

Boise State University

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2019 Undergraduate Research and Scholarship
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Undergraduate Research and Scholarship
Showcases

4-15-2019

The Burj Khalifa

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The Burj Khalifa

Abstract

The Burj Khalifa is currently the tallest building and freestanding structure in the world. It stands at over 2,716 feet tall. This height is taller than two Eiffel towers stacked on top of each other. The Burj Khalifa also holds the world record for the elevator with the longest travel distance.

Construction of the Burj Khalifa began in January of 2004 with the excavation of the job site. Roughly three years after the excavation process began, the concrete and steel foundation and structural system was complete. In May of 2007, the exterior cladding began to be added at a rate of about 20 to 30 panels per day and eventually improved to as many as 175 panels per day. Construction finally concluded in September of 2009.

The intricate design was created by the Chicago firm of Skidmore, Owings and Merrell. The inspiration for the design is derived from minarets and desert flowers, as well as Frank Lloyd Wright's plans from 1956 for the Illinois Sky-City in Chicago. Even though the goal of the Burj Khalifa is to conjoin Islam and modernity, economically, Dubai is struggling. Thus this structure might be seen as unsustainable and irresponsible given Dubai's political climate.

Works Referenced

Bedell, Geraldine. "Dubai's Burj Khalifa | Architecture Review." The Guardian, Guardian News and Media, 10 Jan. 2010, www.theguardian.com/culture/2010/jan/10/burj-khalifa-dubai-skyscraper-architecture

The Burj Khalifa



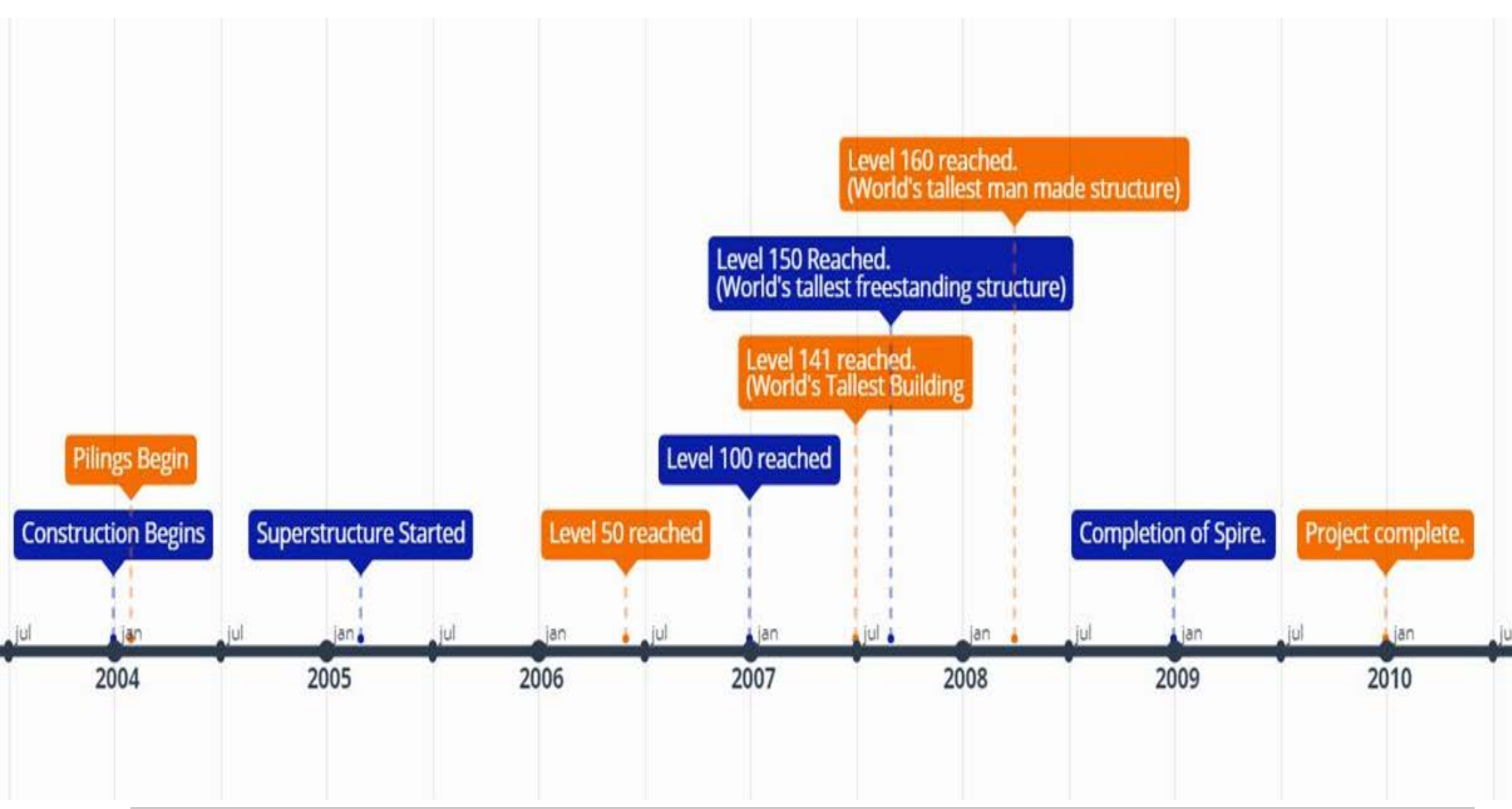
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Instructor: Dr. Kirsten Davis

Our Research:

Introduction

The Burj Khalifa in Dubai is currently the tallest building and freestanding structure in the world, standing at over 2,716 feet tall. The building was designed to be the centerpiece of a large-scale, mixed-use land development. The Burj Khalifa was designed to symbolize international strength and diversity, while promoting tourism.

Construction Timeline



Miscellaneous Facts

- The Burj Khalifa is taller than two Eiffel towers stacked on top of each other.
- World's longest travel distance elevators: (1,654 ft)
- Highest vertical concrete pumping (for a building): (1,988 ft)
- Project used over 431,600 yd³ of concrete and 31,400 metric tons of steel rebar
- 22 million man-hours of construction
- The amount of rebar used for the construction would extend a quarter of the way around the world if laid end to end.

Construction

The construction began by digging 150 feet into the ground and creating 200 concrete piles for support. Concrete and reinforcing steel were used for the skeleton. Glass and steel make up the exterior skin. A total of 30,000 glass panes were used to cover the exterior. A "kangaroo" crane was used to lift the prefabricated steel sections into place. It's called the kangaroo crane because it extends up a few floors at a time as the building grows, and the base is hydraulically lifted to follow. 630 horsepower pumps were used to force the concrete to the top of the building for the precast concrete sections.

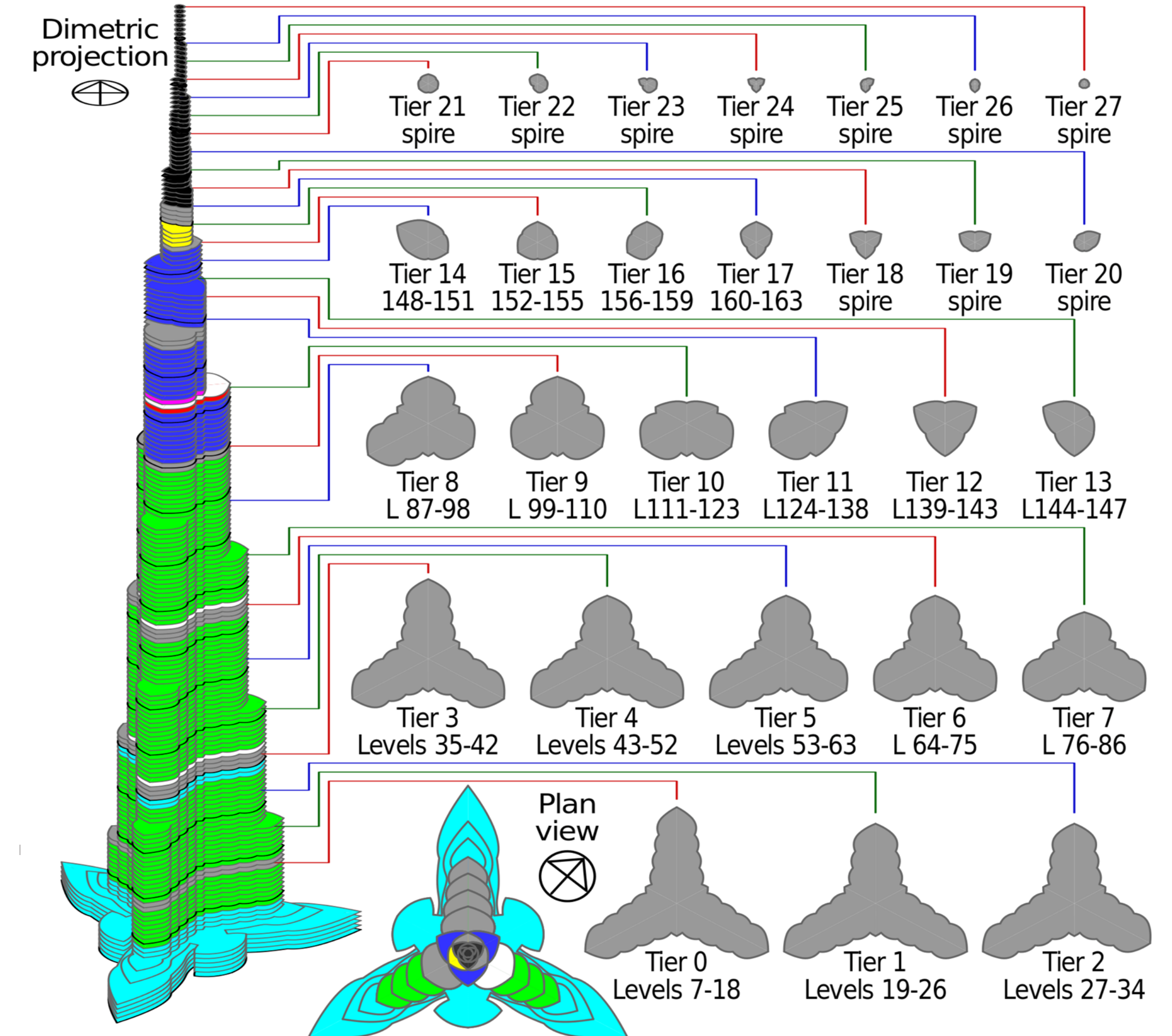


Influencing factors

- Economic: The ruler of the emirates, Sheikh Mohammed bin Rashid al Maktoum, wanted to diversify the economy through enticing businesses and manufacturing while expanding this industry which is tourist heavy. This endeavor is made possible due to the structure of the government in Dubai and their involvement in urban development.
