



# STEEL

Architecturally  
Exposed Structural  
Steel

SPAN

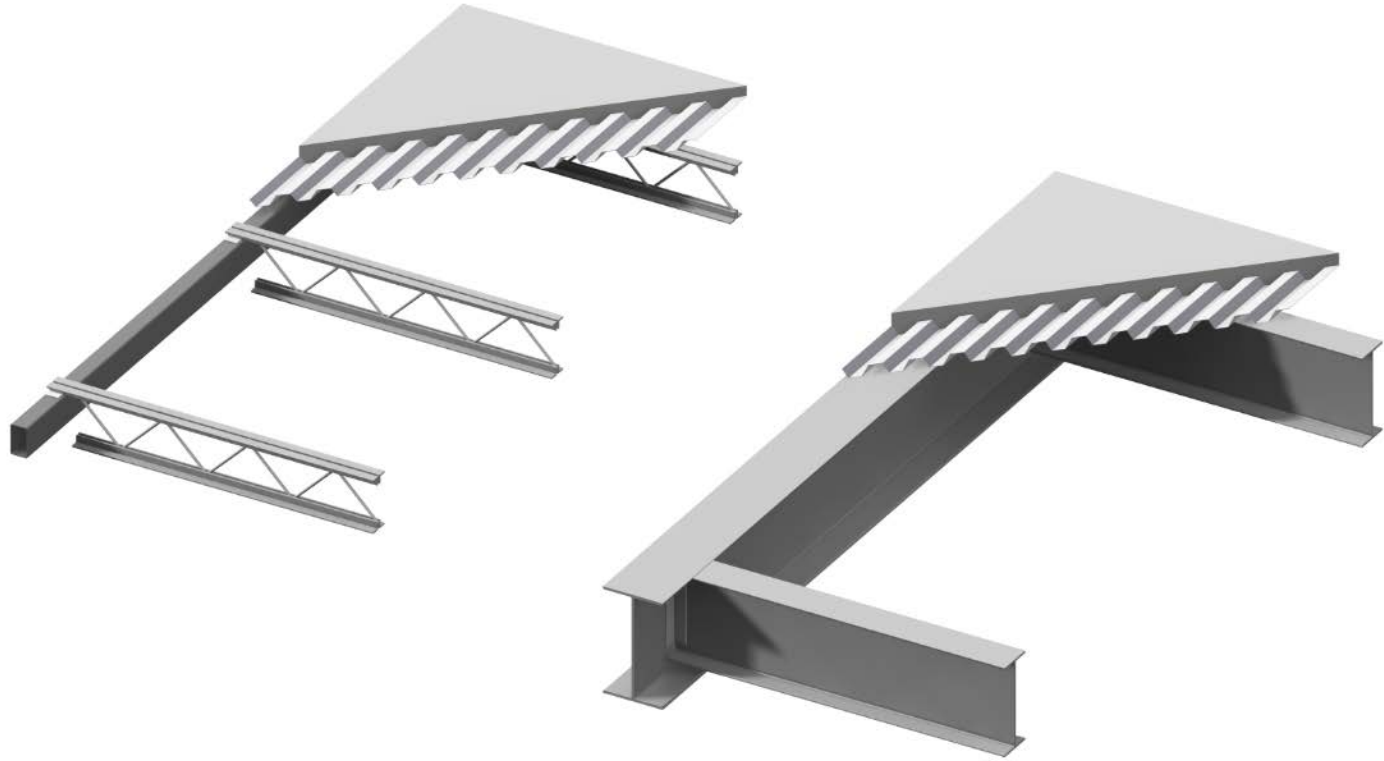
## Span Types:


- Floor systems (flat)
- Opaque roof support systems (flat, curved, sloped)
- Skylight support systems
- Extremely long span systems for buildings (where column free spaces are essential)
- Bridges (separate lecture on this)

## Specialty Systems:

- Space frame systems
- Lattice grid systems

Floor  
and Flat  
Roof  
Systems






Lillis Business School  
Eugene, Oregon



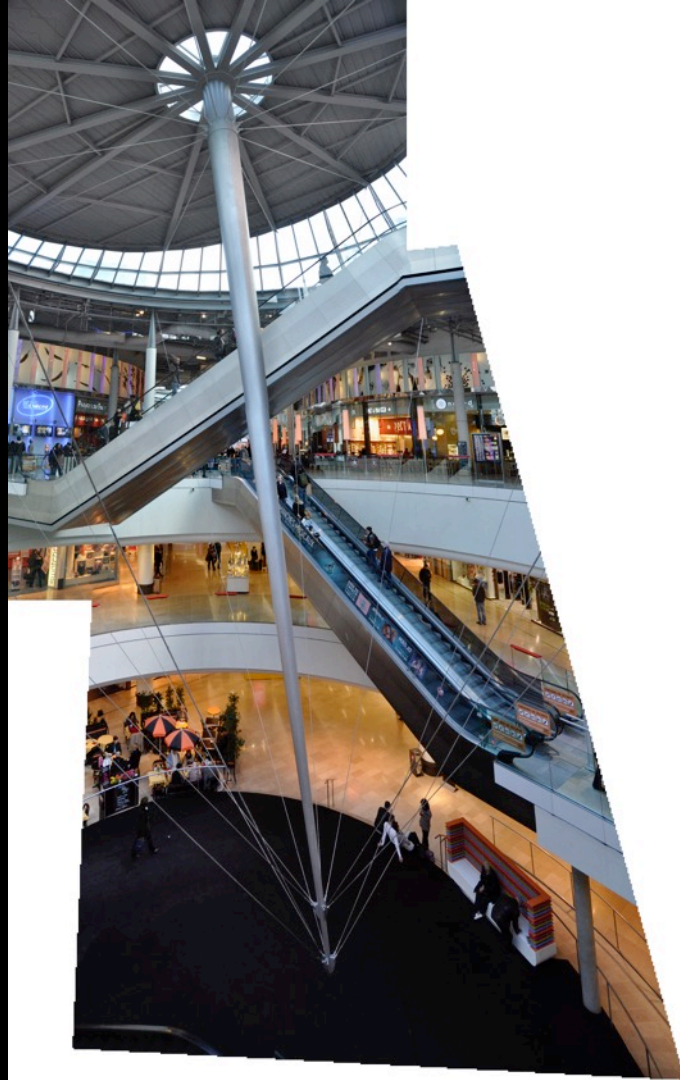




Les Quatre Temps  
La Defense, Paris  
Atelier LWD  
1981









PAWS Climbing Centre  
University of Alberta  
Edmonton, Alberta  
Group 2 Architecture  
2015





















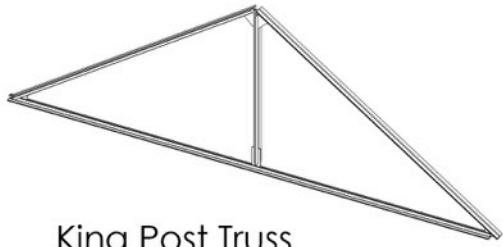
Federation Square  
Melbourne, Australia  
Batesmart and LAB Architecture  
2002







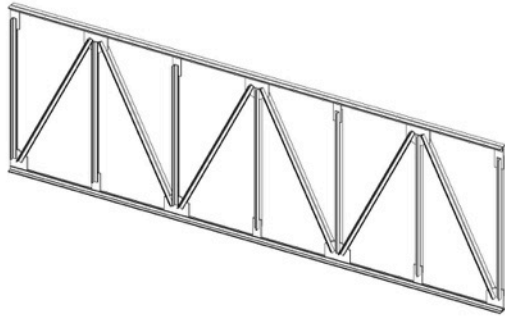
## COMMON TRUSS TYPES



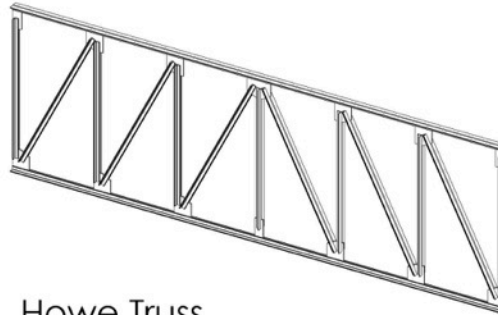
King Post Truss



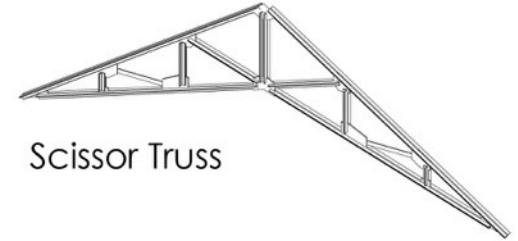
Pitched Howe Truss



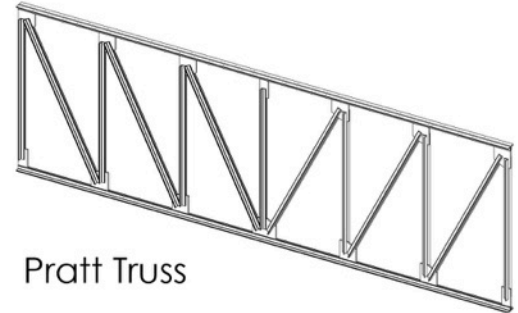
Modified Warren Truss



Howe Truss



Scissor Truss



Pratt Truss



Abilities Centre  
Whitby, Ontario  
B+H Architects  
2012







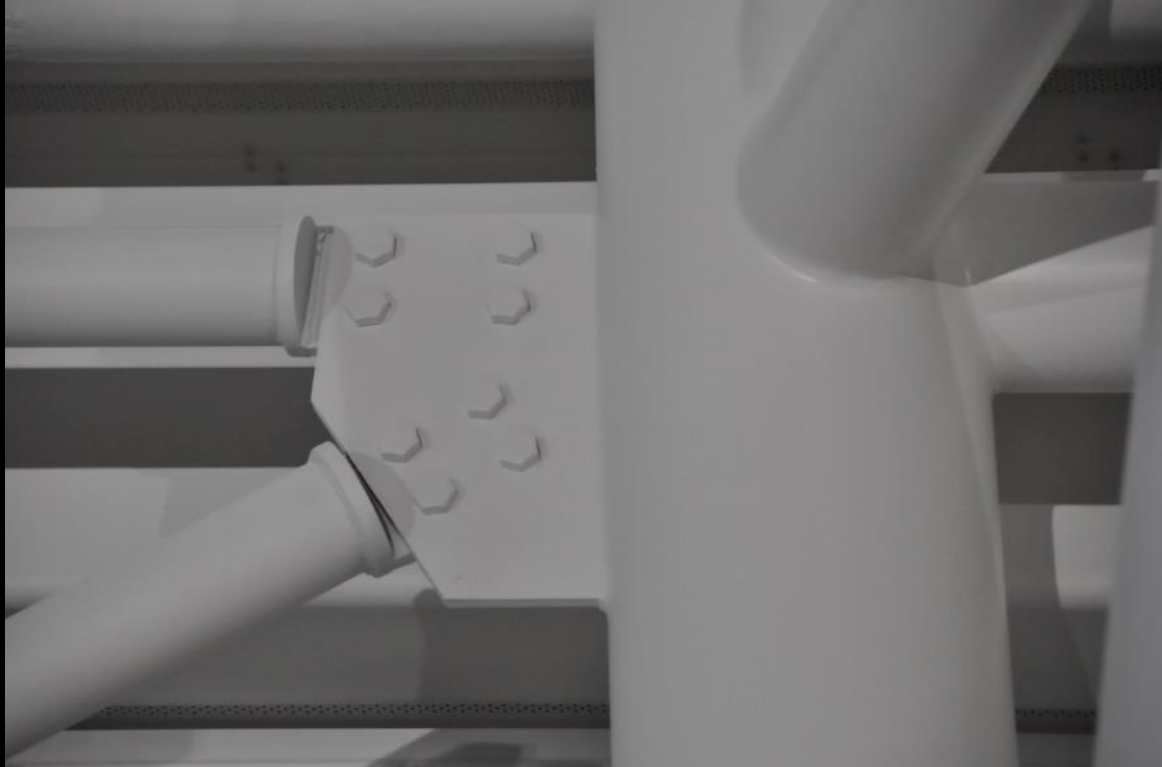














A photograph of the Auckland Marine Events Centre, a modern building with a series of white, curved, arched roof sections. The building is situated on a waterfront, with several boats docked at a pier in front of it. The water is a light blue-green color. The sky is blue with scattered white clouds. In the foreground, a concrete pier with wooden pilings and metal bollards runs along the water's edge. A sign on the building reads "VIADUCT EVENTS CENTRE" in red letters. A white boat with "ZMOI" on its side is docked at the pier. A yellow boat is also docked. A blue boat with "SAN COVILLE" on its side is docked. A white car is parked on the pier. The overall scene is a busy waterfront area.

