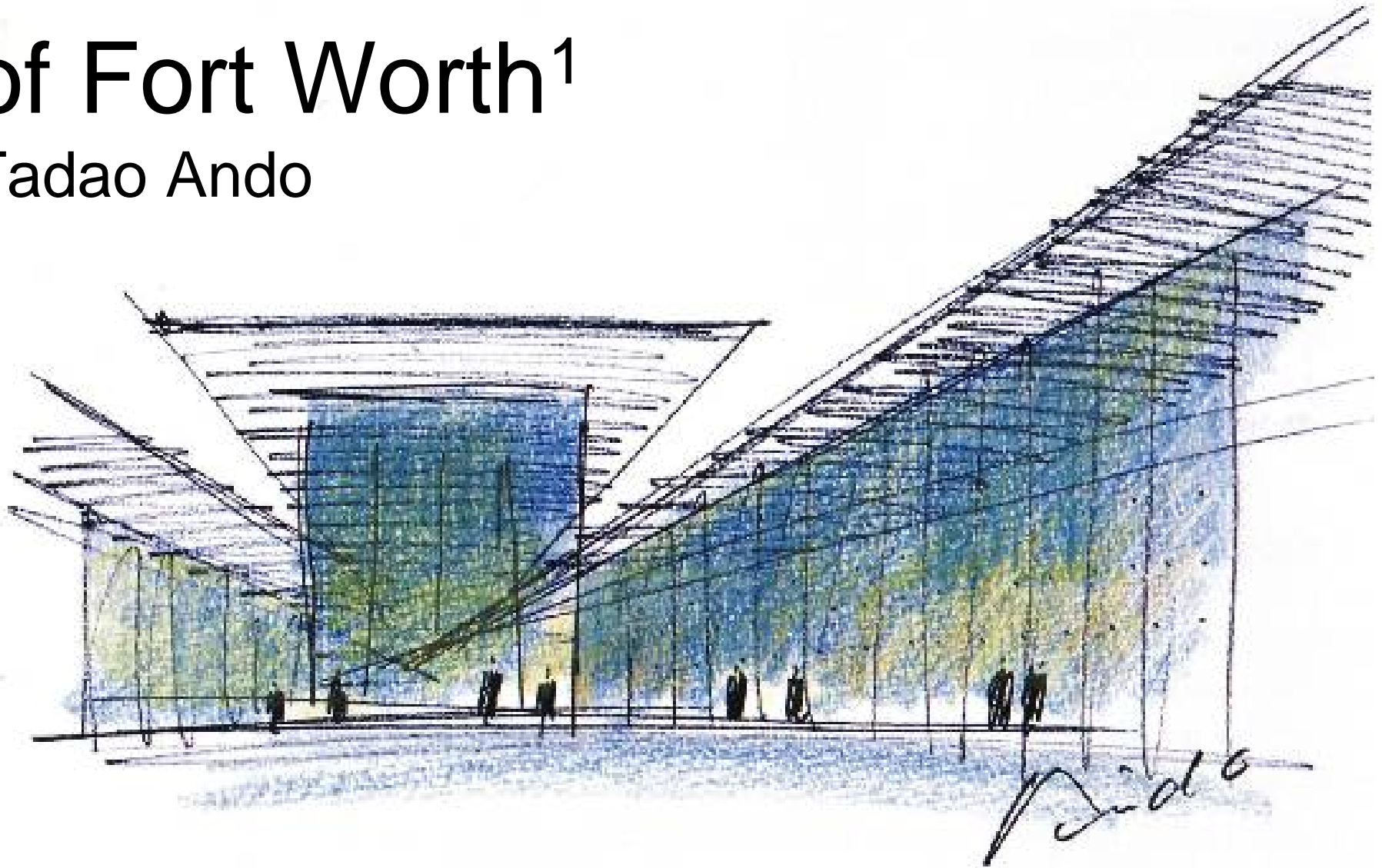


# The Modern Art Museum of Fort Worth<sup>1</sup>

Tadao Ando



# The New Modern

Six international architects were invited to submit design proposals for the Modern Art Museum's new building<sup>1</sup>

The design by Tadao Ando, a renowned Japanese architect, was chosen in 1997<sup>1</sup>



*Ando and Le Corbusier*<sup>2</sup>

# The New Modern

Ando's vision was to protect the art and yet maintain a connection to the outside<sup>3</sup>

To protect the art, he enclosed it in a concrete box, but to maintain the connection to the outside, he placed the concrete box within a glass box, creating a space he referred to as the '*engawa*', a traditional Japanese element consisting of an enclosed space that connects inside to outside<sup>3</sup>



