

JEDDAH FORMULA 1 INTERNATIONAL CIRCUIT

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Abstract

Since the automobile was first invented, there has been interest in the automobile and all its various applications. This project is to introduce and promote more the extreme sport experience to the people as a different recreational activity. Designing the motor sport complex (Jeddah F1 Park) will be the first entertainment and culture complex of its kind in Jeddah. It is a major new leisure and cultural place. Several similar case studies were conducted and spac program is proposed consist of administration zone, cultural zone, educational zone, amenities zone, and F1 zone. Starting from motoring exhibition halls, cars show room, racing track, driving school and more. The selected site location is at Salman bay based on the evaluation criteria of location, accessibility, visual quality, future development, visibility, surrounding amenities, utilities, security and safety, and topography. The project will enable the Kingdom to host some of the most fabulous motor sports events locally, regionally and internationally. Also, will allow the visitors to explore and experience different world the world of high speed, racing, and motors.

Keywords -- Formula 1, International Circuit, Motor Sport Complex, Recreational Activity

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INTRODUCTION

The Milwaukee Mile is the second oldest racing circuit in the world and has been held here since 1903 [1, 2]. It was not designed for motor racing; it started as a horse racing in the 19th century. In 1907, the first specially constructed track for motor racing opened in Brookland, England with the track of 3 miles long and the curve was steep [2,3]. Brook landing track is the first track specifically built for racing. By the end of the Second World War, the speed and function of the car had been further developed, with advance improvements and a more powerful engine [5].

Motorsport is a popular sport around the world especially at Europe. But recently the concept of motorsport culture and pastime has been present in the Middle East. Motorsport is a competition that involves automobiles racing and there are several racing categories [6]. For example, formula 1, rally racing, drag racing, and kart racing. Formula 1 is a famous kind of motorsport racing. It's the famous second sport after soccer.

Formula One is a large event with many factors. The game itself has attracted global television viewers, media attention and a lot of sponsorship.

The Formula One racing season is held every year in major cities around the world. Hosting F1 will impact the city positively economically and will increase the number of tourism. Therefore, creating motor sport complex will be perfect entertainment place and a popular tourist destination in Jeddah. The project will help the city promote economic development and increase the popularity of the region's leisure and tourism industries.

CASE STUDIES

The case studies chosen are different in their design, style and regions. The first one is Ferrari world as an example for museums, showroom and entertainment facilities. The other three case studies will be analysed for F1 circuits namely Yas marina circuit, Sepang international circuit, and Bahrain international circuit.

Ferrari world Abu- Dhabi, Yas island Abu-Dhabi

Ferrari World Abu Dhabi Entertainment and Leisure Theme Park is located on Yas Island in the Emirate of Abu Dhabi, UAE (Figure 1). The project features its huge red roof structure and once again becomes the world's largest indoor theme park. Ferrari World Abu Dhabi is offering a unique experience with a wide variety of functions such as museum and galleries, kids driving school, cinema, playing areas, and restaurants. Simply the objective of Alder's for Yas Island is to develop high grade resort destination that include unique attractions, lifestyle sports, entertainment, major events. Ferrari World is an important part of Abu Dhabi's 2030 vision, which will greatly increase the visibility of the region's leisure and tourism industry [7, 8].

The main idea is to create a unique form that look like a crown shape on Yas Marina Circuit. Moreover, because of their superior location, they hope that anyone passing or flying over the island will see the smooth shape and beauty of the building. The construction design concept was as very simple "ground hugging" form. The architects (Benoy) vision to construct building that inspired by the classic hyperbolic surface of the Ferrari GT body, it reflects the winding structure of Ferrari [7, 9].

Yas marina circuit, Yas island Abu-Dhabi

Yas Marina Circuit is more than advanced motorsports tracks it's include many functions and home to Abu Dhabi's Formula 1, it also a place for many event and social interaction. Yas Marina Circuit is the only racing circuit in the world that offers shaded stands in the entire facility. Yas Marina Circuit is the most modern, full-service venue in the region and can be used to host conferences, incentive events and exhibitions (Figure 2) [10, 11].

