Art & Culture

Edited by
Liz Totton
elizabeth.totton@itp.com

Aiming to be iconic: Louvre Abu Dhabi

A constellation of steel stars graces the dome of the Louvre. *Liz Totton* learns how the construction crew crafts a masterpiece, working tirelessly to keep this star grounded

Floating landmark: The iconic Louvre Abu Dhabi

While the Louvre Abu Dhabi team of international curators toil abroad threading together what is expected to be one of the grandest art collections in the world, a construction crew toils in the heat of the midday sun aligning stars to ensure that this feat of architecture is iconic enough to house its collection and the outlook is not just good, it's stellar.

TOAD talks to Stuart Keane, the senior owner's representative delivery for the Tourism Development & Investment Company (TDIC), to learn more about the construction site and the future museum.

As of May 1, where is the Louvre in terms of construction?
The museum is right on schedule. We expect to complete the construction phase on time in December 2015.
Has there been any one thing unexpectedly difficult about getting the museum open that you can share?

Inside the Louvre

Everyone involved in the construction is an expert in his/her field so there is no design component that is too challenging for us collectively. The only real challenge we have faced is that the design is entirely bespoke. There is no comparable feat of architecture with regard to the dome, which is obviously the most iconic aspect of the museum. And then there is the sheer fact that this is a museum that is, to some degree, effectively floating on the sea.
Can you tell us more about the iconic dome?

Dome facts by numbers

What you need to know:
- Total canopy weight is **12,000** tonnes which is broken down into the following:
  - Steel Structure weight: **7,000** tonnes – weighing almost as much as the Eiffel Tower
  - Aluminium cladding weight: **5,000** tonnes
- Length: **180** metres – the length of two football pitches
- Circumference: **565.5** metres
- Highest point: **38** metres – height of an 11-storey building
- Number of super-sized elements that makes the dome: **85**
- Average weight of each super-sized element: **50** tonnes
- Number of temporary towers required to support each super-sized element while it is lowered into place: **4**
- Number of temporary towers used during construction: **120**
- Number of permanent piers holding dome after its completion: **4** – each is 125 metres apart
- Lifting weight capacity of the super-sized cranes used on site: **1,600** tonnes
- Height of 1,600 tonne capacity crane: **230** metres
- Number of trucks used to transport the crane: **90** trucks
- Maximum number of workers on dome at any time: **800**

A rain of light

Hala Wardé, project director of the Louvre Abu Dhabi at Ateliers Jean Nouvel, discusses the inspiration for the dome:
'The project is based on one of the major symbols of Arabic architecture and a universally recognized form: the dome. This 180-metre wide cupola protects the museum city below and filters the sun rays to create a 'rain of light' effect, referencing the interlaced palm leaves traditionally used as roofing material in the Emirates and the light effect this produces.

The reference to geometry and light ties the dome into the Arabic architectural discourse whilst the materials and construction process place it firmly in the 21st century.

The design, composed of eight superimposed layers, marries aesthetic choices with climatic concerns as the perforation cartology is equally dictated by the uses of the spaces under the dome, with greater shading over outdoor public spaces, adapting the design to provide environmental comfort for the museum users.

Applying a contextual approach to the site, the museum has been designed as an archipelago in the sea. Architecture belongs to a moment and a place. It is a form of dialogue with the people who lived there and the ones who want to modify a place at a given point in time. We are not building a space but in a space. The vocation and objective of this iconic museum is to mirror a protected territory, one that belongs to the Arabic world; the Louvre Abu Dhabi will belong to its country, to its history, to its geography, and of course, to its traditions.'

Work in progress: Stuart Keane looks over the site

Steel stars ready to be added to the dome roof

It's amazing. It's fascinating to be a part of. If you have driven around and seen truckloads of steel stars traversing the city, you don't need to wonder where they are all going anymore. The dome is made of structural steel elements and each piece of each star is different because of the geometry of the dome. It has a certain numbered position on the dome, and it wouldn't fit anywhere else. It requires a lot of coordination to put this puzzle together – it's 180m in diameter and 12 tonnes, resting on four pillars that sit on bearings built on the sea – there is nothing quite like it in the world.

How exactly do you piece this puzzle together?
It's a bit like a spider web coming over the top of the dome. It starts in one direction and works its way out. It cannot start in multiple directions and meet in the middle because of thermal expansion and minor errors, the stars might overlap or not come together at all, so we have to piece it together working in one direction: west to east.

We assume the weather plays an enormous role in a construction like this.
Yes, the temperatures move the materials at different rates, but we have to work all year round due to the schedule. We have built a tolerance into the dome. Gaskets allow the parts to expand and contract. It's complicated, but our team is diverse and experienced enough to be prepared for anything that is thrown at them.

Under construction: Completion is expected in December

You mentioned that you had to contend with the fact that the museum is floating. Can you elaborate?
We reclaimed the land, though we did indeed keep the original shoreline. The building currently sits on more than 5,000 concrete pilings. Usually when you put a building on pilings, it's to keep it from sinking. But, in this case, our objective is to keep the museum from floating out to sea. We are eventually going to take all that dirt away and, as you see in the rendering, the building is going to be surrounded by water with a tension piling to keep it from floating away, and to hold it in place.

Is this the first building that you have ever built that has the potential of floating away?
[Laughing]. Yes, it is the first building that I have ever done that will be surrounded by water on all sides and accessed only by bridge. I think that's pretty unique.

To date, what aspect of this project has given you the most gratification as a humble museum engineer?
In September 2014, we lowered the dome into its final position, which was a major achievement. During the dome's construction, it sat on temporary towers. You can see a time lapse video of that momentous day on the TDIC website.

It was exciting and nerve-wracking at the same time.

Visit www.tdic.ae to view time lapse videos and to keep up to date with the progress of the Louvre Abu Dhabi construction. Completion expected December 2015.