- Social: The Burj Khalifa since its completion, has become one of Dubai's most prominent tourist attractions. The structure has also had a positive influence on the surrounding hotel businesses which have increased up to 35 percent from 2009.
- Political: Dubai's political structure is a representation of both state control and economic liberalism, which results in a capitalist approach to their country. These political approaches, are reflected within the Burj Khalifa's construction and image.

Design

The intricate design was created by the Chicago firm of Skidmore, Owings and Merrell. The inspiration for the design is derived from minarets and desert flowers, as well as Frank Lloyd Wright's plans from 1956 for the Illinois Sky-City in Chicago. The final design of the building consists of an organic form which contains tri-axial geometry as well as spiraling growth. Within the design, traditional Islamic forms are referenced which highlight the rich culture and history surrounding the structure.



Equipment & Technology

- To protect the building from the desert heat, special windows had to be designed. Engineers came up with a solution that consisted of window panes that were coated with a thin layer of metal on the outside to deflect ultraviolet radiation and silver on the inside of the pane to deflect the infrared rays from the hot surrounding desert.
- To protect the building from the immense wind forces at such great heights, the design of the building had to be unique. The rounded, multi-section design was used to break up the naturally occurring vortices that are present from such strong wind gusts.
- When pouring the concrete, the pumps were so powerful that they were able to pump 25 tons of concrete to the top floor in under 40 minutes.
- Special planning was put in place in case of fire. If any of the fire detection equipment get triggered for smoke or fire, special high pressure fans blow cool air into the stairwells forcing the smoke out and keeping a clear escape route for the people inside.