



جامعة عجمان  
AJMAN UNIVERSITY

College of Engineering

Department of Architectural Engineering

Graduation Project I (ARC 500)

## **DUBAI AUTOMOBILE MUSEUM**

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DUBAI  
AUTOMOBILE  
MUSEUM

GRADUATION  
PROJECT

OMAR HASSAN 201410599



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# DUBAI AUTOMOBILE MUSEUM

A Dissertation Submitted to the Department of Architectural Engineering at Ajman University in Partial Requirement for the Degree of Bachelor of Science in Architectural Engineering.

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201410599



# Acknowledgment

I'd like to take a moment to thank everyone who supported me to complete this project, First with Allah's blessing i have been able to gain the strength and motivation.

Second to the head of department Dr. Jehad Awad, My instructors and professors Dr. Baseem who taught me alot of experience through out my design years, Ms Neveen and Dr. Thafir who thought me real life experiences and mistakes i should avoid in this achitecture field.

Finally id like to thank my Family including my mom and dad. My big brother abdulrahman hassan who is way more experienced in architecture field than i am, Mostafa hassan and everyone from my family who supported me through these 5 years. Id like to thank my close friends who without them i wouldnt have the motivation to complete. Ahmed HMY, Khald and all my collegues ive known in my education years

# Abstract

An automobile, motor car or car is a wheeled motor vehicle used for transporting passengers, which also carries its own engine or motor. The purpose of an Automobile museum is the same as an ordinary museum, an Automobile museum is a museum where a range to cars are for display for the people to view.

Study cases included in this thesis implemented a different and unique concept on their projects, the common thing is that they all serve the same function of displaying automobiles but how each and every project expresses a unique idea is included in this study ranging from vertical circulation to conceptual design zoning

Dubai, UAE was chosen as the site of this project since Dubai has the greatest tourist count of all cities in the UAE, Also its advanced in technology world wide and that aids the design process

The design concept has to adopt the form in order to provide a special experience which opens the eyes on how great it is to see how automobiles evolved throughout the years

# Introduction

## Why automobile museum?

- One man's Trash may be other man's treasure.
- They are built to collect, document, preserve interpret and exhibit some form of material evidence.
- A museum is a centre where people when visit can connect themselves to the past.
- It is showcases the heritage and contribution of the place as well country.

The mission of the Automobile Museum is to collect and preserve the automobile for future generations, with an emphasis on vehicles collected to tell the story of the impact of the automobile on the society.

Since dubai is one of the most visited cities in the world it'll be a great opportunity to grow the economy. There is a huge interest in automobile by different age groups in the UAE which allows them to know more about the history of their favourite brands. The aim of this project is to gather visitors to this experience all in one space and for interested individuals to expand their knowledge.

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# CHAPTER 01



# 1.1 Definition

## 1.1.1 AUTOMOBILE MUSEUM

Holds on various vehicles showing the evolution of the design and functionality that chained throughout the years, each represented company have their own style that can be viewed by visitors with similar interest



### “AUTOMOBILE”

[aw-tuh-muh-beel, aw-tuh-muh-beel, aw-tuh-moh-beel, -buhl]

ORIGIN: 1865–70; < French: literally, self-movable (vehicle).

- A passenger vehicle designed for operation on ordinary roads and typically having four wheels and a gasoline or diesel internal-combustion engine.



### “MUSEUM”

[myoo-zee-uh m]

ORIGIN: 1605–15; < Latin mūsēum place sacred to the Muses, building devoted to learning or the arts (referring especially to the scholarly institute founded in Alexandria about 280 b.c.) < Greek Mouseíon, equivalent to Moûs(a) Muse + -eion suffix of place

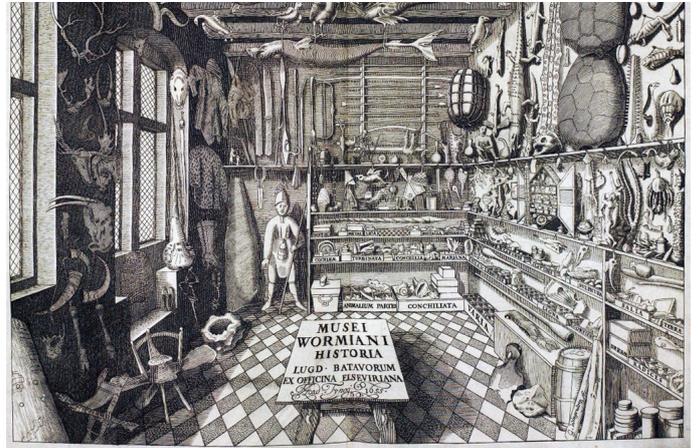
- A place or building where objects of historical, artistic, or scientific interest are exhibited, preserved, or studied



# 1.2 Historical background

## 1.2.1 MUSEUM

1610s, “the university building in Alexandria,” from Latin museum “library, study,” from Greek mouseion “place of study, library or museum, school of art or poetry,” originally “a seat or shrine of the Muses,” from Mousa “Muse” (see muse (n.)). Earliest use in reference to English institutions was of libraries (e.g. the British Museum); sense of “building to display objects” first recorded 1680s.



## 1.2.2 AUTOMOBILE

### AUTOMOBILE MUSEUM

( **Beaulieu National Motor Museum** ) The museum was founded in 1952 by Edward Douglas-Scott-Montagu, 3rd Baron Montagu of Beaulieu, as a tribute to his father, who was one of the great pioneers of motoring in the United Kingdom, being the first person to drive a motor car into the yard of the Houses of Parliament, and having introduced King Edward VII (then the Prince of Wales) to motoring during the 1890s



Beaulieu National Motor Museum

### THE AGE OF STEAM

Most historians agree that Nicolas-Joseph Cugnot of France was the constructor of the first true automobile. Cugnot’s vehicle was a huge, heavy, steam-powered tricycle, and his model of 1769 was said to have run for 20 minutes at 2.25 miles (3.6 km) per hour while carrying four people and to have recuperated sufficient steam power to move again after standing for 20 minutes.



1769 CugnotIn

### GASOLINE CARS

Most authorities are inclined to honour Karl Benz and Gottlieb Daimler of Germany as the most important pioneer contributors to the gasoline-engine automobile. Benz ran his first car in 1885, Daimler in 1886.

## EARLY ELECTRIC AUTOMOBILES

At the beginning of the 20th century, 40 percent of American automobiles were powered by steam, 38 percent by electricity, and 22 percent by gasoline. In the face of the gasoline car's unreliability, noise, and vibration and the steamer's complications and thirst, the electric offered attractive selling points: notably, instant self-start, silent operation, and minimal maintenance. The first automobile to exceed 100 km (60 miles) per hour was an electric (Camille Jenatzy's La Jamais Contente, 1899).



Camille Jenatzy's La Jamais Contente, 1899

## EUROPEAN DEVELOPMENTS

In France the giants were De Dion-Bouton, Peugeot SA, and Renault (the last two are still in existence). The Italians were later in the field: the Stefanini-Martina of 1896 is thought of as the foundation of the industry in Italy, and Isotta-Fraschini was founded about 1898. Giovanni Agnelli founded Fiat SpA in 1899, saw it grow into one of the weightiest industrial complexes in the world, and maintained personal control until his death in 1945. Fabricators of lesser puissance but great repute were Lancia, Alfa Romeo SpA, Maserati, and Ferrari



A De Dion motor car, c. 1901

## UNITED STATES

The Daimler and Benz claims to the invention of the automobile were attacked in 1895 when U.S. patent 549,160 was granted to George B. Selden as inventor of the automobile.

## FORD AND THE AUTOMOTIVE REVOLUTION

Henry Ford produced eight versions of cars before the Model T of 1908, with which his name became synonymous; these were the models A, B, C, F, K, N, R, and S. They were not remarkable automobiles, but public response to the less expensive ones indicated the soundness of Ford's idea—to turn the automobile from a luxury and a plaything into a necessity by making it cheap, versatile, and easy to maintain.



Henry Ford's first car was the Quadricycle, seen here with Ford driving.

## AGE OF THE CLASSIC CARS

The decade 1925–35 was notable not only for the appearance of many new small automobiles but also for the building of many ultra-large ones. The years from 1925 to 1948 are cited by collectors of automobiles as the “classic years,

## EUROPEAN POST-WAR DESIGNS

When automobile manufacture was resumed in 1946 after a lull during World War II, the effect of Italian ideas on the world’s automobile body designers was profound. Pininfarina of Turin was the best-known of the coach builders who established the characteristic Italian approach: grace, lightness in line and substance, and minimal use of decoration

## V-8’S AND CHROME IN AMERICA

In the United States, automobile racing in the years around 1910 was drawing the biggest crowds in American sports history. It began to regain popularity following World War II. By the mid-1950s motor racing had again become a high-ranking American spectator sport, and by 1969 estimated attendance was 41,300,000, higher than that for baseball or football.

## AMERICAN COMPACT CARS

While the size of the standard American motorcar increased steadily from the late 1940s to the early 1960s, a small segment of the population was demonstrating a preference for smaller cars and for comparatively uncluttered styling. The success of the Volkswagen and other small cars, bolstered by the 1958 recession, eventually led the major American producers simultaneously to undertake the production of automobiles generically termed “compact.” A similar exercise in “market engineering” at General Motors created the “muscle car,” an intermediate-size car with a large engine from the top of the line, as typified by the Pontiac GTO.



Duesenberg J  
The Duesenberg Js, built from 1929 to 1937



Instant Cisitalia.



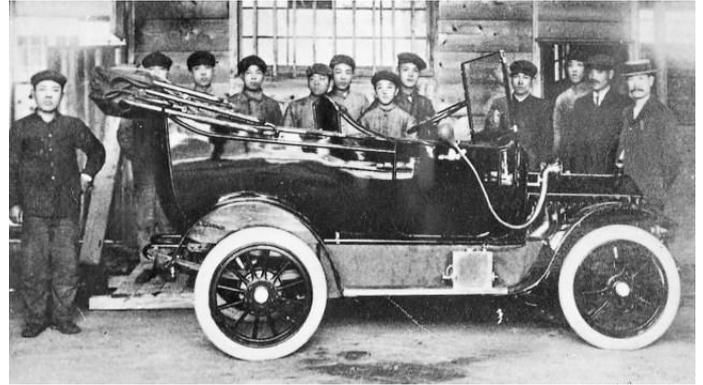
1959 Mercury Monterey



1965 Ford Mustang

## JAPANESE CARS

Although Datsun (Nissan Motor Company, Ltd.) had been making cars since 1914, the majority of automobile production in Japan before 1936 came from a subsidiary of Ford in Yokohama. As a result of laws requiring local ownership, however, Datsun and Toyota Motor Corporation, the latter originally a textile machinery company, dominated from that time.



First Japanese car

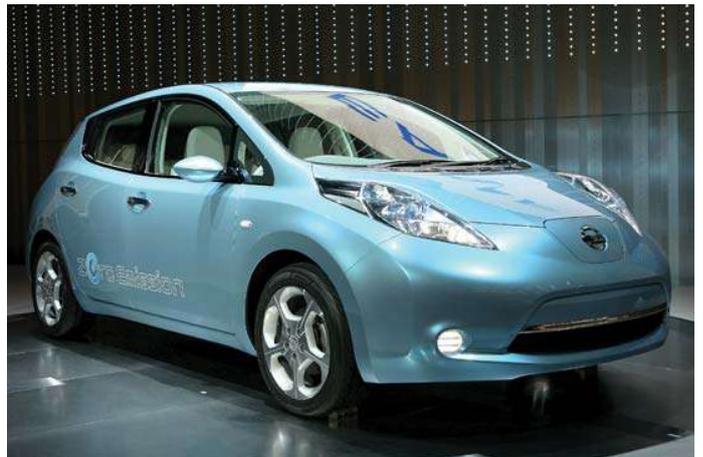
## ALTERNATIVE FUEL VEHICLES

### -DIESEL

After World War II the diesel engine, particularly for light trucks and taxis, became popular in Europe because of its superior fuel economy and various tax incentives.

### -ELECTRIC

The first of the fuel crises, in 1973–74, rekindled interest in electric vehicles in America. Numerous experimenters and entrepreneurs began work on battery electric cars, the most successful being the CitiCar built by a Florida company, Sebring Vanguard, Inc.



Leaf zero emission electric vehicle 2009

### -ELECTRIC-GASOLINE (HYBRID)

In 1997 Toyota introduced its four-passenger Prius hybrid to the Japanese market. Combining a small gasoline engine and an electric motor through a sophisticated control system, the Prius uses gasoline power only when necessary to supplement electric propulsion or to recharge its batteries.



Leaf zero emission electric vehicle 2009

### -ETHANOL AND FUEL CELLS

In 1999 Brazil mandated that by 2003 all new cars sold in the country had to be FlexFuel vehicles (FFVs)—vehicles certified to run on gasoline containing up to 85 percent ethanol (ethyl alcohol), marketed as E8W5.



Gumpert supercar runs by alcohol

## **1.3 Historical Timeline**



Steam Power

1801



Internal Combustion

1886

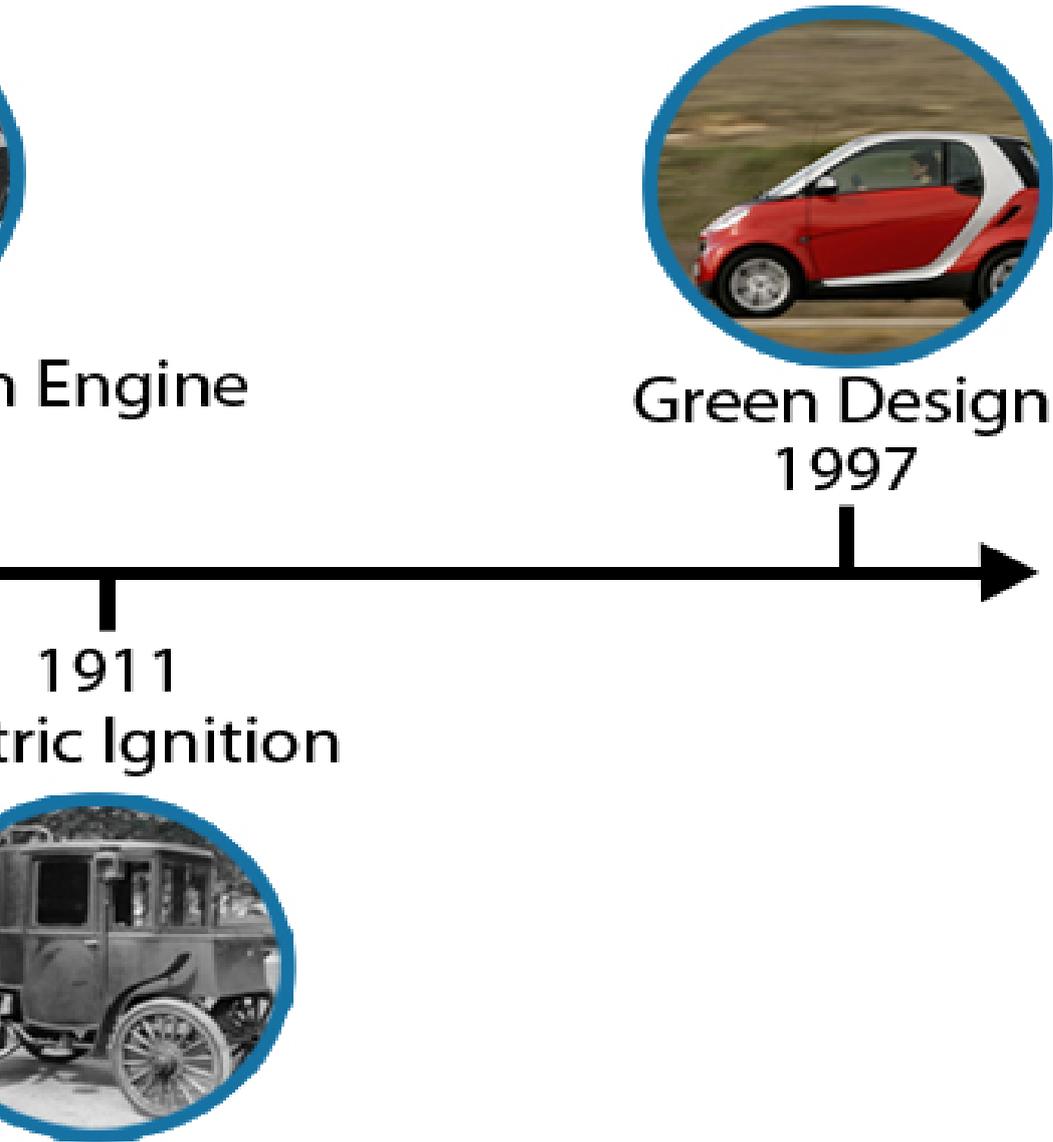


1858

Coal-Gas Engine

Elect





## 1.4 Objectives

- Collecting people with similar interests varying from different age groups
- Provide a simple circulation and easy presentation of automobiles throughout the years till the present day
- Create a bond between two eras (modern technology and the old school automobiles)
- Boost the economy in Dubai in a different scale
- The one of its kind in the middle east



# 1.5 References

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- [www.britannica.com/technology/automobile/History-of-the-automobile](http://www.britannica.com/technology/automobile/History-of-the-automobile)

- [https://en.wikipedia.org/wiki/History\\_of\\_the\\_automobile](https://en.wikipedia.org/wiki/History_of_the_automobile)

- [https://en.wikipedia.org/wiki/National\\_Motor\\_Museum,\\_Beaulieu](https://en.wikipedia.org/wiki/National_Motor_Museum,_Beaulieu)



# CHAPTER 02: CASE STUDIES



## 2.1 BMW WELT, Munich, Germany

(Existing)



### Information:

### Architects:

Coop Himmelb(l)au

### Project Architects:

Paul Kath Design

### Team:

Wolf D. Prix, Tom Wiscombe, Paul Kath,  
Waltraut Hohenender, Mona Marbach

### Area:

25000.0 m<sup>2</sup>

### Project Year:

2007

### Manufacturers:

FMG, Gretsch-Unitas

**DATA** COMPETITION 1st PRIZE: 2001  
START OF PLANNING: 11/2001  
START OF CONSTRUCTION: 08/2003  
OPENING: 20/21.10.2007

SITE AREA: 25,000 m<sup>2</sup>  
GROSS FLOOR AREA: APPROX. 73.000 m<sup>2</sup>

BUILDING COST: ABOVE 100,000,000 Euro

JOBS CREATED: APPROX. 200  
VEHICLE DELIVERIES: MAX. 250 PER DAY

## 2.1.1 CONCEPT

**The realization of the technical building facilities within the scope of the architecture led to a planning model with five thematic blocks: Hall, Premiere, Forum, Gastronomy**

### - Hall

A low-tech concept optimized ecologically using high-tech methods

The technical solution here is based on previous experience with large halls. All of the necessary features were realized successfully according to a low-tech concept. The interrelations of daylight and artificial light with ambient climate and acoustics influence people's feeling of well-being in the Hall.



### - Premiere

Exhaust gas diffusion prevented through negative pressure

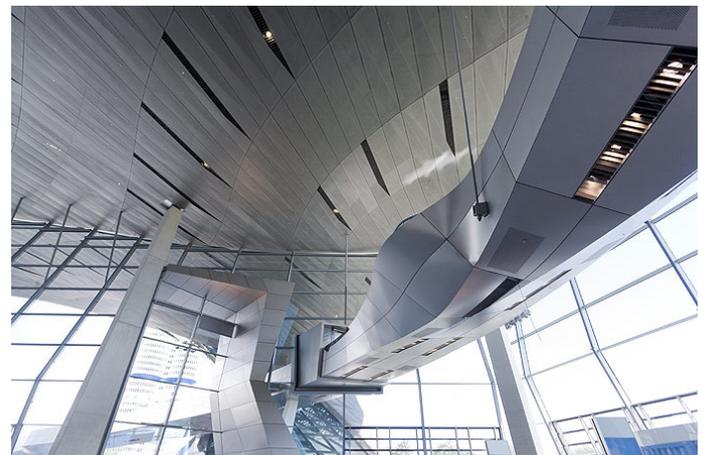
The key task of the new BMW Welt is to deliver cars - in the Premiere section - with all concepts geared toward enhancing the experience of delivery. Because of the exhaust gases that this task involves, special considerations and calculations had to be made in terms of the ventilation plan, since the Premiere is open to the Hall - the major space in this world of experience.



### - Forum

A room-in-a-room for maximum flexibility

The Forum is a separate event area for up to 1,200 persons, equipped to meet all the specifications for a full-fledged theater or conference room.



## - Tower

Island solutions place high demands on building systems to ensure well-being. The technical equipment discreetly supports the gastronomic functions. In places where guests spend longer periods of time, air sources are placed near the floor. In order to ensure pleasant air quality even near the glass facades, the vertical facade support profiles are heated to prevent the cold downdrafts typical for this kind of construction.



## - Double Cone

An event space offering all the options of a public assembly place.

The Double Cone is used as an exhibition space and for special events. Air is brought in by means of a low-induction system along the base of the facade and streams into the roof through the opening at the top of the cone.

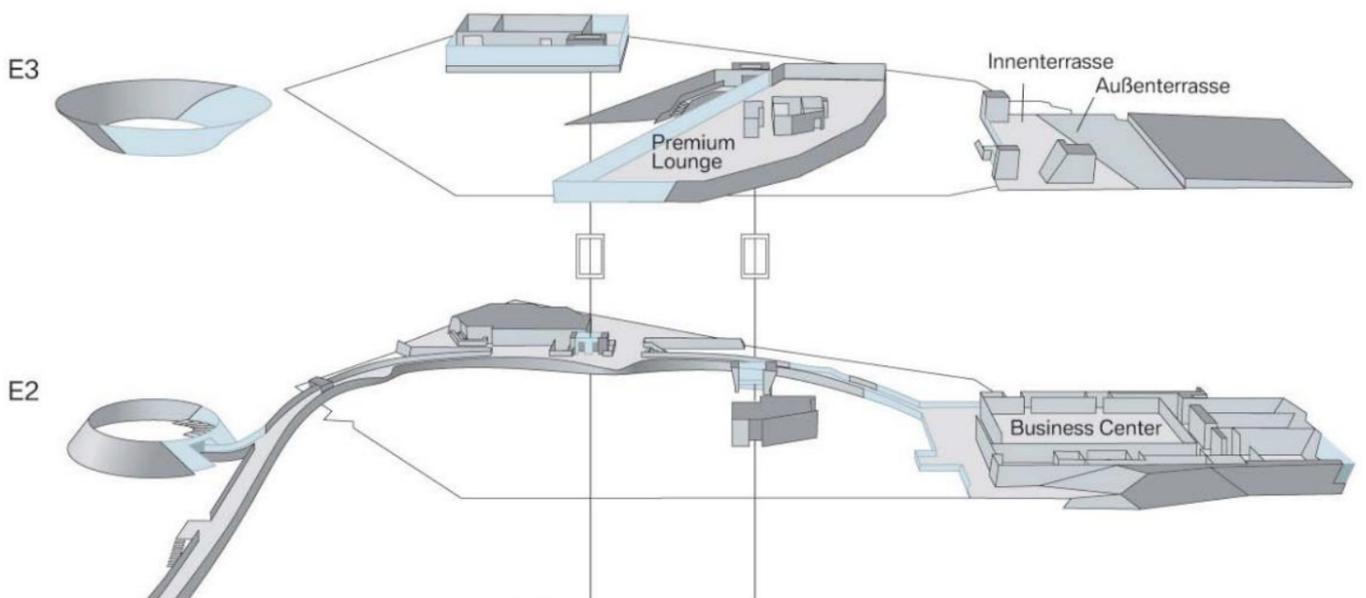
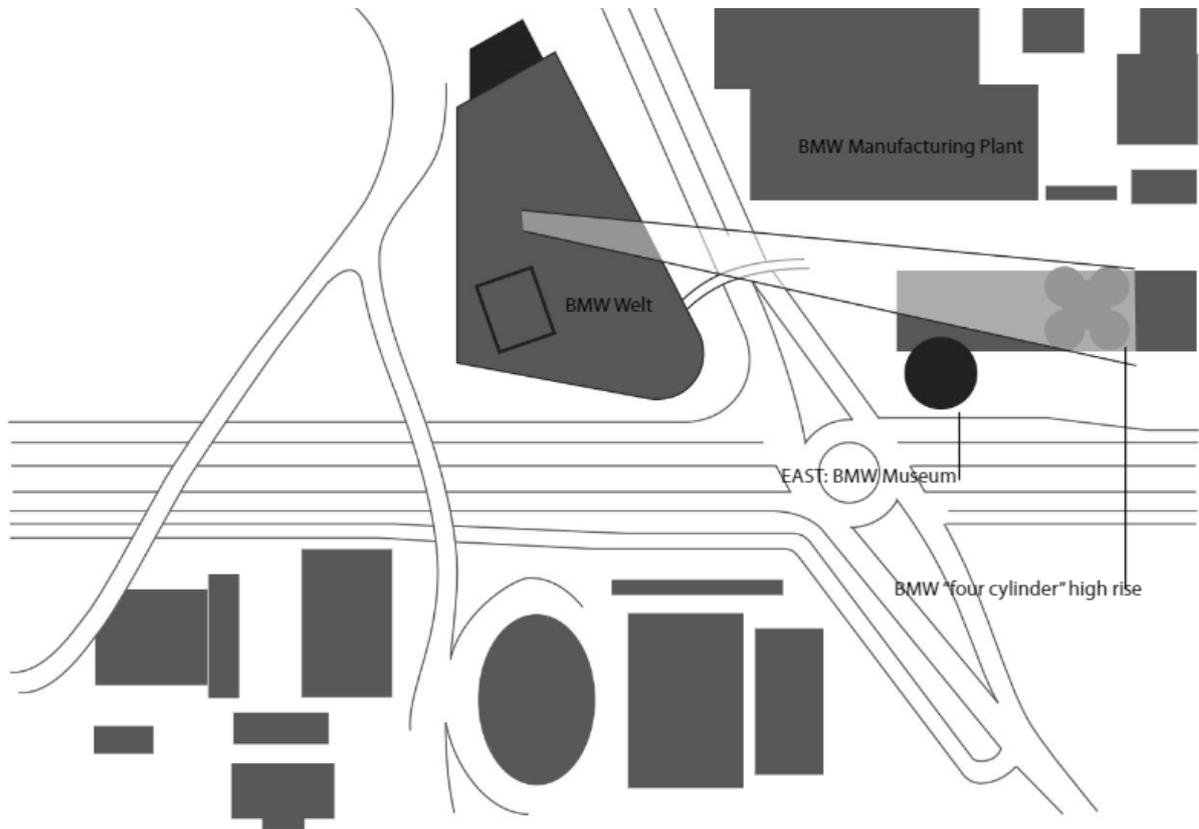


