

Introduction to Architecture and Town Planning



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Q1: Take any building from internet, put its picture in Microsoft Word and explain its positive and negative points according to the principles of design. What could be done to make the building more attractive? Answer must be at least 200 words. (CLO1-PLO7)

Ans: Burj Al Arab



- **Building Name:** Burj-Al-Arab Hotel.
- **Other/Former Names:** Arab Sail.
- **Chief Architect:** The primary architect who designed the building Tom Wright of Atkins.
- **Construction :** 1993 – 1999.
- **Floors :** 60.
- **Floor Area :** 111,500 m² (1,200,000 sq ft)

Introduction:

- The Burj Al Arab - Tower of the Arabs , also known as "Arab Sail“.
- A luxury hotel located in Dubai, United Arab Emirates.
- At 321 m (1,050 ft), it is the third tallest building in the world used exclusively as a hotel.
- Stands on an artificial island 280 m (920 ft) .
- Connected to the mainland by a private curving bridge.
- It is an iconic structure, designed to symbolize Dubai's urban transformation and to mimic the sail of a boat.

Positive Points According To Principles of Design

- The orientation of the building minimizes the heat gain during the summer seasons.
- The south elevation has the most exposed surface area. As a result, it has the maximum capacity for heat absorption.
- For people, there is access to the hotel through the roof via a helicopter. At the main entrance there is a grand stairway, an escalator and elevators.
- For air, the revolving door located at the main entrance acts as a locking mechanism to prevent a phenomenon known as the stack effect, which occurs when the hot air rises and the cool air falls in a tall building.

Environmental Approach

1. Wind Effects Dubai's

- Geographic location subjects the hotel to severe weather conditions including strong winds and occasional violent thunderstorms.
- Due to the structure's proximity to its adjacent hotel resort, wind tunnel testing was considered to ensure a safe design.
- Wind speed of 45 meters per second, under the recommendations of Dubai Municipality, was adopted for the design.

2. Seismic Impact Dubai

- Itself is not located in an earthquake intensive zone. However, southern Iran which is only 100 miles away to the north is subjected to moderate earthquake risk and in turn which could create tremors in Dubai if a seismic event were to occur in Iran.
- To reinforce the structure from any potential swaying, two tuned mass dampers, weighing about 2 tonnes each, limit vibrations in the tubular steel mast that projects 60 m above the building.

3. Vortex Shedding

- Analysis were done with respect to Building response under wind loads
- Wind tunnel could threaten the entire skeleton. Wind blowing away sharp edges can cause destruction.
- Vibration may cause due to vortex shedding.

RESPONSE

- First option was to change the shape but Architect was against and forced the engineer to re-think.
- Ingenious hanging weight were installed at variable places - when wind blows, 5 ton weight will swing and damp down the vibrations to safety limits (refer image for locations highlighted in red)

Exoskeleton Frame

- Exoskeleton is made of two legs on each side of the structure. These Legs are built up H Sections connected by lattice braced members.
- Diagonal are huge tubular triangular trusses tied to two legs to the central core. The diagonal trusses can contract and expand up to 5 cm in 24 hours.
- Horizontals-connects rear leg to core wall
- The exoskeleton bows are provided with tuned mass damper at 11 critical points with 5 ton weight which swings to damp down the vibrations caused by vortex shedding