The main concept of Yas Marina Circuit is to encourage the development of sports culture in the UAE and establish a center of excellence for motorsports in the Middle East. In addition, build a racing community by creating destinations for the most exciting racing experience in the world [10].The combination of style and function is the main ideal of Yas Marina Circuit. The track of the Formula 1 car is 5.55 kilometers long. According to needs, the track can be divided into smaller tracks of 3.1 km and

2.4 km. The track includes twenty-one corners, along Yas Island, across the Abu Dhabi coast, and past the marina. All the main buildings of the Yas Marina Formula One Circuit, such as team buildings and public spaces, are designed to reflect the successful symbiosis between the high-tech environment of the track and traditional culture. The building allows 50,000 spectators to watch the action on the track in the comfort of a covered permanent stand and VIP facilities [10, 11].

Sepang international circuit, Malaysia

Sepang International Circuit is a racing circuit complex located near Kuala Lumpur International Airport, 60 kilometers south of Kuala Lumpur (Figure 3). It is the site used for the different motor sport events national and international. The philosophy of creating Sepang F1 Circuit is to create a landmark for the motoring sport and place to be “Home of Motorsports” [12].

The main circuit usually raced in a clockwise direction with a length of 5.54 kilometers. The track includes a series of complex uphill and downhill curves, which are built into the natural terrain of the track site, which presents unique challenges for drivers and cars. The main circuit is divided into two circuits: north track and south track. North track runs in clockwise direction. It is basically the upper half of the main circuit, with a total length of 2.71 kilometers. The South track is the other half of the track, with a total length of 2.61 kilometers [12].

Bahrain international circuit, Bahrain

BIC recently won the Best International Circuit Award. In terms of technology and construction quality, Bahrain International Circuit (BIC) is considered to be one of the best international circuits. Bahrain became the first Middle Eastern country to host the Formula 1 Grand Prix. The BIC is built in the desert and the track is located about 30 kilometers south of the island’s capital, Manama (Figure 4) [13, 14].

BIC has encouraged the rapid development of local motorsport. The aim is to be popular area for motorsport in the Middle East and hosts big national and international events. BIC is designed to be interpreted as a true regional landmark using Arabic architectural styles that reflect desert culture. The scenery around the site is all deserts, reflecting the characteristics of the true Arabian Grand Prix. The design of BIC was inspired by the Arab (Bedouin tent) architectural style. The track includes different tracks each use depend on the event [14, 15].



Figure 1. Ferrari world Abu-Dhabi [9]



Figure 2. Yas marina circuit [11]



Figure 3. Sepang international circuit [12]



Figure 4. Bahrain international circuit [15]

SPACE PROGRAM

The project will include five zones namely administrative zone, cultural zone, educational zone, amenities zone, and F1 race track. The cultural zone includes automobiles museum, showroom, and shared services. The educational zone includes racing school for both adults and children.

The amenities zone includes restaurants and cafes, kids playing area and commercial area. Race circuit requirements may depend on the track type and event type. There are different styles of race track for example, oval track, street track, medium speed race track. The Main building assumption bubble diagram is shown in Figure 5.

Regarding the design consideration, it is best to have a track of at least 250m between the starting line and the first curve. At the corner of the track, the direction changes by at least 45 ° and the radius is less than 300 m.

It is foreseeable that at least 12 m wide maintenance area lanes, maintenance area garages and race control facilities should be adjacent to the starting line and at least 4 m apart to provide verge, pit wall and signal platforms.

Emergency services require sufficient parking spaces and service roads behind the first protection line and track entrance so that emergency vehicles can reach the track and medical center from the track without hindrance. In addition, portable fire extinguishers in appropriate locations should be placed in suitable locations along both sides of the track, with an interval not exceeding about 500 m.

The fire extinguishers should be carried out by trained operators. If on one side, the maximum distance between the operators is 250 m.