# Main Structural System

The main structural system consists of cast in place load bearing concrete walls and columns with a 'Y' shaped accent column supporting a cantilever on one side

These elements support a slab/plate hybrid which acts as a plate over the majority of the building, but becomes a two-way slab-like system to cantilever past the 'Y' shaped column

# Components

Shear Walls

Columns

'Y' Columns

Slab/Plate



**Load Bearing  
Concrete Wall**

**Shear Walls<sup>1</sup>**



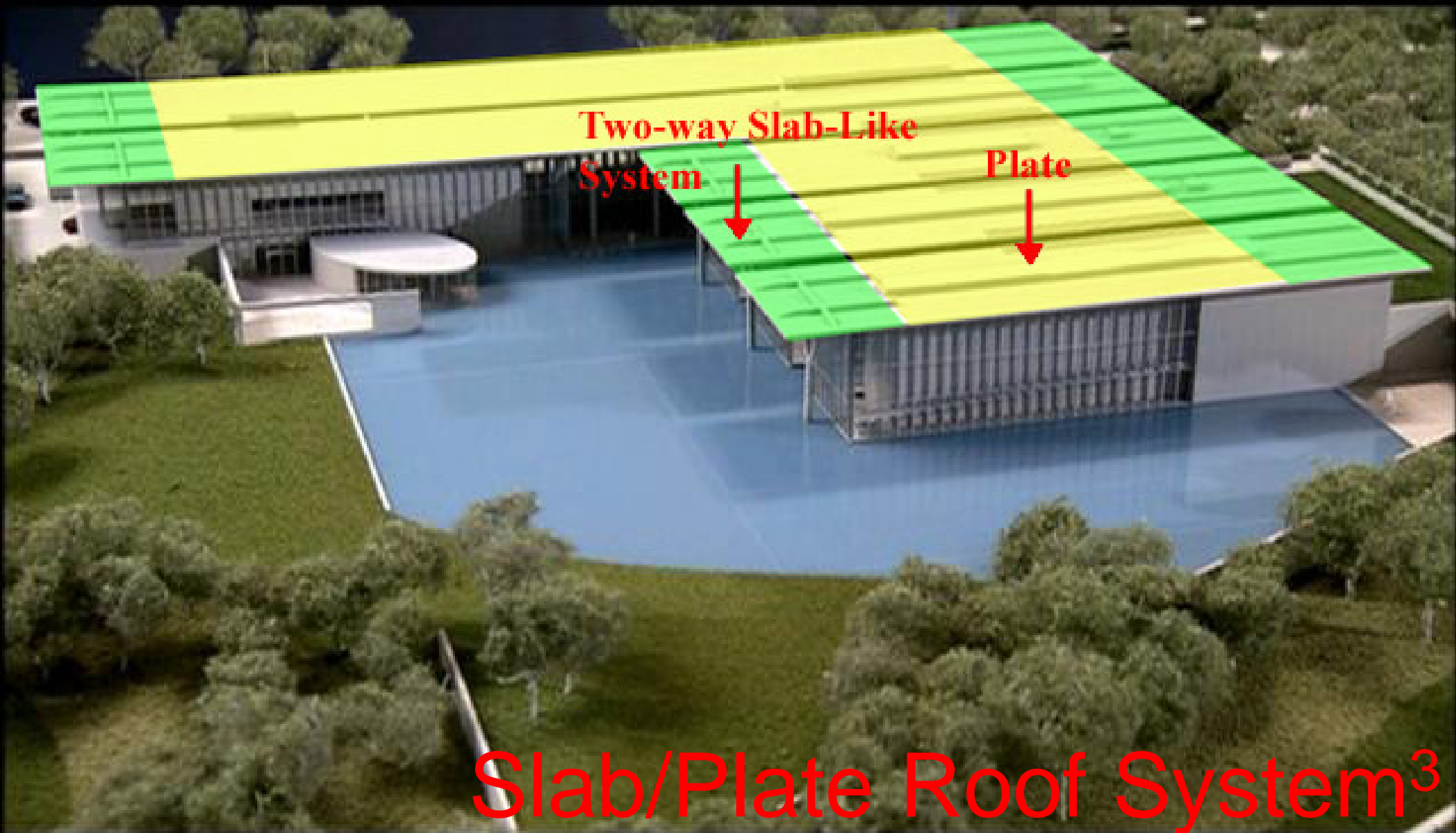
Load Bearing  