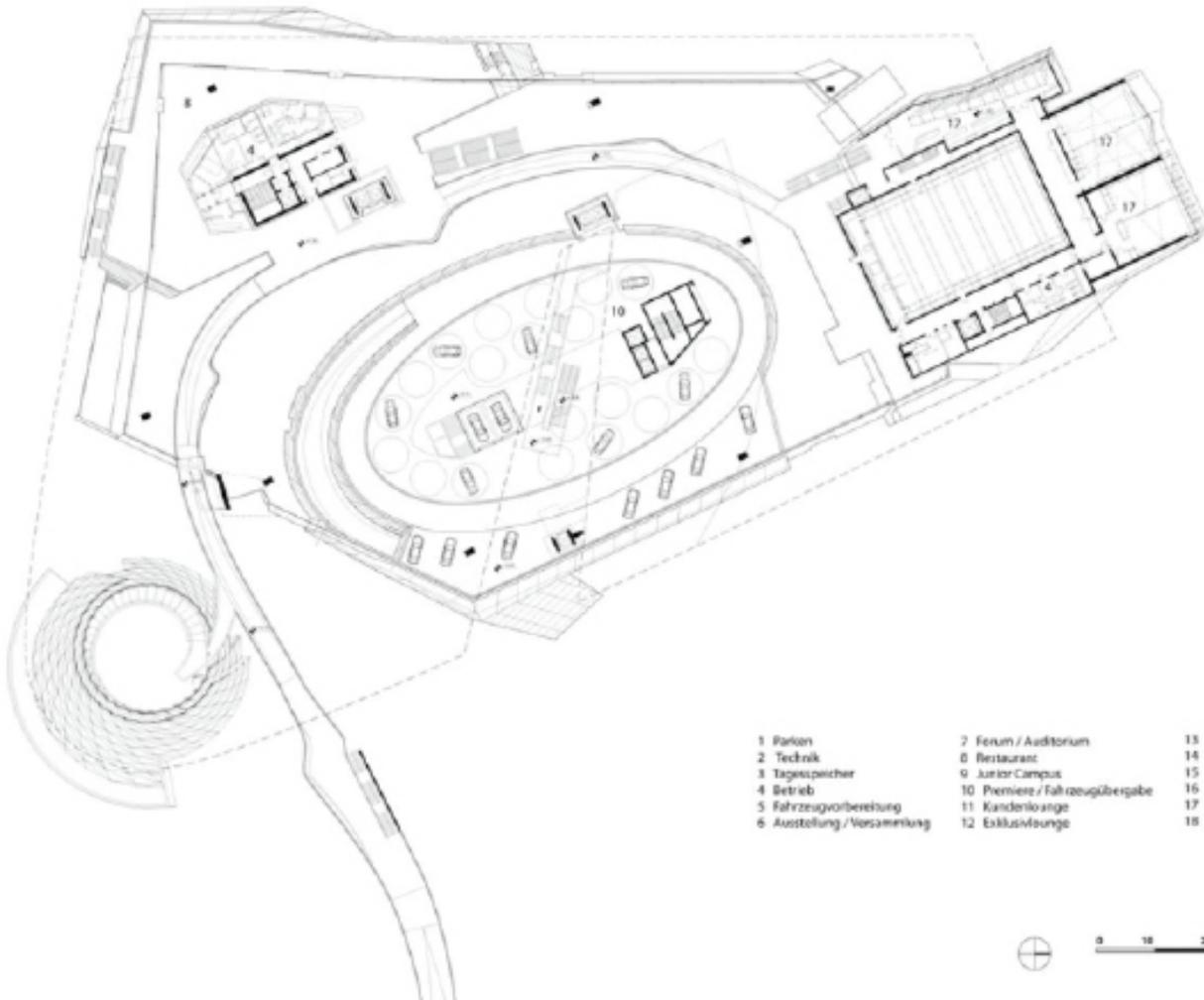
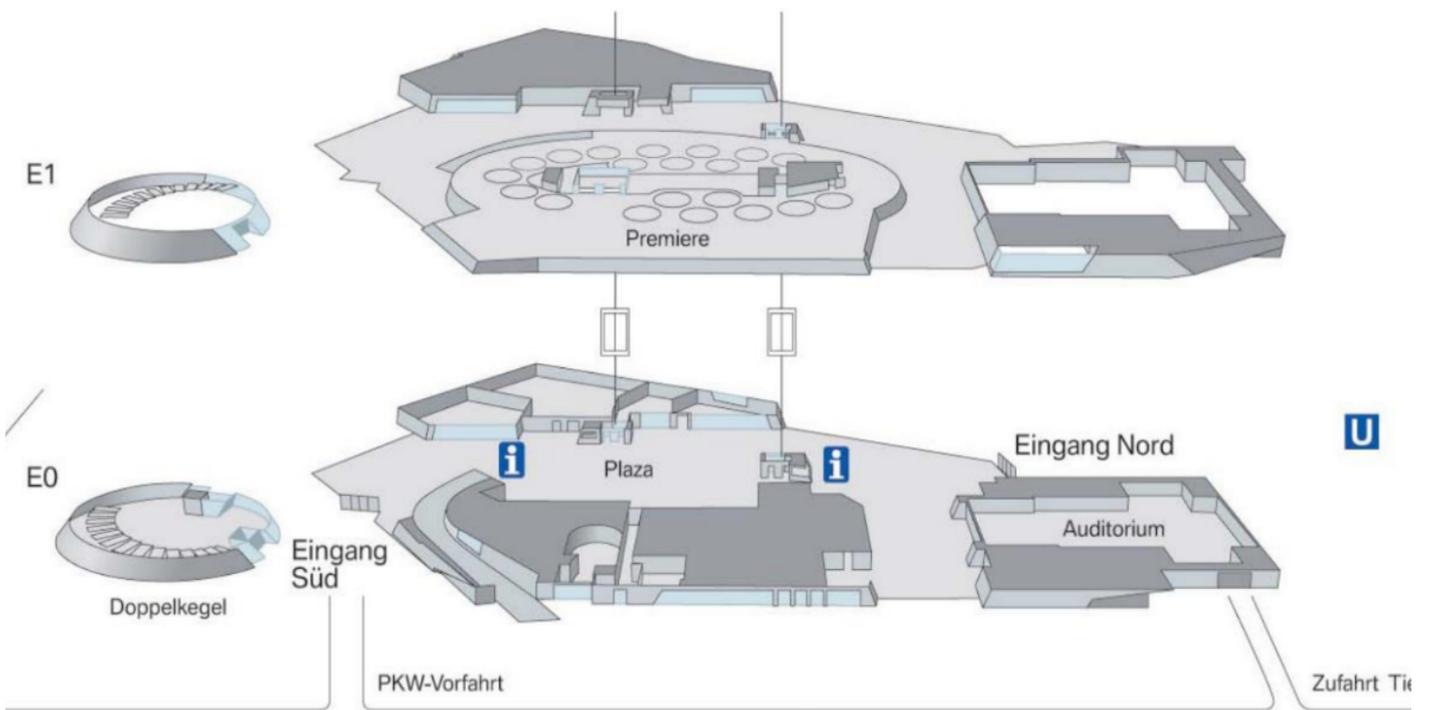
## - Ramp system

From the existing idea of Karl Schwanzer, the “street in altered space”, studio ATELIER BRÜCKNER developed a **ramp system as a central motif for the architecture** and exhibition. The ramp became the **dynamic concept** of the new architecture. As both a **formed and forming element**, the ramp takes on a **key function**. It leads the visitor through the museum and **connects the new long-term exhibition with the “Museum Bowl”**, now used for special exhibitions. In the end, a diverse perspective on vehicles, company history, and company philosophy is allowed by the ramp system. The experience of the fluent space leaves a lasting impression, drawing from the visual narrative of many single perspectives throughout **the space**.



## 2.1.2 PROGRAM, PLANS, AND SECTIONS

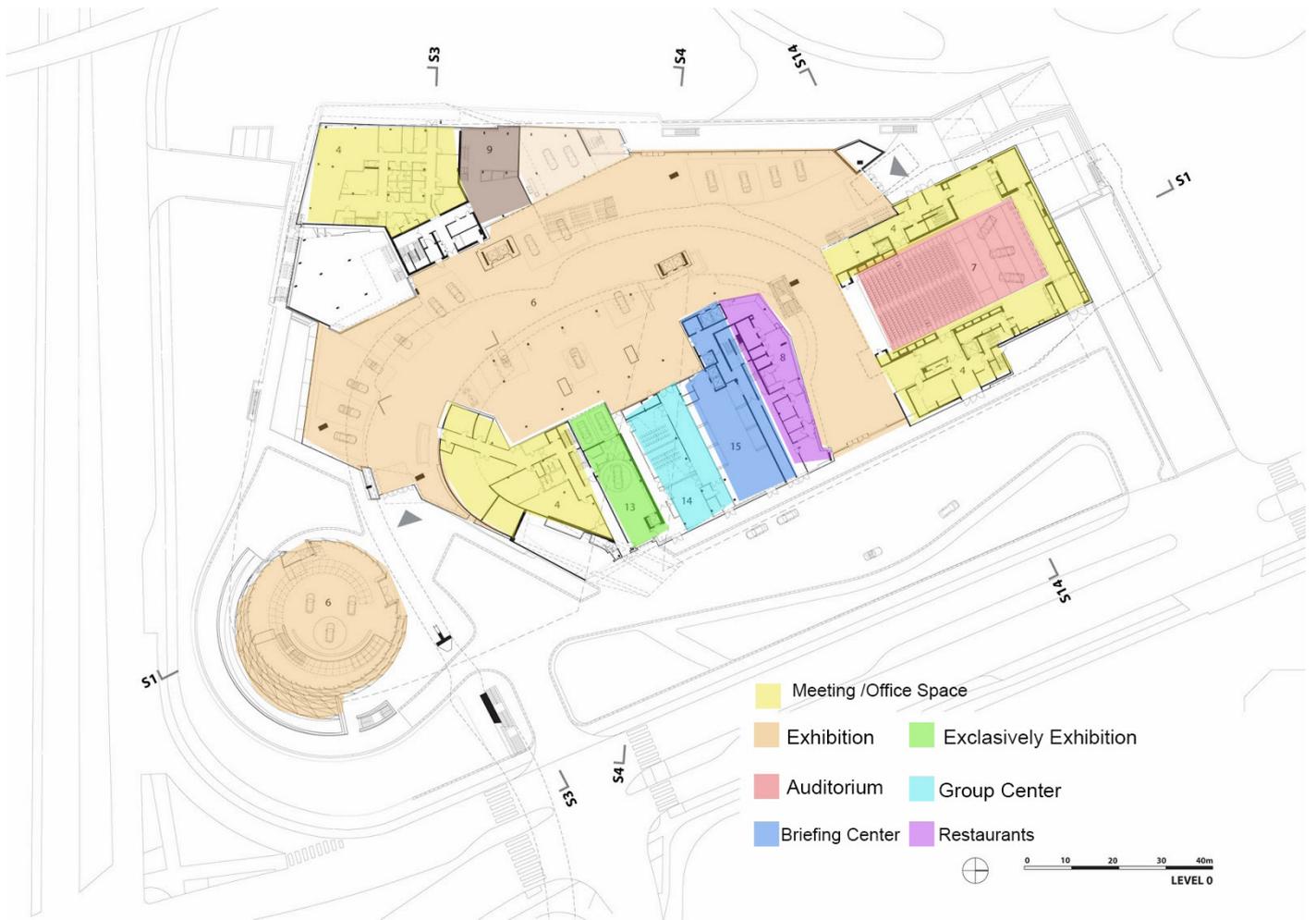




- |                             |                                |                         |
|-----------------------------|--------------------------------|-------------------------|
| 1 Parken                    | 7 Forum / Auditorium           | 13 Exklusivlieferung    |
| 2 Technik                   | 8 Restaurant                   | 14 Gruppenzentrum       |
| 3 Tagesspeicher             | 9 Junior Campus                | 15 Briefing Center      |
| 4 Betrieb                   | 10 Premiere / Fahrzeugübergabe | 16 Markenakademie       |
| 5 Fahrzeugvorbereitung      | 11 Kundenlounge                | 17 Forum Businesscenter |
| 6 Ausstellung / Versammlung | 12 Exklusivlounge              | 18 Forum Terrasse       |



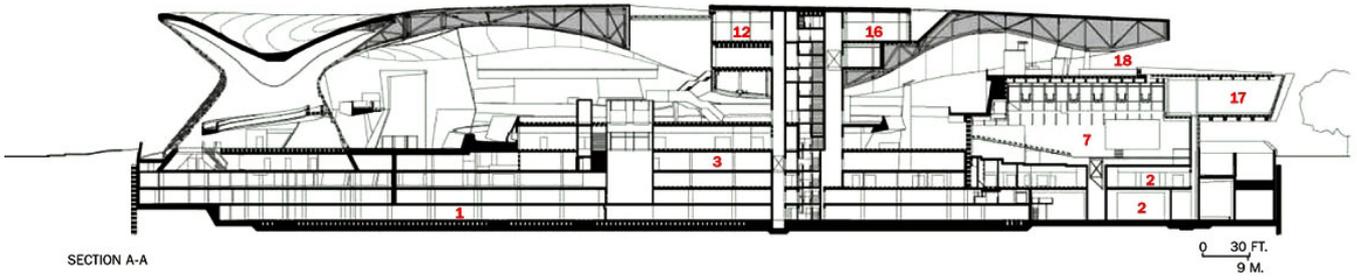
**THIRD FLOOR PLAN**



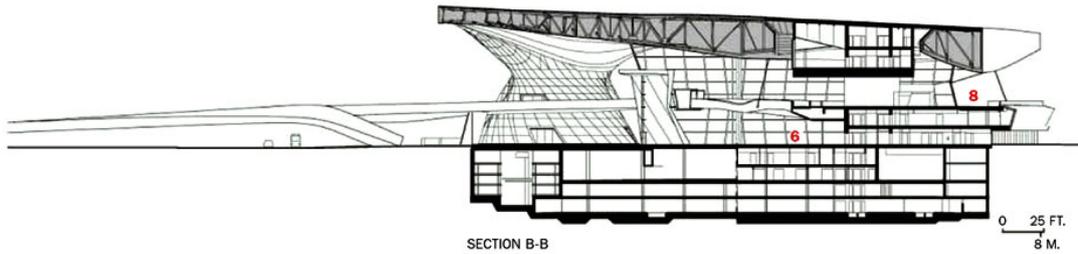
**GROUND FLOOR PLAN**



The section above shows a huge area of the space located below ground level to further enhance the floating cloud over the open space below.

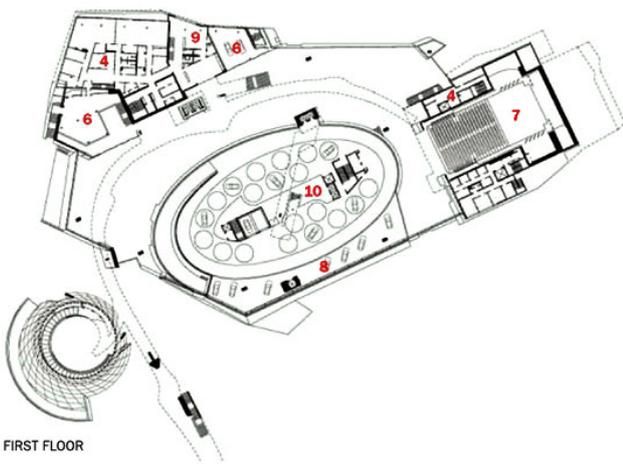


SECTION A-A

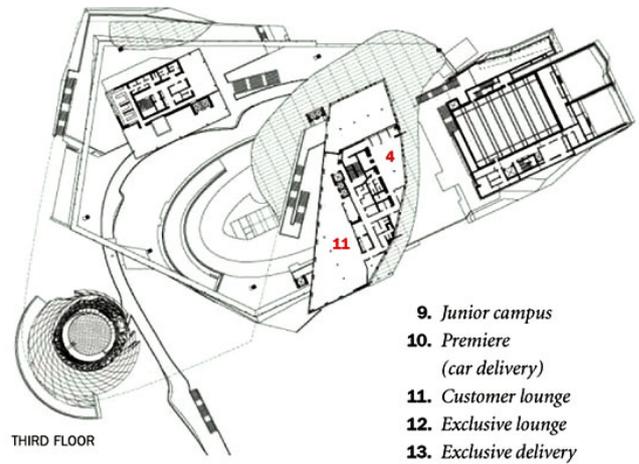


SECTION B-B

- 1. Parking
- 2. Technology
- 3. Daily car storage
- 4. Shop/offices
- 5. Vehicular preparation
- 6. Exhibition/assembly
- 7. Forum/auditorium
- 8. Restaurant

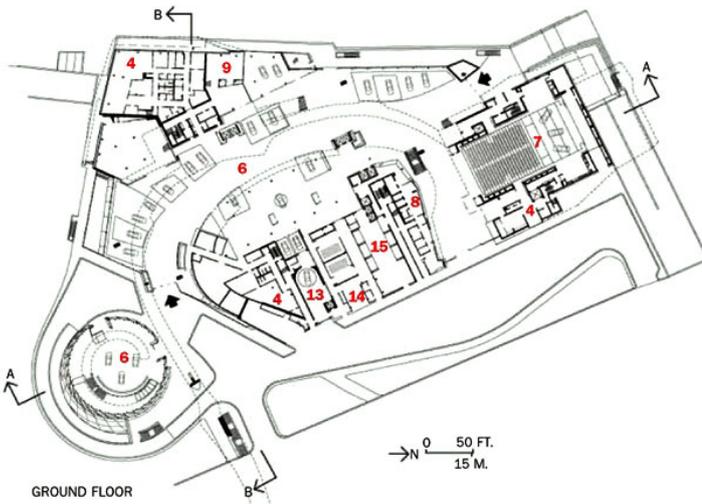


FIRST FLOOR

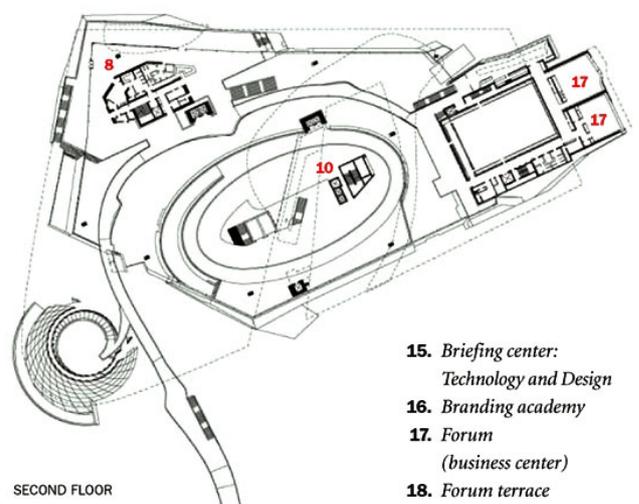


THIRD FLOOR

- 9. Junior campus
- 10. Premiere (car delivery)
- 11. Customer lounge
- 12. Exclusive lounge
- 13. Exclusive delivery
- 14. Group center



GROUND FLOOR



SECOND FLOOR

- 15. Briefing center: Technology and Design
- 16. Branding academy
- 17. Forum (business center)
- 18. Forum terrace

## 2.2 Porsche Museum, Stuttgart, Germany

(Existing)



### Information:

#### Architects:

hg merz architekten museumsgestalter

#### Location:

Stuttgart, Germany

#### Year:

2009

#### Client:

Porsche AG

#### Area:

5,600 sqm



## 2.2.1 CONCEPT

The new museum enlightens the visitor in an impressive, clear, and interesting manner about the entire history of what is now Dr. Ing. h.c. F. Porsche AG. Production cars have been just as important to the name recognition of the Porsche brand as many vehicles designed specifically for racing. Porsche designs have had an impact on individual mobility even in the early years of motorization.

The exhibition layout provides separate exhibit areas for the two periods before and after 1948. “Porsche Idea,” “Product History,” and “Thematic Islands” are the three core elements of the museum concept. Visitors making their way through the exhibition will often find these three main elements thematically interlinked.

The “**Porsche Idea**“ section focuses on specific, trailblazing technical solutions for interesting challenges from nearly all areas of mobility. Visitors can learn about the values, motivation, and philosophy driving the company throughout its history and to its ultimate success.



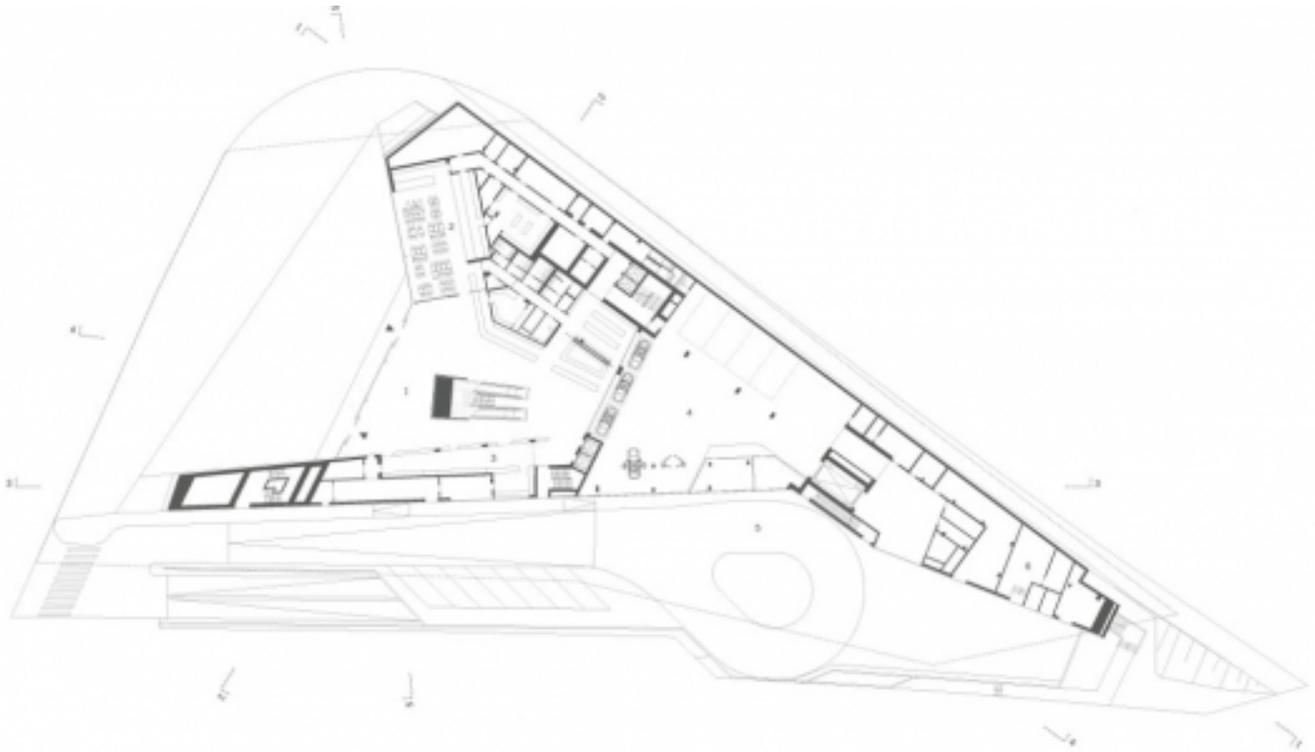
The “**Product History**” section is a chronologically arranged presentation of the history of Porsche sports cars from its beginnings in 1948 to the latest models with all their technological diversity and stylistic individuality.

“**Thematic Islands**” focus on particular, especially important aspects of Porsche history. Some of them, like “Evolution 911,” are dedicated to specific model series. Others bring together vehicles from different eras, for example in the splendid motorsport history of “Le Mans.”

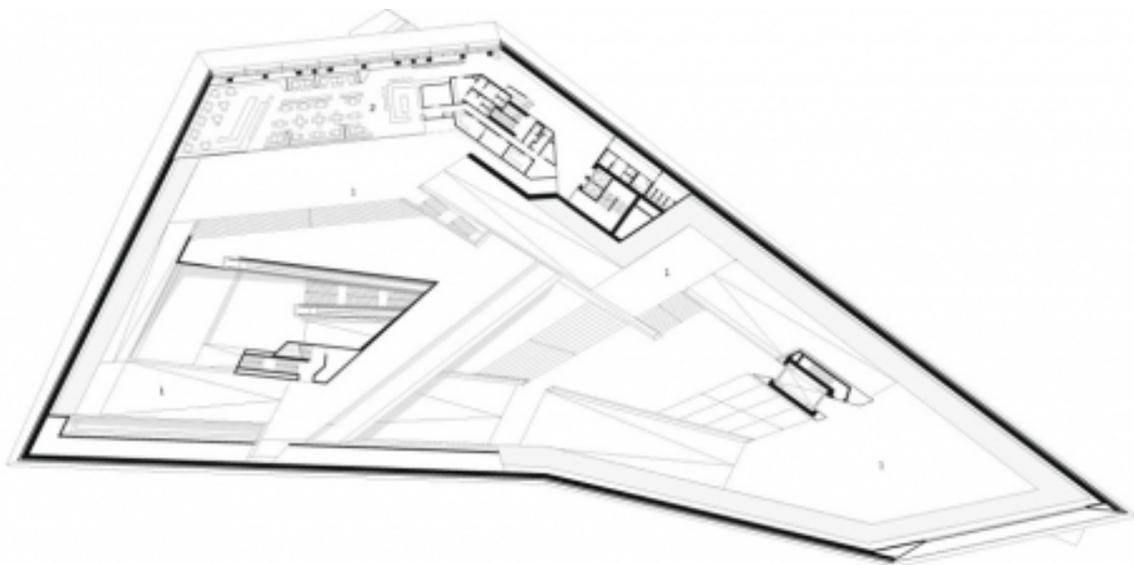
The architectural design is simple and pure, designed in the same idea of technological competitiveness. The enveloping surfaces are in generally dominated by white reflective metal and glass sheets. The white also dominates the interior design, consistently following an “all white” decorum, dotted here and there with few colored surfaces and etched glass supports for the exhibited automobiles.



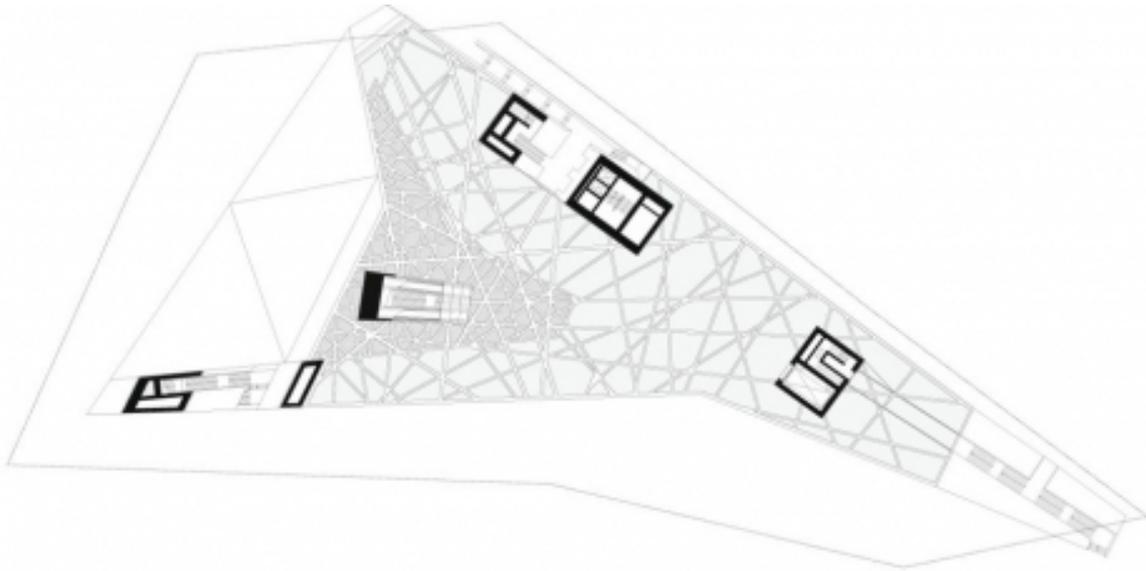
## 2.2.2 PROGRAM, PLANS, AND SECTIONS



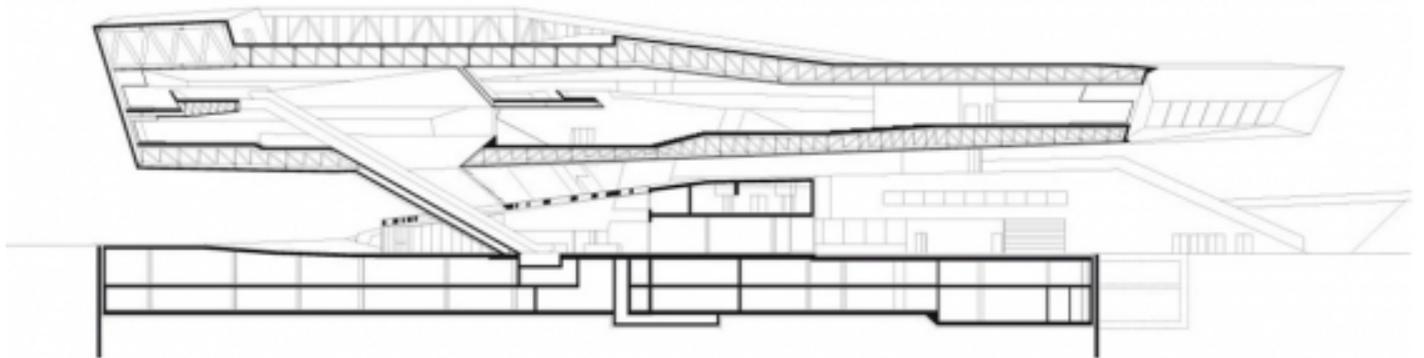
LEVEL 0 PLAN



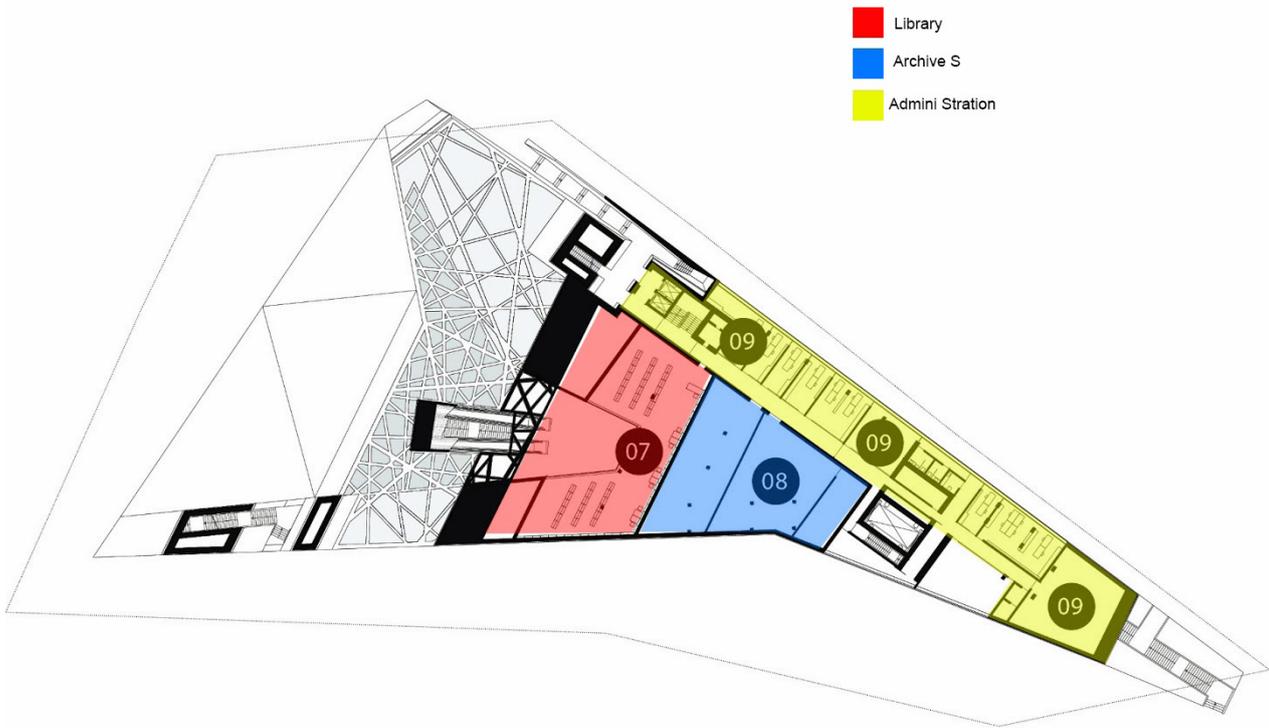
LEVEL 3 PLAN



OPEN SIDED LEVEL PLAN



SECTION



LEVEL 1

## LEVEL 1 SPACE PROGRAM



## **1. CONSISTENCY/EVOLUTION**

The eternally young 911 Turbo—Porsche's design shows a classic, elegant profile.