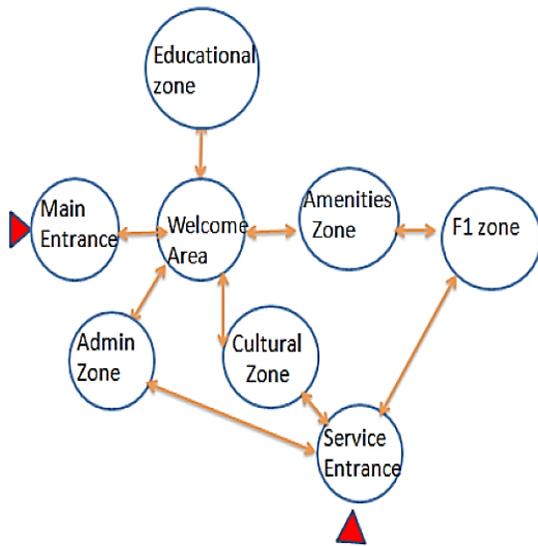


Figure 5. Main building assumption bubble diagram

The design considerations for the track also include the acceleration zone, which must not exceed 1,386 feet. The entire racing circuit, including the deceleration zone, should be paved. The maintenance area behind the starting line should be separated from the track by a six-foot-tall welded fabric or chain fence. The track boundary and center line must be clearly marked with white or yellow lines and be at least 100 mm wide. The width of the return section should be at least 3 meters with appropriate access pits and transition zone areas. The service roads should be kept in good condition, with smooth surfaces. Moreover, two ambulances placed in the medical centre and the medical centre can easy to reach from the track.

Based on different case studies around the world the gross areas are varying according to the site area, facilities, and the event. The total net area for Jeddah F1 park approximately 23450m². The Gross area for Jeddah F1 park approximately 30483m². The outdoor area is depend at race circuit length and assumed the length will be 5.5km. The race track is assumed can accommodate approximately 30,000 spectators. The allocated parking area is about 46004m². The space program of the project is tabulated in Table 1 and the parking calculation is tabulated in Table 2.

Table 1. Space Program

Zones	Net Area (m ²)	Gross Area (m ²)	Floors	Foot Print (m ²)
Administration zone	823	1069	1	1069
Cultural zone	5347	6951	2	3475
Educational zone	1116	1450	3	483
Amenities zone	1940	2522	2	1261
F1 zone	14224	18491	3	6163
Race circuit				5.5
Total	23450	30483		12456.5

Table 2. Parking calculation

Zone	Parking calculation	Number of Parking
Museum	Parking lot / 70	56
Showroom	Parking lot / 40	74
Admin	Parking lot / 70	15
Restaurants	Parking lot / 35	29

Shops	Parking lot / 45	13
F1 track	1parking/5spectore(cars)	3000
	1parking/150spectore(buses)	100
Total number of parking		3287
Total parking area		46004 m ²

SITE SELECTION AND ANALYSIS

The project is located in Jeddah. There are three proposals for the site selection of the project, namely Abhor al shamaleya, Asfan and Salman bay, where usually the total area of the site are varies between 500000- 2000000 m². Figure 6 shows site 1 is located at Abhor Al-Shamalyia, with total site area of 857112m². The accessibility of the site is surrounded by two main streets namely Al-Medina and Al-Haramin road. The site is capable for car racing and rally. The site is about 2km from king Abdullah sport city. The site is visible it's near the airport. Figure 7 shows site 2 is located at Asfan road near the path of Al-Haramain rail way and the site area is about 630000m². The site is located next to a horse racing track. Figure 8 shows site 3 is located at Salman Gulf with total site area of 723550m². The accessibility of the site is surrounded by two main streets and secondary commercial streets. Also the site near to the path of Al-Haramain rail way. The site match with the surrounding located next to proposed children race track, horse track, and gulf area. The site has a great waterfront view.



Figure 6. Site 1 [16]



Figure 7. Site 2 [17]



Figure 8. Site 3 [18]

To select the best site for the project, every site will be evaluated based on specific criteria. The considered site criteria are location, accessibility, visual quality, future development,

visibility, surrounding amenities, utilities, security and safety, and topography. The site evaluation result is tabulated in Table 3.

