figure 6, the site is located between two main roads 2nd Ring Road from the North and 3rd Ring Road from the south. The site is in front of Ajjadstreet that leads directly to Al Haram which acts as a collector road. Parallel to Ajjadstreet from the west there is another collector street which is Ibrahim AL Khalil. In between of these two streets there is Al Taqwastreet which flow directly into Ajjad street and It is also act as a collector street. Kudai tunnel is in the north west of the site and it is a direct route to Al Haram. From the south east of the site there is Al Furqanstreet, which is a collector street and parallel to the 3rd Ring Road and pours directly into Ajjad street.



Figure 6. Road network around the site

Furthermore, The use of Kudai parking land is for public services. Most of the lands around the site are for hotel use due to its nearness of Al Haram. The site is also surrounded by huge percentage of slums. The site is surrounded by a small percentage of commercial use. On the other hand, The site is surrounded by the most dominant landmark which is Al Haram. Also, there are many landmarks around the site such as King Abdullah Water Zamzam Distribution, General Court of Makkah,

Le Meridian Towers, Makarim Um AlQurah Hotel, Casablanca Takamul Hotel and the The Police Station of Ajjad.

In term of the climate, Makkah is characterized with its hot temperatures above 40°C degree; therefore, the project should provide passive and active designs to create high level of thermal comfort in an efficient and sustainable way like using shading devices, make use of the buildings shadow and use of high performance glazing.

PROJECT DESIGN

Figure 7 shows the proposed zoning for the multi model transportation complex at Kudai. The zoning includes bus station, parking spaces, retail area, admin area, clinic and green plaza.



Figure 7. The zoning diagram of Kudai Complex.

The following are the design criteria. The building foot print is 80% of the site, therefore the project foot print is 18000 m². The project building height will be between 2- 3 floors. The project main entrance will consider a minimum setback of 35 m from Ajjad road due to the traffic load. The service entrance will be designed in the south side of the project. The public plaza, retail and the historical center will be placed between the northern and western side for the best view and climate. The service, clinic and hygiene zones will be placed in the southern side. The administration zone will be placed between the retail, station and historical center. The south side of the project will be designed with sustainable shading devices, screening and trees buffers. The project facade treatment will be supplied with air pollution reduction technology and the site will be designed with large green areas. The project station zone will have 3 separate terminal zones to avoid passengers overlap. Figure 8 shows the overall perspective of Kudai complex and Figure 9 shows site

plan of the Kudai complex. Furthermore, in terms of sustainability, the complex will employ solar energy usage, green spaces, water retention and good ventilation system.



Figure 8. Overall perspective of Kudai Complex.



Figure 9. The site plan of Kudai Complex.

CONCLUSION

This work has proposed a multi model transportation complex (Kudai complex) at Kudai, Makkah, Saudi Arabia. The site is located near to Al Haram mosque. The proposed Kudai complex requires anthe estimated total net area is 17640 m² and the gross floor area is 25200 m².This transportation complex will be a main point of attraction at Makkah, as it will be a main hub for Al Haram visitors and fulfill all the needs in one complex.

REFERENCES

1. Henderson JC. 13 Pilgrimage and tourism development in Saudi Arabia. *International Tourism Development and the Gulf Cooperation Council States: Challenges and Opportunities*. 2017 Jul 14:222.
2. Bashir H, Beigh RA, Rumysa BS, Bazaz AY. Experience of Umrah Trip to Saudi Arabia from Kashmir India: Model Study on Management and Facilities to Pilgrims by Custodian of Holy Mosques Kingdom of Saudi Arabia. *J Tourism Hospit*. 2017;6(328):2167-0269.
3. Stephenson ML, Öter Z, Ekiz E. Tourism development in the Kingdom of Saudi Arabia: Determining the problems and resolving the challenges. In *International Tourism Development and the Gulf Cooperation Council States 2017 Jul 14* (pp. 142-157). Routledge.
4. Aal AA, Shoukry H, Sayed MA, Ghramh HA. Physical characteristics of heat-dissipating smart marble at Al Masjid Al-Haram, Makkah City, Saudi Arabia. *Arabian Journal of*

Geosciences. 2018 Apr 1;11(8):159.

5. Alshalalfah BW, Shalaby AS, Dale S, Othman FM. Feasibility study of aerial ropeway transit in the Holy City of Makkah. *Transportation Planning and Technology*. 2015 May 19;38(4):392-408.
6. Utomo SB, Scott N, Jin CX. Hajj outcomes: A review of the literature. *CAUTHE 2016: The Changing Landscape of Tourism and Hospitality: The Impact of Emerging Markets and Emerging Destinations*. 2016:314.
7. Anisurrahman M, Alshuwaikhat HM. Determining Sustainability Assessment Indicators for the Holy City of Makkah, Saudi Arabia. *Arabian Journal for Science and Engineering*. 2019:1-4.
8. Alhamami M. Makkah is the Ultimate Multilingual Phenomenon. *International Journal of Islamic Thought*. 2018 Dec 1;14:60-71.