## **2. LIGHTNESS/TARGA FLORIO**

Thanks to clever material combinations, Porsche cars have always been lighter and thus more successful than those of the competition, as shown by the many victories at the Targa Florio.

## **3. CLEVERNESS/STUDIES**

Porsche engineers and designers are constantly pushing the limits. Here, for example, is a 911 with a lengthened wheelbase, and the 911 Panamericana.

## **4. SPEED/LE MANS**

Optimized aerodynamics help translate the available power into greater speed—the secret to success behind Porsche's 16 overall victories at Le Mans.

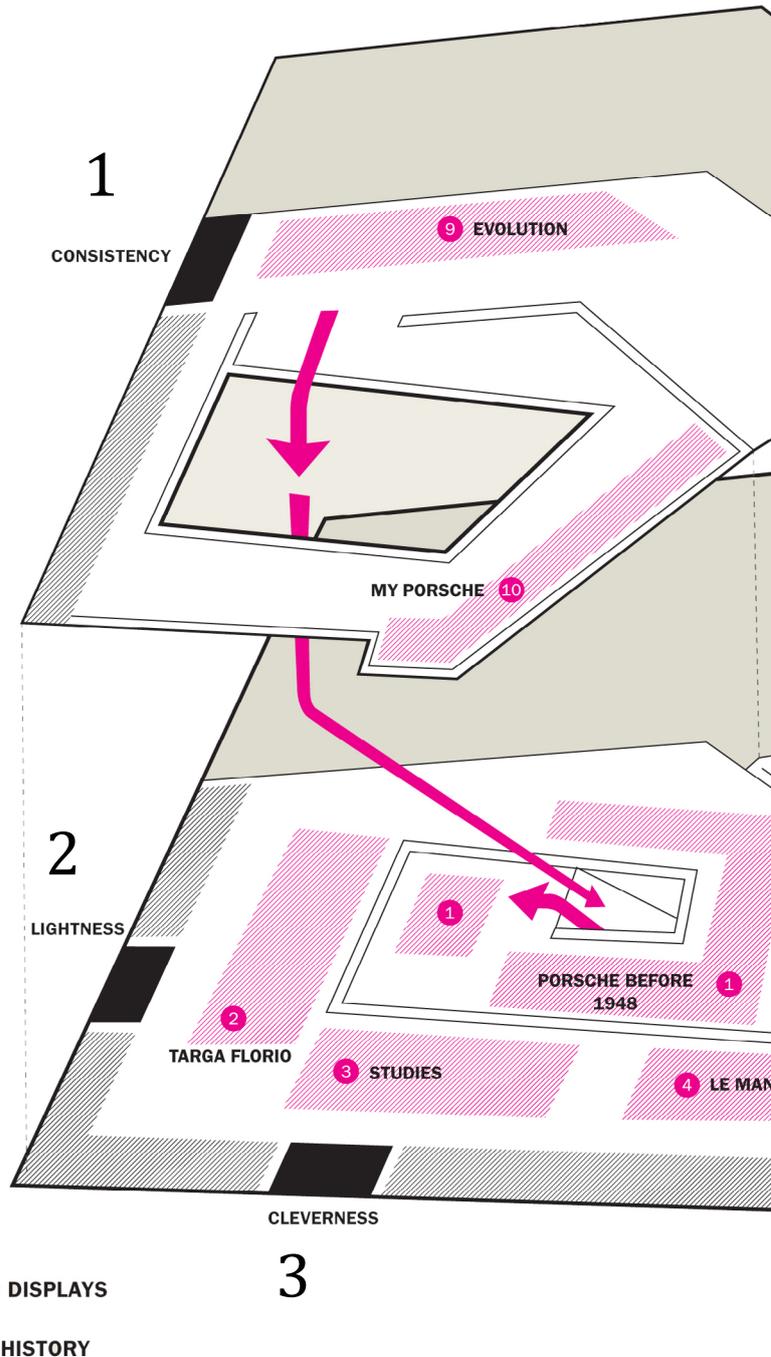
## **5. STRENGTH/THE 917 ERA**

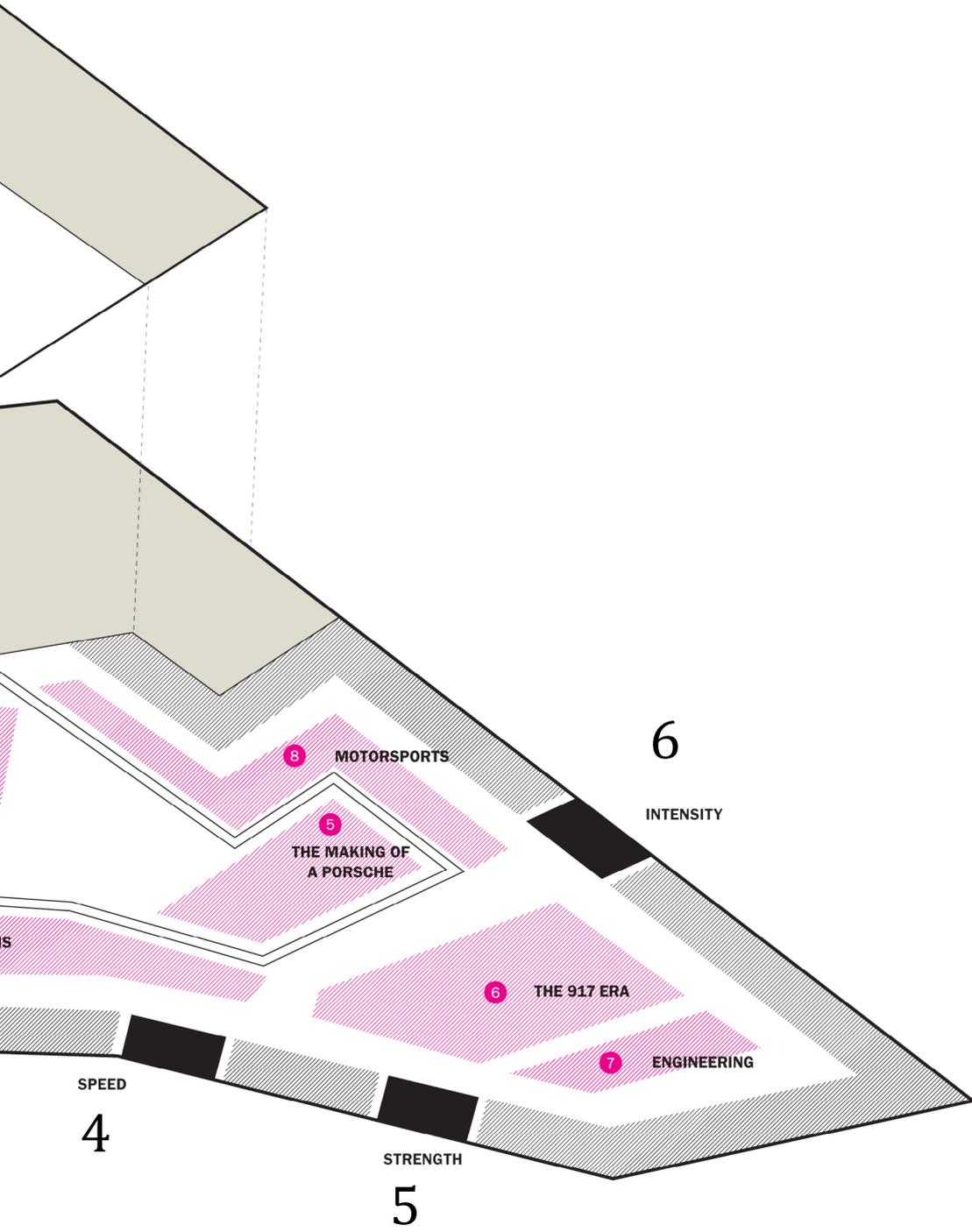
Porsche is a pioneer in turbocharging technology. Incredibly powerful and extremely reliable: the legendary Porsche 917.

## **6. INTENSITY/MOTORSPORTS**

Porsche and racing—a successful relationship with more than 28,000 victories.

- 1- Consistency
- 2- Lightness
- 3- Cleverness
- 4- Speed
- 5- Strength
- 6- Intensity





## 2.3 Mercedes Museum, Stuttgart, Germany

(Existing)



### Information:

#### Architects:

UNStudio

#### Location:

Stuttgart, Germany

#### Year:

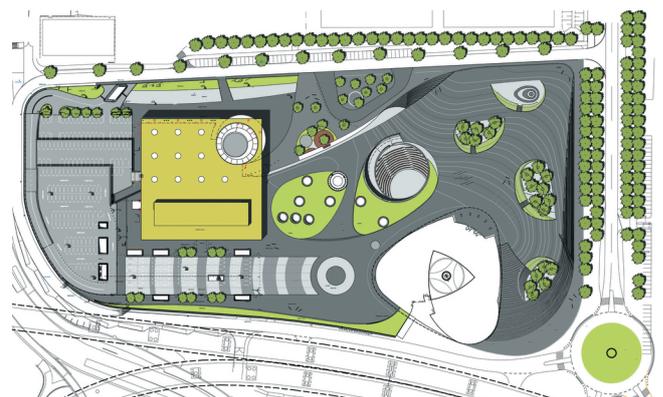
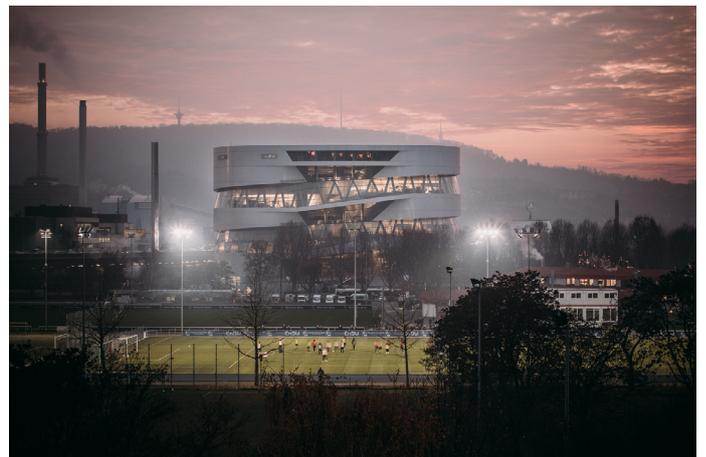
2006

#### Architect in charge:

Ben van Berkel

#### Area:

35000.0 m<sup>2</sup>



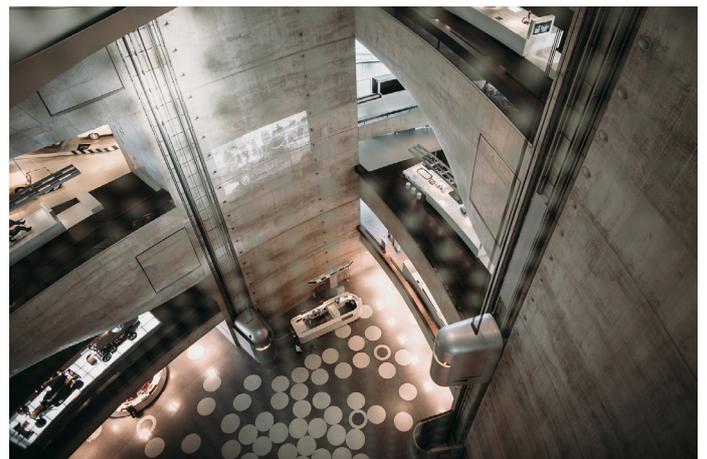
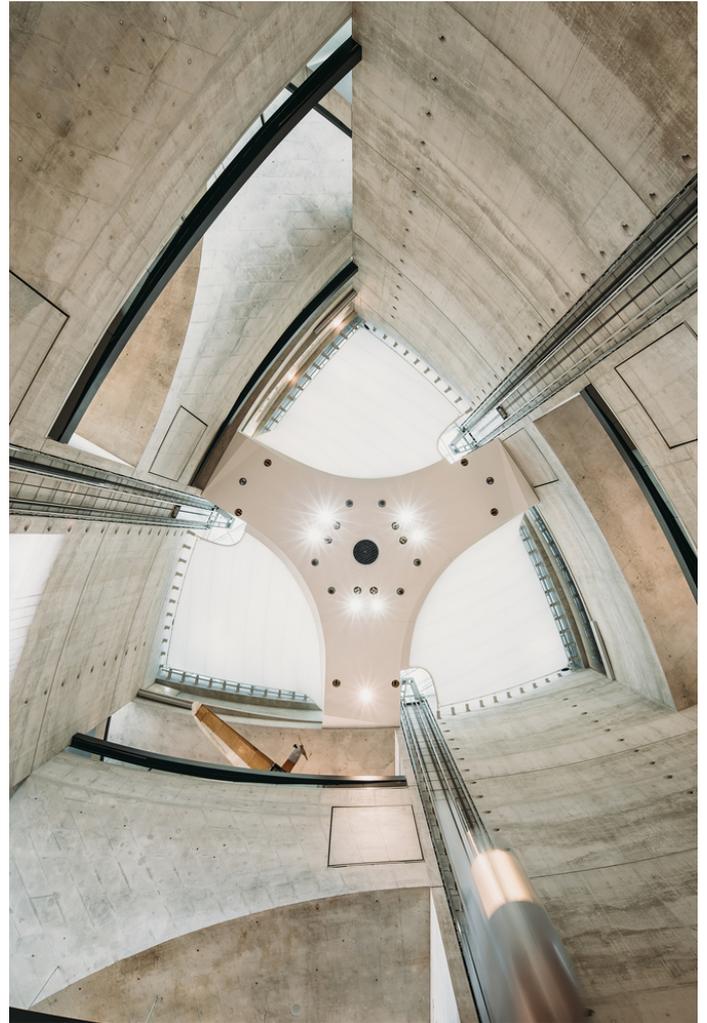
## 2.3.1 CONCEPT

Mercedes-Benz Museum develops (2001-2006), under the distinctive signature of UnStudio. The trefoil and double helix shape (Hansen, 2006) leads to a continuous walking space surrounding an inner atrium of the building, which hosts the entrance space, the elevators access hall and the opening of all exhibitions across the building elevation.

The design of the exhibition has been provided by HG Merz Architekten Musumsgestalter51 - a German architectural office specialised in museum design - who also contributed to Porsche Museum.

Architectural design innovation consists not only in the resulted nuanced volume and shape, but also in the process of project design involving advanced computational actions. The result is suggestively described: "Typical baroque characteristics are omnipresent; the building eludes quick comprehension, refuses to cut clear boundaries, even blurs its boundaries.

It is impossible to detect the tremendous forces at work, and even this vehemence is easily concealed by absorbing it into one infinite motion. Situated in a wide open public space, MercedesBenz Museum is a distinctive object presenting itself as unique and particular in terms of both image and architectural design



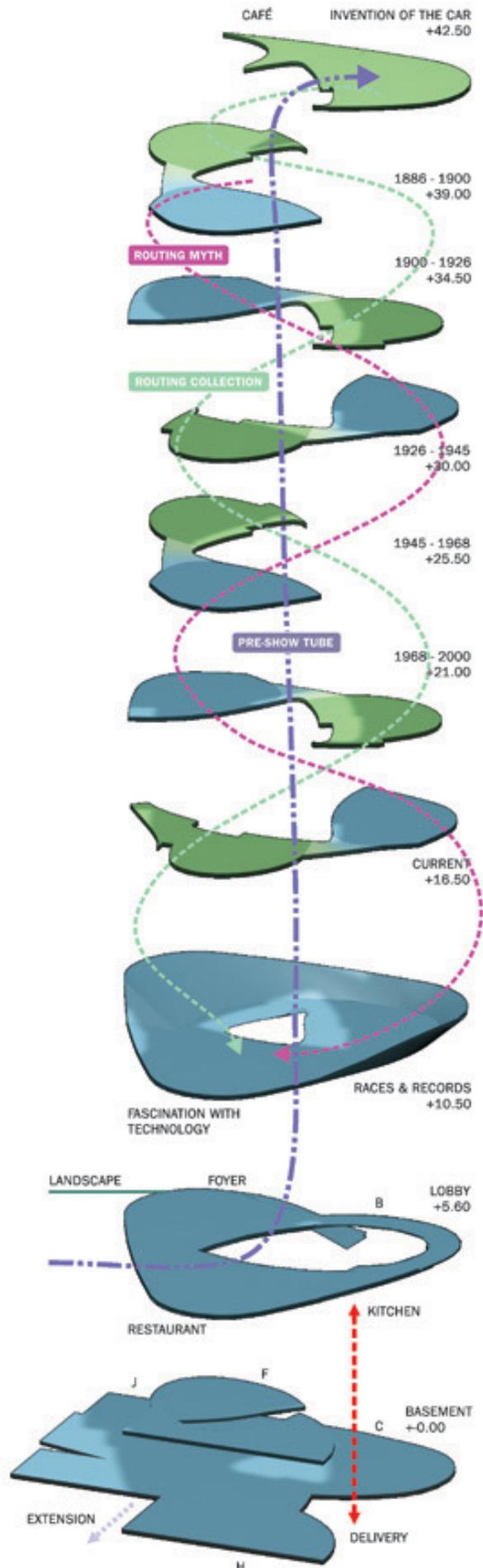
## 2.3.2 PROGRAM, PLANS, AND SECTIONS

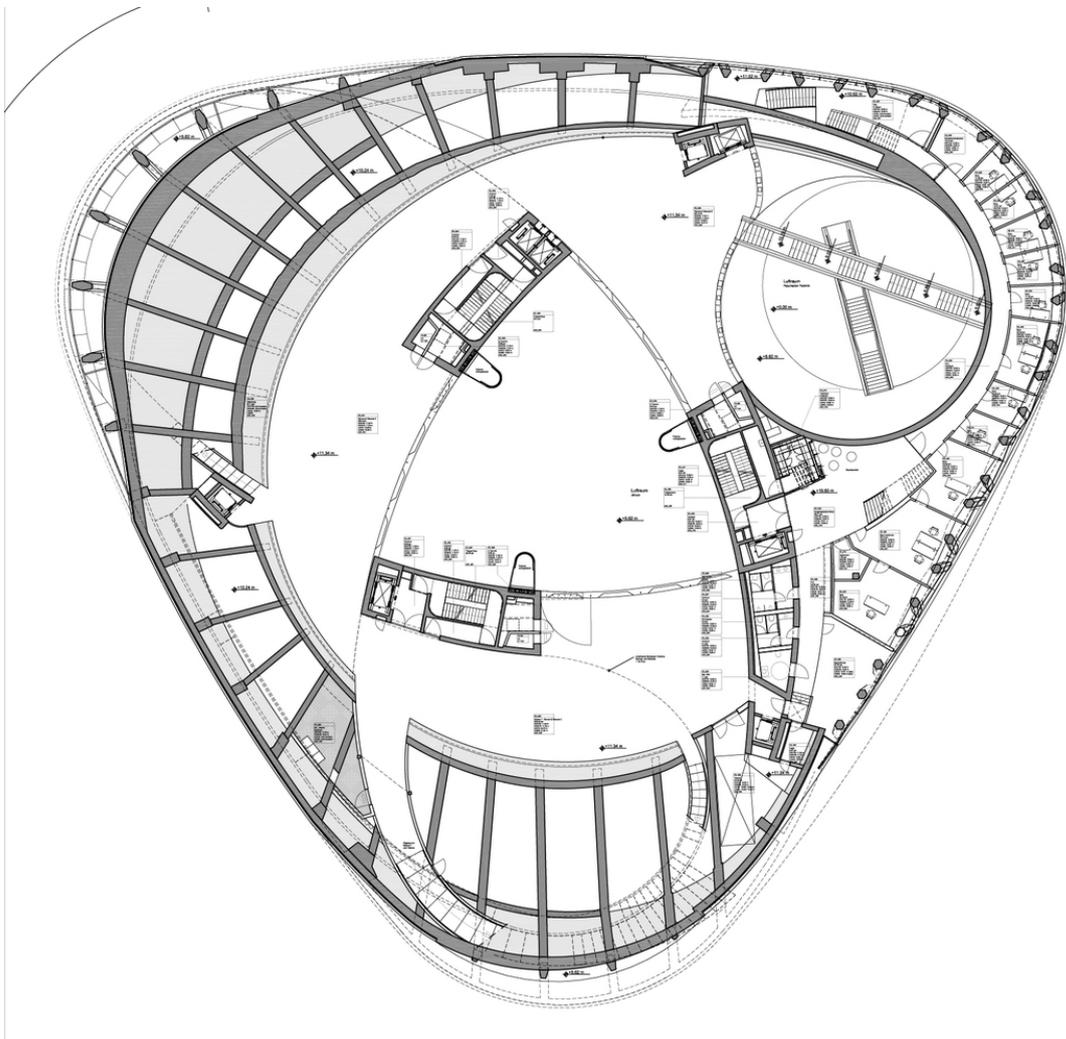
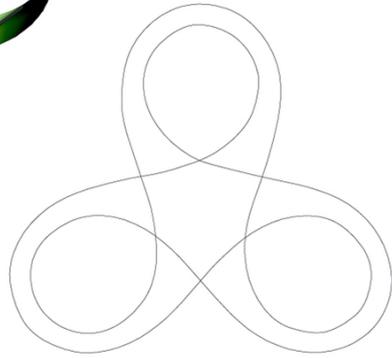
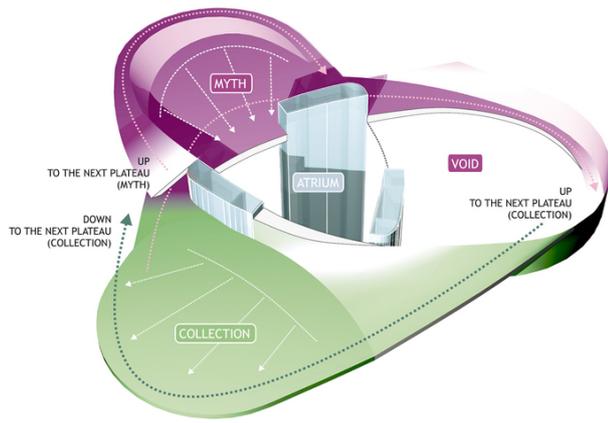
The Museum's sophisticated geometry synthesizes structural and programmatic organizations resulting in a new landmark building celebrating a legendary car. The geometric model employed is based on the trefoil organization. The building's program is distributed over the surfaces which ascend incrementally from ground level, spiraling around a central atrium.

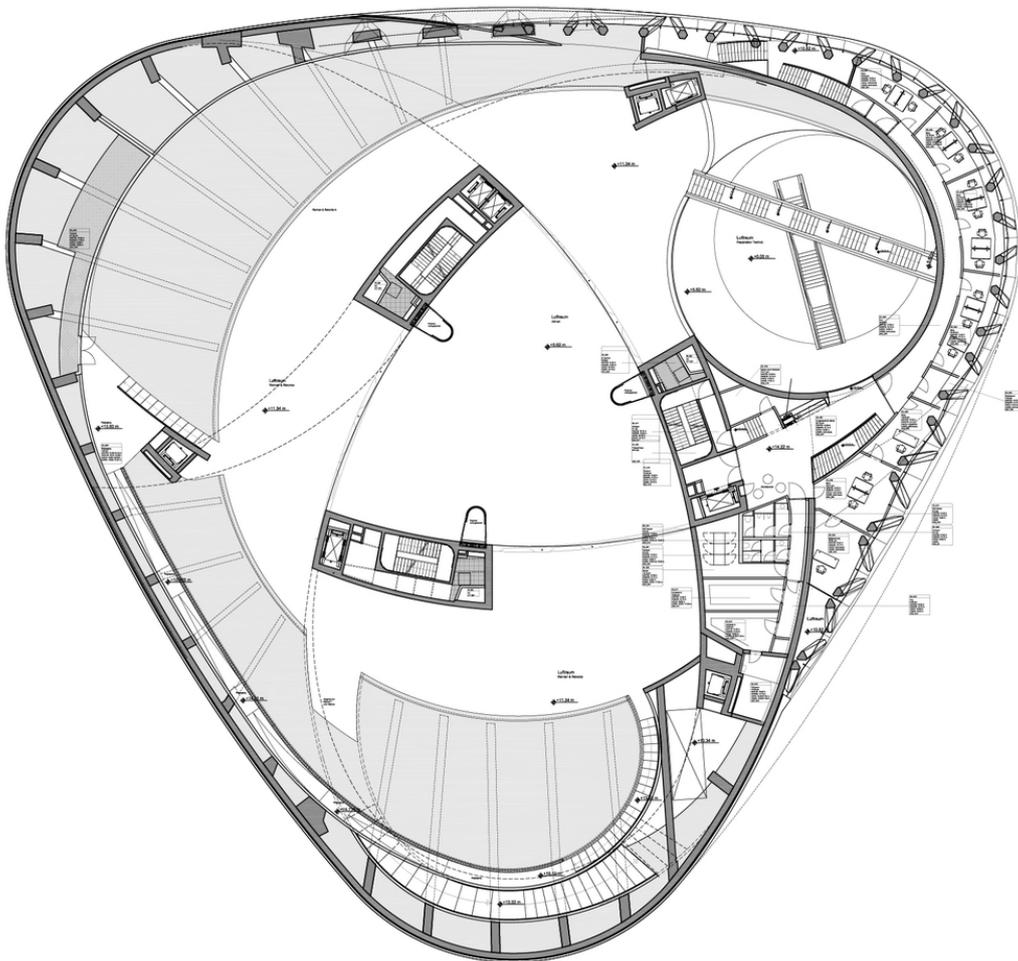
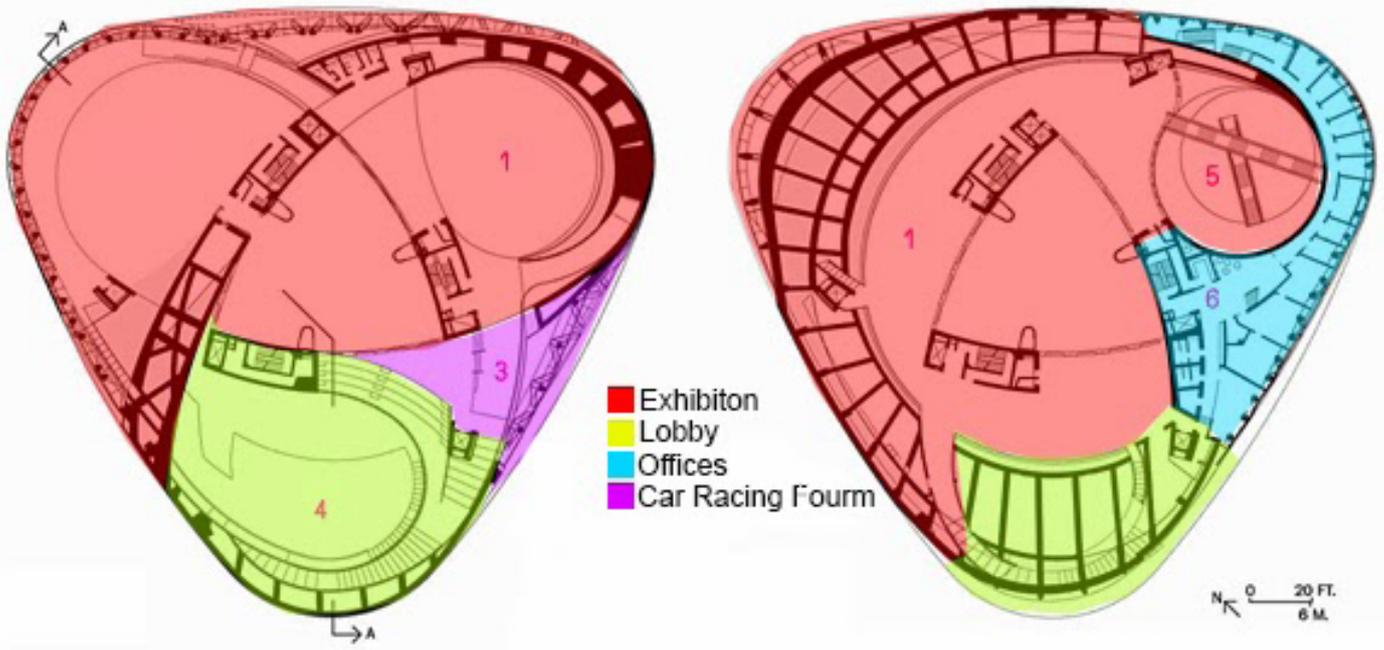
The Museum experience begins with visitors traveling up through the atrium to the top floor from where they follow the two main paths that unfold chronologically as they descend through the building. The two main trajectories, one being the car and truck collection and the other consisting of historical displays called the Legend rooms, spiral downwards on the perimeter of the display platforms, intersecting with each other at several points allowing the visitor to change routes.