Auckland Marine Events Centre  
Auckland, New Zealand  
Moller Architects  
2014



VIADUCT  
EVENT  
CENTRE

VIADUCT  
EVENT  
CENTRE

healthy living  
Show  
On Now

Healthy Living Show  
On Now







**D&H STEEL CONSTRUCTION**



2010 8 11















Rogers Place Arena  
Edmonton, Alberta  
360 Architecture  
2016







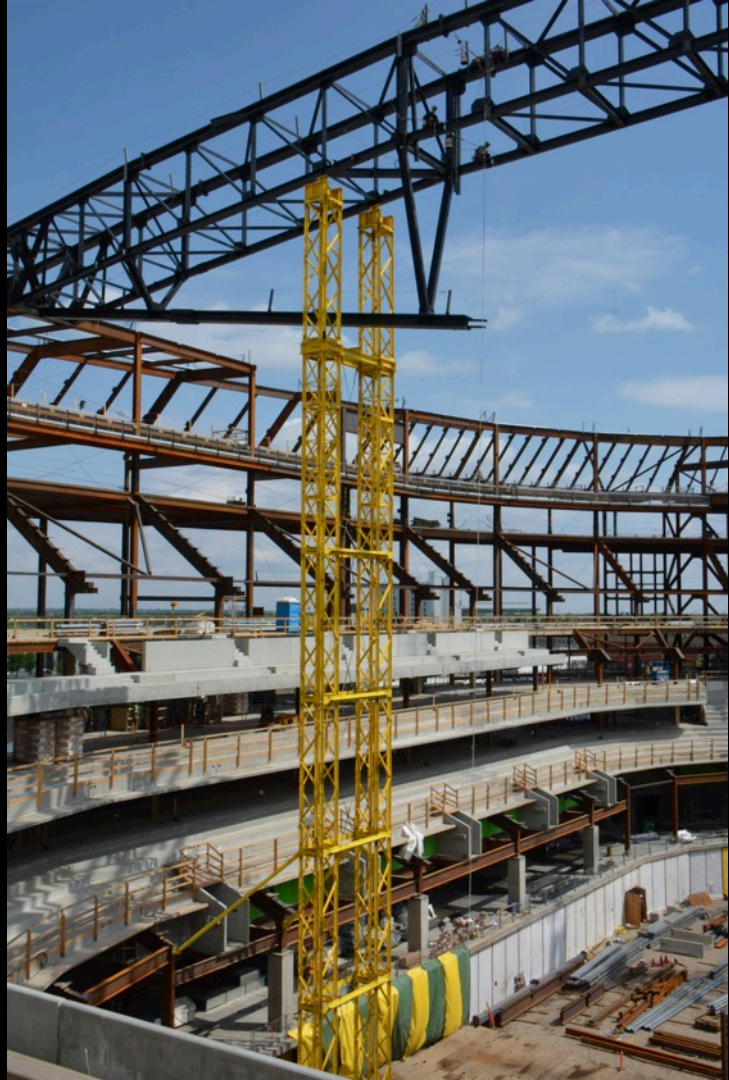


















The image captures the intricate steel truss structure of the Atocha Station Roof in Madrid, Spain. The structure is composed of numerous brown-painted steel beams that intersect to form a series of triangular and quadrilateral patterns, creating a complex, geometric web. A prominent, light-colored concrete pillar stands in the center, supporting the roof. The lighting is dramatic, with strong shadows and highlights that emphasize the three-dimensional quality of the steelwork. In the background, a walkway with a metal railing is visible, suggesting the interior of a large, covered public space.