Concrete Column

Columns<sup>1</sup>



'Y' Columns<sup>1</sup>





**Slab/Plate Roof System<sup>3</sup>**

# Connections

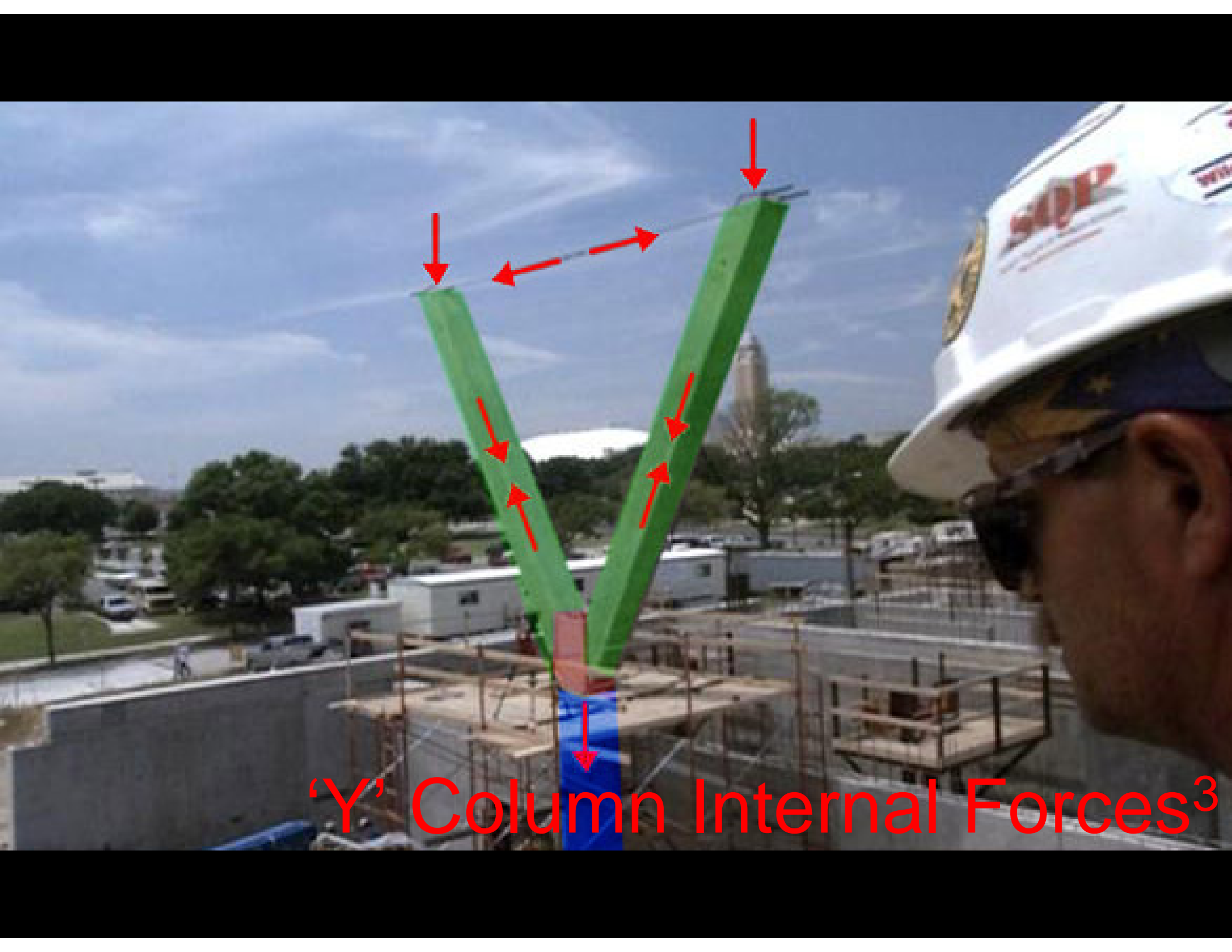
The connections for most of the structure are rigid cast in place connections

The 'Y' column is made of 4 pre-cast components which are bolted together

The connection between the slab/plate and the 'Y' column creates a triangular shaped truss-like element in the 'V' of the 'Y', producing tension in the span between the top points and compression in the two top elements of the 'Y'