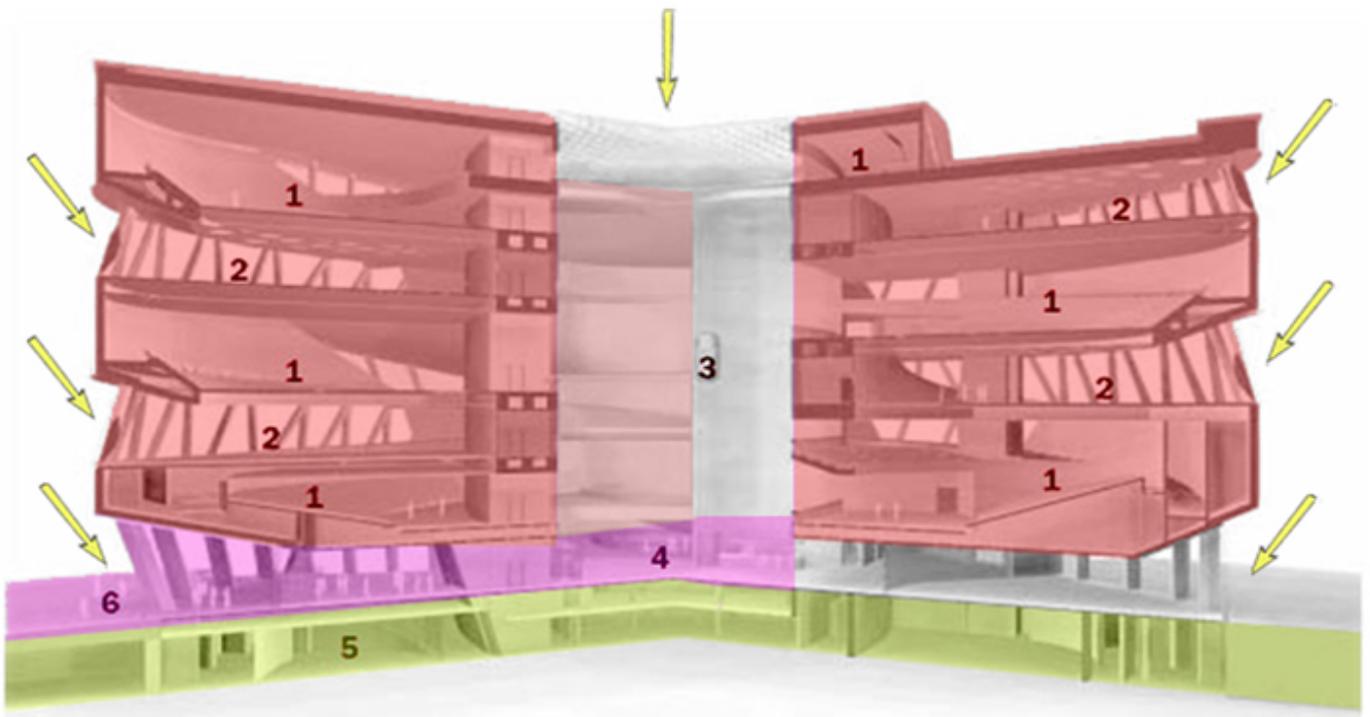
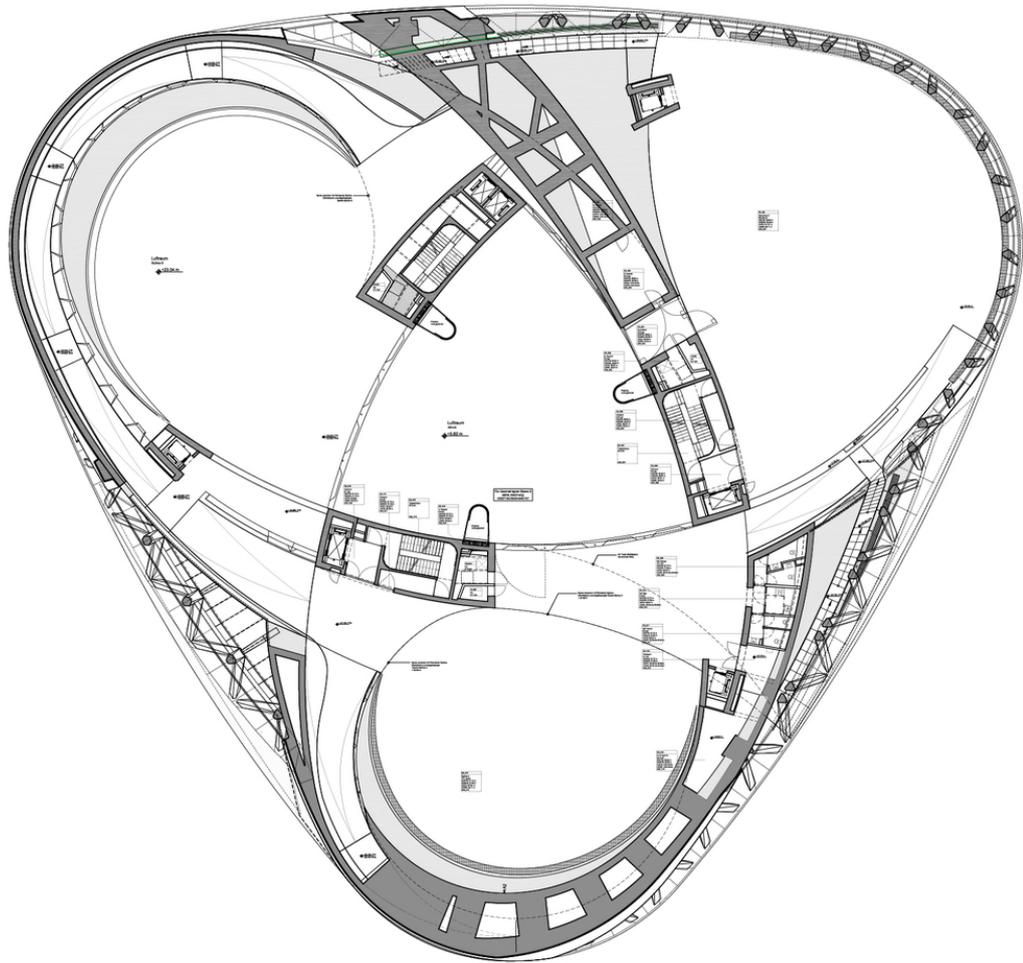
The 25,000 m<sup>2</sup> MB Museum is situated next to the Daimler-Chrysler Untertuerkheim plant on a raised platform which also offers room to the Vehicle Center. Visitors enter the building from the northwest corner. The entrance lobby introduces to the visitor the organizational system of the Museum, which entails the distribution of the two types of exhibitions over three 'leaves', which are connected to a central 'stem' in the form of an atrium.

The visitor proceeds through the Museum from top to bottom; during the ride up the atrium, visitors are provided with a multimedia Preshow presentation. The two aspects of the museological arrangement, the collection of cars and trucks and the Myths, are ordered chronologically from top to bottom, starting with the three oldest cars at the top floor in the display dedicated to the invention of the car. From this starting point at the top, the +eight level, the visitor may take one of two spiralling ramps down; the first chain linking the collection of cars and trucks, and the second the connecting Mythos rooms, which are the secondary displays related to the history of Mercedes Benz. The two spiralling trajectories cross each other continuously, mimicking the interweaving strands of a DNA helix, thus making it possible for the visitor to change trajectories.









**SECTION A-A**

Legend:

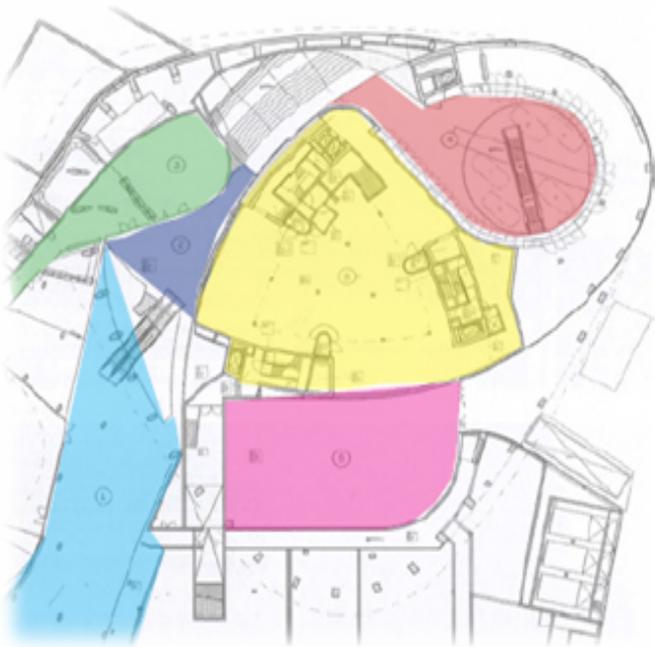
- Exhibition
- Office
- Lobby
- Other
- Light

- 1. Historical Exhibition
- 2. Vehicle Collection
- 3. Elevator

- 4. Lobby/ Atrium
- 5. Underpass
- 6. Entrance/ Exit

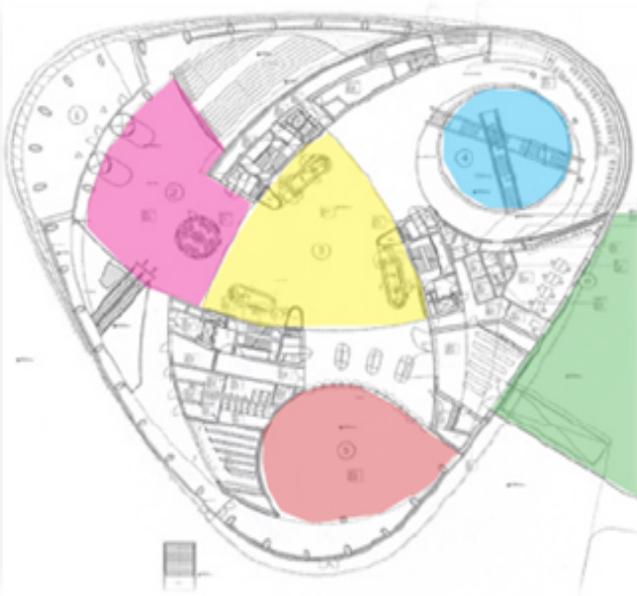


## Level 0



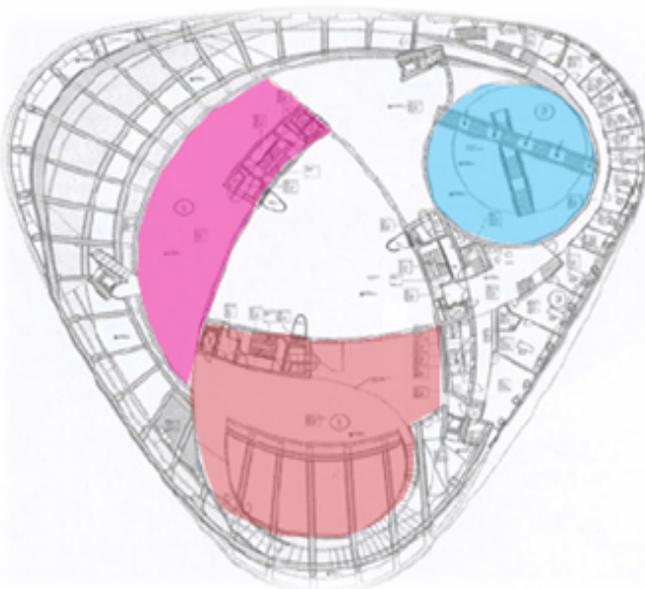
- Passage
- Connection to lobby
- Club area
- Fascination of technology
- Technical area
- Depot

## Level 1



- Main Entrance/Lobby
- Atrium
- Fascination of technology
- Grand Hall
- Offices

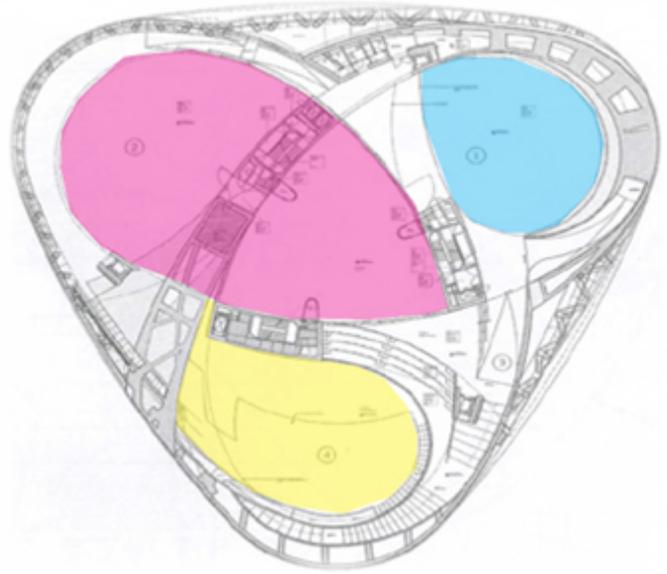
## Level 2



- Legend 7 race and records
- Fascination of technology
- Offices

### Level 3

- Legend 6
- Collection
- Void above legend 7



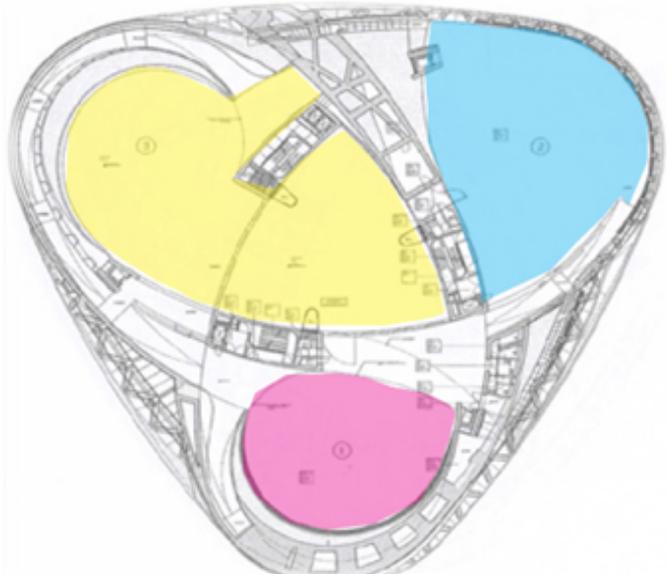
### Level 4

- Legend 5
- Collection 4
- Void above legend 6



### Level 5

- Legend 4
- Collection 3
- Void above legend 5



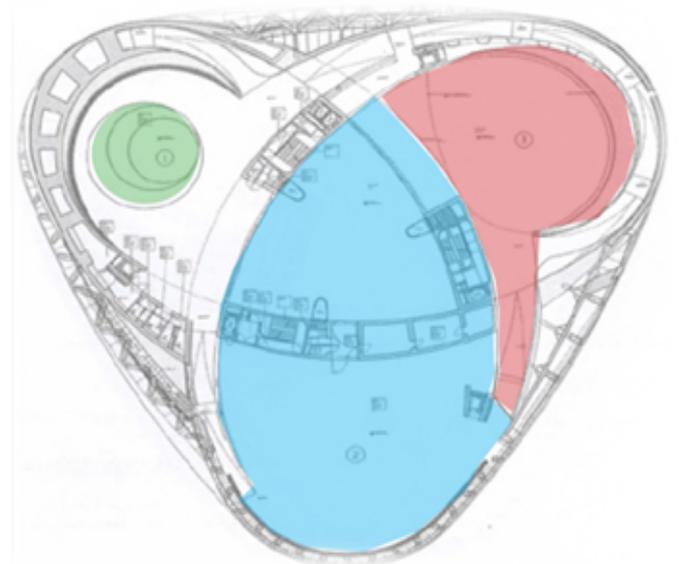
## Level 6

- Legend 3
- Collection 2
- Void above legend 4



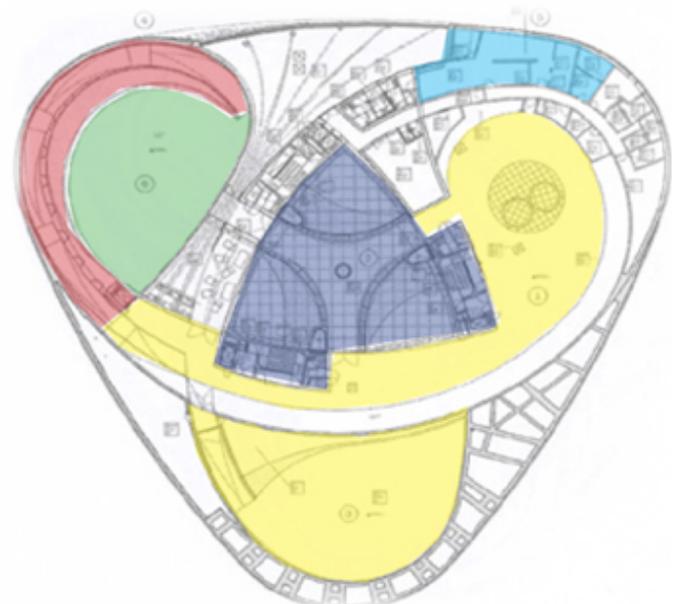
## Level 7

- Legend 2
- Collection 1
- Void above legend 3



## Level 8

- Legend 1
- Preshow bridge
- Event space/ casino
- Kitchen area
- Void above legend 2





## 2.4 Audi museum, Ingolstadt, Denmark

(Existing)



### Information:

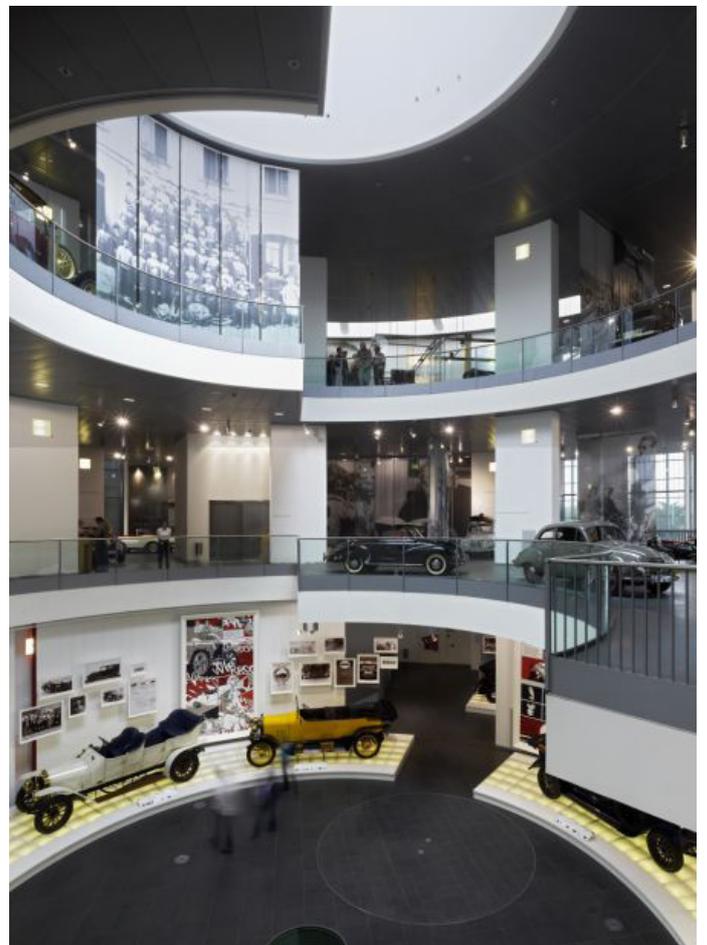
**Location:**  
Ingolstadt, DE

**Client:**  
AUDI

**Area GFA:**  
9,600 m<sup>2</sup>

**Architect:**  
HENN

**Year:**  
2000

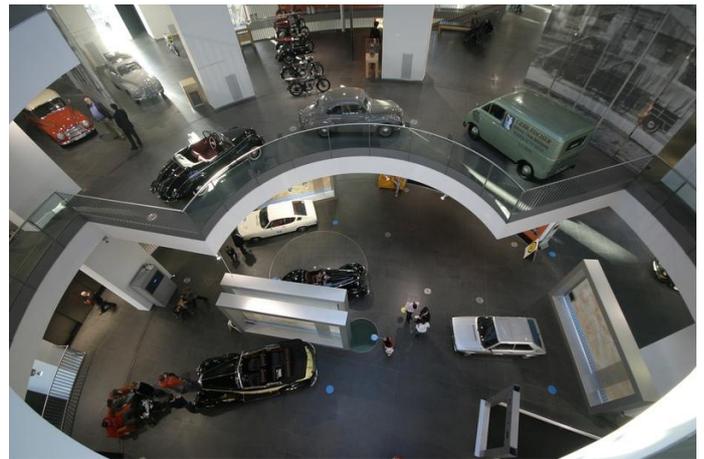


## 2.4.1 CONCEPT

a circular building with large glass openings suggesting something closer to a multi-storey showroom than a museum. It features circular floors with a large round void in its core and a spectacular car elevator - moving continuously a part of the exhibits up and down in the space, creating an impressive and somehow unusual mobile technological display. The same elevator is used to move the cars from one floor to another. Although following a circular path -the visitor perceives the exhibits sequenced- floor by floor - and not in continuous walk like in the case of Mercedes Museum.



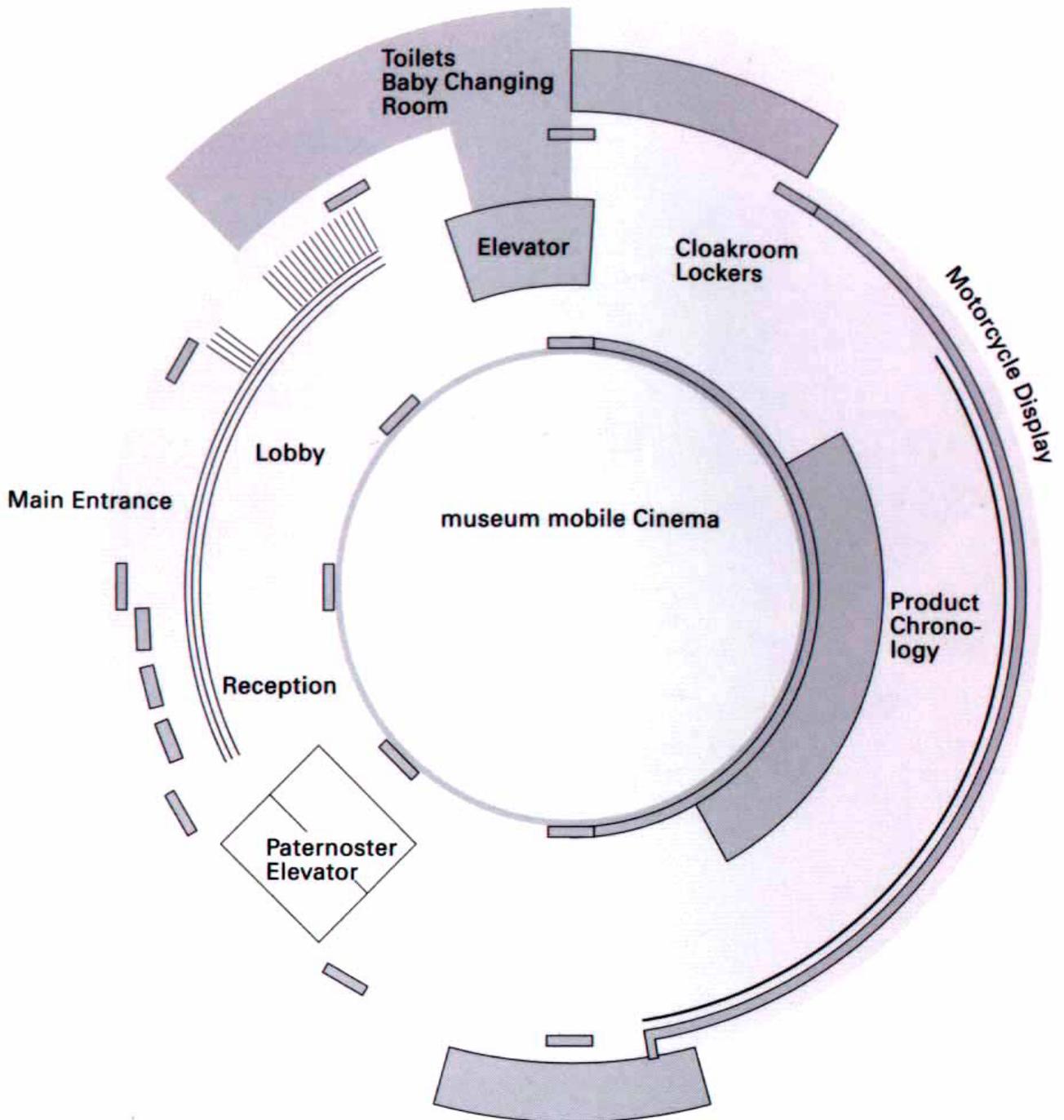
With its 5.800 m<sup>2</sup> it is by far the smallest of the listed examples which makes it seem modest by comparison (see Table II.). However it manages to present reasonably the brand history and technological evolution using in addition to the exhibited cars various printed and video media. Museum Mobile is also the oldest of the chosen examples and this shows - it is somehow less spectacular, with a more timid architectural approach - probably also because it is conceived as an entrance pavilion-like feature and part of a much larger development site including significantly larger buildings.



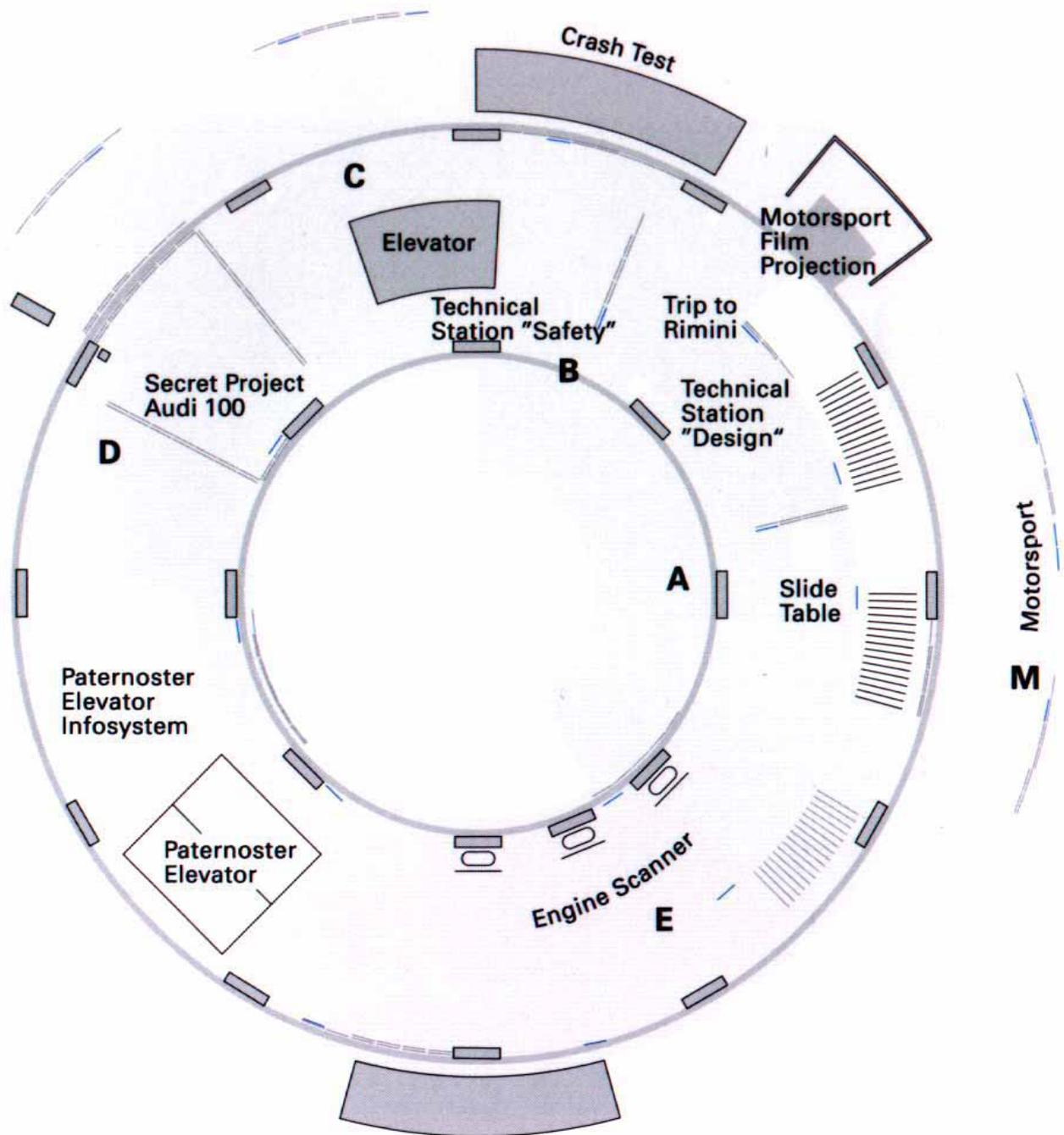
**The brand identity becomes visible in the building's language and is transported to the outside. The Museum Mobile is the three-dimensional content hub of the building ensemble on the Audi Forum. In terms of town planning it formulates the entrance to the works premises, in terms of content it realises such expressions as transparency and mobility.**