Atocha Station Roof  
Madrid, Spain





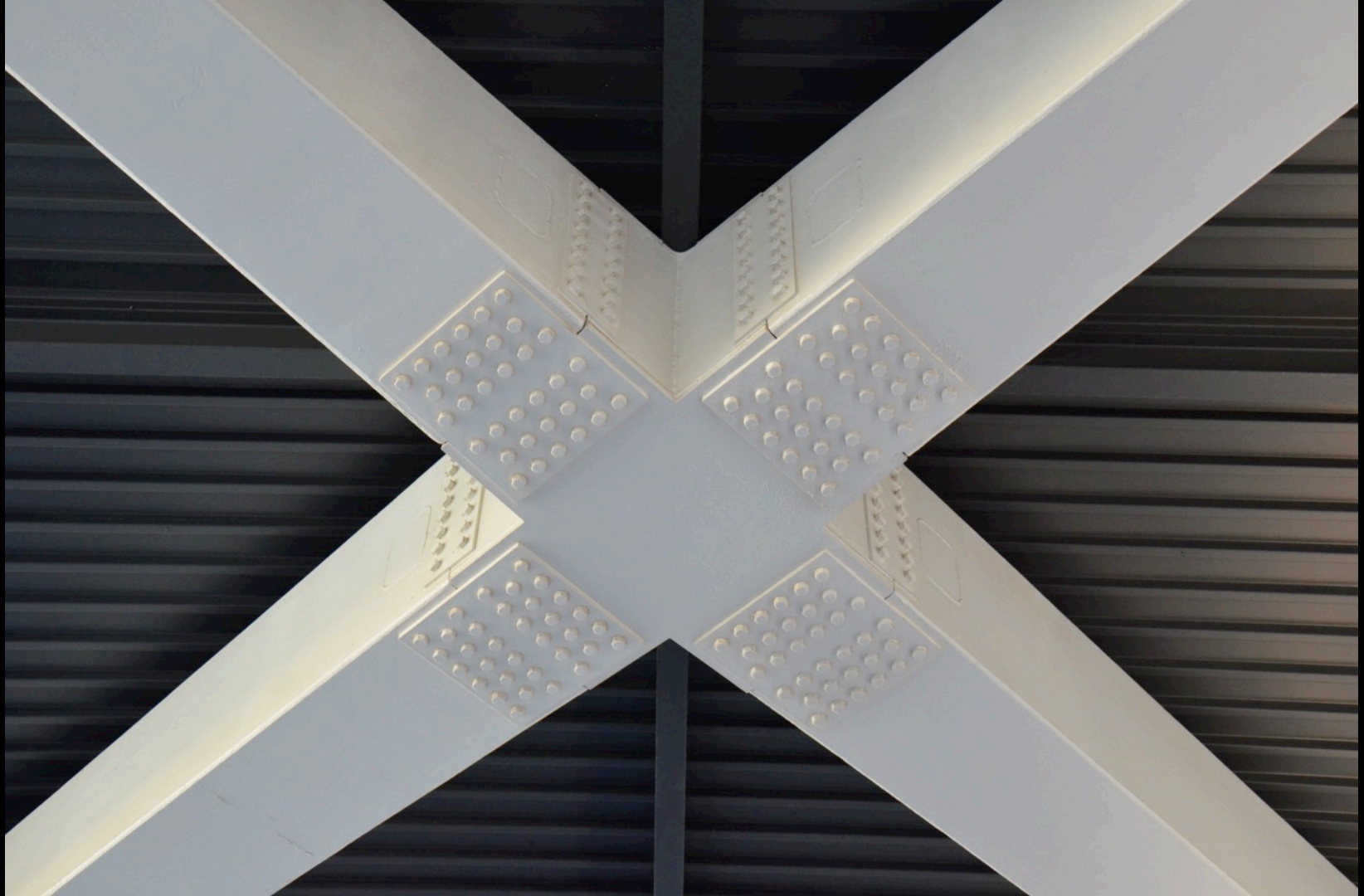




Valencia Train Station  
Valencia, Spain











Southern Cross Station  
Melbourne, Australia  
Nicholas Grimshaw  
2007









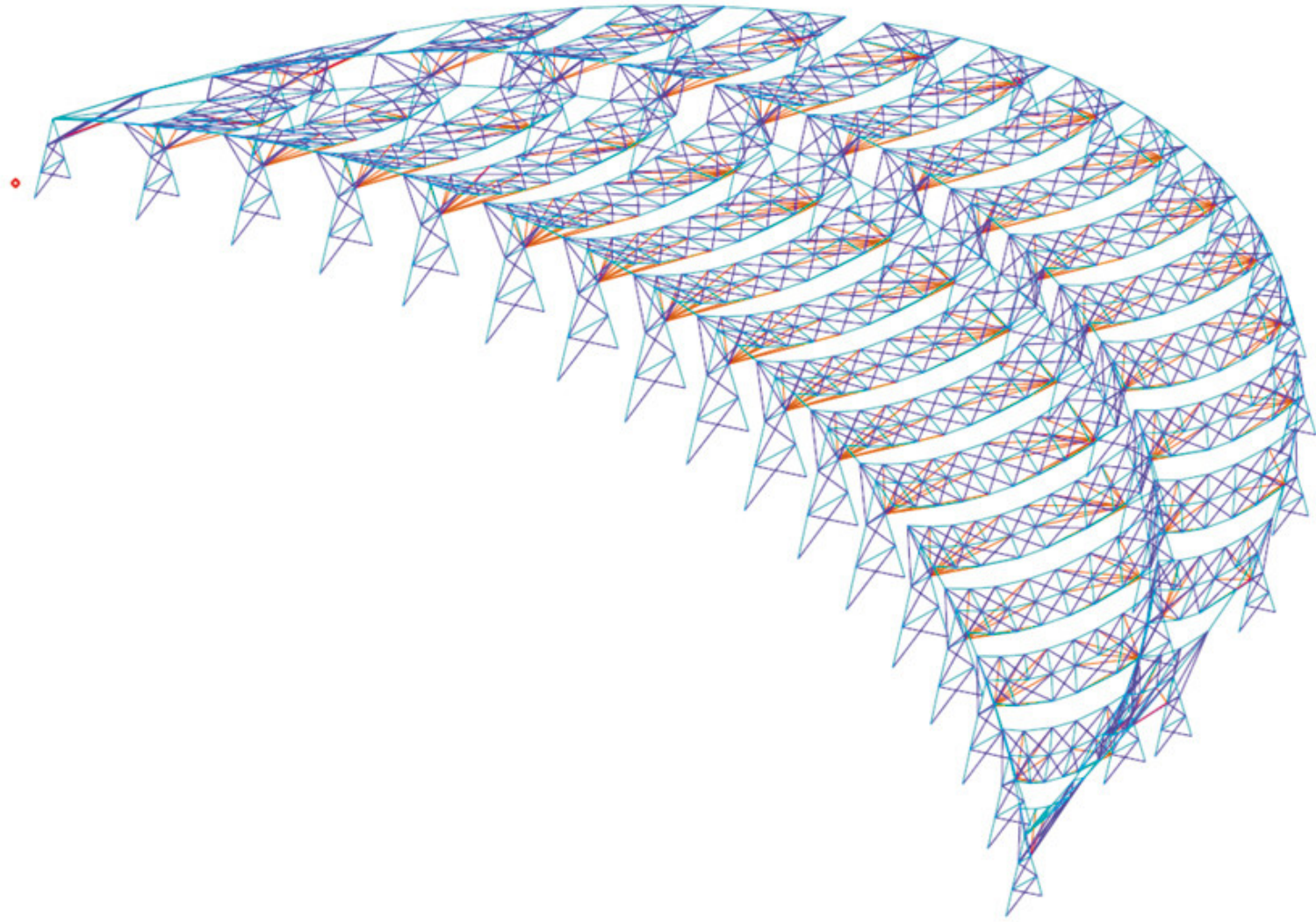




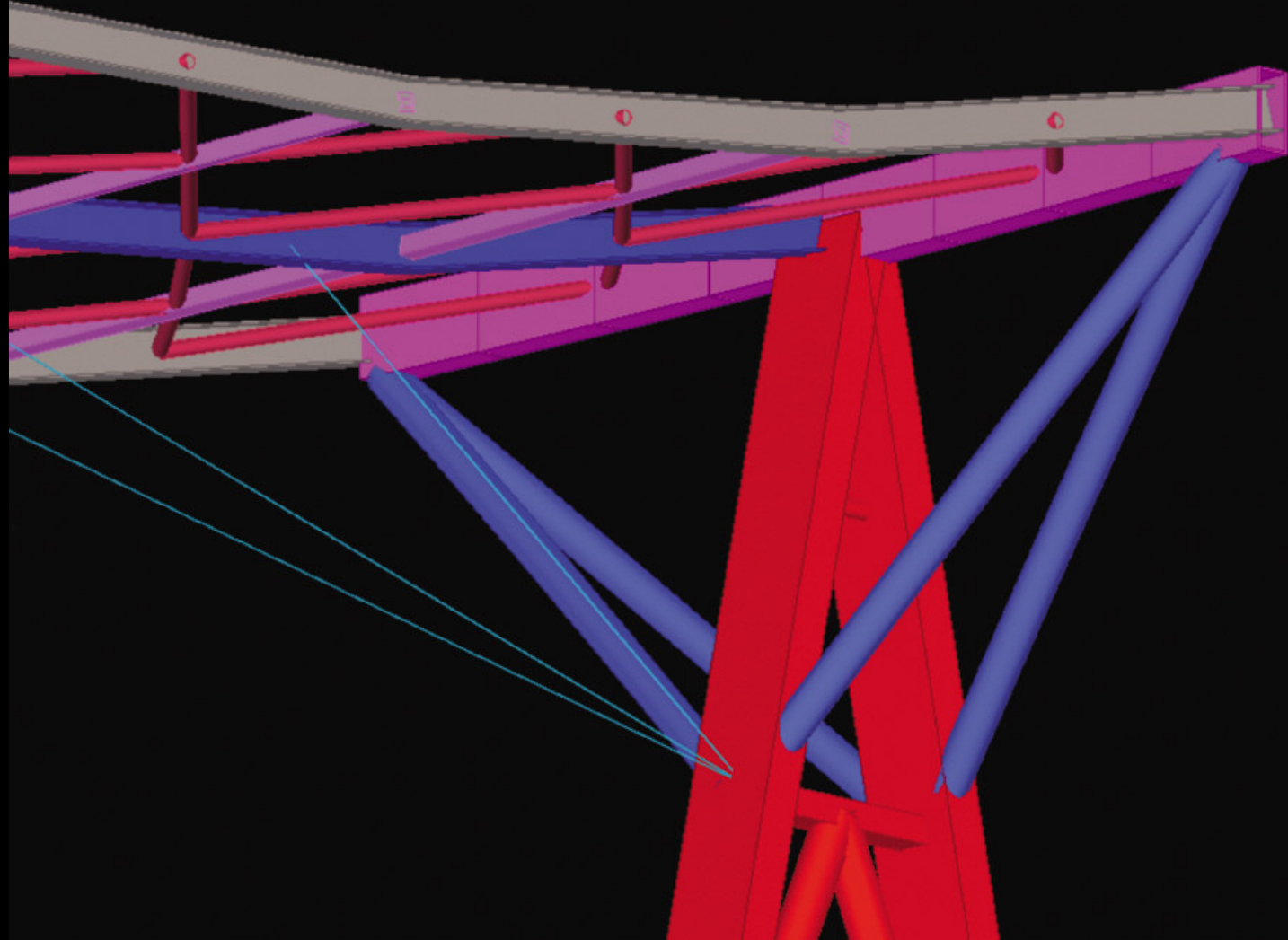


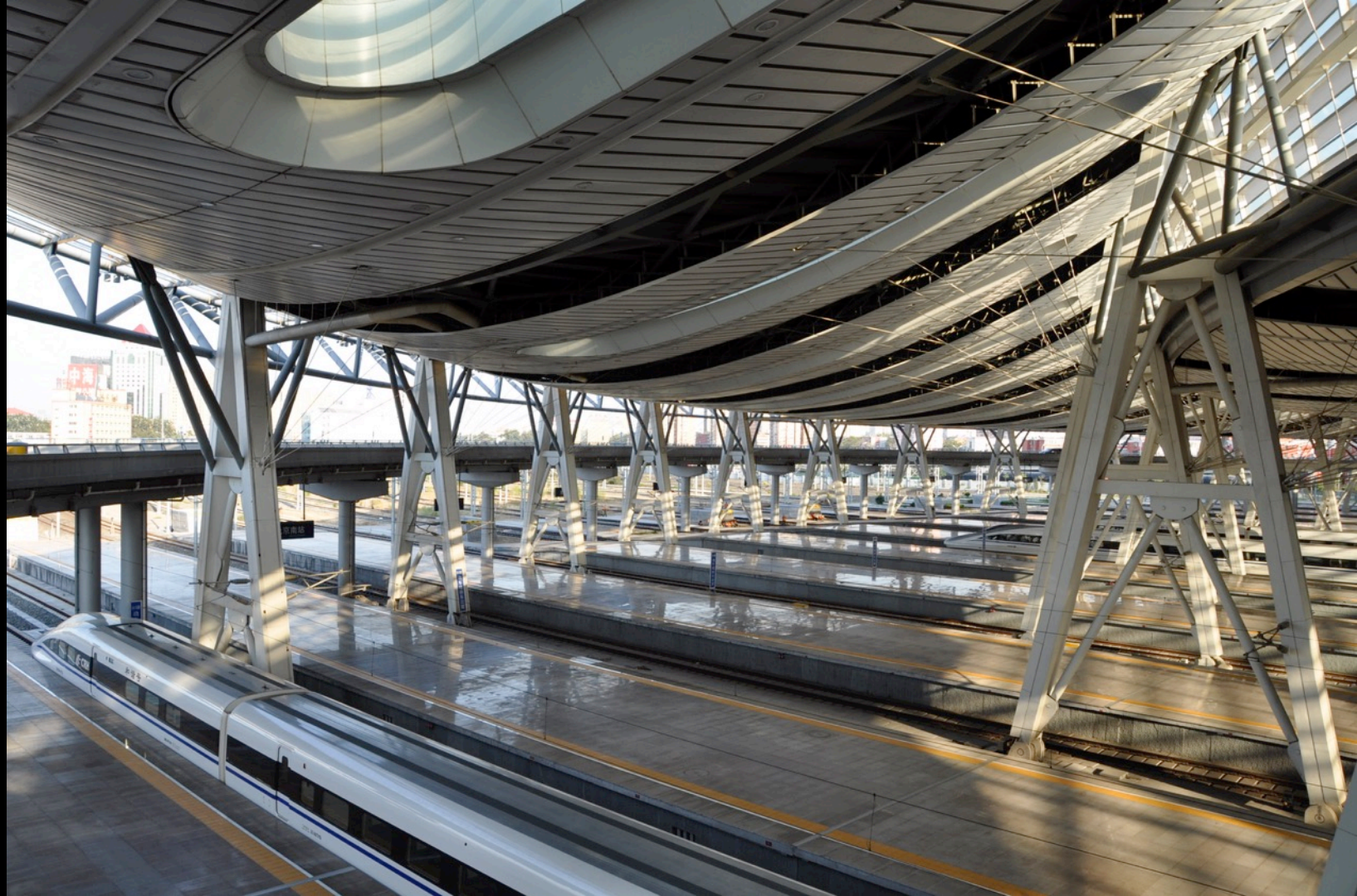


South Railway Station  
Beijing, China  
TFP Architects with Arup  
2008





















Pudong International Airport  
Terminal 2  
Shanghai, China









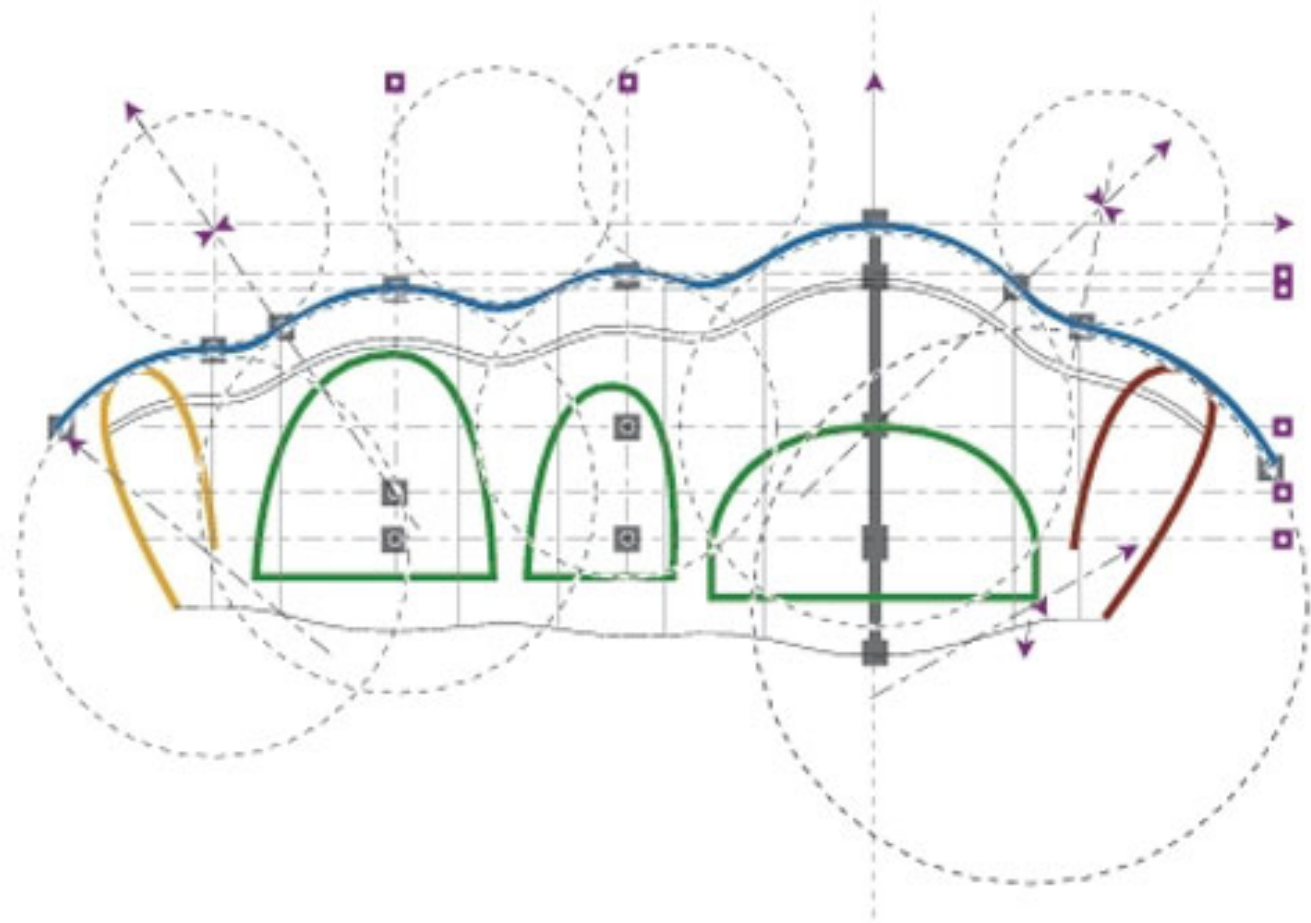




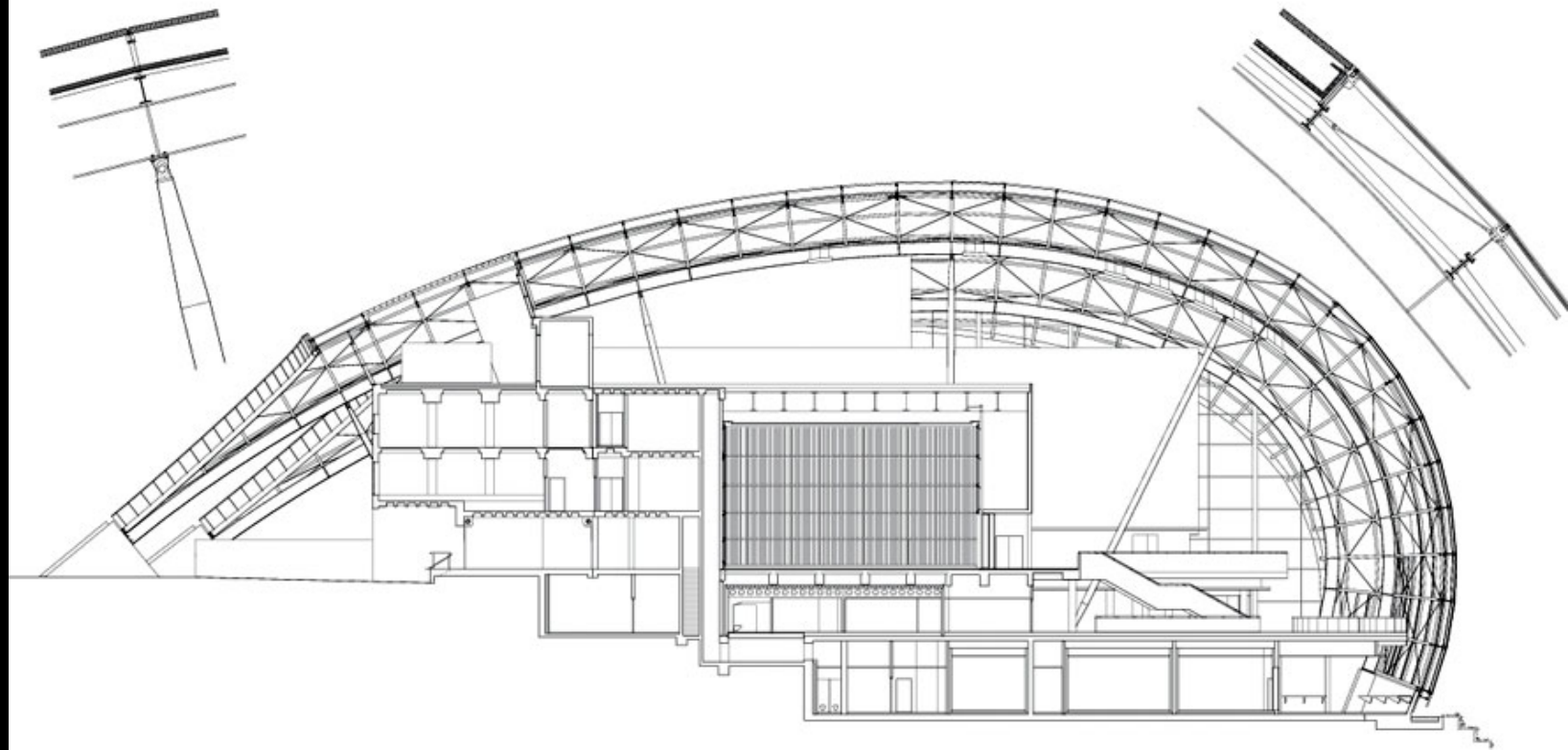




Sage Theatre  
Newcastle/Gateshead, UK  
Foster and Partners  
2004











The Sage Gateshead





Hall Two





















Mainly Supporting Expansive Glazing



Gaylord Hotel  
Dallas, Texas













Centro Vasco da Gama  
Lisbon, Portugal





optimus  
TARIFARIO  
OPTIMUS  
LIGA









きららよいこころよい  
東京ミッドタウンの秋  
MIDTOWN

MIDTOWN

Tokyo Midtown  
Tokyo, Japan  
SOM  
2007























TGV Station  
Charles de Gaulle Airport  
Paris, France  
Peter Rice













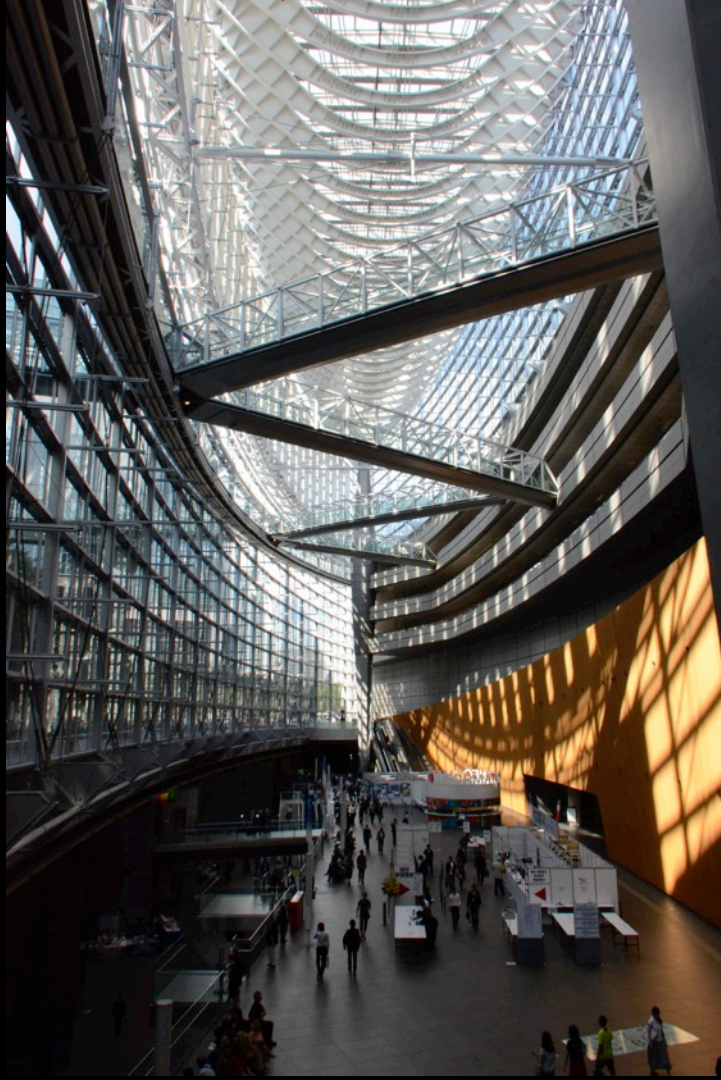




A photograph of the Tokyo International Forum building in Tokyo, Japan, designed by Rafael Vignoly in 1996. The building features a prominent, complex steel and glass facade with a grid-like structure. The sky is blue with scattered white clouds. In the foreground, there are some dark, rectangular structures and a street lamp.