It is very important to find an appropriate location for the site in order for it functions successfully as well as to add value to the location. There is no specific location for f1 circuit. In some cases F1 circuits located 30km - 90km from the city. Some circuits located near from the sport facilities, desert, and marine. The site should be easily accessible by private and public transportation. Visibility is important as the location is required to attract a large number of people. The quality of the existing neighbourhood surrounding play a roles. The site should be well-matched with surrounding land uses, both existing and proposed. The site should have availability of some amenities and entertainment facilities that surround the site like sport facilities, gas station would serve the project positively. The site should have potential level of future developments in areas bordering and near to the site that will impact the site positively or negatively. The level of safety for the site and its surroundings need to be considered. The availability of electricity, water, gas, sewer, and other services will help to avoid extra costs. It should be in place now, or by the time construction is scheduled to start. The site is preferred to be smooth sloping with an elevation and contour which will ensure good drainage.

Table 3. Site evaluation result

Criteria	Grade	Site 1	Site 2	Site 3
Location	3	15	13	15
Accessibility	3	14	15	15
Visual quality	3	14	12	15
Future development	3	13	14	15
Visibility	2	10	9	9
Surrounding amenities	2	9	8	10
Utilities	2	10	9	10
Security and safety	2	10	10	10
Topography	1	5	5	5
Total		100	95	104

Based on the site evaluation result shown in Table 3, site 3 with highest score is chosen as the project site location. The site is located at highly accessible area from different roads, such as Al-Medinaroad, Dahban Road, Abhor Road, and Al-Durra Road. These roads considered to be one of the most famous streets in Jeddah. Also the site is near to the path of Al-Haramianrail way. The site will have three entrances: VIP and team entry point that will be from the main St. Al durra Rd because it is less crowded and al medina Rd because has access to the airport. Main entrance for the public, which is the other main street king Saud, Faculties and services entrance from the secondary St. from the south.

The site is surrounded by commercial streets where the availability of amenities, such as restaurants, gas station and other facilities. Also, the site is surrounded by parks and sport facilities like children racing track , horses race track , golf area, Salman bay, residential area, and empty land. The Site is located in leisure costal area. The area of Sulman bay is considered to be the focal point of future development for the city. The developments include residential, educational, leisure and sport facilities.

The site includes different type's views. The Sulman Gulf is from the west area, empty land and horse race track are from the south. From the east there are Golf Park, children race track, and residential area.

The geographic location is affected the climate of Jeddah. Jeddah encounters high temperature and humidity in the summer. The main wind in Jeddah is northwest wind. According to the sun path and wind direction, it is preferable to have the open spaces at north or west area also its important prevents the hot wind and sun coming from the south side. The grandstands also will be located to take the advantages of wind and to avoid the glare coming from the sun also all the grandstands will be shaded. The location of the building will be at south west to drop shadows at the race track.

ZONING AND PROJECT DESIGN

There are different features affected the site and leads to the zone distribution assumption. The VIPs and team entrance will be from the main street and directly connected to the pit building and team building. The entrance for the welcome centre will be from the other main street. A secondary entrance is created for services and staff. This project also considers develop open spaces and landscaped walkway. The location of outdoor spaces will be at North West to take the benefit from the preferable wind direction. People will enjoy the outdoors as well as the sea breeze and view. The welcome centre will be at the southwest to drop the shadow at the race track, because of the sun direction of the site. The site zoning diagram is shown in Figure 9.



Figure 9. Project Zoning

The main concept of creating a racing track is to create a unique environment that will be home to some of the world's leading brands in the automotive industry, retail showrooms and car dealers. The project will be mixed use complex contain different functions. The project will allow the families get up-close to the technology of motors and racing. Figure 10 and Figure 11 demonstrate the project view of F1 zone and main entrance respectively. Also, the main perspective view of the project is shown in Figure 12.



Figure 10. F1 zone



Figure 11. Main Entrance



Figure 12. Main perspective

CONCLUSION

This project is to make Jeddah a major international centre for motor sport and to be the new leisure place that will host big events and attract visitors all around the world. The proposed site has five main zones namely administration zone, cultural zone, educational zone, amenities zone, and F1 zone. Several site evaluation criteria were considered for site selection which is location, accessibility, visual quality, future development, visibility, surrounding amenities, utilities, security and safety, and topography. The chosen site for the project is located at Salman bay. This project provides a place that capable to host big event in Jeddah and become the home to some of the best sporting actions and racing activities. Moreover, this project will be an important land mark in Jeddah that attracts many visitors.

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