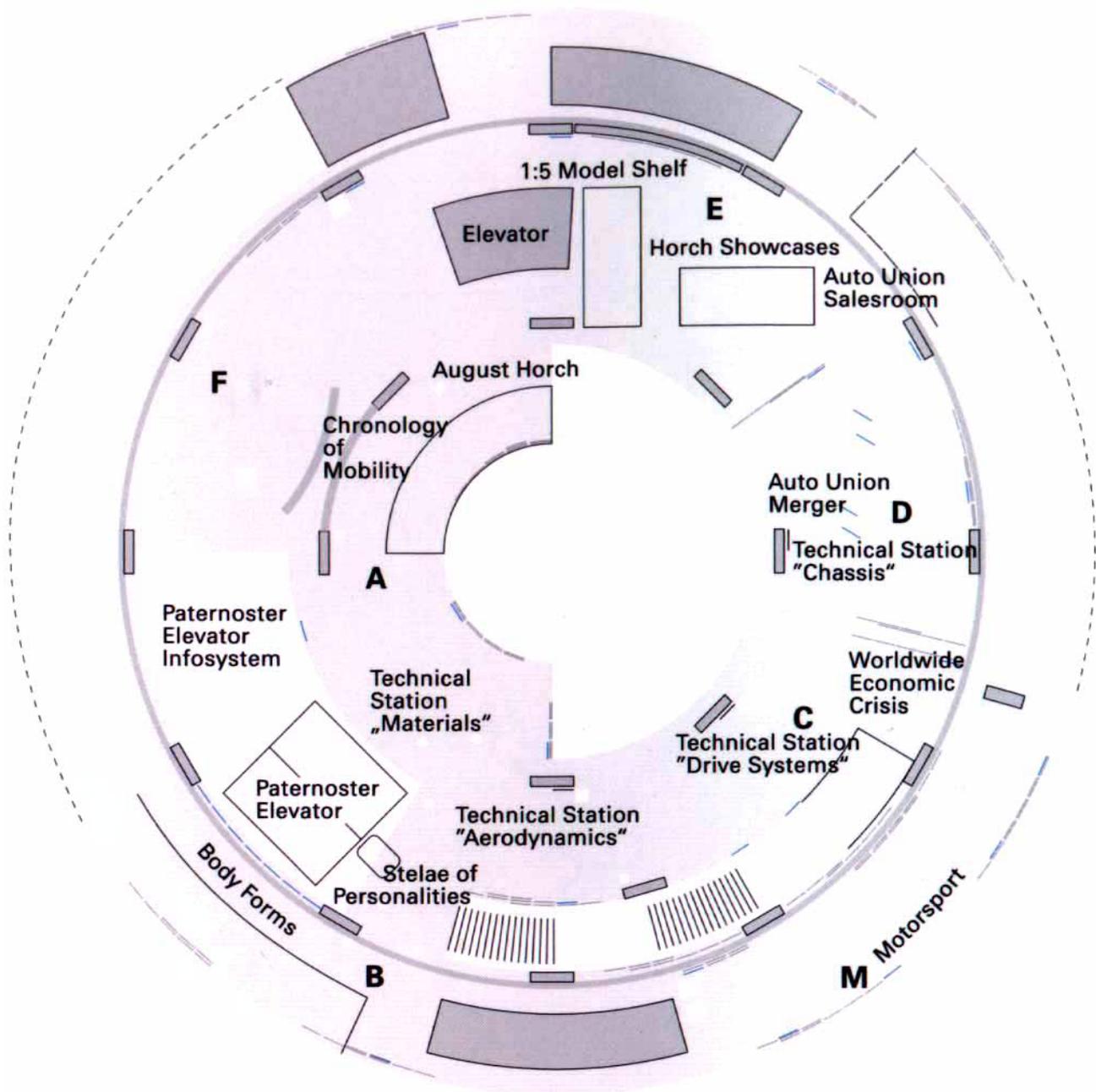
## 2.3.2 PROGRAM, PLANS, AND SECTIONS



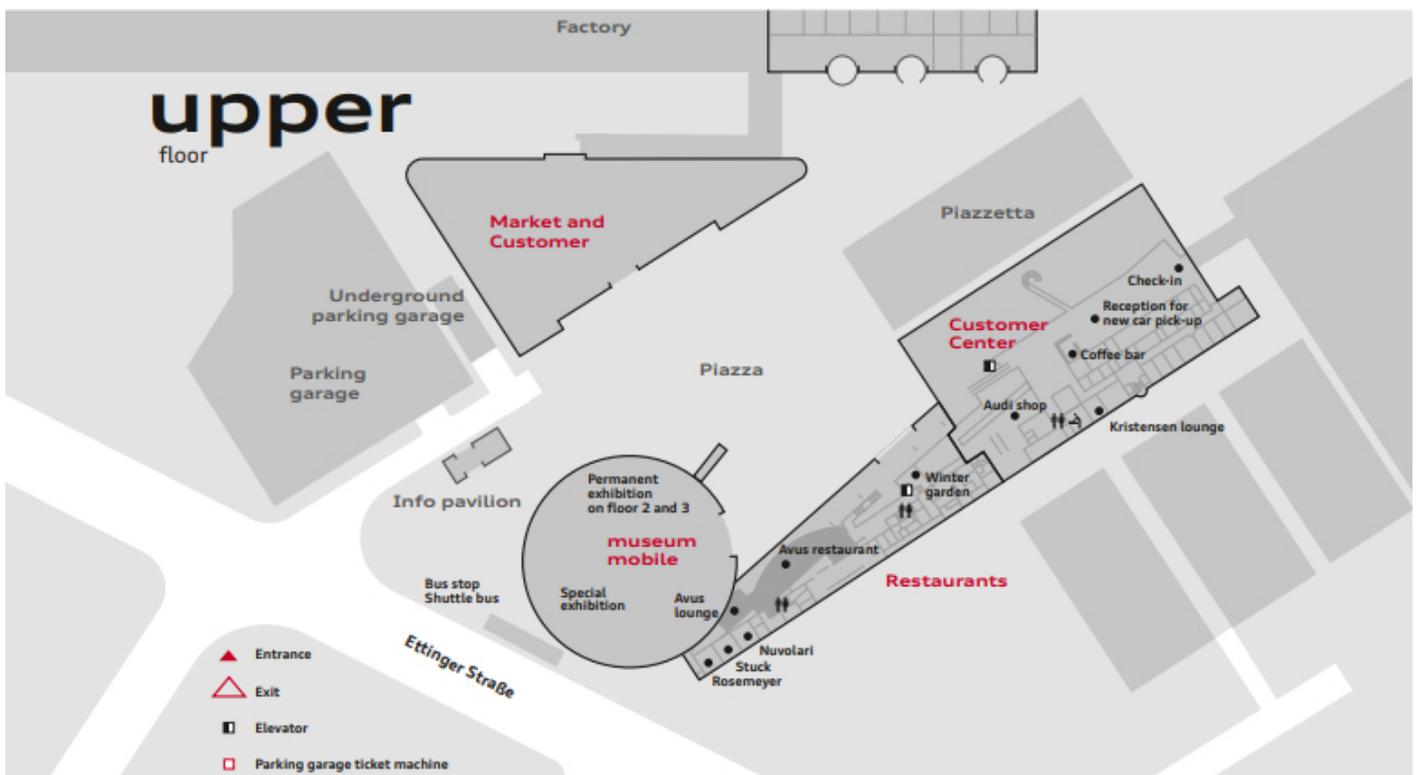
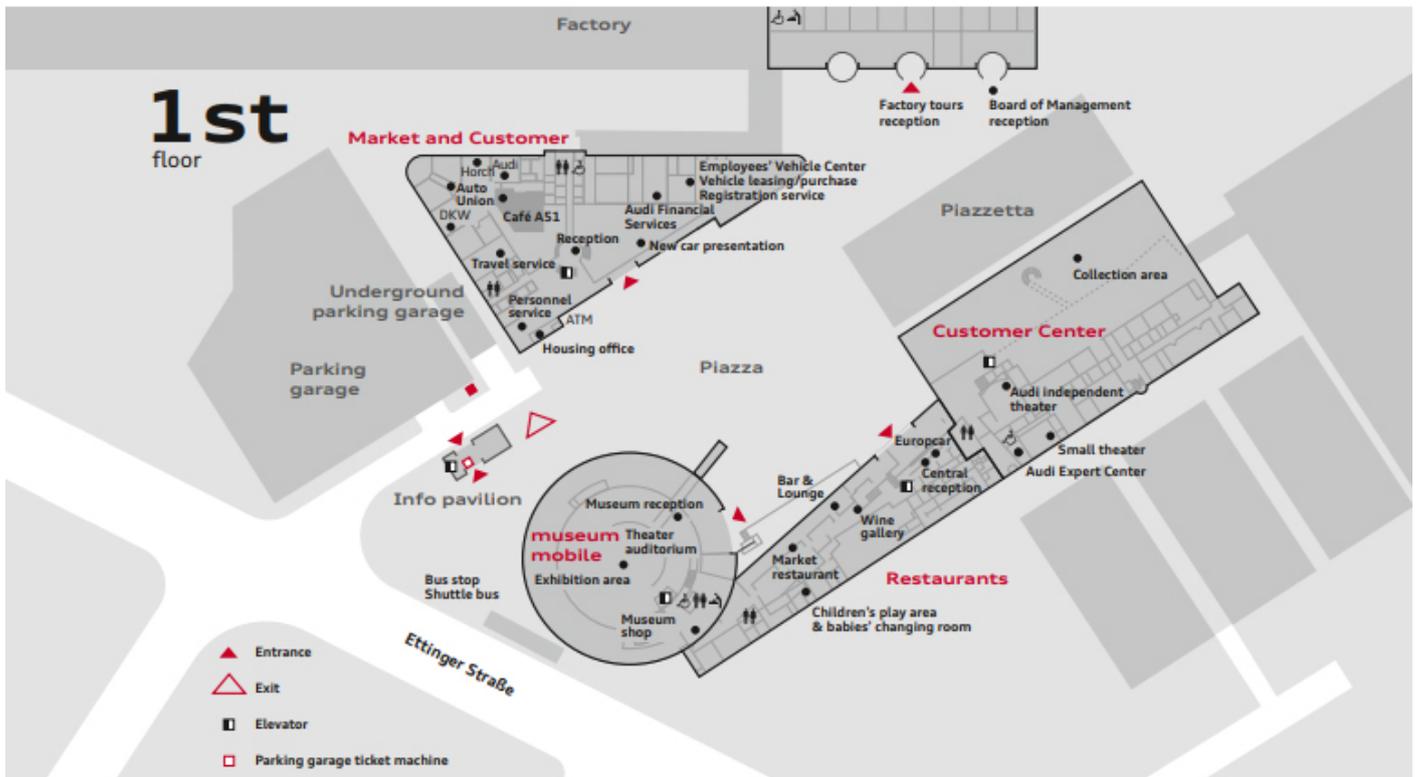
Ground floor



Level 1



Level 2



## 2.5 References

- 1 - <https://www.archdaily.com/805982/mercedes-benz-museum-unstudio/>
- 2 - <https://www.world-architects.com/en/unstudio-amsterdam/project/mercedes-benz-museum-2>
- 3 - <http://arch3610s2014precarey.blogspot.com/2014/02/>
- 4 - <https://www.archdaily.com/29664/bmw-welt-coop-himmelblau>
- 5 - <http://forgemind.net/phpbb/viewtopic.php?t=12135>
- 6 - <https://www.dezeen.com/2009/02/01/porsche-museum-by-delugan-meissl/>
- 7 - <https://www.architonic.com/en/project/delugan-meissl-associated-architects-porsche-museum/5100017>
- 8 - <https://www.architonic.com/en/project/delugan-meissl-associated-architects-porsche-museum/5100017>
- 9 - <https://www.world-architects.com/en/projects/view/porsche-museum-2>
- 10 - <https://www.arch2o.com/the-porsche-museum-delugan-meissl/>

## 2.6 Case study comparative analysis and Findings



study case / figures+numbers	BMW WELT – BMW MUSEUM <sup>abcd</sup>	
	1	
	1.1.	1.2.
<b>opened</b>	2007	1973/ 2008
<b>time</b>	2001 competition 2001 planning 2003 start construction 2007 opening	1968 – tender and competition 1971 construction start 1973 – opening 2004 – start renovation 2008 – opening of expansions
<b>Cost</b>	Approx Euro 100 million	–
<b>Architect</b>	COOP HIMMELB(L)AU	Prof. Karl Schwanzer Architect of renovation: Atelier Brückner
<b>Visitors</b>	2,5 million/2012	Over 500,000/ year
<b>Site area</b>	25,000 m <sup>2</sup>	–
<b>Ground floor Area</b>	16,000 m <sup>2</sup> (roof)	Area of Museum Bowl: 1,000 m <sup>2</sup> Area of low building: 4,000 m <sup>2</sup>
<b>Overall area</b>	75,000 m <sup>2</sup>	12,200 m <sup>2</sup>
<b>volume</b>	531,500 m <sup>3</sup>	–
<b>Exhibits (cars)</b>	284	approx. 130
<b>Sources</b>	(BMW Group Corporate Communications, 2009, 2012b)	(BMW Group Corporate Communications, 2013, 2012a)



<b>PORSCHE MUSEUM</b> Stuttgart, Baden-Württemberg <sup>ef</sup>	<b>MERCEDES BENZ MUSEUM</b> Stuttgart, Baden-Württemberg <sup>ghi</sup>	<b>AUDI MUSEUM</b> Ingolstadt, Bavaria <sup>i</sup>
2	3	4
2008	2006	2000
2004 competition 2005 award 2005 construction start 2009 opening	2001 competition 2003 construction start 2006 opening	1998-2000 2000 opening
Approx Euro 100 million	Over Euro 150 million	Approx Euro 11 million (authors estimation based on a total of 70 million for the whole Forum)
Delugan Meissl Associated Architects HG Merz (exhibition design)	UNStudio van Berkel & Bos, Amsterdam HG Merz (exhibition design)	HENN
500,000 (2009) 1,000,000 (by June 2011) <a href="http://press.porsche.com/news/release.php?id=836">http://press.porsche.com/news/release.php?id=836</a>	Over 700,000/2013	122,570/2011
8.200 m <sup>2</sup>	—	—
13,333 m <sup>2</sup>	4,800 m <sup>2</sup>	2,200 m <sup>2</sup>
27,692 m <sup>2</sup> 5,600 m <sup>2</sup> exhibition area	16,500 m <sup>2</sup> 35,000 m <sup>2</sup> exhibition space	5,800 m <sup>2</sup> Out of 36,000 m <sup>2</sup> Audi Forum
225,464 m <sup>3</sup>	210,000 m <sup>3</sup>	—
—	160	—
(PORSCHE AG, 2009; Delugan Meissl Architects, 2014)	(DAIMLER, 2014, 2012; UN STUDIO, 2014; PERI Group, 2014; Wüst, 2014)	(AUDI AG Media Services, 2012; HENN, 2014)

<b>study case/ investigating correlated urban-architectural synthetic factors</b>	<b>BMW WELT – BMW MUSEUM</b>	
	1	
<b>Architecture category</b>	museum, cultural	museum, cultural
<b>urban category</b>	insertion, cultural, attraction, touristic	insertion, cultural, attraction, touristic
<b>relation /address to the context</b>	response of the client as technologic design ICON-recipe: innovative landmark	present, but discreet, as an accent of the closed factory (renovated)
<b>volume typology</b>	mass emotional architecture	ground-underground architecture
<b>architecture concept</b>	<i>brand-experience and car-delivery centre; to create a spatial, ideal, and identity-forming architectural ensemble</i>	renovation, re-concept <i>Road in the rebuilt space (add to old concept: streets and places in urban space)</i>
	high-tech, public space related, innovative at many levels	high-tech, public space related, innovative at many levels
<b>Urban features</b>	bridge connecting the building with factory development, plot on the park green side, connected with green bridge to the Olympia Stadium + continuous urban path	almost hidden underground, accent volume near the entrance, correlated with the factory, should be discovered
<b>architectural features</b>	the double cone, the fluid surfaces and shapes, the nuanced textures, huge volume and facades, mass built landscape making the alternance between the BMW WERK scale and Olympia Stadium scale	the concrete mushroom as accent, the neutral entrance, almost hidden as expression or very discreet
<b>structure</b>	metallic + composite (concrete and metal)	concrete + composite (concrete and metal)
<b>interior architectural features</b>	bridge road passing through, exhibition concept space – everything with one roof	urban streets and plazas, lighting neutral from the walls, everything is a path, every wall is light and information or exhibition, design should be an expression of art.

<b>PORSCHE MUSEUM</b> Stuttgart, Baden-Württemberg	<b>MERCEDES BENZ MUSEUM</b> Stuttgart, Baden-Württemberg	<b>AUDI MUSEUM</b> Ingolstadt, Bavaria
2	3	4
museum, cultural	museum, cultural	museum, cultural
insertion, cultural, attraction, touristic	insertion, cultural, attraction, touristic	insertion, cultural, attraction, touristic
response of the client as technologic design ICON-recipe: innovative landmark	response of the client as technologic design ICON-recipe: innovative landmark	present, but discreet, as an accent of the closed factory. ICON through contrast
floating volume above public space	man& machine computer design, statement	modernist, rotation volume/volumes
<i>design concept, all white, autonomous</i>	<i>museum sets up an interface for a series of radical spatial principles in order to create a completely new typology</i>	<i>place for the pursuit of learning history meets modern</i>
high-tech, public space related, innovative at many levels	high-tech, public space related, innovative at many levels	high-tech, public space related, innovative as status
urban island, nearby the railroad and the bridge above, developing a conceptual public place, but in fact developing paths through the conceptual public space, floating urban object as museum s expression	plaza with different accesses, upper plaza near the street	in the courtyard of the factory development
floating autonomous object as museum s expression, public space intention and continuity, visual connected with the showroom across the street	mono-block sculptural volume, with 2 types of textures-manifestation skins, massive but impressive-emotional comparing with flat + slope plaza	mono-block as central radial space, circular starting from the idea of forum, shaped and round facade-surfaces nuanced, in a rotation understanding of the volume, probably from the concept of mobile-mobility.
metallic + composite (concrete and metal)	concrete + composite (concrete and metal)	metallic + composite (concrete and metal)
interior space segmented but scenographic spaces, articulating 2 states of emotion + the down and the upper, all white as design, all clear and pure – only shape should be visible	*algorithmic architecture, designed from interior state of perception and path through, central atrium, continuous walking space and space exhibition	central atrium, open space exhibition to the atrium, mobile devices

## 2.7 Program contents comparison

Program contents	BMW	Porsche	Mercedes	Audi
Parking	10 %	20 %	×	×
Technology	2 %	15 %	5 %	5 %
Storage	5 %	3 %	5 %	5 %
Exhibition	30 %	40 %	20 %	30 %
Premiere	20 %	×	20 %	20 %
Lounge	5 %	10 %	3 %	3 %
Offices	5 %	2 %	8 %	5 %
Restaurant	3 %	×	5 %	3 %
Multipurpose	10 %	×	10 %	5 %
Club area	×	×	5 %	×
Foyer	×	×	10 %	5 %
Toilets	5 %	4 %	2 %	2 %
Mechanical	5 %	6 %	7 %	7 %



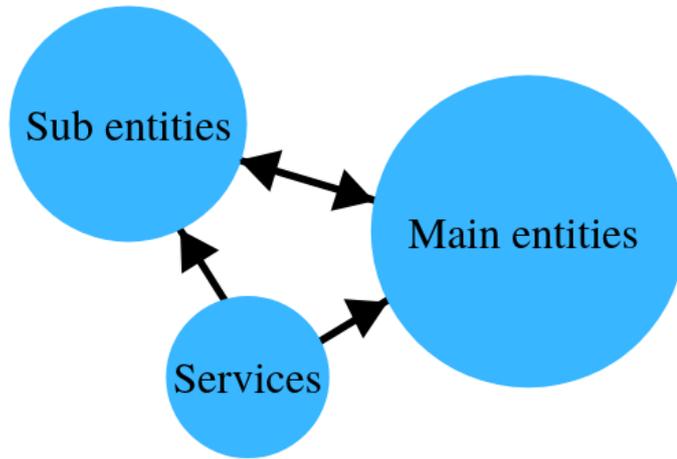


A black and white close-up photograph of the front of a classic car. The image is dominated by the right-side headlight, which is circular and features a prominent lens with a grid-like pattern. Below the main headlight is a smaller, round fog light. To the left, the top of the car's grille is visible, showing a grid pattern. The background is blurred, showing the side of the car and a window. The overall aesthetic is vintage and detailed.

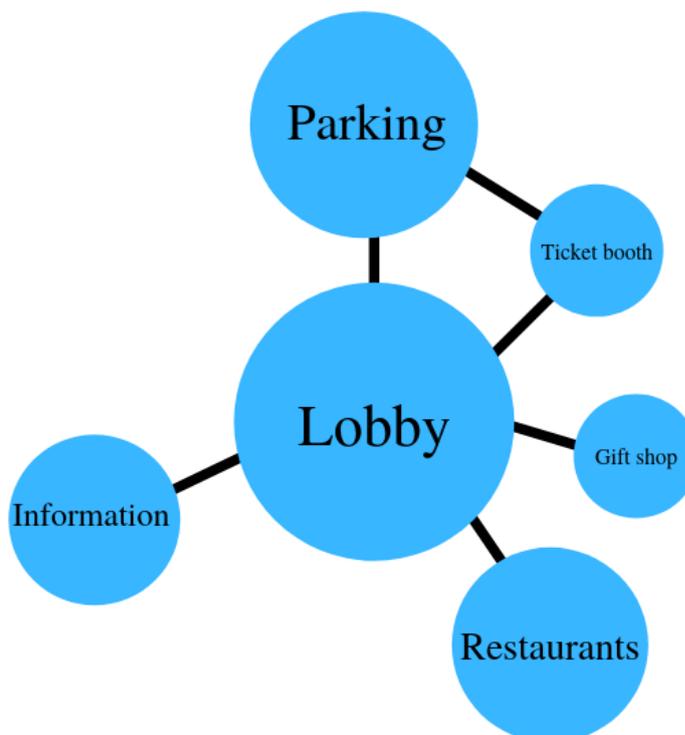
# CHAPTER 03: Program

# 3.1 Qualitative

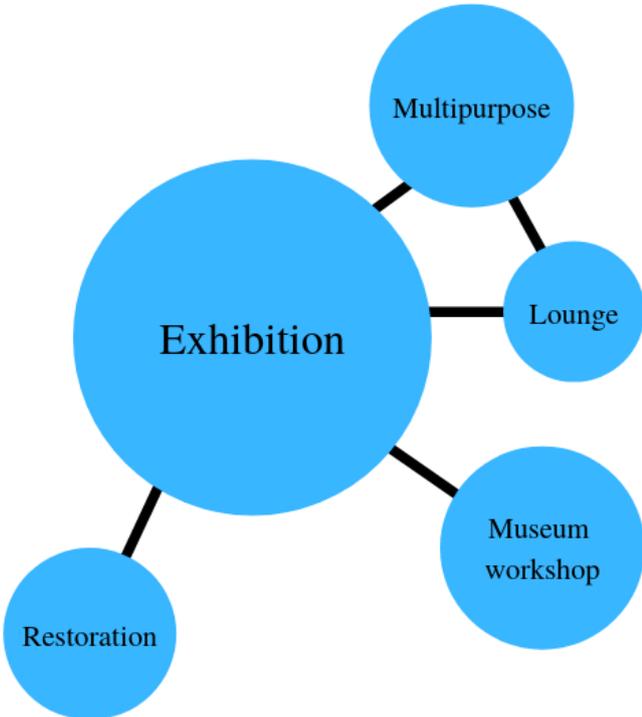
## 3.1.1 Bubble diagram



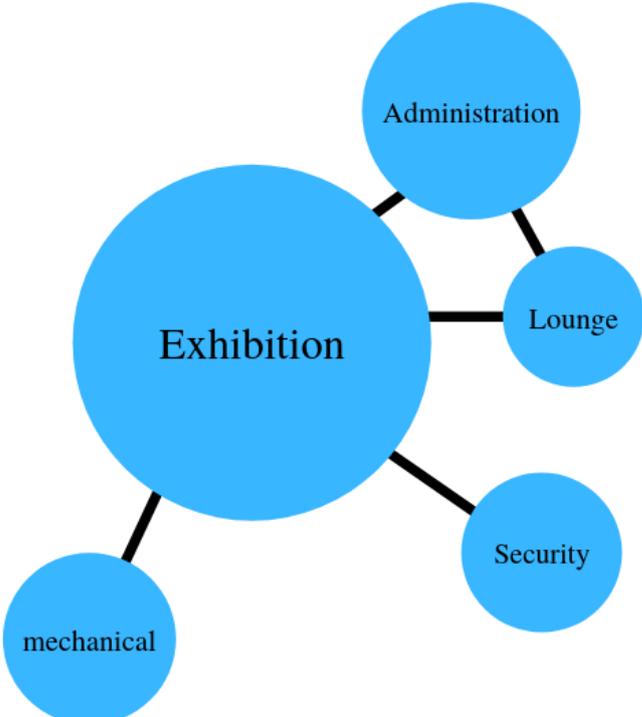
Ground Floor



First Floor



Second Floor



## 3.1.2 Zone type

### Main

- Lobby
- Exhibition
- Information
- Administration
- Ticket booth

### Sub

- Multi purpose
- Restaurant
- Lounge
- Restaurant
- Workshop

### Services

- Mechanical
- Security
- Parking
- Toilets
- Clinic
- Loading deck

### Notes :

- The multipurpose hall of the museum should be able to hold a car launch program.

- The minimum interior height of the museum should be such that a person can see the exhibits from the top also from a comfortable viewing distance.

- The circulation of the museum can be designed with single or multiple ramps to create more interesting spaces.

### **3.1.3 Zone Category**

#### **Public**

- Lobby
- Ticket booth
- Parking
- Restaurant
- Lounge
- Information
- Exhibition

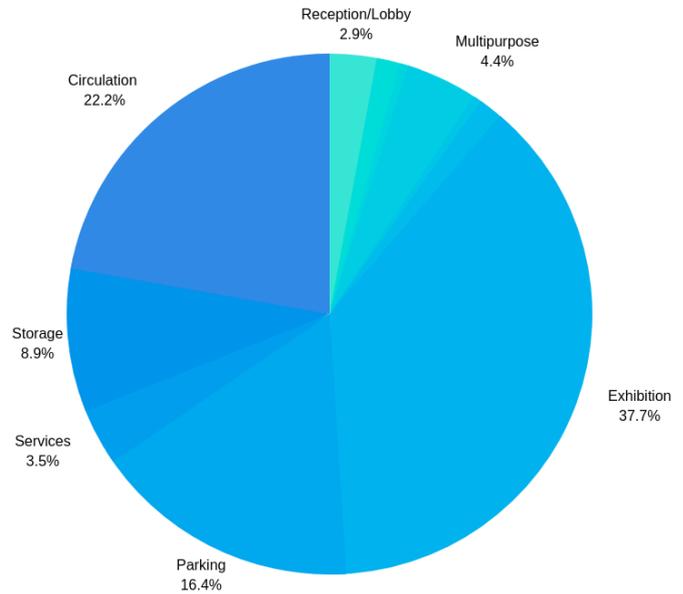
#### **Private**

- Administration
- Multipurpose hall
- Workshop
- Security
- Mechanical

## 3.2 Quantitative

### 3.2.1 Proposed Program

1. Lobby / reception
2. Lounge
3. Multi-purpose hall
4. Restaurant
5. Museum admin
6. Museum workshop
7. Exhibition space
8. Parking
9. Services
10. Storage



### 3.2.2 Proposed Program Area

<b>1. Reception/lobby</b>	<b>450 m2</b>
<b>2. Restaurant</b>	
- sitting arrangement	250 m2
-Kitchen+store	75 m2
<b>-Total</b>	<b>325 m2</b>
<b>3. Lounge - for 60 people 1200 sft</b>	<b>115 m2</b>
<b>4. Multi-purpose- which can be used as a launching area for the cars also.</b>	<b>660 m2</b>

## 5. Museum administration

- <b>Manager</b>	30 m <sup>2</sup>
- <b>Control room</b>	30 m <sup>2</sup>
- <b>Curator</b>	30 m <sup>2</sup>
- <b>Admin toilet</b>	26 m <sup>2</sup>
- <b>Total area</b>	<b>116 m<sup>2</sup></b>

## 6. Museum workshop

- <b>Chief mechanic</b>	20 m <sup>2</sup>
- <b>Storage</b>	10 m <sup>2</sup>
- <b>Workshop</b>	300 m <sup>2</sup>
- <b>Total area</b>	<b>330 m<sup>2</sup></b>

**7. Exhibition area** **8500 m<sup>2</sup>**

**8. Parking** **3700 m<sup>2</sup>**

**9. Services** **790 m<sup>2</sup>**

**10. Storage** **2,000 m<sup>2</sup>**

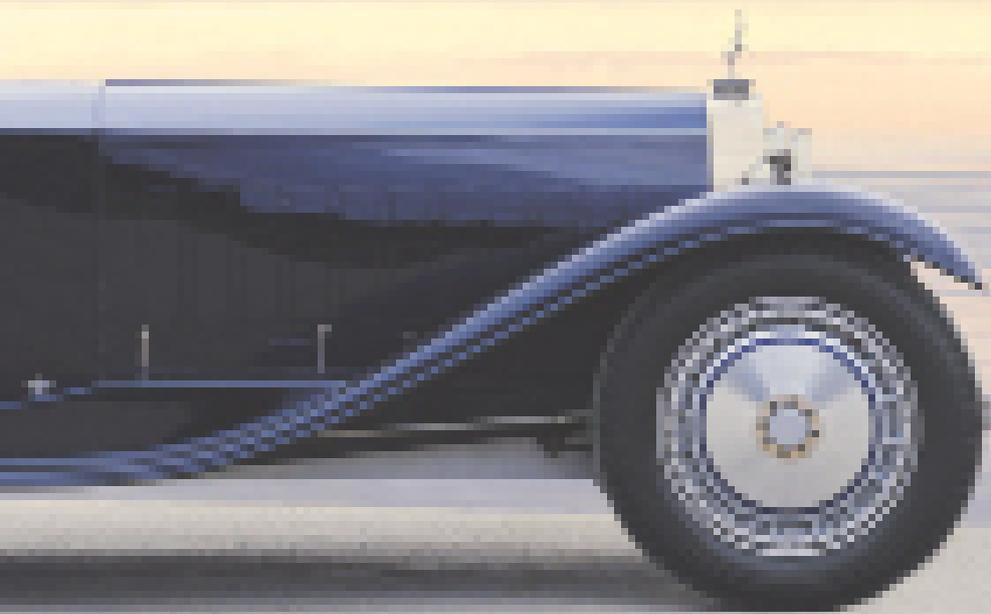
**11. Circulation** **5,000 m<sup>2</sup>**

**TOTAL BUILT UP AREA** **22,100 m<sup>2</sup>**





# CHAPTER 04: Site Selection



## 4.1 UAE

The United Arab Emirates (UAE) is a federation of seven states that has grown from a quiet backwater to one of the Middle East's most important economic centres.