Tokyo International Forum  
Tokyo, Japan  
Rafael Vignoly  
1996













































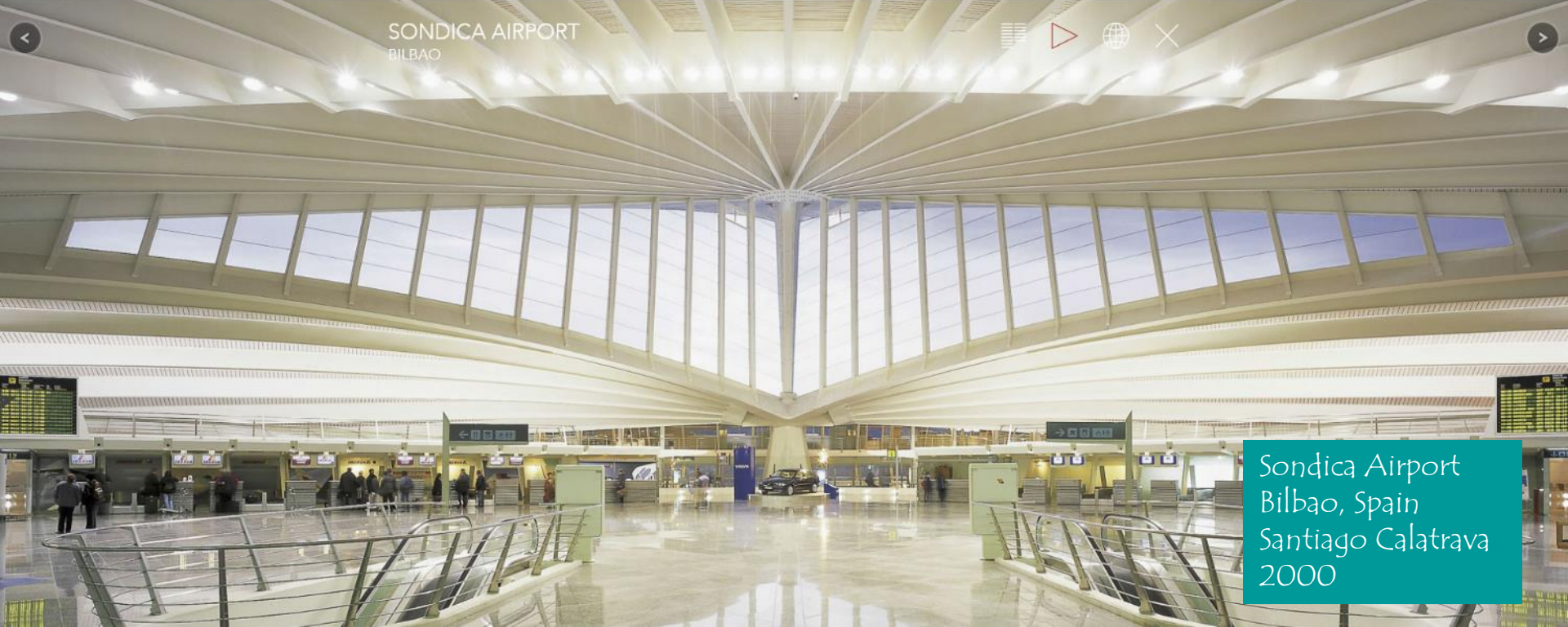






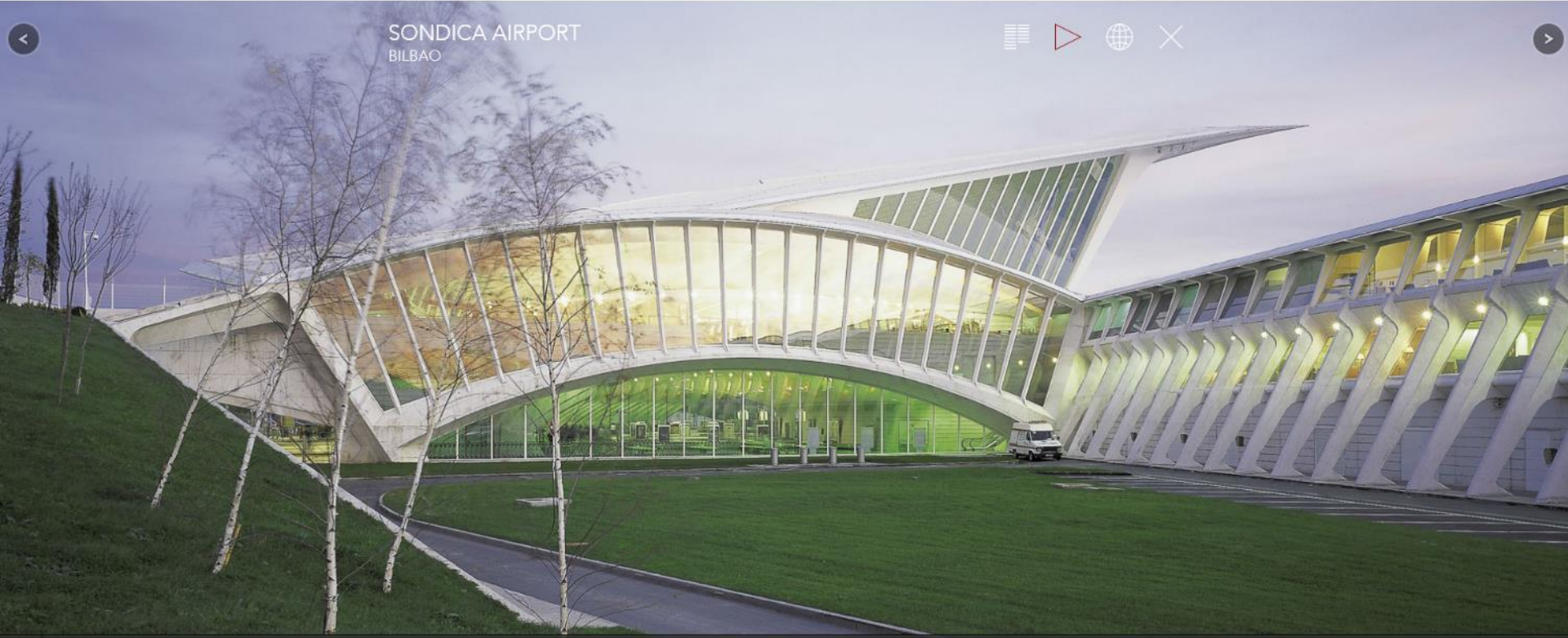


SONDICA AIRPORT  
BILBAO



Sondica Airport  
Bilbao, Spain  
Santiago Calatrava  
2000

SONDICA AIRPORT  
BILBAO

























Free WiFi

OPDOZ  
LUBALICIA  
ECO 2014







Chihuly Garden and Glass  
Seattle, Washington  
AHBL  
2012









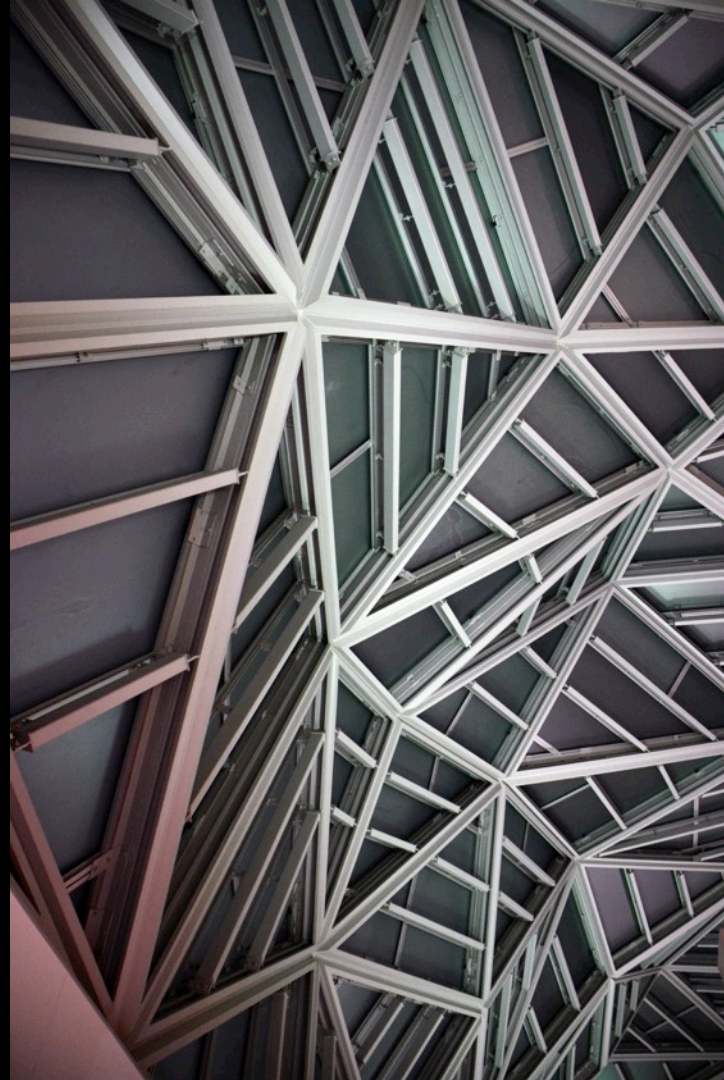








Kyoto Station Hotel  
Kyoto, Japan





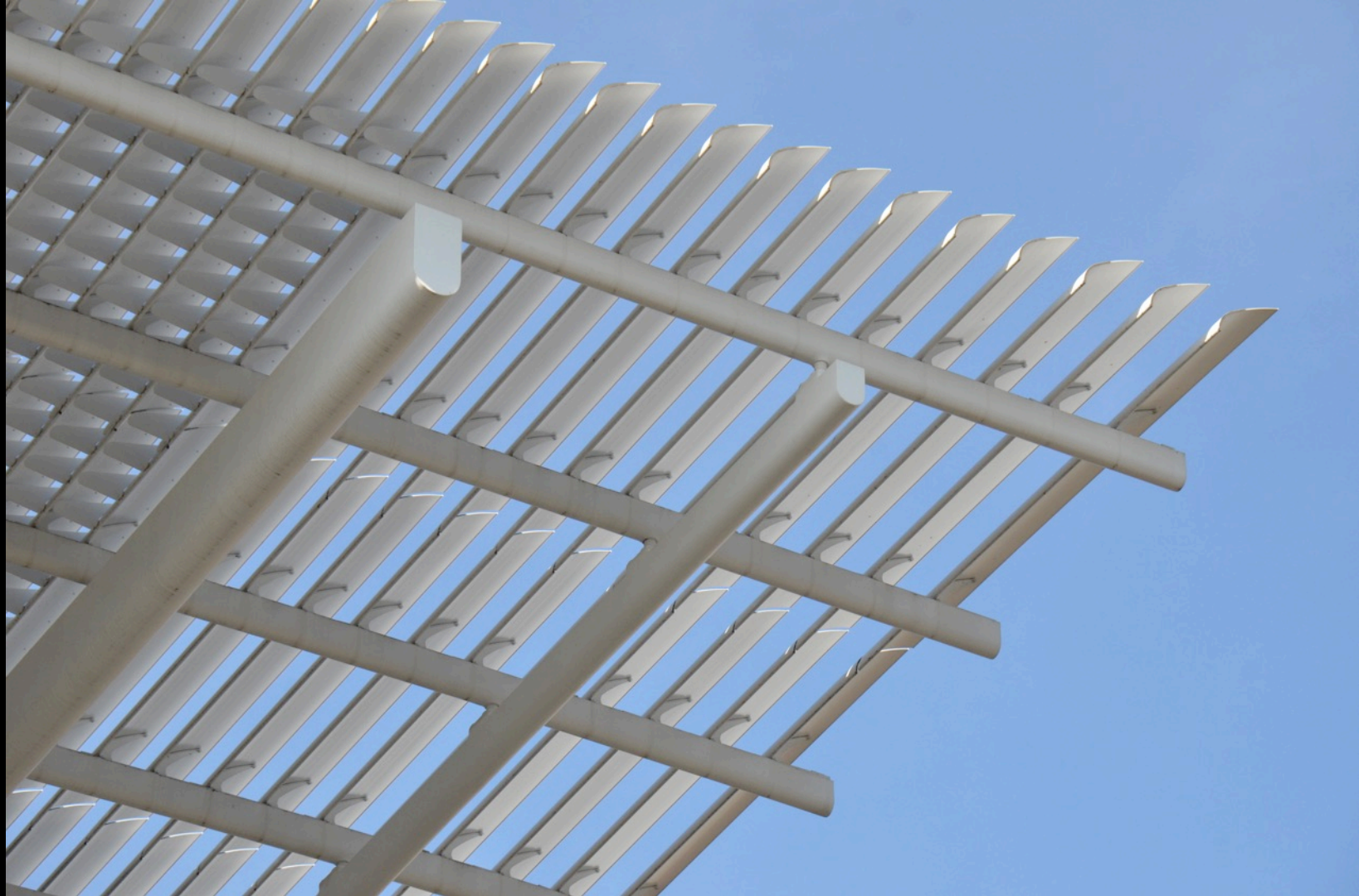




Chicago Art Institute Addition  
Chicago, Illinois  
Renzo Piano  
2009





















Island City Central Park  
Fukuoka, Japan  
Toyo Ito  
2002



















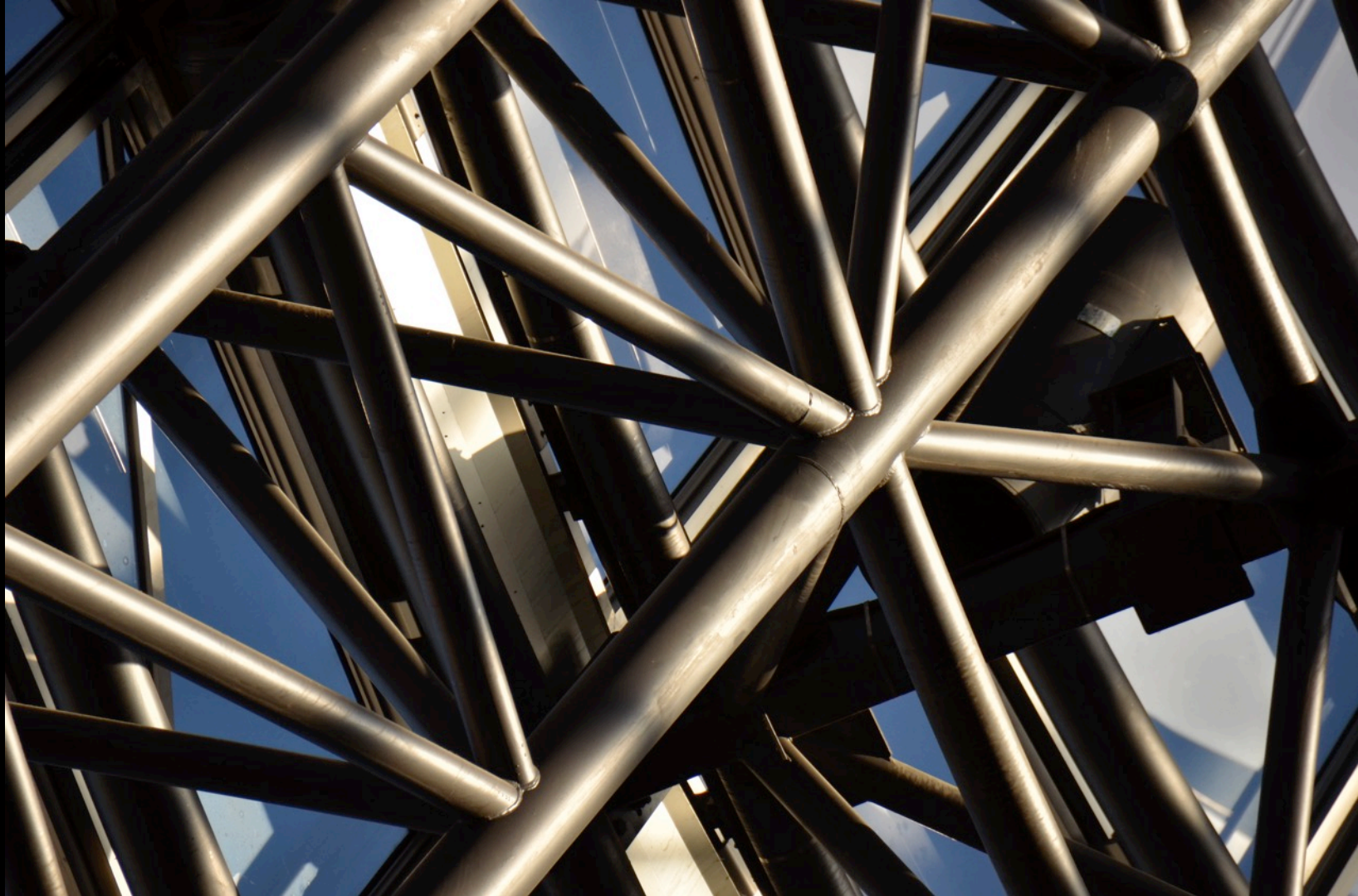




Melbourne Central Shopping Mall  
Melbourne, Australia







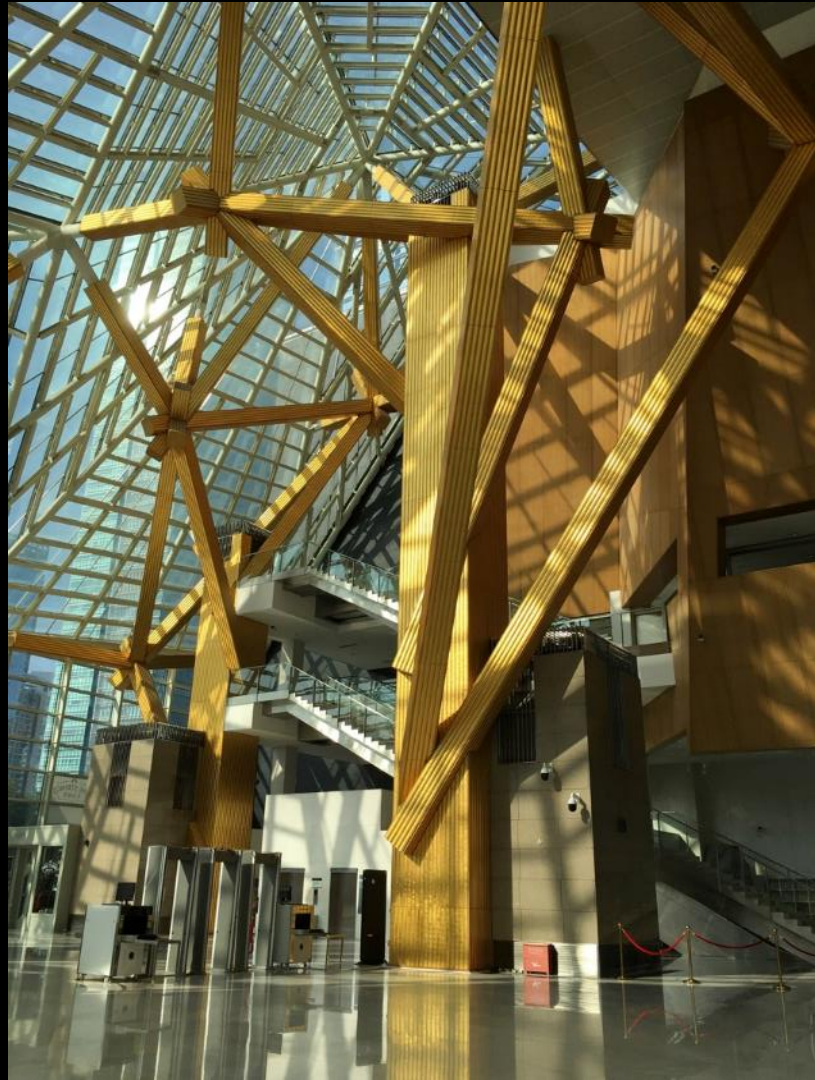




The image shows the Shenzhen Cultural Centre, a modern architectural structure. The building features a prominent glass facade with a grid of vertical and horizontal metal supports. In the foreground, a wide, multi-level staircase made of light-colored stone steps leads up towards the building. The sky is a clear, bright blue with some light clouds. The overall scene is well-lit, suggesting a sunny day.

Shenzhen Cultural Centre  
Shenzhen, China  
Arata Isozaki  
2000











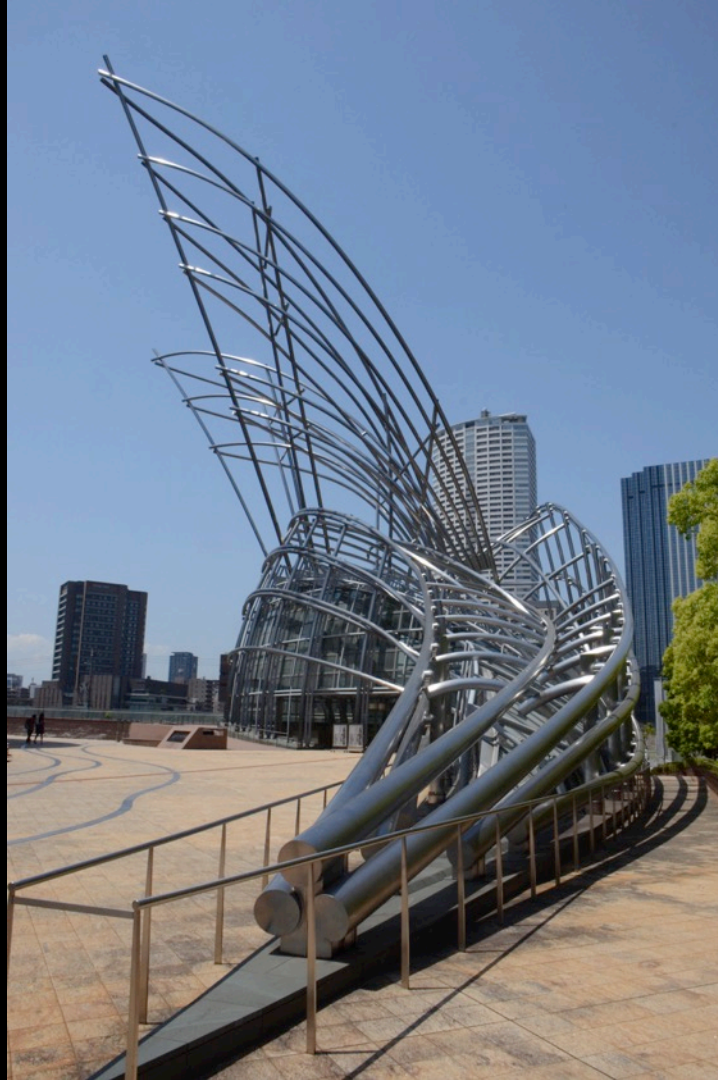












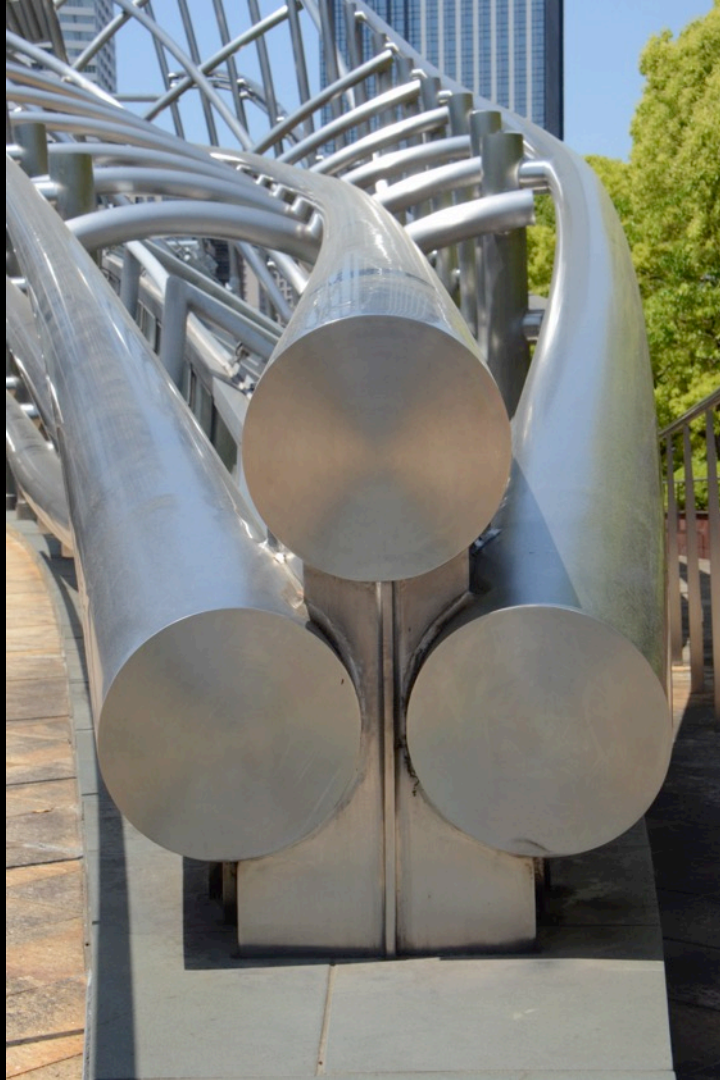
National Museum of Art  
Osaka, Japan  
Cesar Pelli  
2004





































图例：