'Y' Column Installation<sup>3</sup>

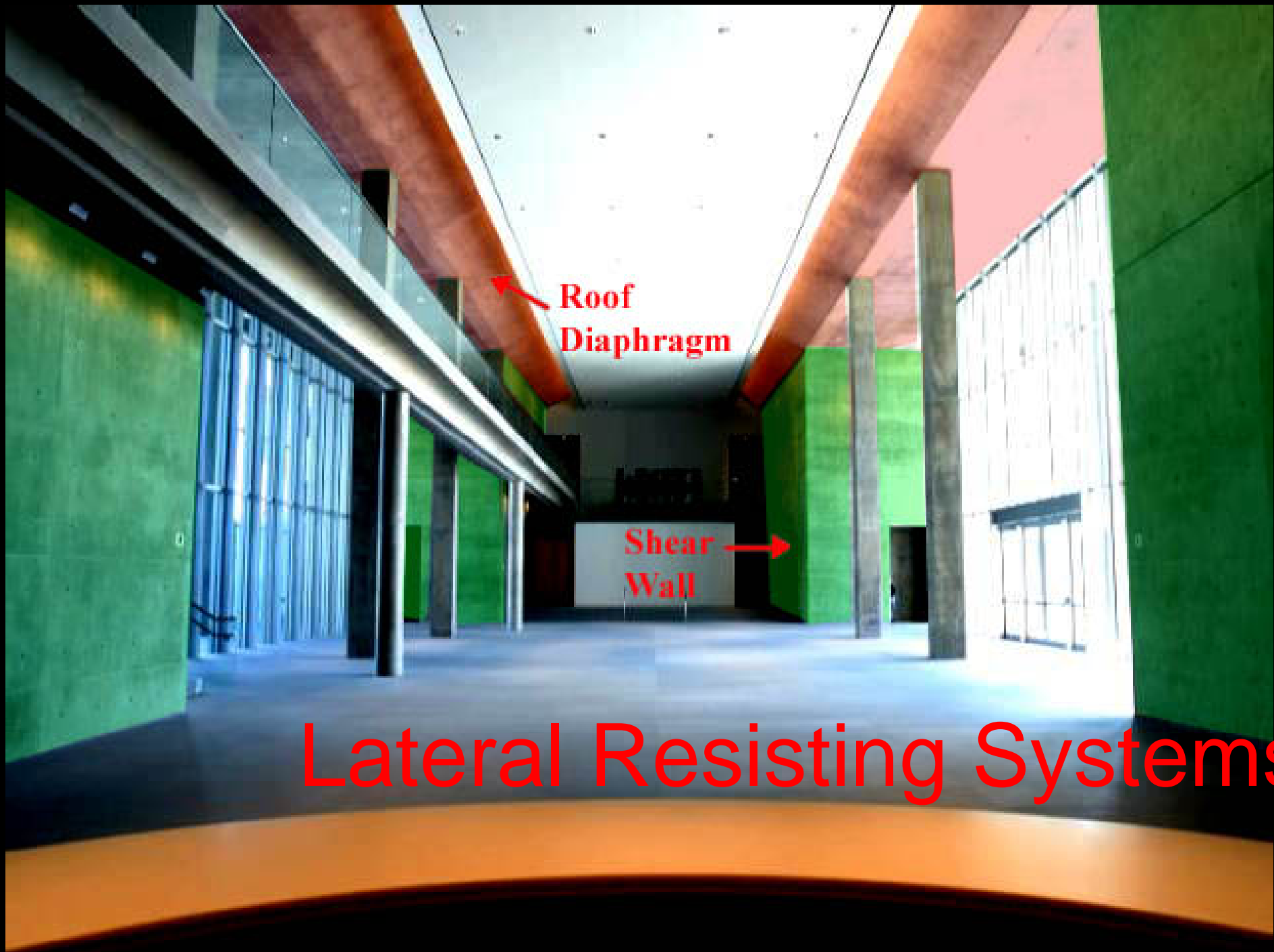


'Y' Column Internal Forces<sup>3</sup>

# Lateral Resistance

To resist lateral loads the roof slab in this system acts as a diaphragm, transferring the loads to the cast in place concrete shear walls

The rectilinear layout of the walls provides lateral bracing in both directions with asymmetrical fenestration in the walls causing a small amount of twist in the structure under lateral loading



**Roof  
Diaphragm**

**Shear  
Wall**

**Lateral Resisting Systems<sup>3</sup>**

# Vertical Load Transfers

The uniformly distributed load created by the plate section of the roof is transferred to the interior concrete columns and the load bearing concrete shear walls

The two-way slab-like section of the roof cantilevers out about 16' from the concrete 'Y' columns

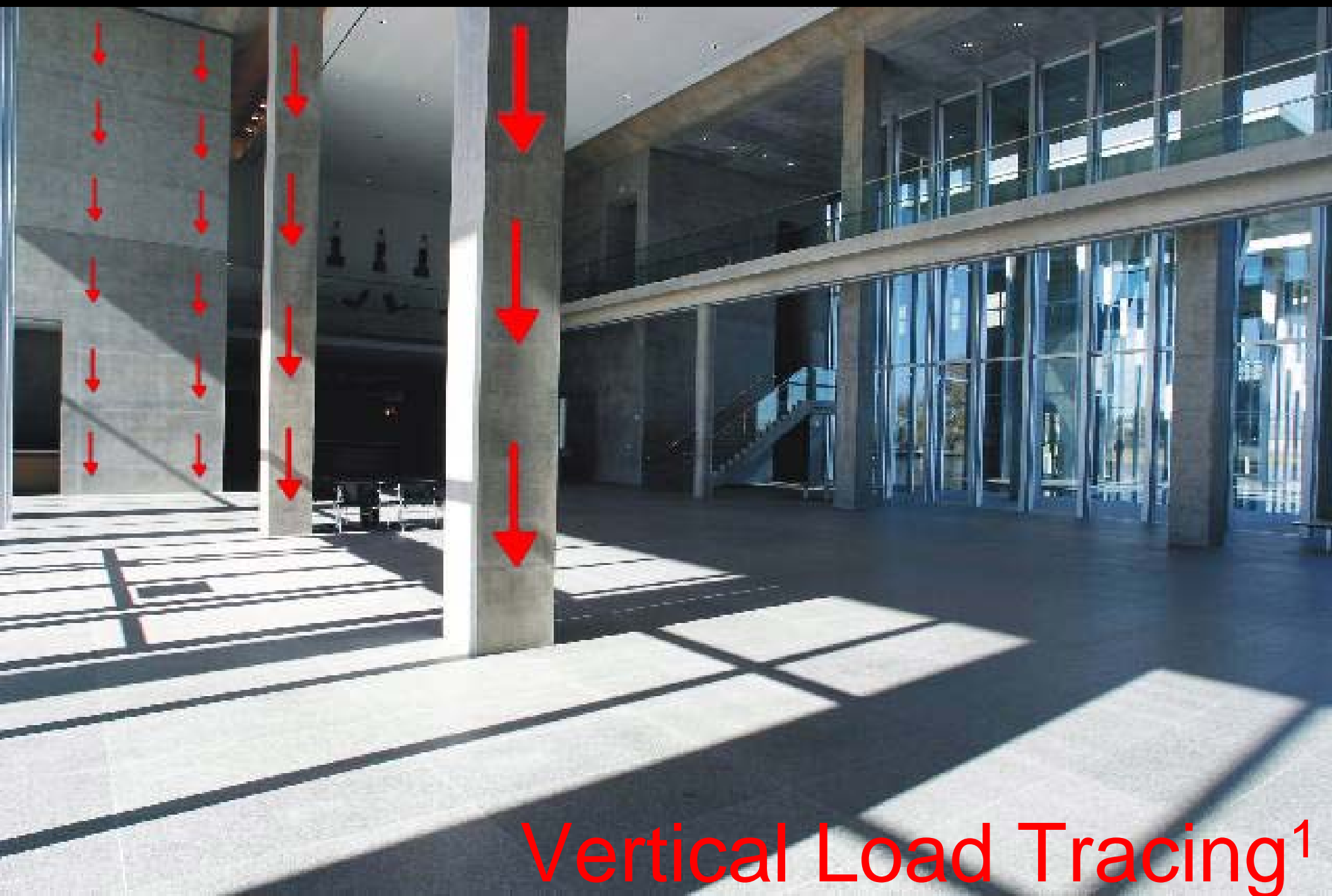
The slab in the two-way system carries the loads to the beams which concentrate the loads into two point loads, one on each of the top portions of the 'Y' column

The two loads are then collected by a single vertical element transferring the load into the ground



Distributed Roof Load<sup>1</sup>





Vertical Load Tracing<sup>1</sup>



Cantilever Shear and Moment<sup>1</sup>



Two-Way System

Two-Way Slab-Like Roof<sup>3</sup>



'Y' Column Load Tracing<sup>1</sup>

# Works Cited

- 1 The Modern Art Museum of Fort Worth. The Modern Art Museum of Fort Worth. 28 Nov. 2004 <[www.themodern.org.html](http://www.themodern.org.html)>.
- 2 Pritzker Laureates / Ando. Pritzker Laureates. 29 Nov. 2004 <<http://209.15.130.81/laureates/pages/Ando.htm>>.
- 3 Lynch, Harry, dir. Making the Modern. Trinity Films, 2003.