The UAE has diversified and has become a regional trading and tourism hub. UAE firms have invested heavily abroad

## 4.2 Dubai

Dubai is located on the Eastern coast of the Arabian Peninsula, in the south west corner of the Arabian Gulf. With year-round sunshine, intriguing deserts, beautiful beaches, luxurious hotels and shopping malls, fascinating heritage attractions and a thriving business community, Dubai receives millions of leisure and business visitors each year from around the world.

**Dubai Motor City** is a property development in Dubai, United Arab Emirates, by Union Properties (a UAE based property development company). The development is based on a motor-sport theme and includes residential units, business towers, motor-sports facilities, retail and a theme park.

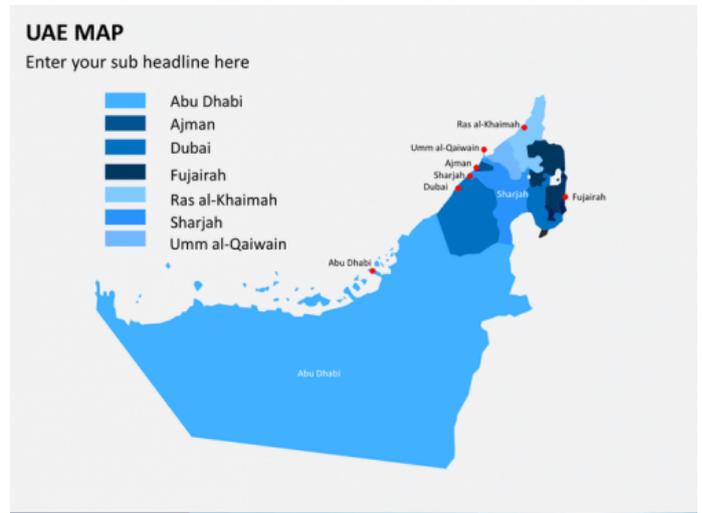
The key components of Dubai Motor City are:

**Dubai Autodrome**

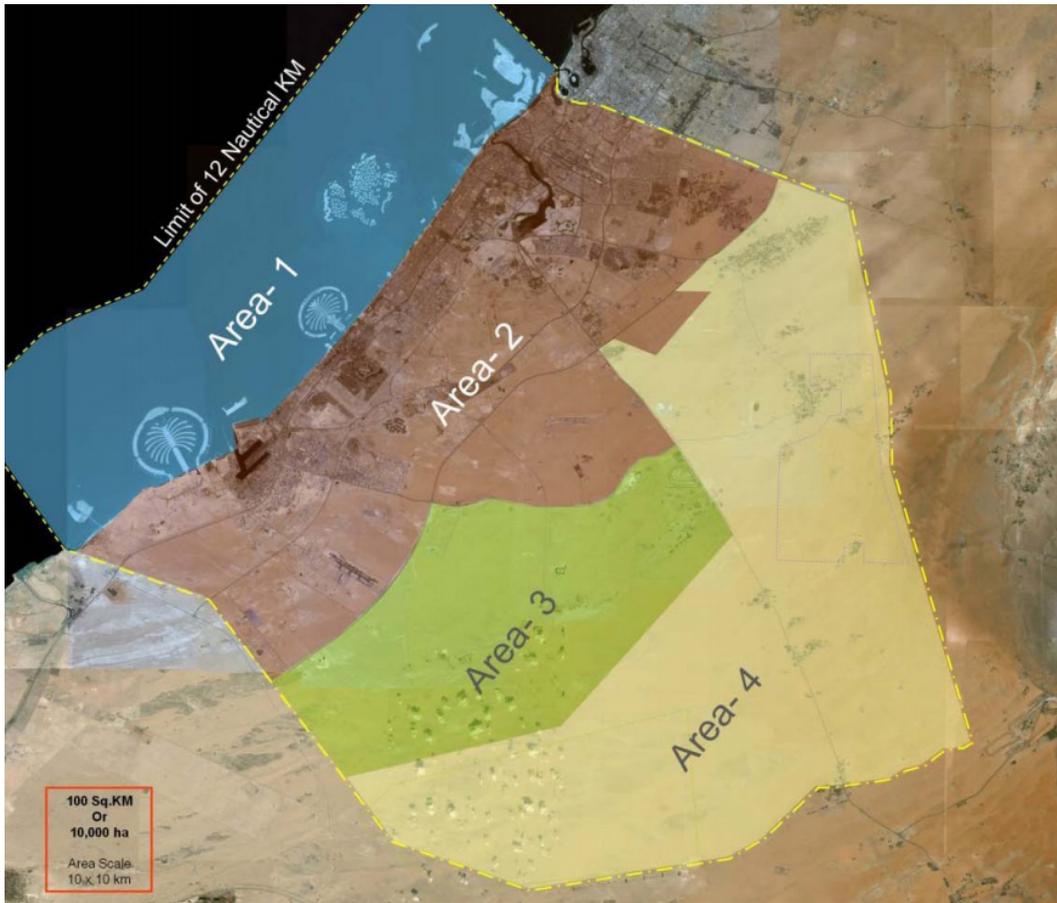
**UpTown MotorCity**

**Green Community MotorCity**

**Business Park MotorCity - F1-X Dubai**



## 4.3 Land use



### Urbanization Parameters

**Area-1  
Offshore Islands**  
Sensitive environmental man-made islands for urban/ resorts development and tourism

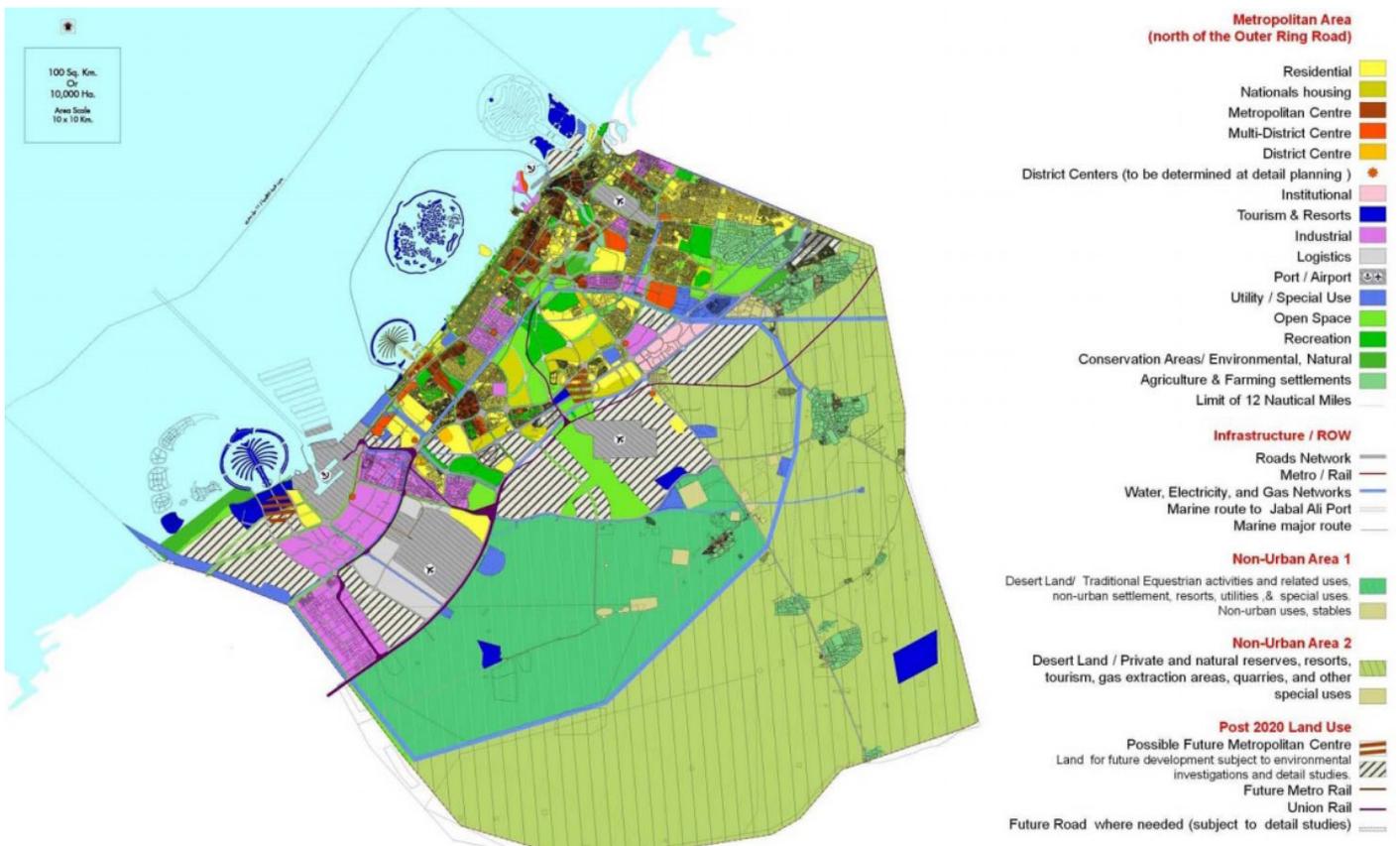
**Area-2  
Metropolitan Area**

Area 1 and 2 cover:  
- Existing urban fabric  
- on-going mega projects  
- on-hold or deferred mega projects (recommended to be developed beyond 2020 where required).

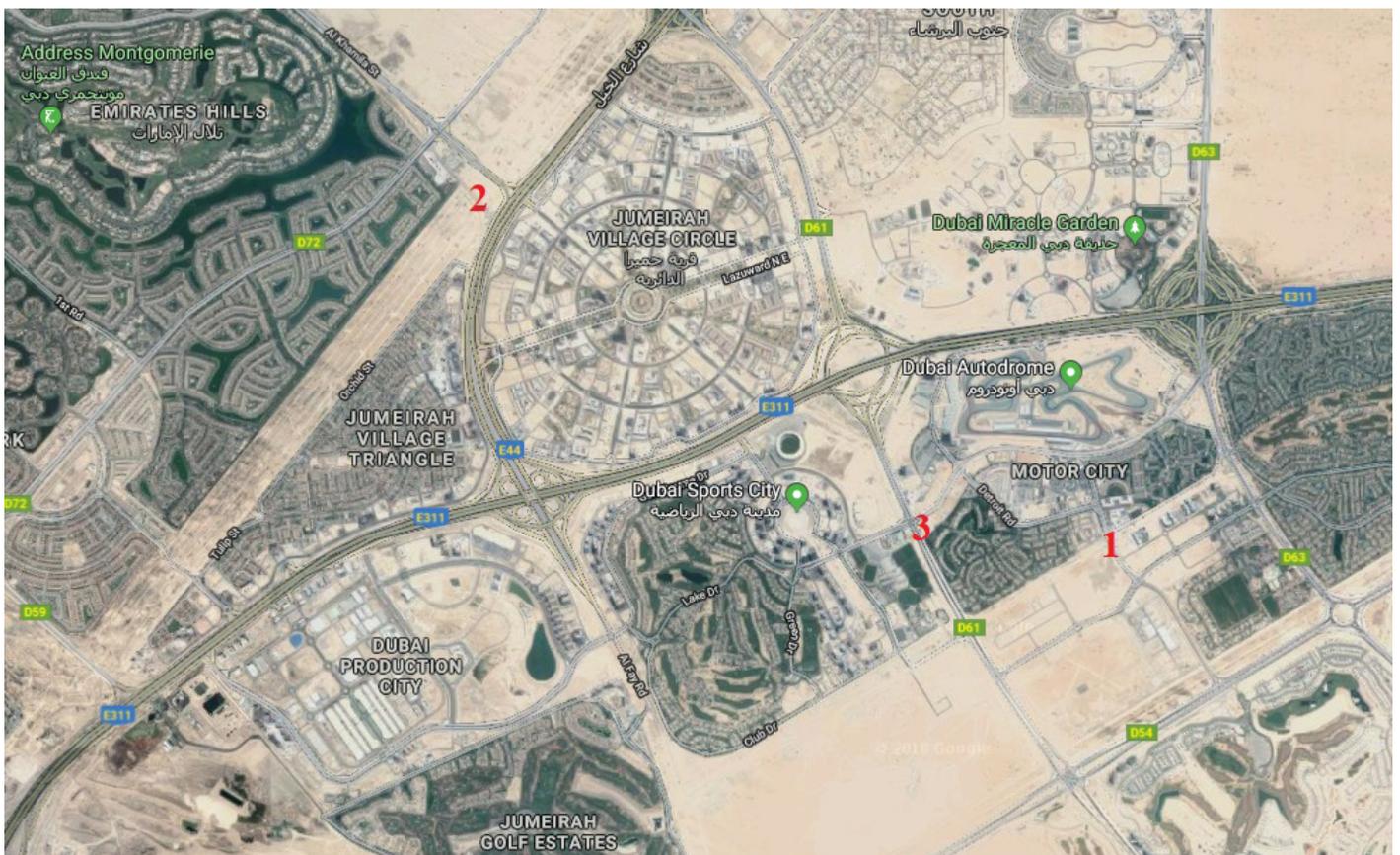
**Area-3  
Non-Urban Area**  
desert land including landuses for:  
- equestrian and camel traditional sport activities and related uses  
- resorts  
- conservation areas,  
- utilities,  
- non-urban settlements,  
- special uses.

**Area-4  
Non-Urban Area**  
Desert land including landuses for:  
- conservation areas  
- resorts,  
- gas extraction area,  
- aquifer zone  
- farming settlements,  
- utilities  
- special uses.