1. 本馆为展示、教育、研究、交流、休闲、娱乐、健身、康乐、服务、接待、展览、会议、培训、演出、比赛、竞赛、颁奖、庆典、纪念、活动、场所。

2. 本馆为展示、教育、研究、交流、休闲、娱乐、健身、康乐、服务、接待、展览、会议、培训、演出、比赛、竞赛、颁奖、庆典、纪念、活动、场所。


3. 本馆为展示、教育、研究、交流、休闲、娱乐、健身、康乐、服务、接待、展览、会议、培训、演出、比赛、竞赛、颁奖、庆典、纪念、活动、场所。

4. 本馆为展示、教育、研究、交流、休闲、娱乐、健身、康乐、服务、接待、展览、会议、培训、演出、比赛、竞赛、颁奖、庆典、纪念、活动、场所。





高松駅 駅舎の軌跡  
2021

A wide-angle photograph of the L'Umbracle in Valencia, Spain, designed by Santiago Calatrava. The structure is a massive, white, ribbed canopy that arches over a walkway. The ribs are arranged in a series of overlapping, curved lines, creating a complex, organic form. In the foreground, a concrete ledge with a row of green plants and red flowers runs across the frame. In the background, several multi-story urban buildings with balconies are visible under a clear blue sky. The overall scene is bright and sunny.

Valencia Science City  
L'Umbracle  
Valencia, Spain  
Santiago Calatrava  
2001
















Space Trusses and Space Frames  
– 3D systems spanning in all directions

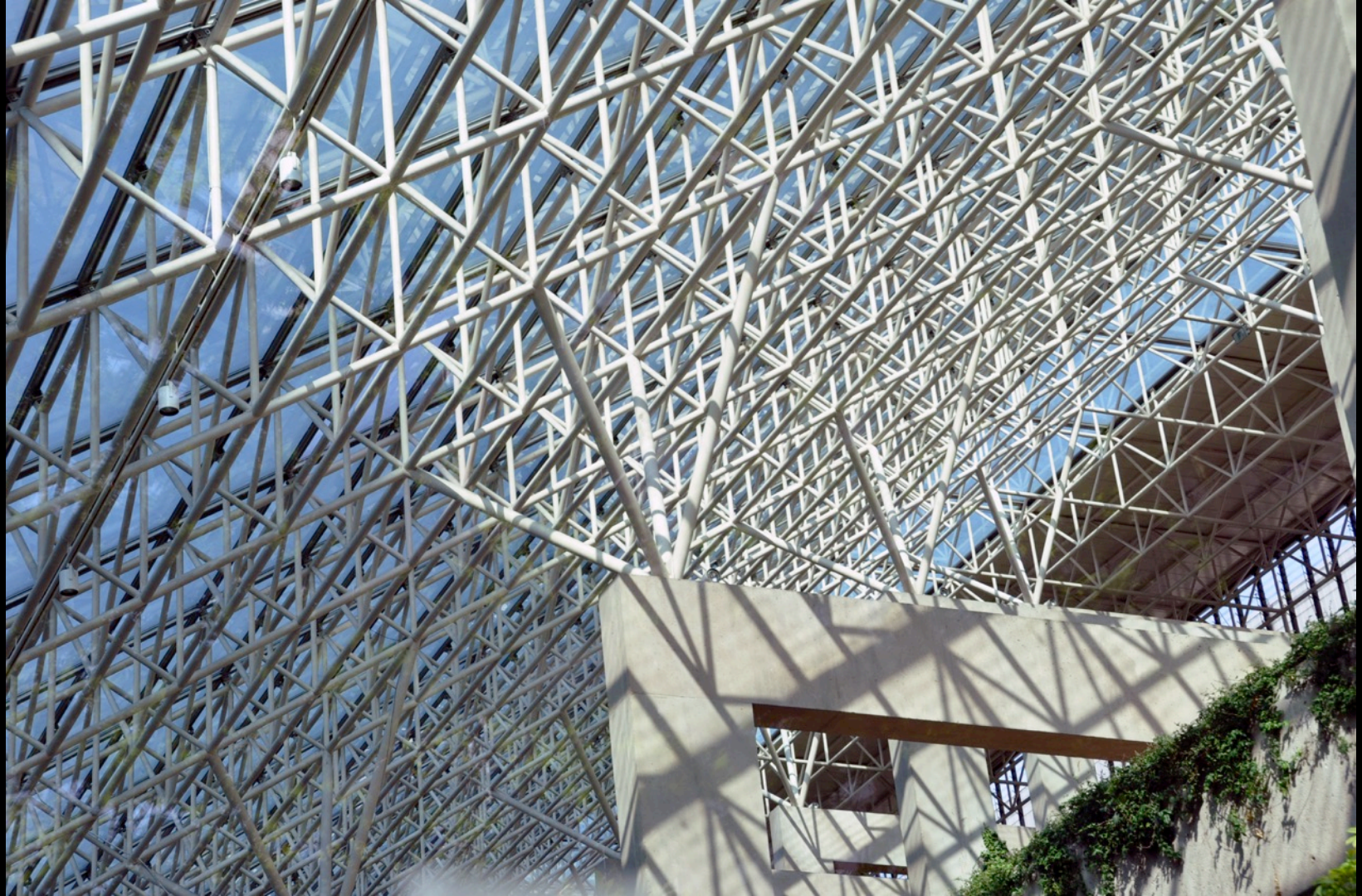
A photograph of the Vancouver Law Courts building, a modern architectural structure designed by Arthur Erickson in 1973. The building features a prominent white steel truss roof structure that extends over a large glass-enclosed atrium. The main facade is composed of light-colored concrete with multiple levels of cantilevered balconies and walkways. These balconies are heavily covered with lush green vines and plants, creating a vertical garden effect. The building is set against a cloudy sky, and other urban buildings are visible in the background.

Vancouver Law Courts  
Vancouver, B.C.  
Arthur Erickson  
1973













Shenzhen Bao'an International Airport  
Shenzhen, China  
Stúdio Fuksas  
2013













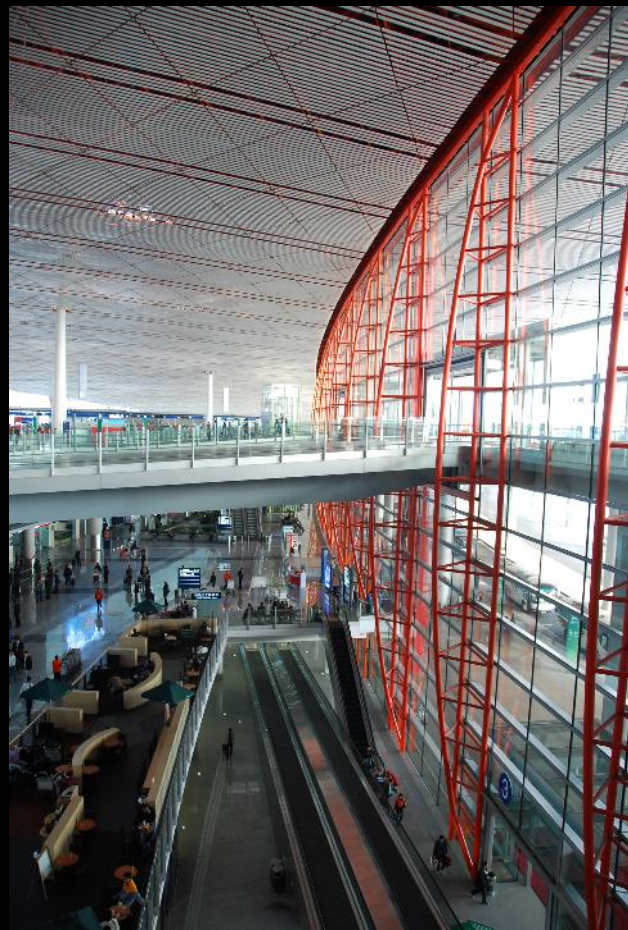


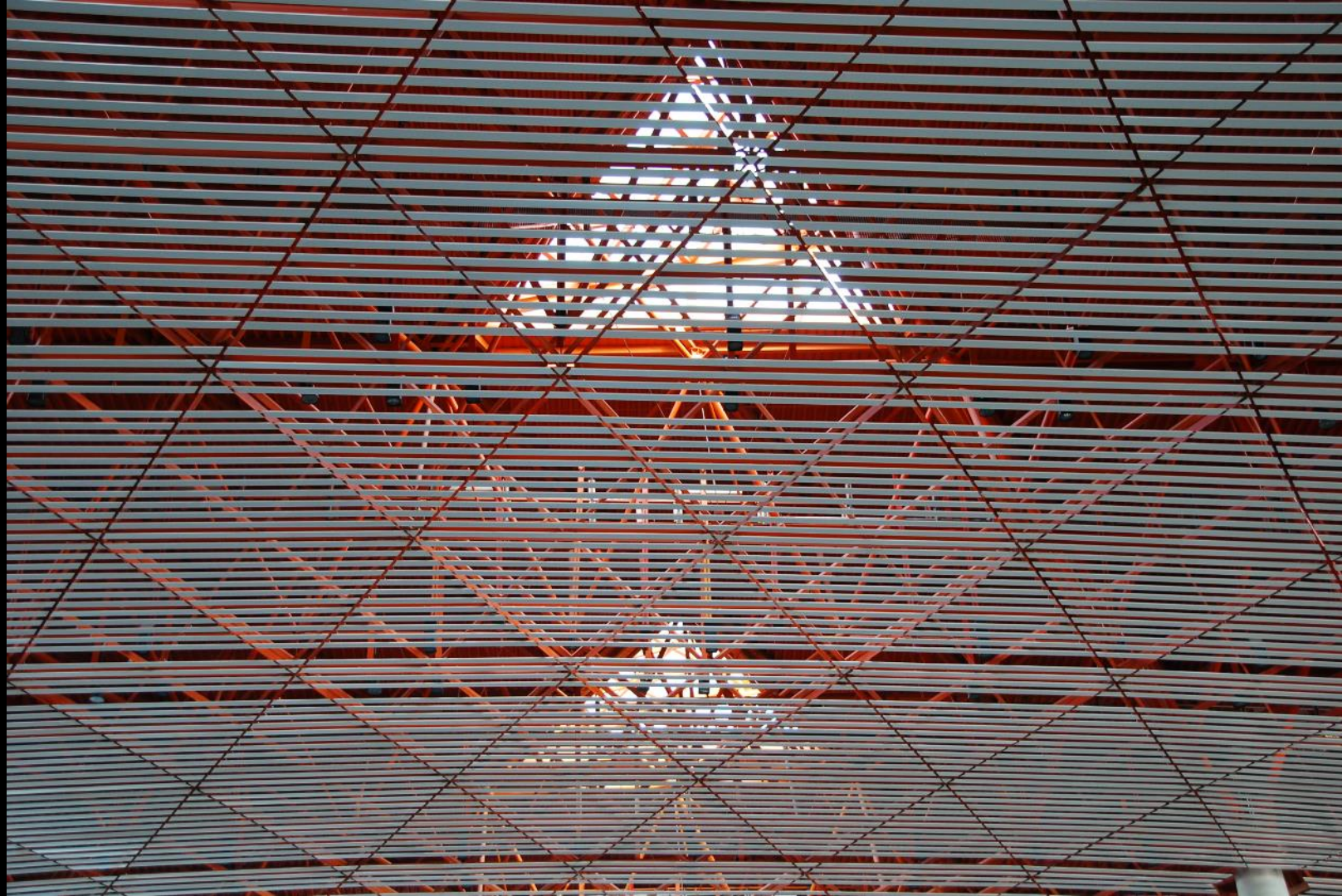
Beijing International Airport  
Beijing, China  
Foster and Partners with Arup

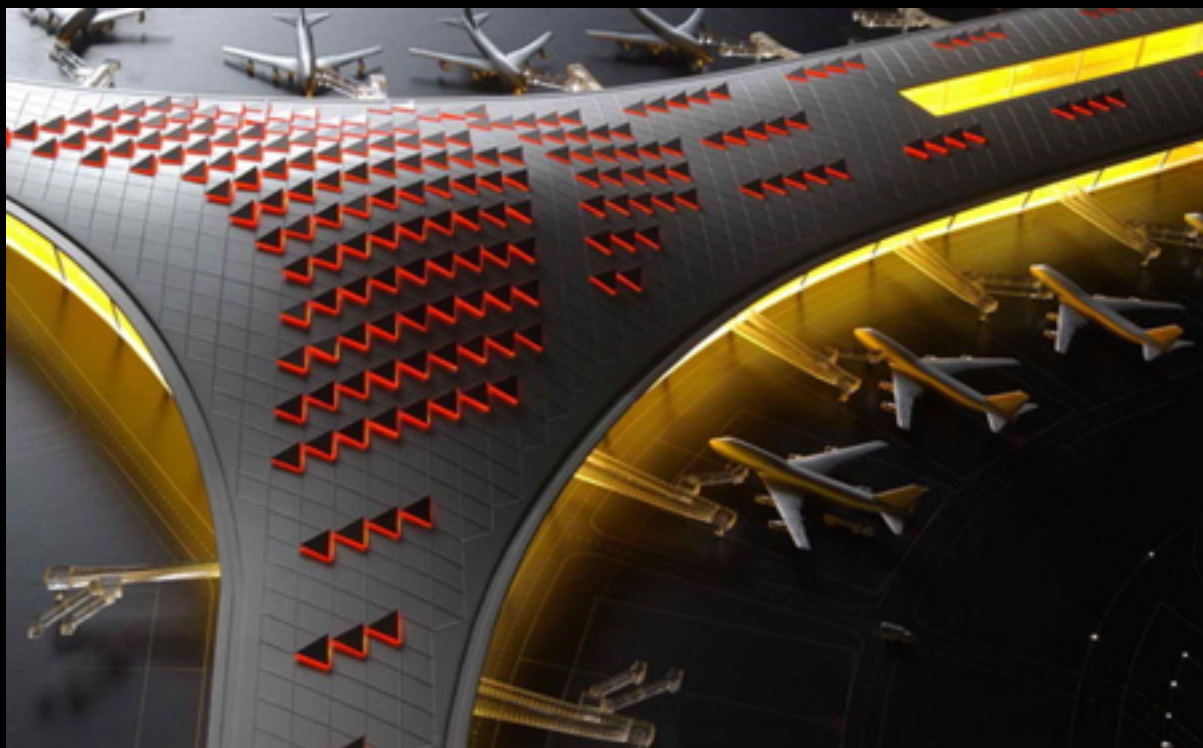














Ferrari World  
Abu Dhabi, UAE























Eden Project  
St. Austell, U.K.  
Nicholas Grimshaw  
2001





















## Lattice Grids

- Single plane systems spanning in all directions



Addition to Kings Cross Station  
London, UK  
John McAslan and Partners with Arup  
2013