Negative Points According to Principles of design

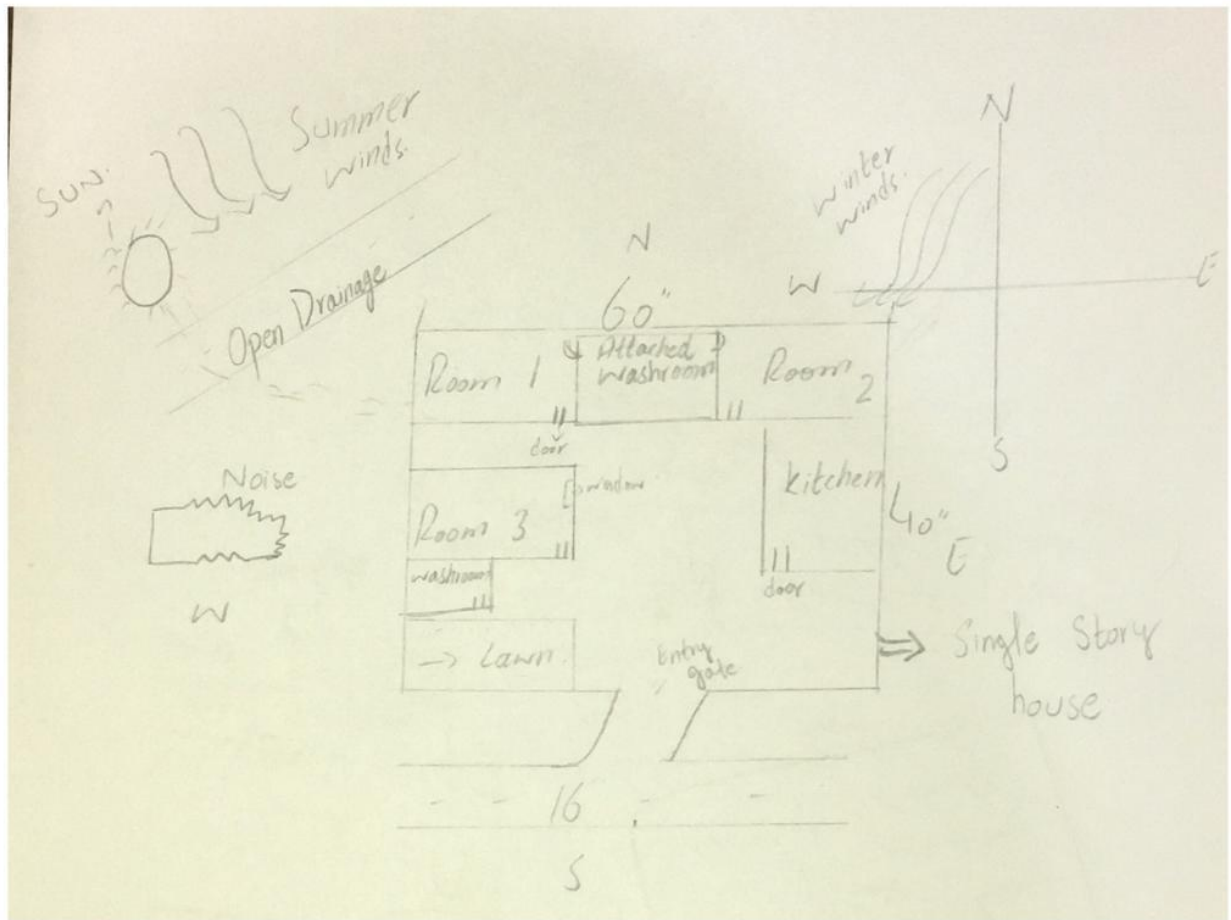
Burj Al Arab has attracted criticism as well a contradiction of sorts, considering how well-designed and impressive the construction ultimately proves to be. The contradiction here seems to be related to the hotel's decor. This extraordinary investment in state-of-the-art construction technology stretches the limits of the ambitious urban imagination in an exercise that is largely due to the power of excessive wealth. Another critic includes negative critiques for the city of Dubai as well: "both the hotel and the city, after all, are monuments to the triumph of money over practicality. Both elevate style over substance. Yet another Emulating the quality of palatial interiors, in an expression of wealth for the mainstream, a theater of opulence is created in Burj Al Arab. The result is a baroque effect.

Q2: Design and sketch an ideal single storey house on the site shown below. The design should be free hand and can be drawn on graph paper. If a graph paper is not available then make a grid of 5'x5' on a separate white A4 size paper. The house should be naturally ventilated and have natural lighting. Also, it should be free of noise. The site is located in Peshawar. Label or explain the Plan neatly. (CLO1-PLO7)

Site Problems:

- **Open drainage in direction of summer winds which is a major source of bad smell**
- **Noise from west side and Winter winds from north-east side**
- **Existing 2 storey building on south side blocking some solar radiations**

Ans:



PhotoScan by Google Photos

Q3: Select a site at the place where you live. Do Micro site analysis of Site and make its sketch on another A4 paper and write about it in detail. You can take your own lawn as a site for analysis or any other site in the neighborhood. Additionally, make a solar path diagram for your area on a separate piece of paper to find the exact sun angles for both winter and summer. Watch videos on YouTube to understand and make Solar Path diagram. Use these sun angles to make a rough sketch of a room. Show window height, type of fixed sun shade used, angle and height of shade as well as its depth and width by keeping sun angles in mind. The purpose for the sketch is to show how winter sun is allowed and summer sun is blocked. (CLO1-PLO7)

Ans:

Google Photos



SUN ALTITUDE AT NOON ON SUMMER	SUN ALTITUDE AT NOON ON WINTER
$= 90 + 23.5 - (\text{your Altitude})$	$= 90 - 23.5 - (\text{your Altitude})$
$= 90 + 23.5 - (29.37)$	$= 90 - 23.5 - (29.37)$
$= 84.13^\circ$	$= 37.13^\circ$
Highest Sun Chart is 75	Lowest Sun Chart is 28

SUN ANGLE

Diagram illustrating sun angles for a building. The building height is labeled H . The summer sun angle is 84.13° of H for latitude up to 27.5° . The winter sun angle is 37.13° of H . A note indicates a distance of 30% of H from the top of the building.