### 4.3.1 Masterplan 2020



## 4.4 Site location



## 4.4.1 Proposed Sites

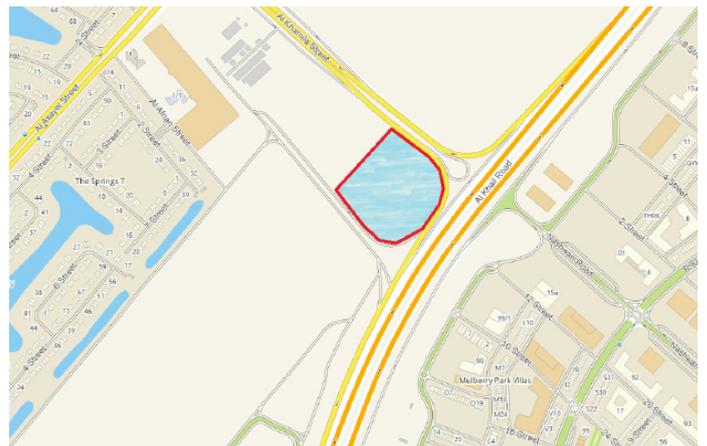
### 1. Motor city (site 1) , Dubai

Area: 28,000 sqm



### 2. Jumeirah village, Dubai

Area: 34,000 sqm



### 3. Motor city (site 2) , Dubai

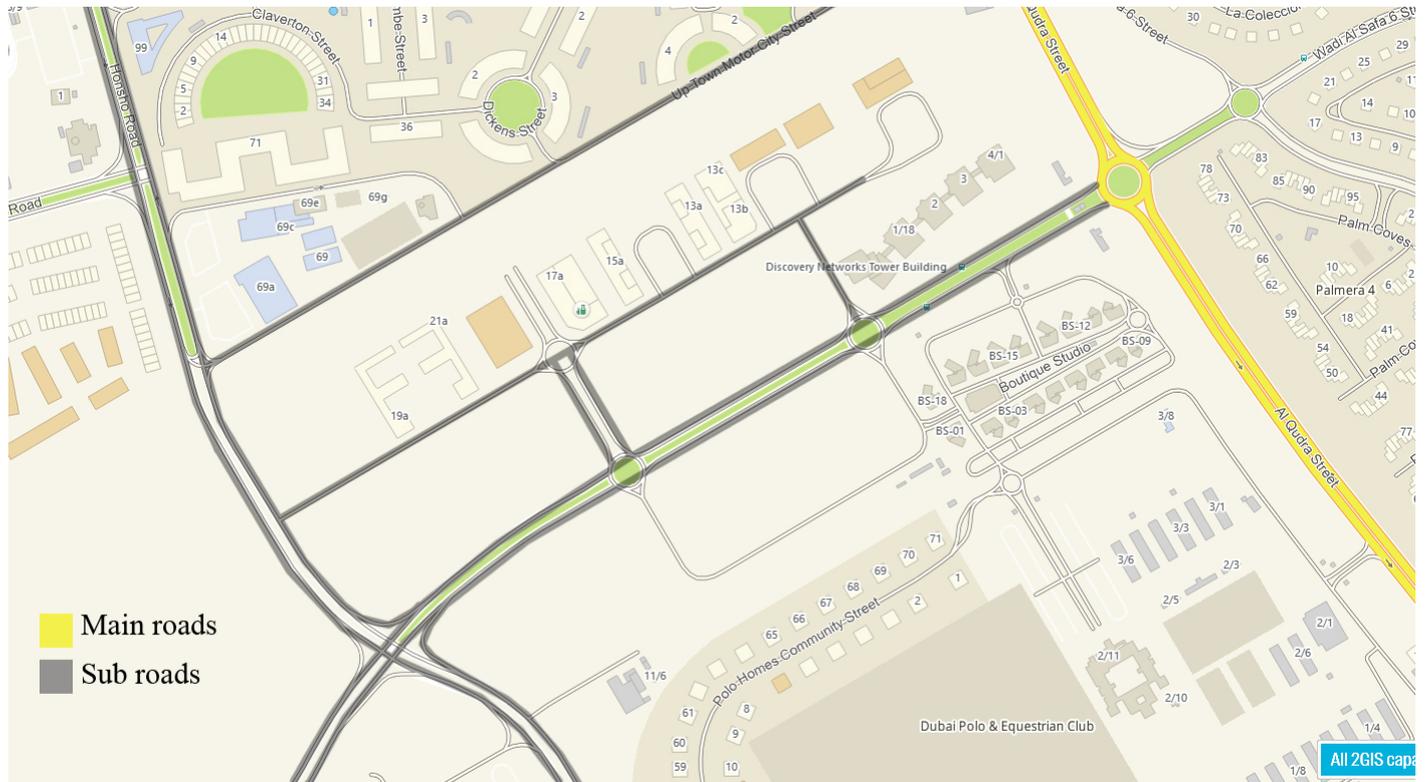
Area: 15,000 sqm



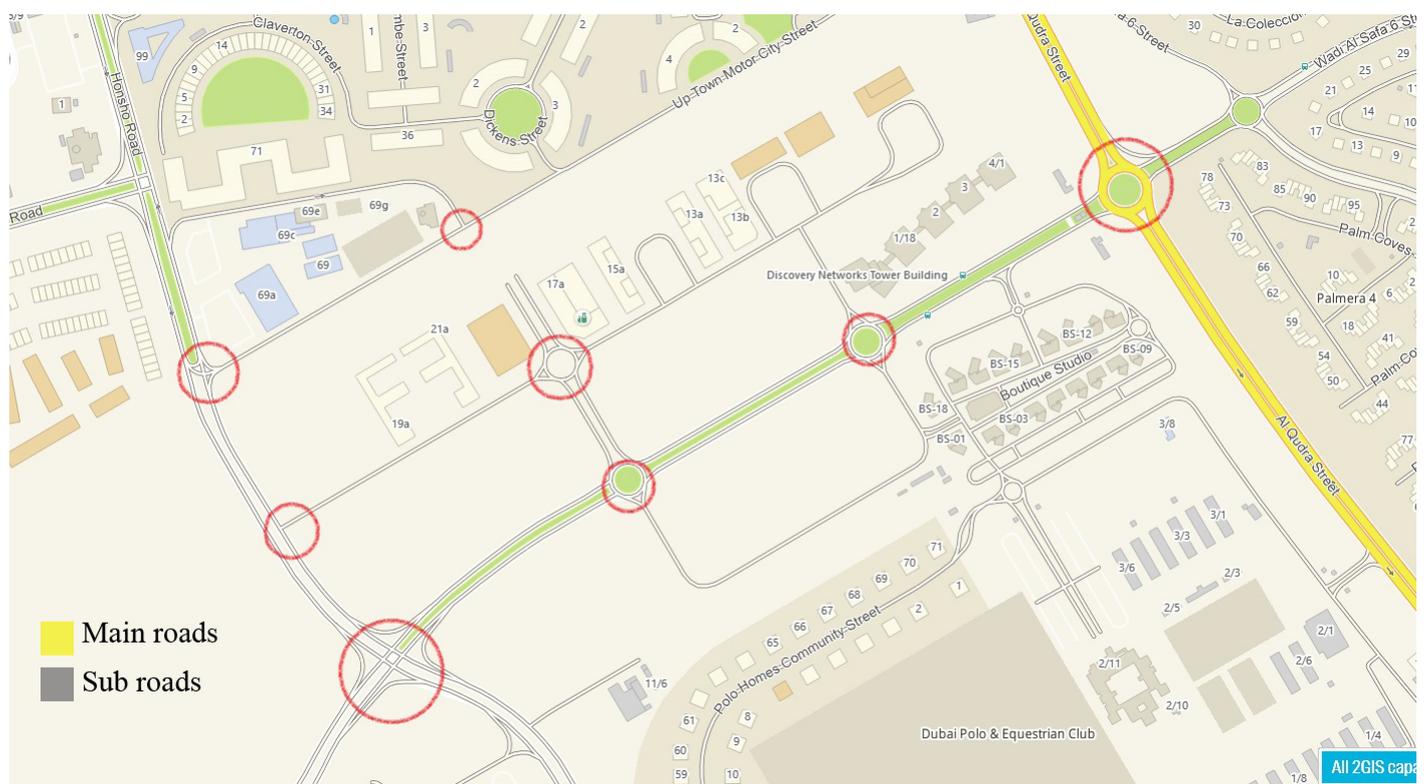
## 4.4.2 Analysis

### 1. Motor city (site 1), Dubai

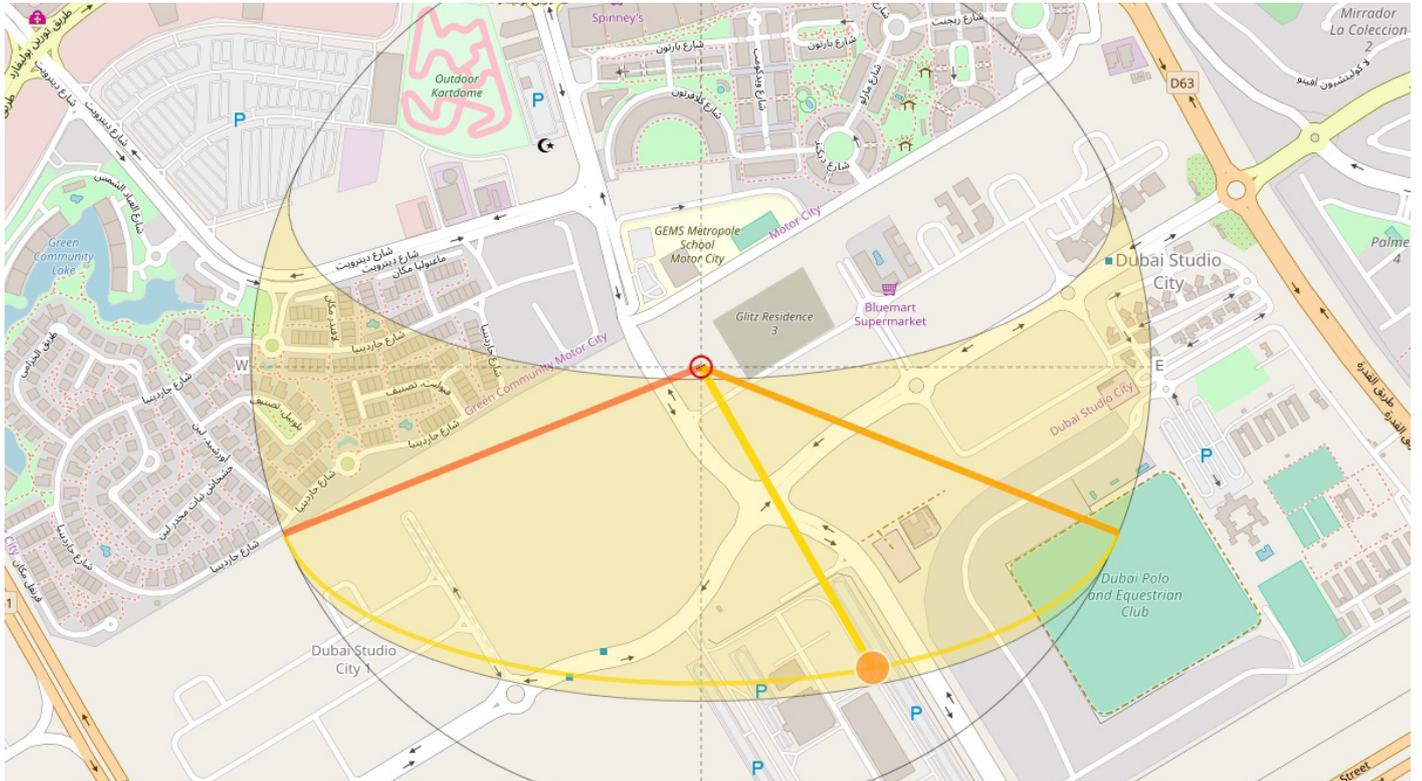
#### Roads



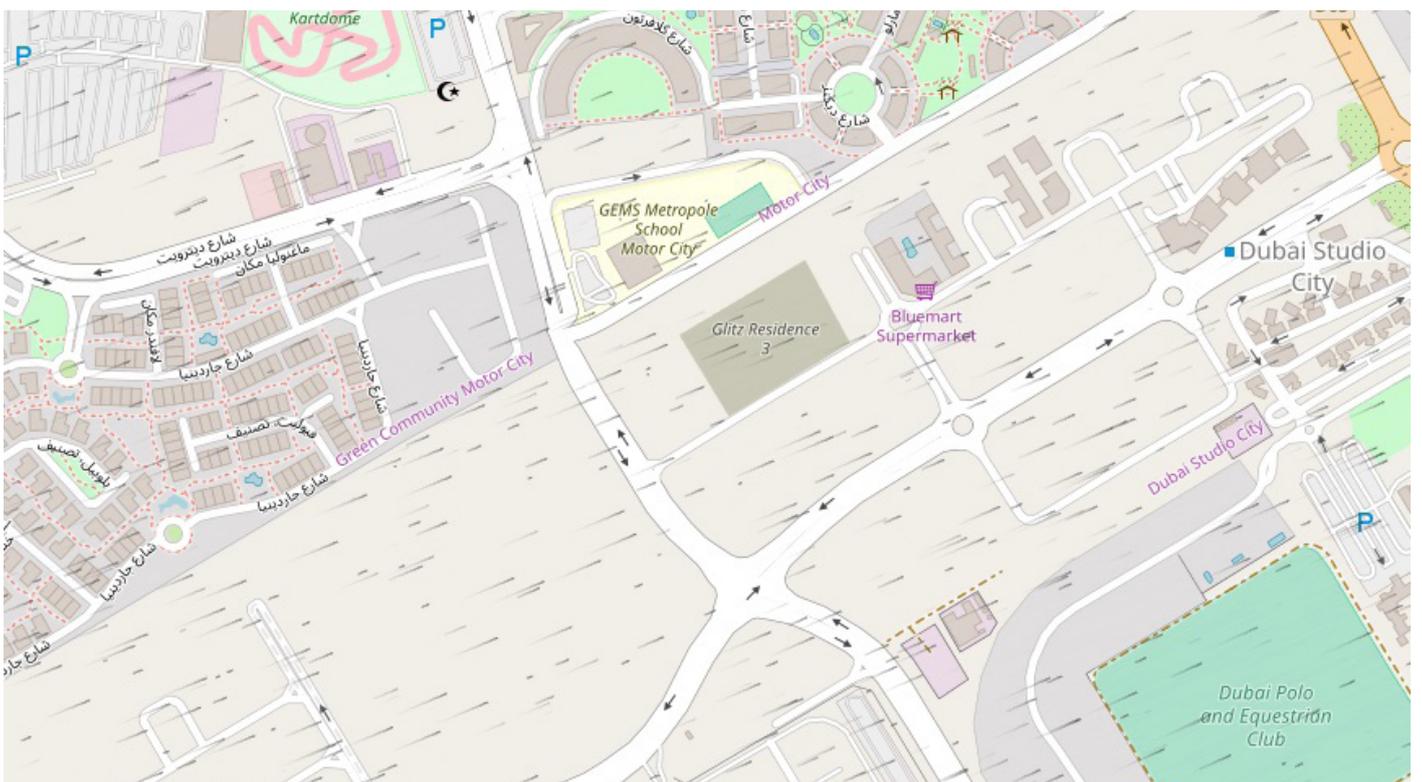
#### Nodes



## Sun orientation



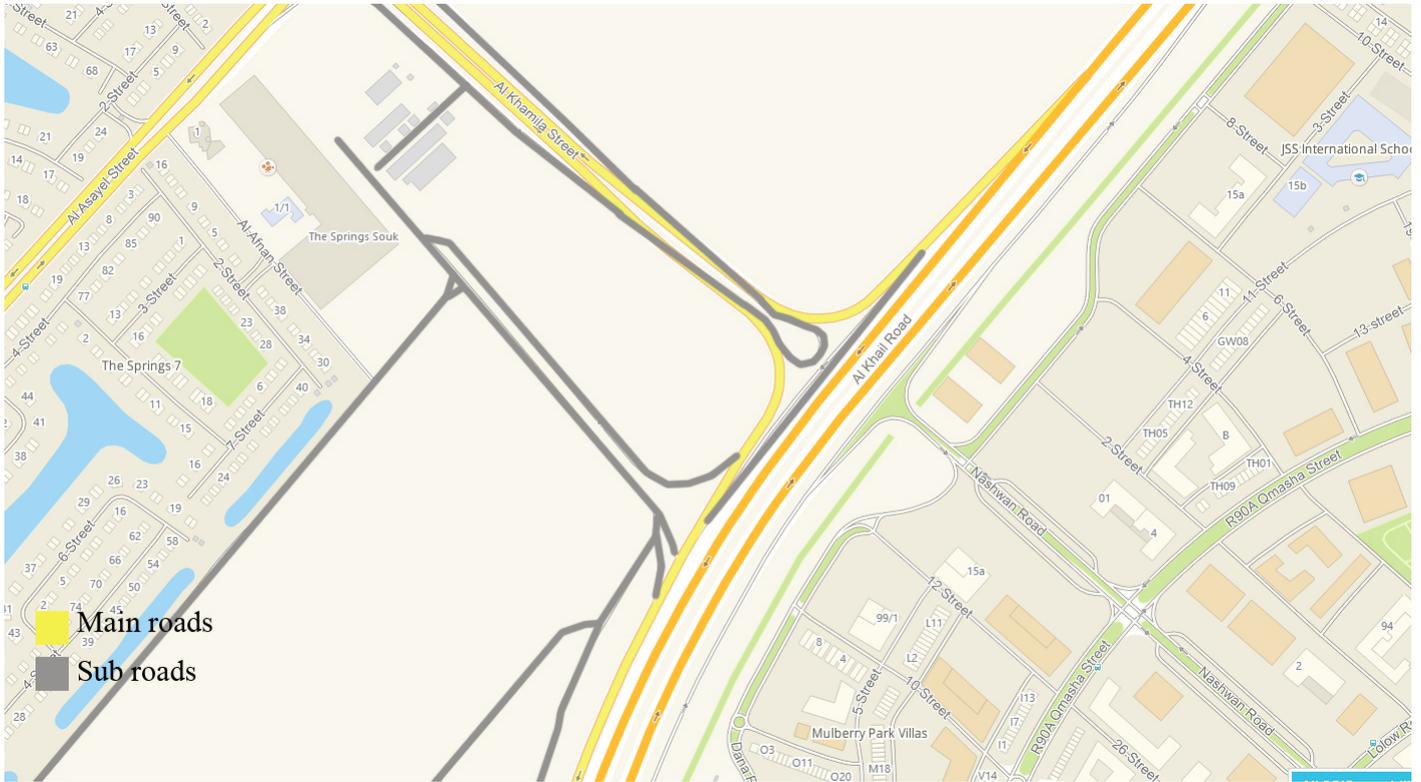
## Wind



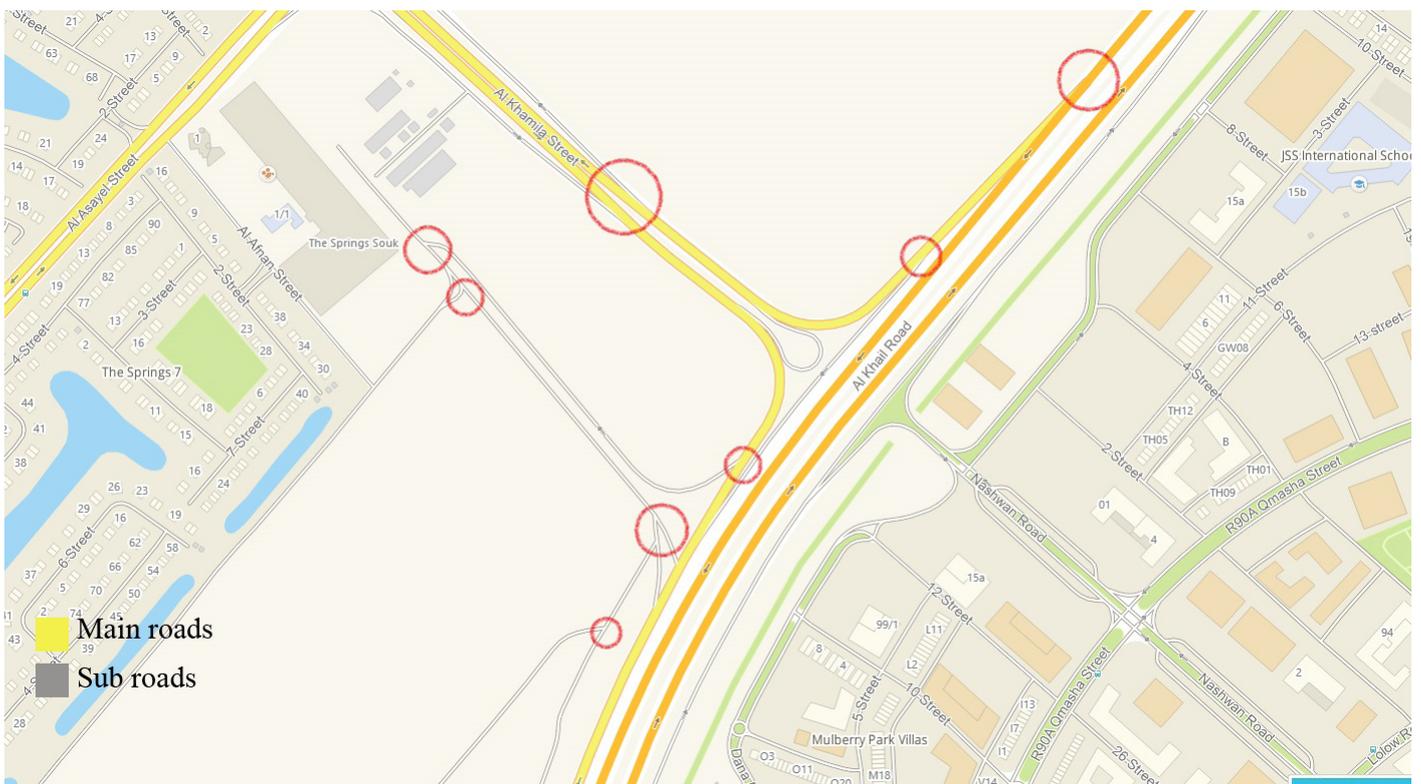
## 2. Jumeirah village, Dubai



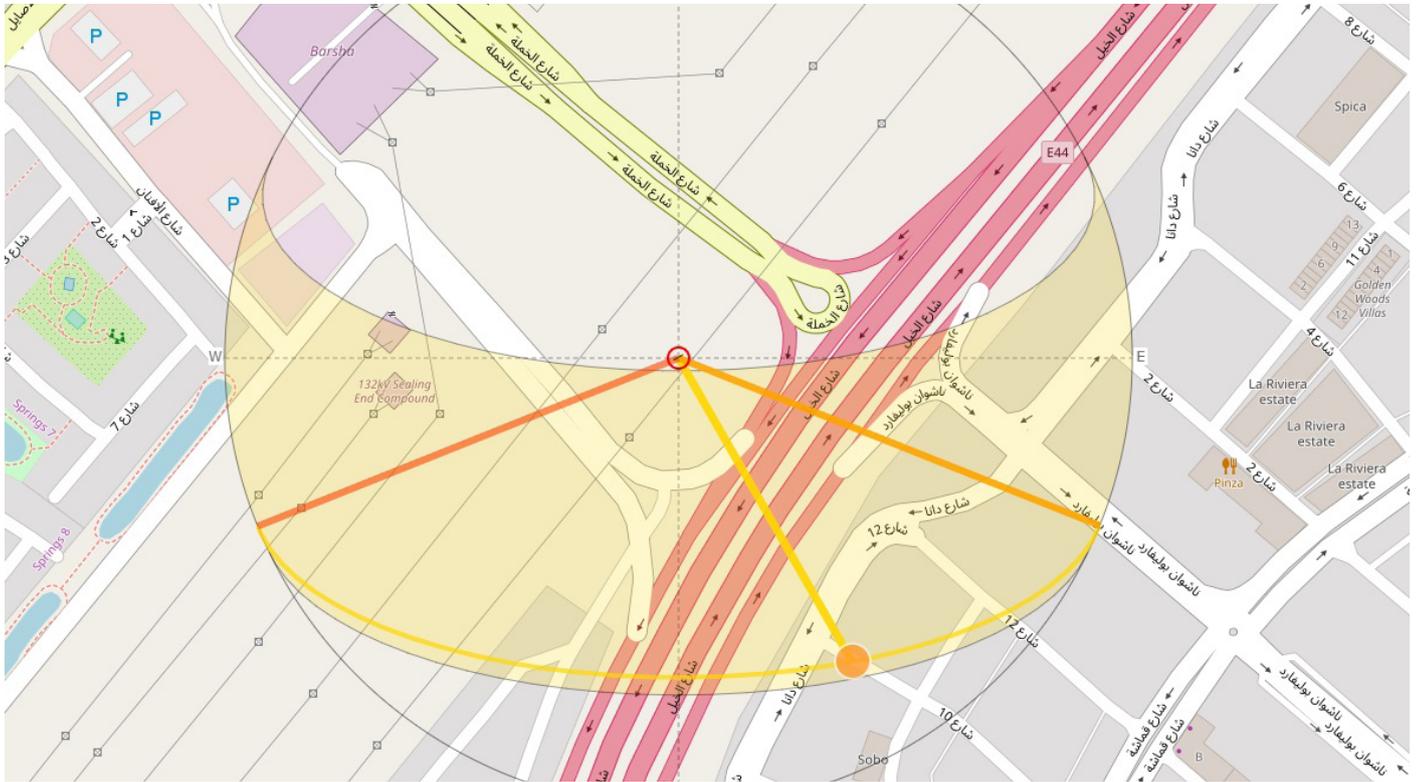
### Roads



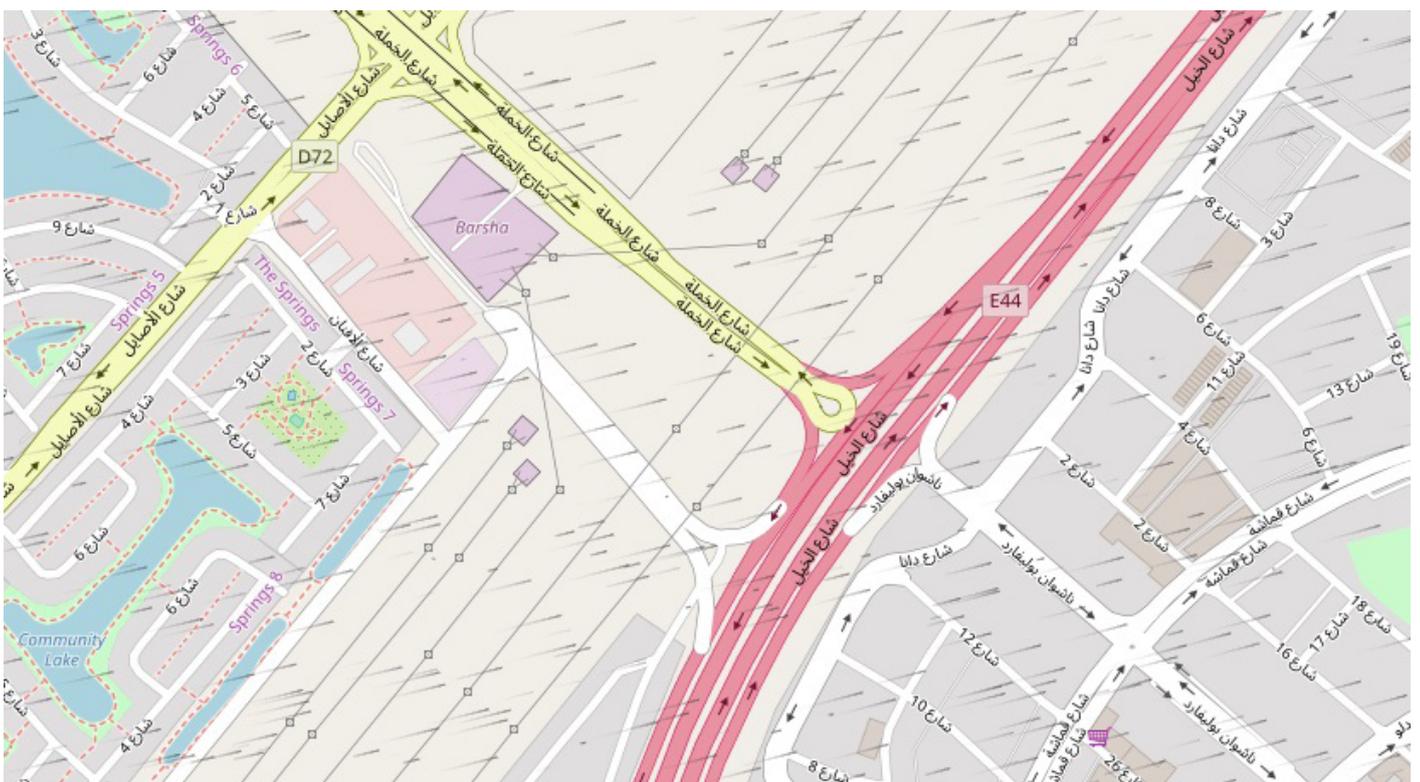
### Nodes



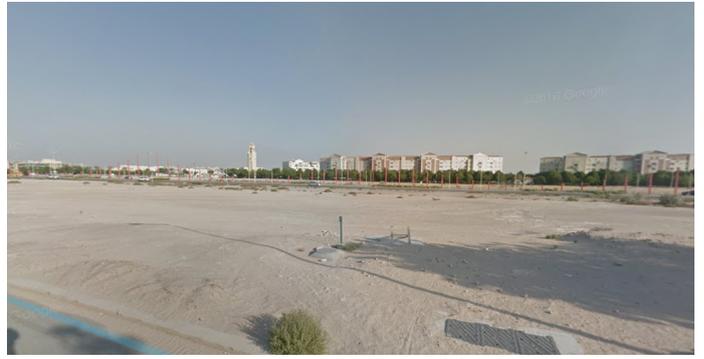
## Sun orientation



## Wind



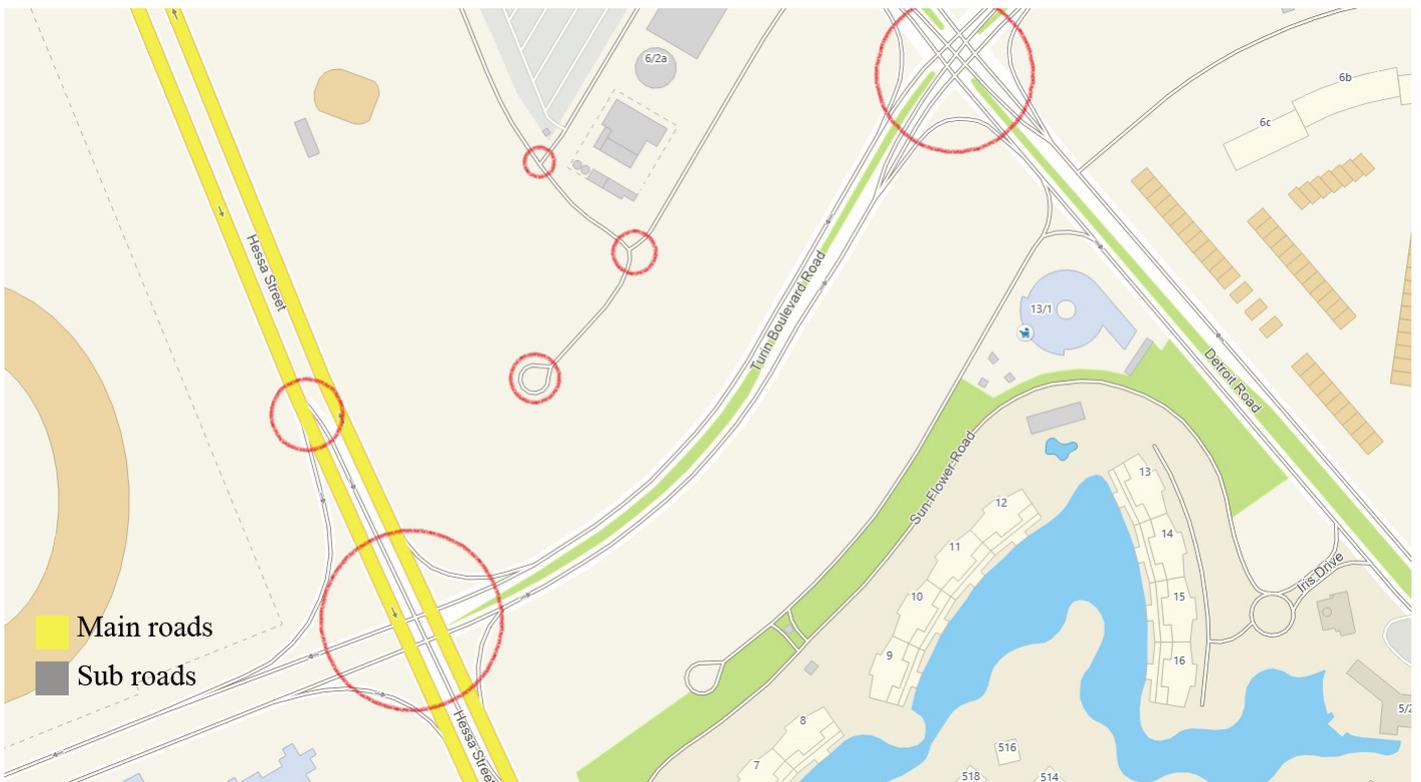
### 3. Motor city (site 2) , Dubai



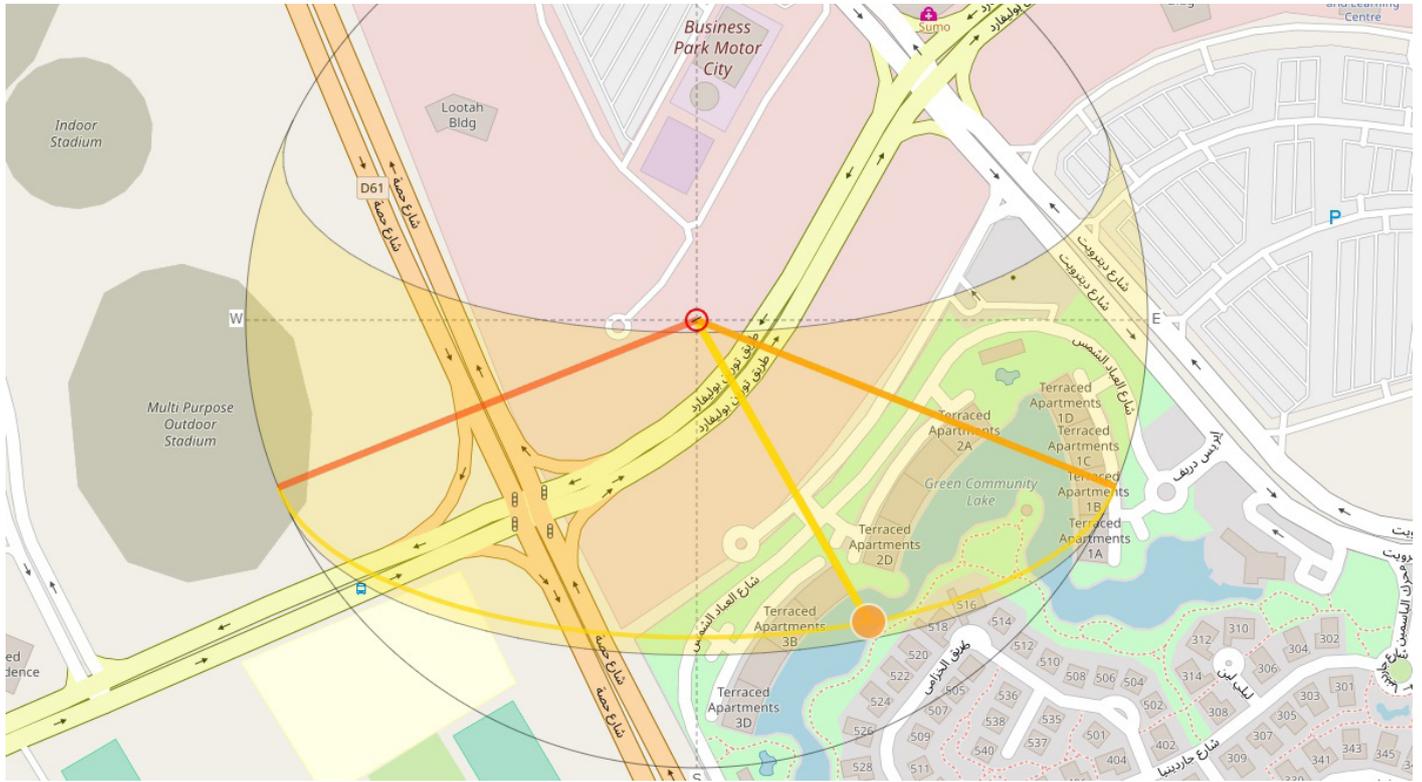
### Roads



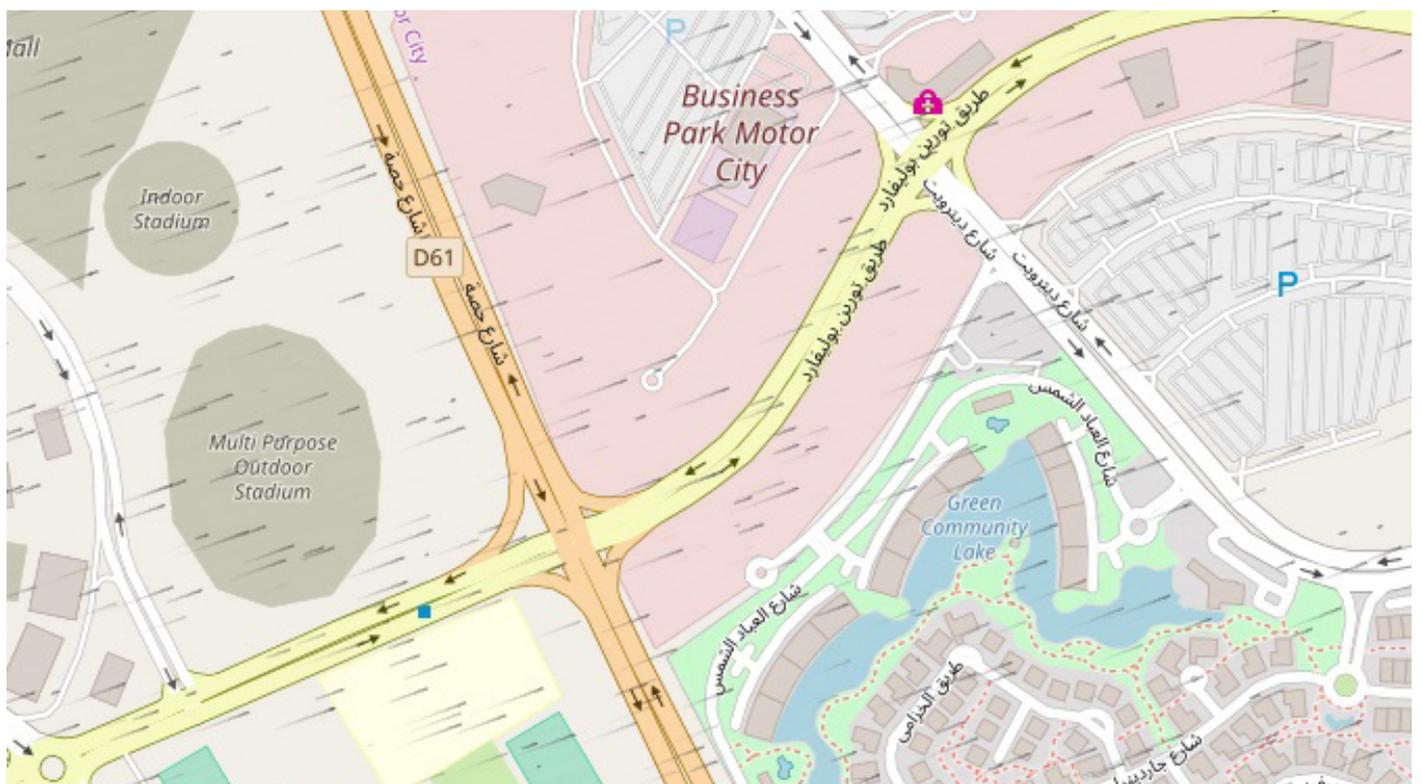
### Nodes



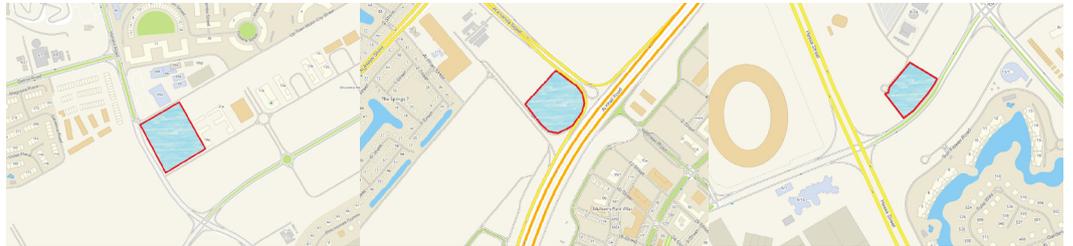
## Sun orientation



## Wind



## 4.5 Site comparison



Criteria	Site 1	Site 2	Site 3
Scale: Important=10 Moderate=8 Less important=6			
Site area	9	10	5
Accessibility	8	10	8
Topography	10	10	10
Fitting	10	10	8
Future expansion	8	8	9
Site orientation	8	8	8
Contextuality	8	6	6
Free from noise	8	5	7
Amenities	8	6	7
wind direction	4	6	4
View	4	3	5
<b>Total</b>	<b>85</b>	<b>82</b>	<b>77</b>



# CHAPTER 05: Concept



## 5.1 Summary

1- An automobile, motor car or car is a wheeled motor vehicle used for transporting passengers, which also carries its own engine or motor. The purpose of an Automobile museum is the same as an ordinary museum, an Automobile museum is a museum where a range to cars are for display for the people to view.

2- Study cases included in this thesis implemented a different and unique concept on their projects, the common thing is that they all serve the same function of displaying automobiles but how each and every project expresses a unique idea is included in this study ranging from vertical circulation to conceptual design zoning

3- Motor city, Dubai, UAE was chosen as the site of this project since Dubai has the greatest tourist count of all cities in the UAE, Also its advanced in technology world wide and that aids the design process

4- The design concept has to adopt the form in order to provide a special experience which opens the eyes on how great it is to see how automobiles evolved throughout the years

## 1- BMW WELT, Munich, Germany

The concept behind the ramp system and how its been implemented in the project

The ramp became the dynamic concept of the new architecture. As both a formed and forming element, the ramp takes on a key function. It leads the visitor through the museum and connects the new long-term exhibition with the “Museum Bowl”



## 2- Porsche Museum, Stuttgart, Germany

The “Porsche Idea“ section focuses on specific, trailblazing technical solutions for interesting challenges from nearly all areas of mobility. Visitors can learn about the values, motivation, and philosophy driving the company throughout its history and to its ultimate success.



## 3- Mercedes Museum, Stuttgart, Germany

The visitor proceeds through the Museum from top to bottom; during the ride up the atrium, visitors are provided with a multimedia Preshow presentation. The two aspects of the museological arrangement, the collection of cars and trucks and the Myths, are ordered chronologically from top to bottom



## 4- Audi museum, Ingolstadt, Denmark

The brand identity becomes visible in the building’s language and is transported to the outside. The Museum Mobile is the three-dimensional content hub of the building ensemble on the Audi Forum. In terms of town planning it formulates the entrance to the works premises, in terms of content it realises such expressions as transparency and mobility.