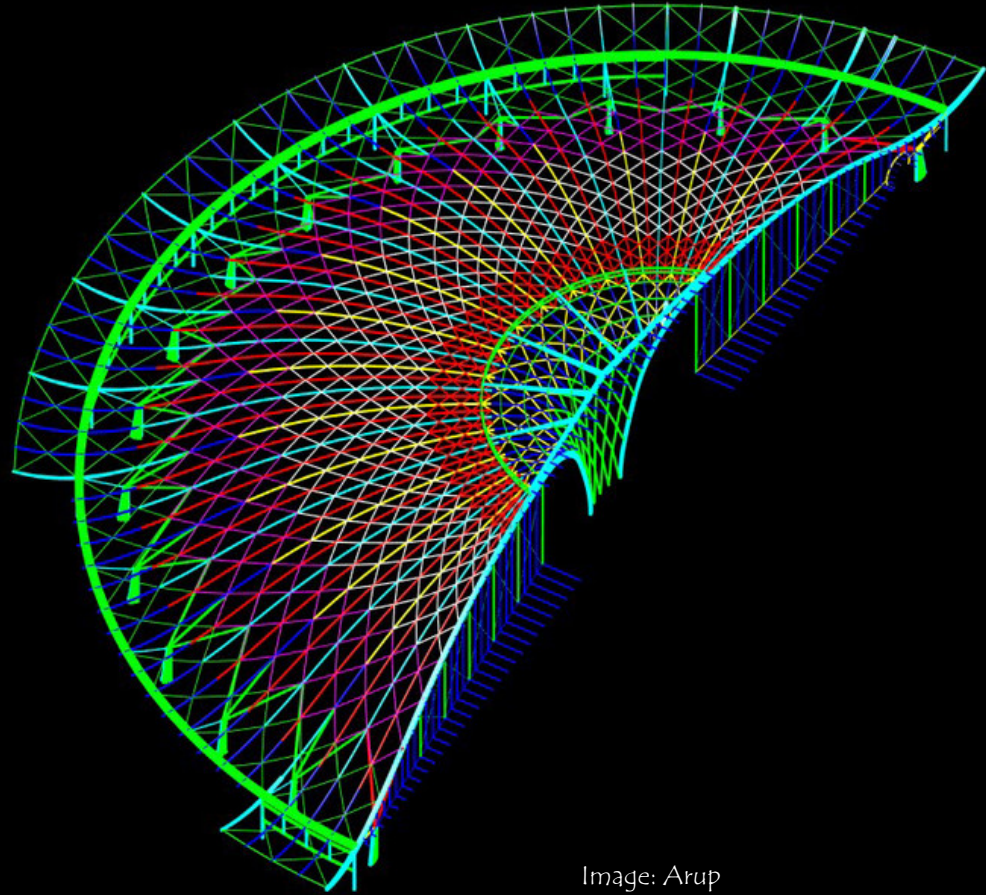


Image: Arup

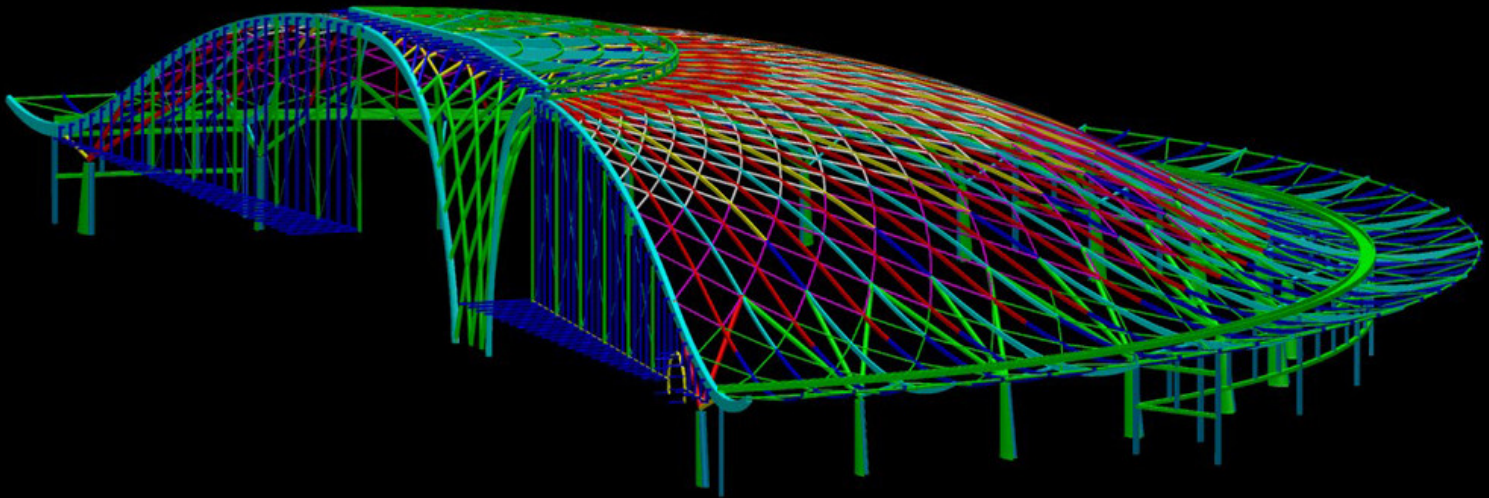


Image: Arup

















Image: Arup





Image: Arup





A wide-angle photograph of the Smithsonian Courtyard Roof in Washington, DC. The image shows a large, open-air courtyard with a prominent, white, diamond-patterned glass and steel roof structure. The courtyard is surrounded by classical stone buildings with columns and windows. In the foreground, there is a paved area with a rectangular water feature. To the right, a group of people is seated at outdoor tables, and a few people are walking. The overall atmosphere is bright and modern, blending historical architecture with contemporary design.

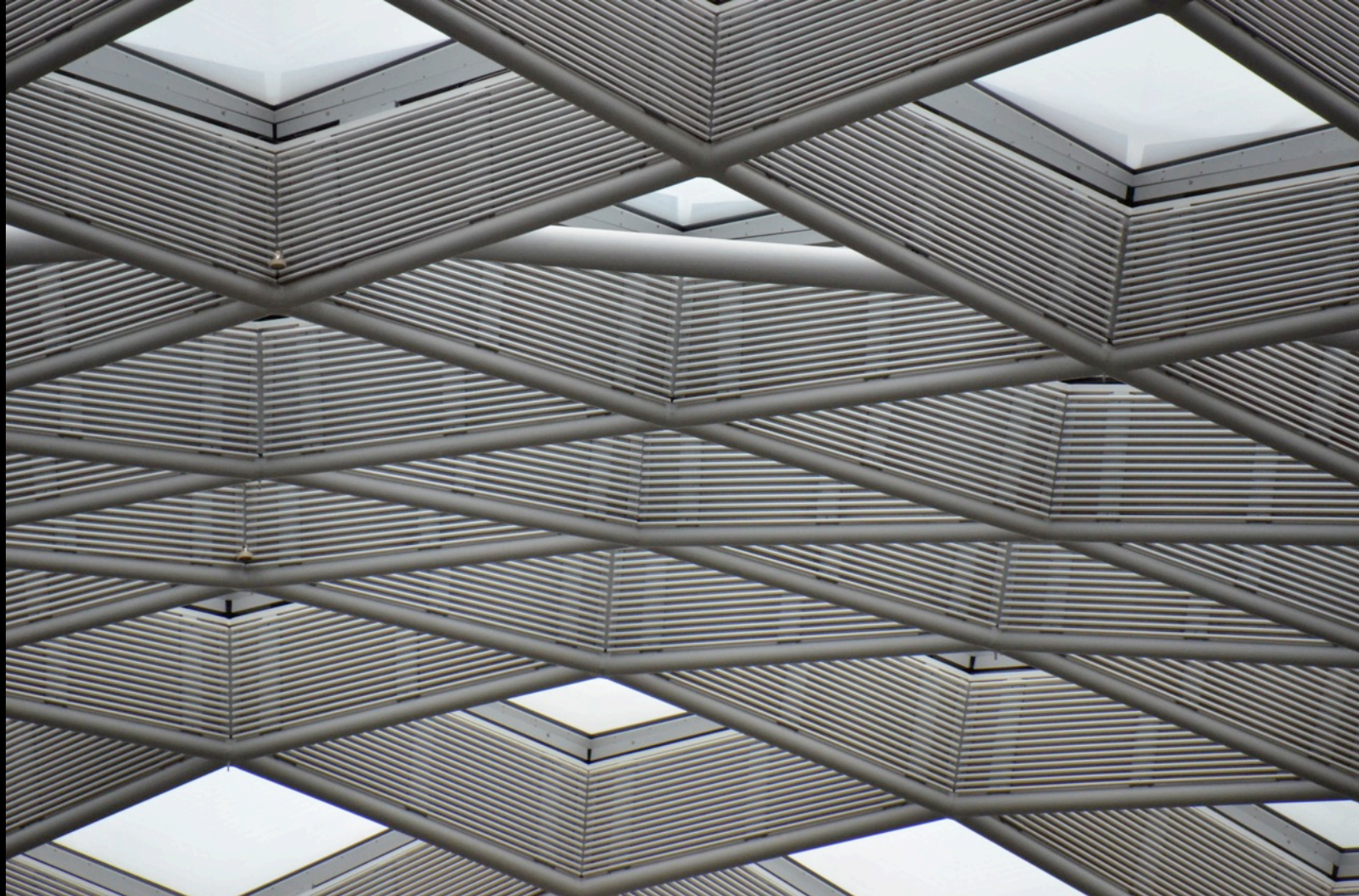
Smithsonian Courtyard Roof  
Washington, DC  
Foster and Partners  
2010



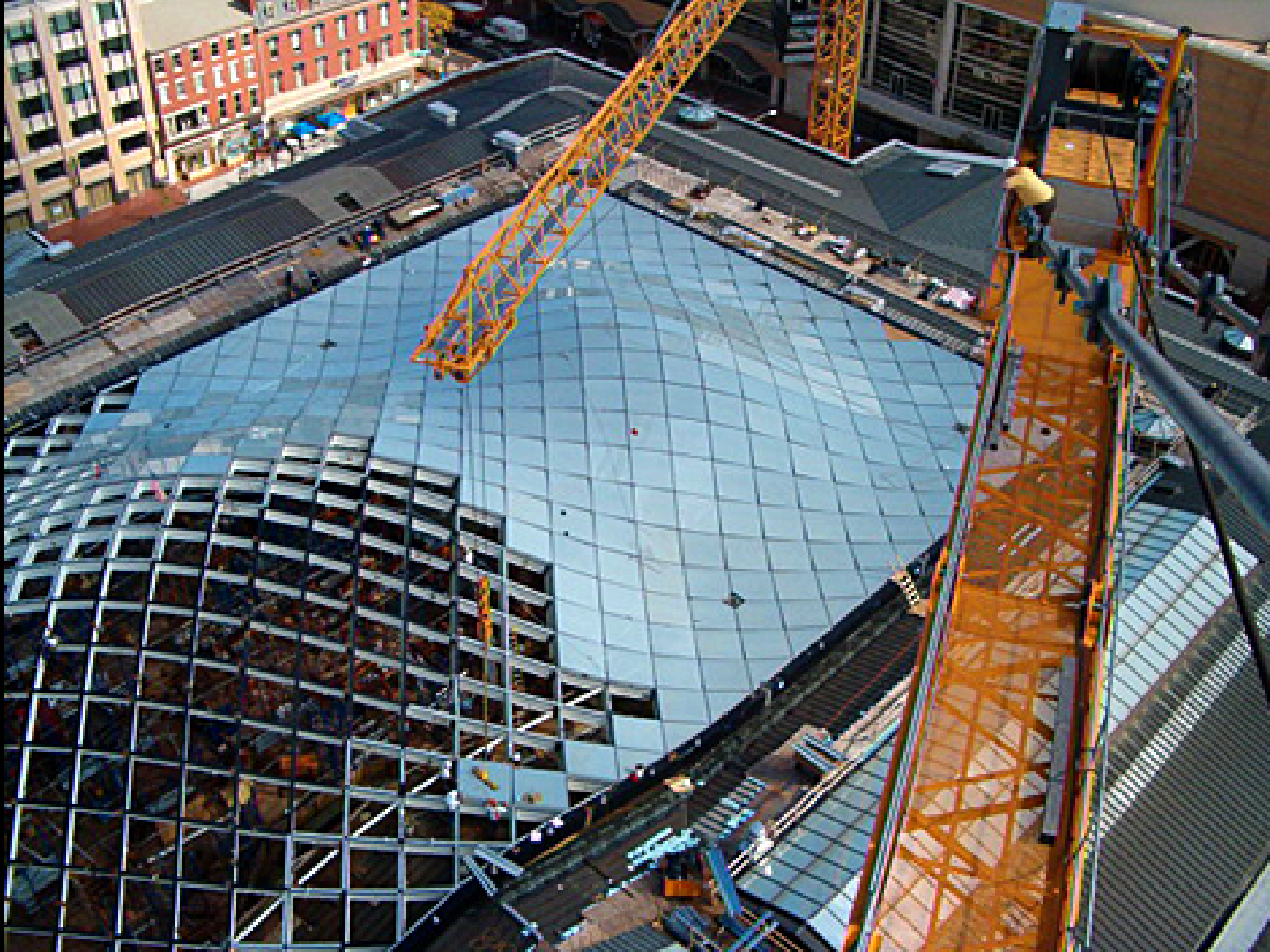
ROBERT AND AILEEN BOGDAN COURTYARD













More on lattice grids to be covered in the steel and glazing lecture!