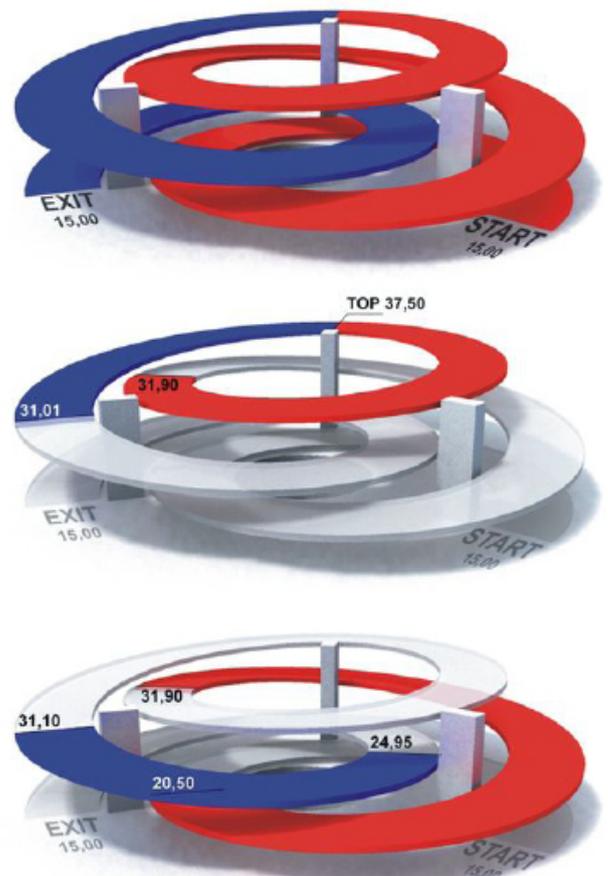
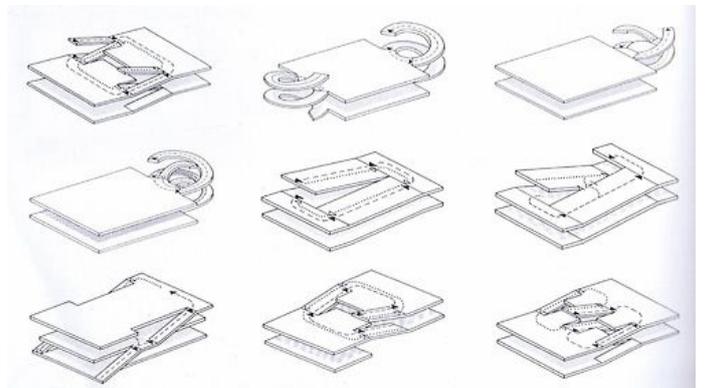
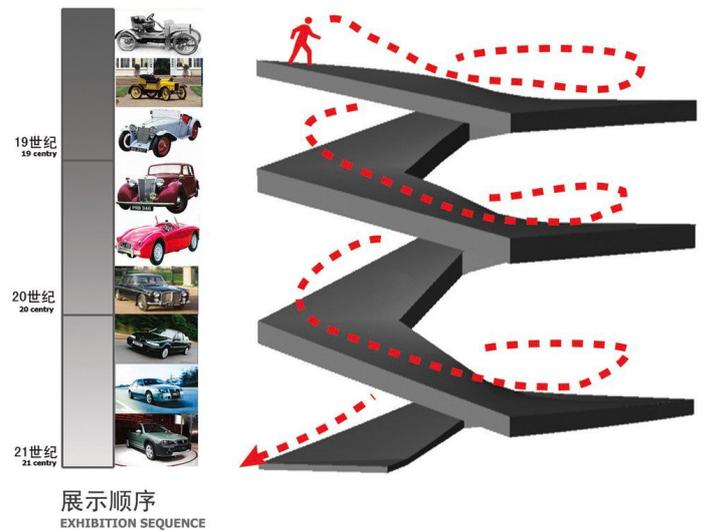


## 5.2 Vertical circulation

The idea of the ramp system is to provide a vertical circulation to the exhibition in which each level define a certain era. Starting from the 19th century till the 21th century. The ramp will be used as a circulation and exhibition at the same time in which it will provide mobility to the function of the space.

The exhibition is one of the main programs of the project infact it is the core of the project. This will aid in narrating the story of the automobile history since its all based on the evolution of these automobiles.

Different implementations can be applied for the ramp system varying from spiral, double helix, single or even double ramped system



## 5.3 Automobile setup

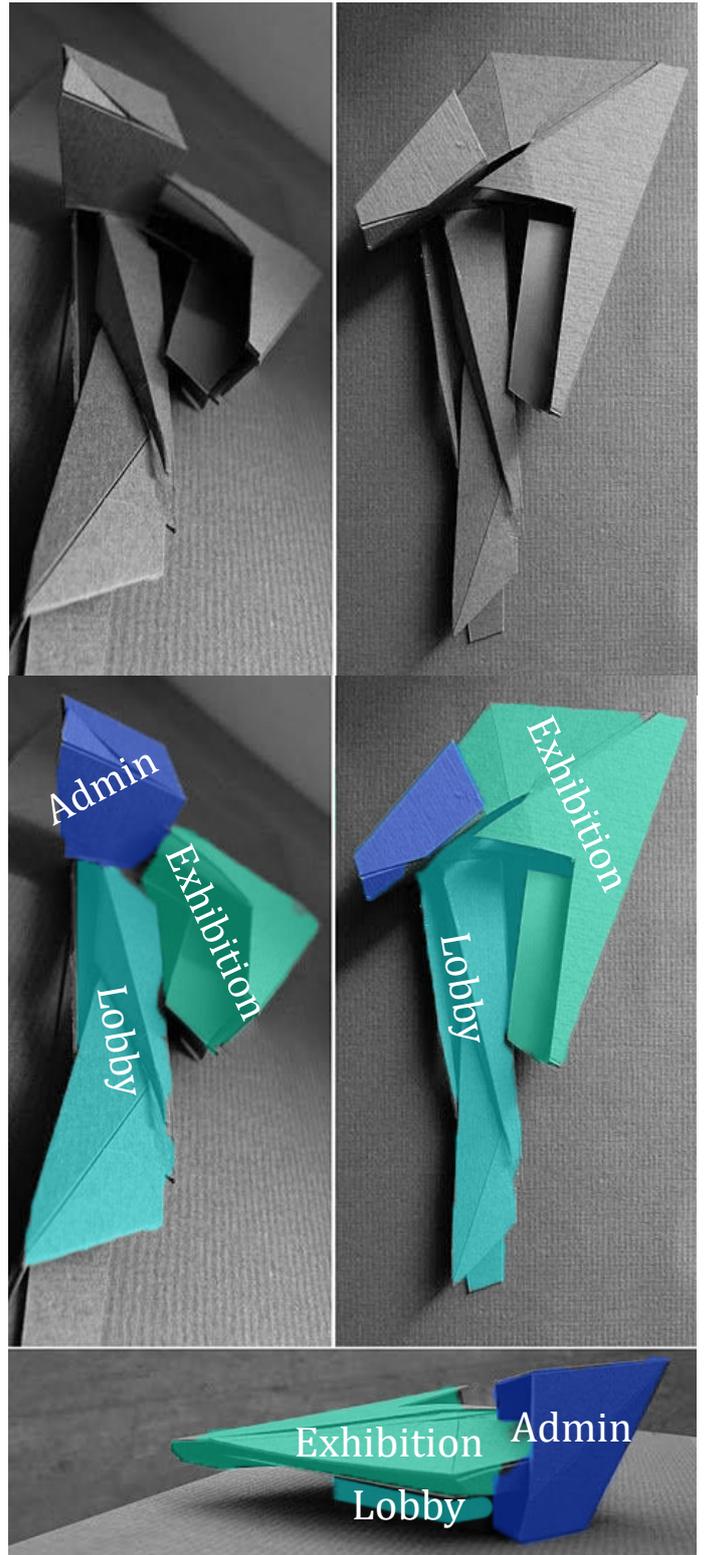
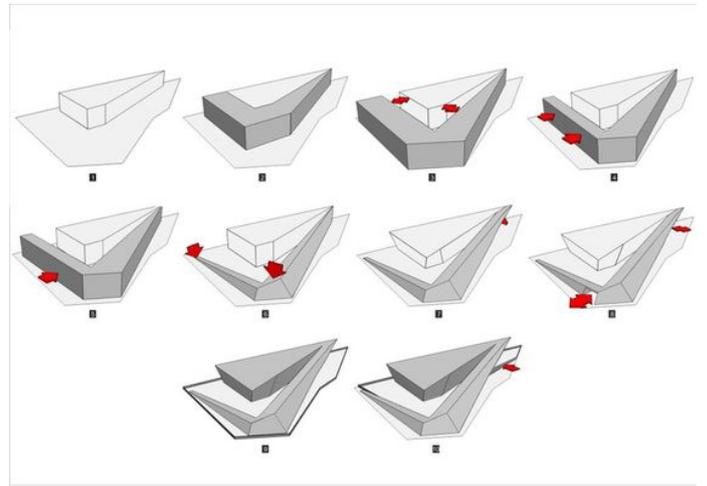
Setting up and importing the automobiles to each floor is a concern, that's why by using some sort of automobile elevator system must be taken into considerations. Various applications have been implemented by this system and it saves space and is aesthetic. However the mechanism of that system must be calculated and applied by professionals to avoid any errors



## 5.4 Form

Since the ramp system will be used to narrate the automobile story, Form will adapt to that function since its the main core idea of the project. This will enhance and strengthen the concept of the automobile museum by making the the form guide you from the beginning of the automobile era till this date.

Using some open voids in the structure will give that sharp effect, describing how vintage cars had alot of details when they were first invented. voids will be used as either a green area, lounge, or outside sitting area. By recessing parts of the structure it can be used as a shading to the open spaces which will add a dynamic aesthetic to the structure.



## 5.5 Color Scheme

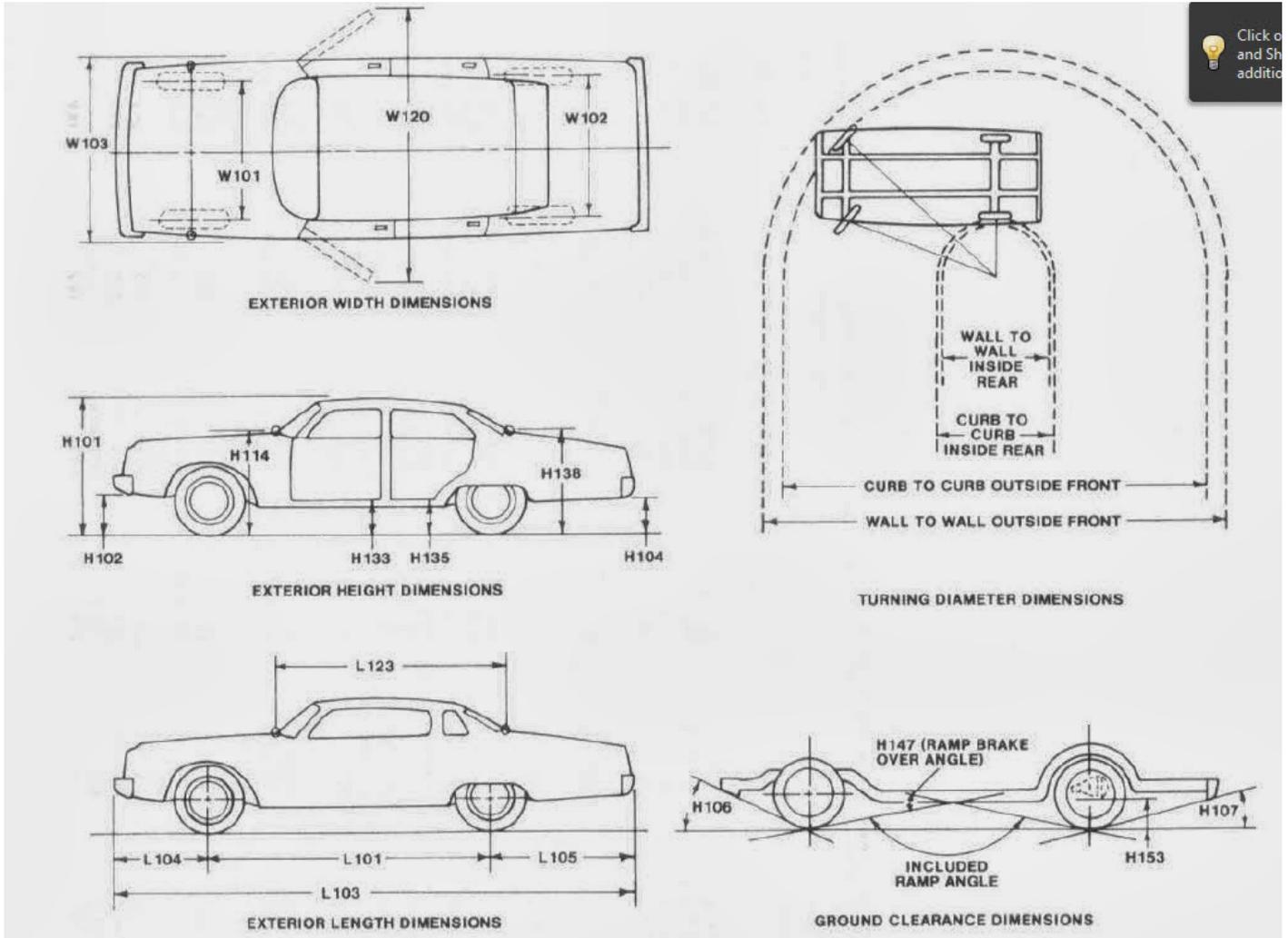
Color choice plays an important role to the project since its been proven that it can change the mood of the person. That has been implemented by schools, libraries and workspaces.

The color scheme for this project will use a vintage color range. This will aid the idea of living the era of automobile history and enhance the experience of the visitors.

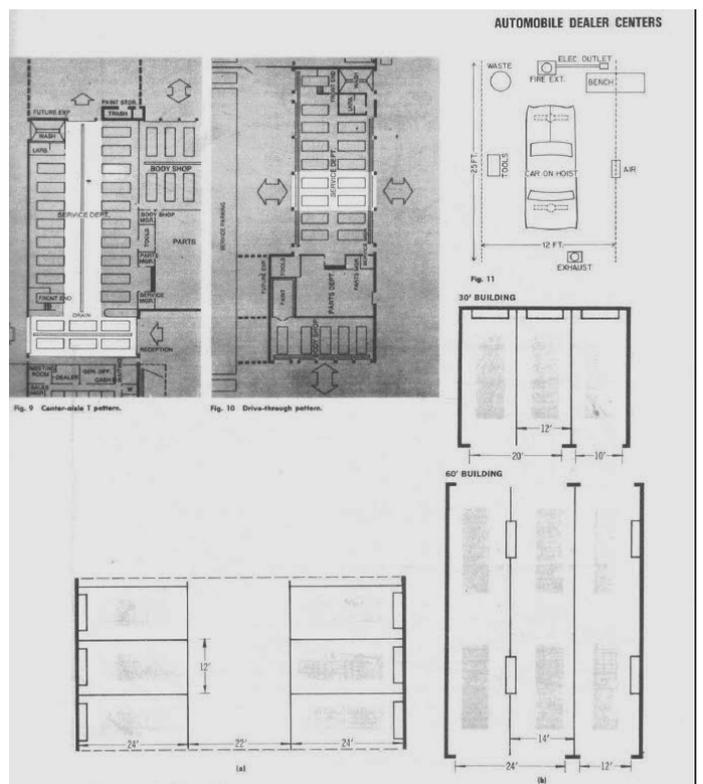


# Appendix

# Automobile:

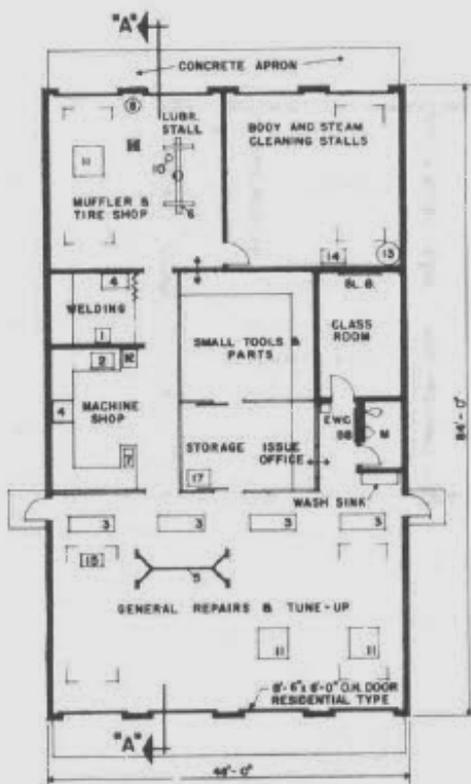


Click on and Show additional



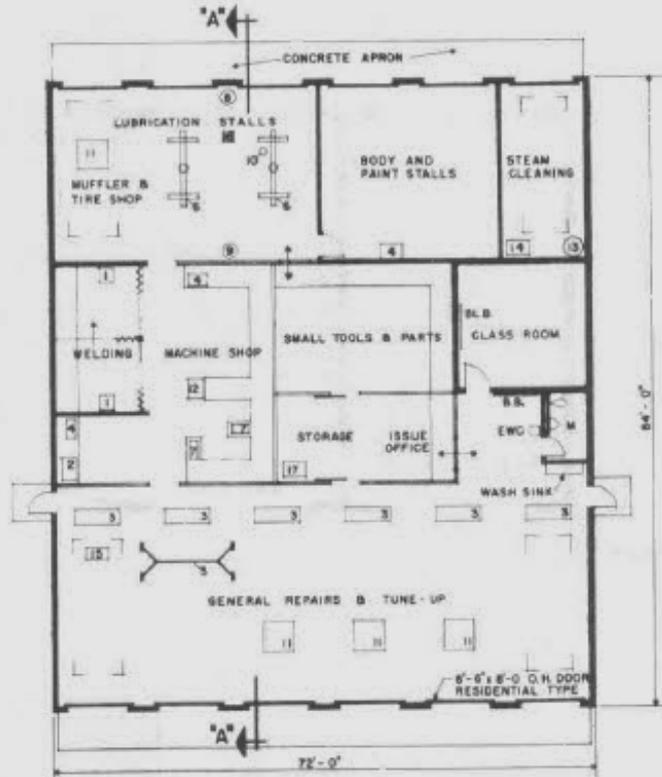
# AUTOMOBILE SERVICE STATIONS

Automotive Shop



FLOOR PLAN - 8 STALLS

Fig. 1



FLOOR PLAN - 12 STALLS

Fig. 2



SECTION "A-A"

Fig. 3

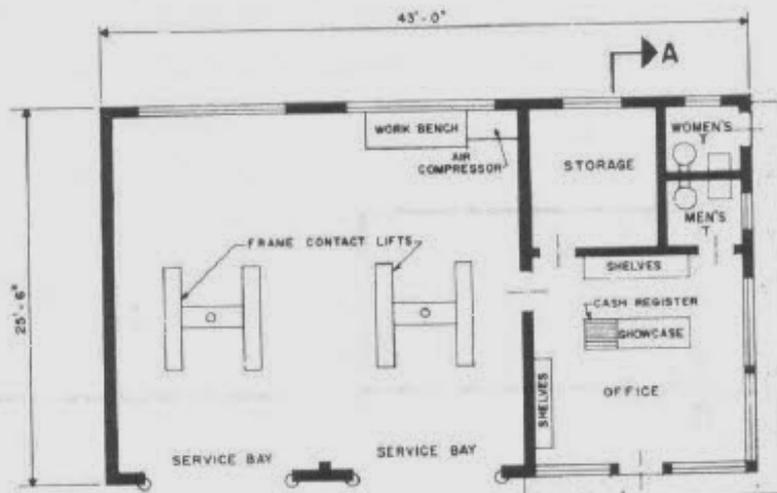


Fig. 4

# Parking:

DESIGNING FOR VEHICLES

## CAR-PARKS

In accordance with the regulations applicable to garages:

- small garages are defined as those with 100m<sup>2</sup> effective area;
- medium garages are those with 100-1000m<sup>2</sup> effective area;
- large garages are those with >1000m<sup>2</sup> effective area.

Underground garages are defined as those with the floor level on average  $\pm 1.20$  below the surface of the ground.

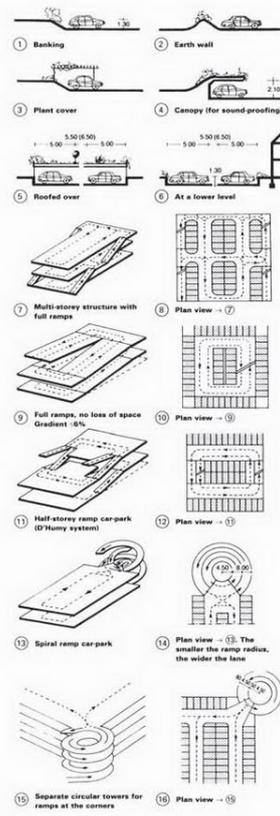
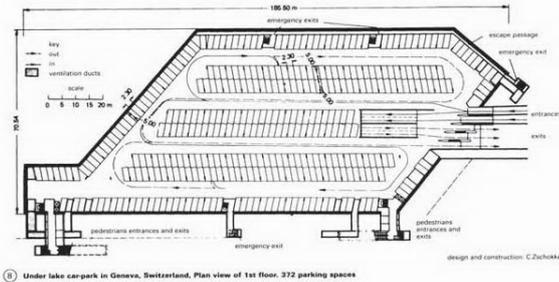
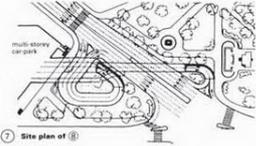
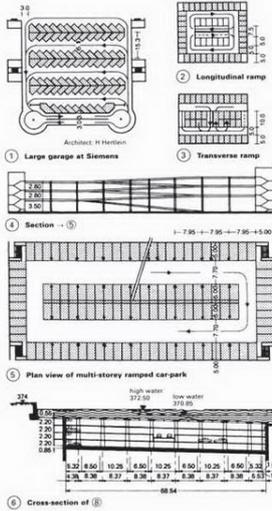
Separate entrances and exits must be provided for large garages. These garages are normally located close to points of major traffic congestion such as railway stations, airports, shopping centres, theatres, cinemas, office and administration blocks and large residential buildings. Medium and large garages must be located in easily accessible areas, have a clear headroom of 2.00m, even below the main beams, ventilation ducts and other structural components. On the ground floor, this clear headroom is normally larger, as the space is often used for other purposes.

To accommodate small transport vehicles, this height should be 2.50m. Floor loadings must be in accordance with local standards. Open garages have openings which cannot be closed equal in size to one third of the total area of the outside walls leading directly into the open air and divided in such a way that there is continuous through-ventilation, even in the presence of weather screening.

There is an ingenious example of a car-park in the centre of Geneva beneath the river Rhone. The entrance and exit points are on the approaches to the Rhone bridge - (7). Vehicles can easily filter in and out of the traffic flow by means of access ramps on both sides. All stores are accessed by a right hand drive up a central sloping ramp - (7) - (8). No staff are necessary as there are automatic parking ticket machines in use.

The criteria for the quality of multi-storey car parks are: safety in use, clear visibility, parking space marking to enable drivers to remember the location of their vehicles, and integration into the context of town planning.

Other factors to be considered are: natural lighting and ventilation, clear views to the outside, plants and greenery and a simple system of collecting charges.

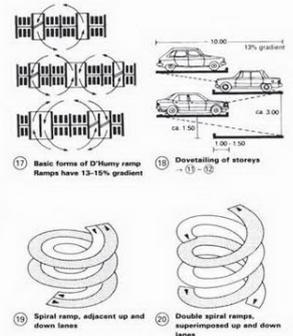


## CAR-PARKS

Examples - (1) - (6) show how parking spaces can be creatively integrated into their surroundings without restricting their use. Parking spaces can be completely or partially sunken or provided with roof planting to increase the area of open space - (3) - (5). Planting not only enhances the look of the area, but also provides shade and improves the environment by absorbing dust.

There are various ramp systems for gaining access to upper and lower floors of car-parks. The gradients of the ramps should not exceed 15%, or in the case of small garages 20%. A horizontal run of more than 5m must be included between an area carrying general traffic and ramps with more than 5% gradient. For car ramps the run must be more than 3m long, with ramps that can be up to 10% gradient. The options available for the arrangement and design of ramps can be summarised under four main headings - (7) - (11):

- (1) straight, parallel and continuous multi-storey ramps with intermediate landings, with separate ramps for up and down traffic located at opposite ends - (7) - (8);
- (2) sloping floors, with a full width ramp with no loss of space. The entire car-park structure consists of sloping levels. A space-saving system is shown - (9) - (10) with a gradient of more than 6%;
- (3) offset half storeys (D'Hunny ramps): parking areas are offset half storeys, height is gained by the use of short ramps - (11) and - (12) - (13);
- (4) spiral ramps - a relatively expensive design which lacks good visibility. The circular shape makes poor use of remaining areas - (14) - (15) and - (16) and (17). Spiral ramps must have a transverse gradient of more than 3%. The radius of the edge of the inner lane must be more than 5m. In large garages where special pedestrian routes are not provided, the ramps that are used by both vehicles and pedestrians must have a raised pavement at least 80cm wide. Medium-sized and large garages must have the following minimum width of lanes at entrances and exits:
  - 2m when used by vehicles up to 2m wide;
  - 3.5m when used by wider vehicles.



440

441

## Commercial PARKING LOTS

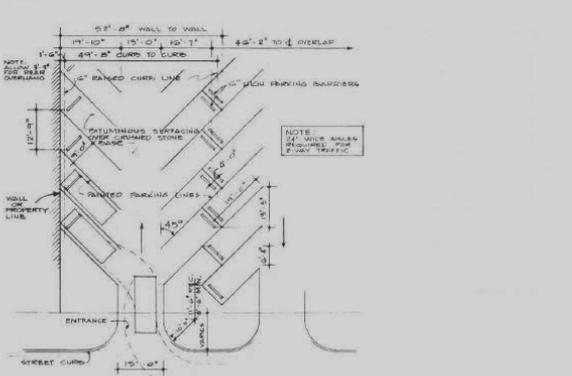


Fig. 4 Parking plan - 45° parking.

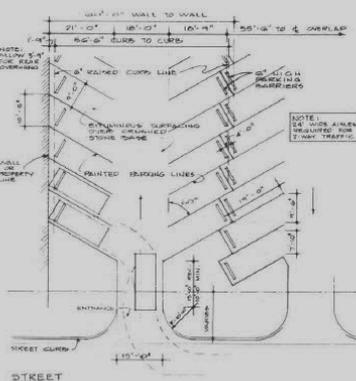


Fig. 5 Parking plan - 60° parking.

## Commercial PARKING GARAGES

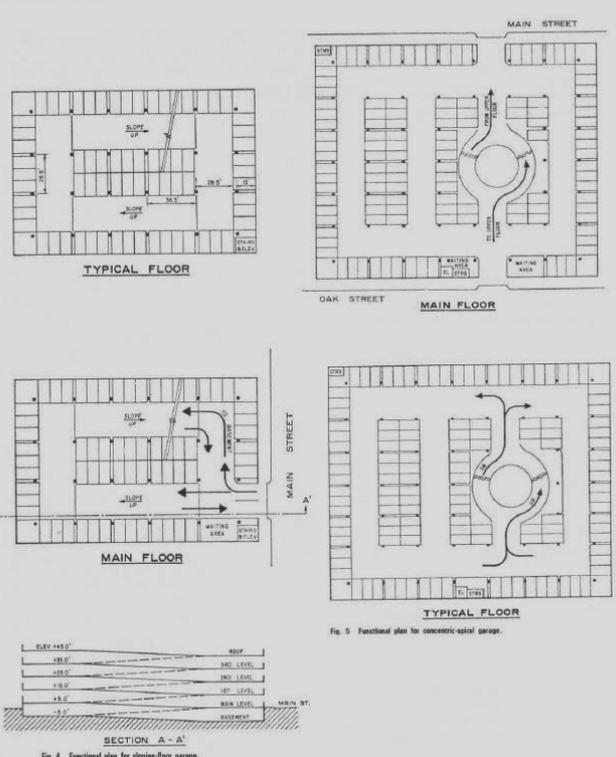


Fig. 4 Functional plan for sloping-floor garage.

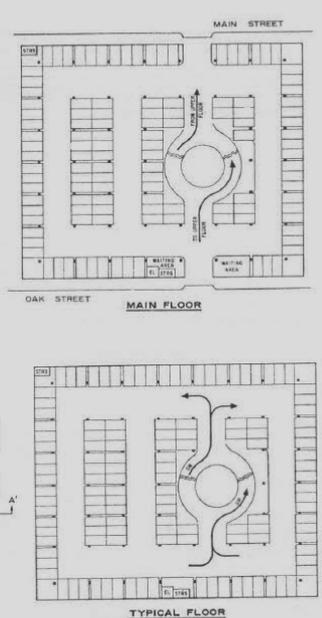
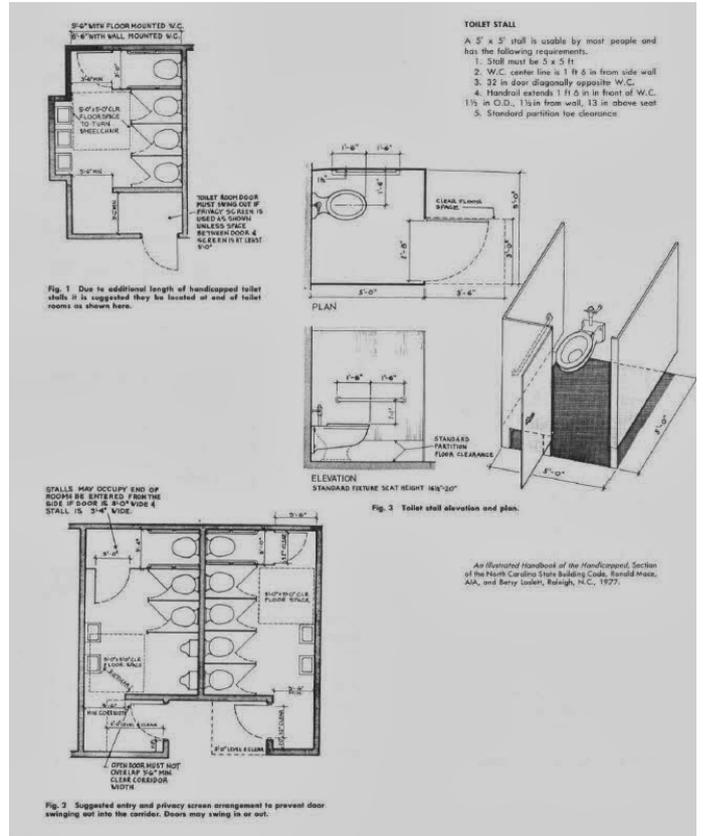


Fig. 5 Functional plan for concentric-typical garage.



# Toilets:



# Offices:

