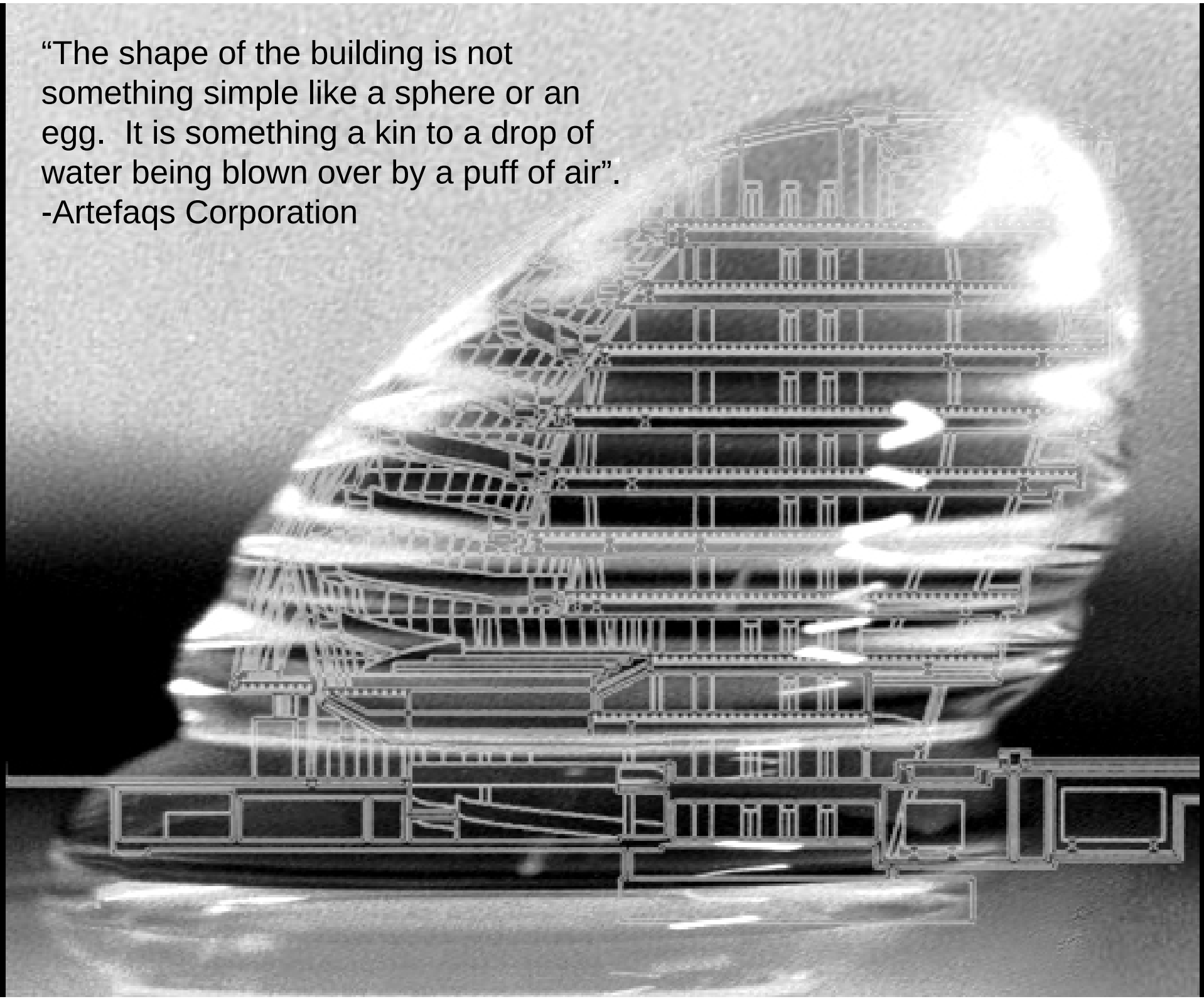

“The shape of the building is not something simple like a sphere or an egg. It is something a kin to a drop of water being blown over by a puff of air”.
-Artefaqs Corporation

London City Hall

Marie Blackmon Diane Hubert Brad Kocurek Joe Seitzer Jennifer Trojcak

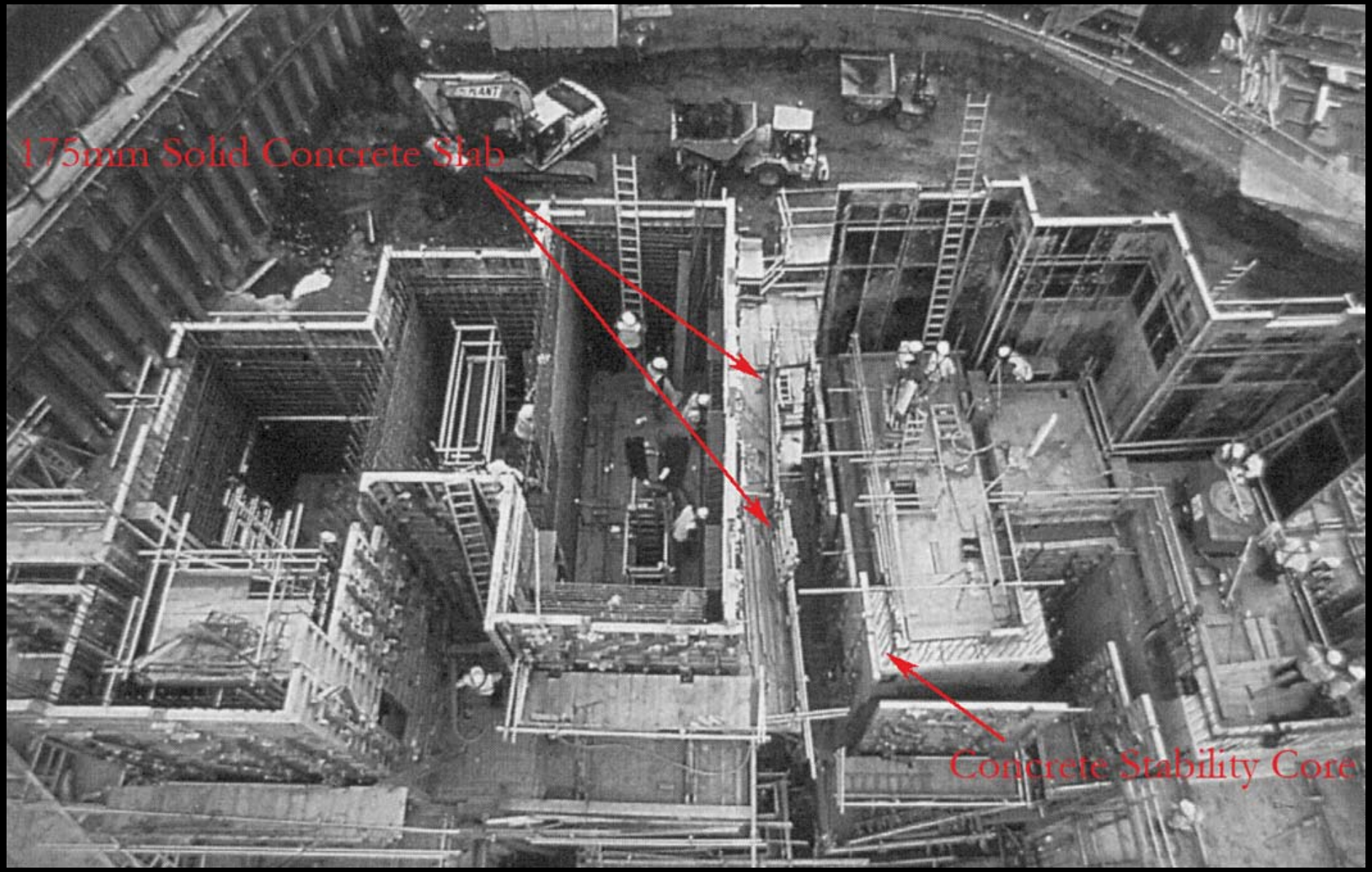
Introduction

- It was derived from a competition between 5 potential submission of building designs and site integration.
- Provided interaction between the public and government as well as serve as an icon for the community.
- The distinctive outer shell and its underlying framework created unique structural challenges throughout the design process.

Background

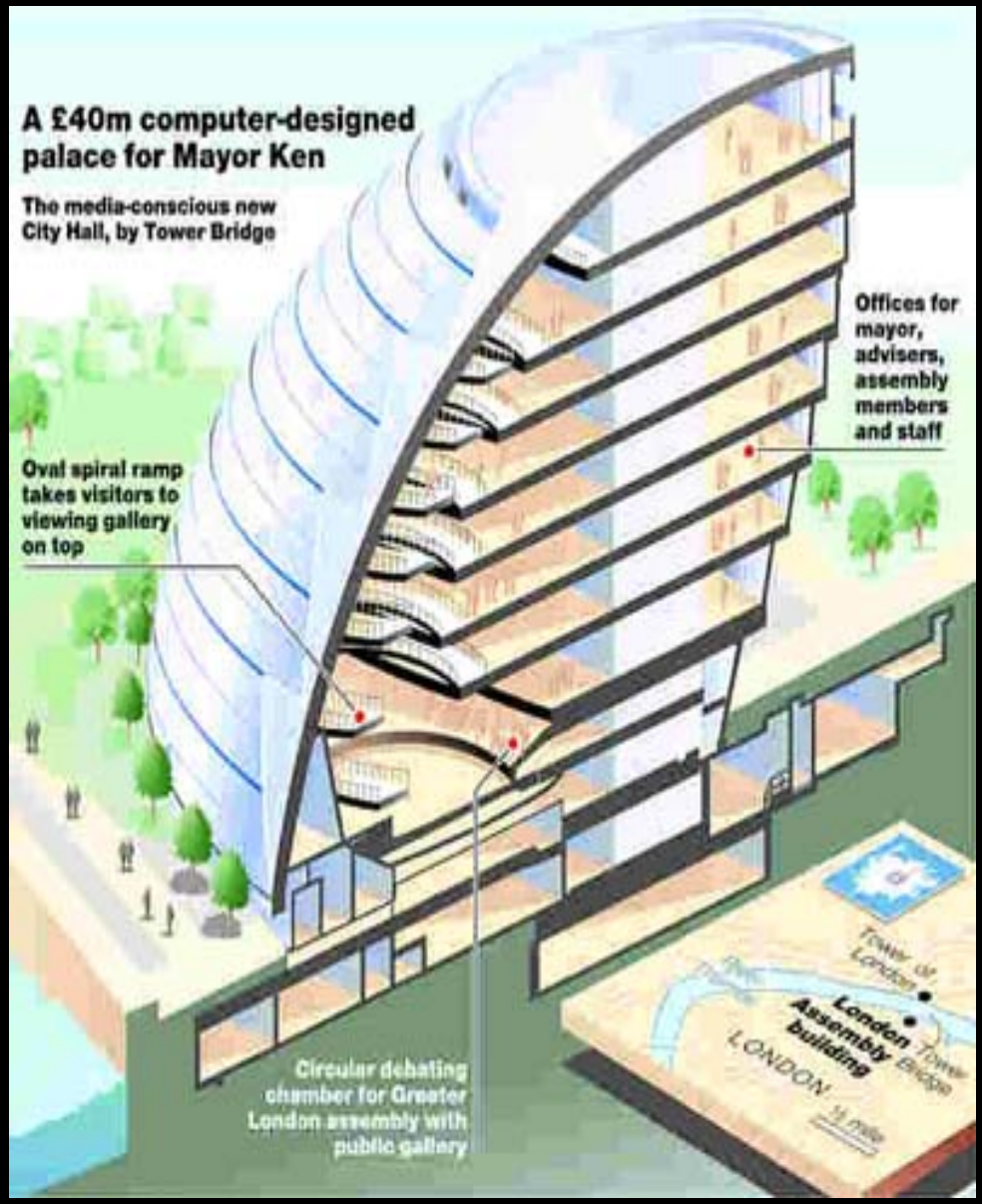
- 10 story building
- located on the Thames beside the London Tower Bridge
- designed by Foster and Partners together with the structural engineers Arup and Partners
- composed of committee rooms, a meeting chamber, public gathering spaces, as well as offices for the Mayor and support staff
- provides 18,000 square meters of space easily accommodating 440 members and staff
- structural shape was based on a modified sphere that was formed through modern computer modeling programs.
- oval form enables the building to perform consuming only the minimum amount of energy necessary and minimizes the amount of sunlight coming in direct contact with the building

Structure



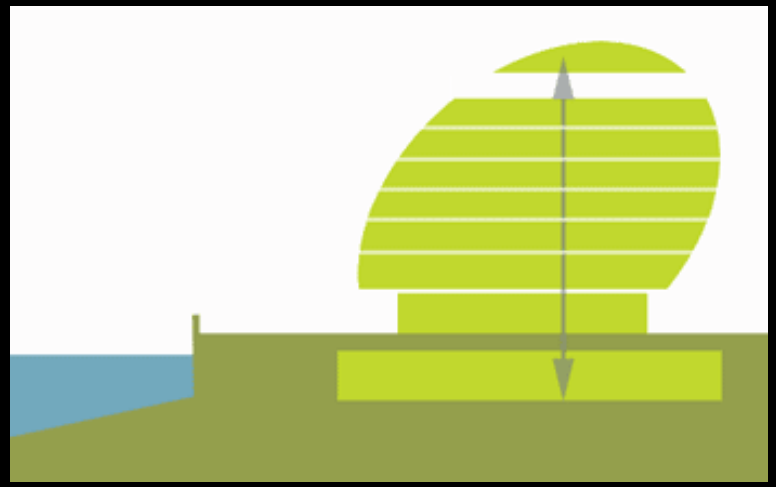
Concrete Slab

- composite slab 175 mm thick was chosen for the base of the structure
- thickness of the slab also allows two layers of reinforcement bars to be angled out of the concrete core walls which provide an alternative path for loads to travel if something were to structurally fail elsewhere
- use of permanent steel formwork for the slab results in a reduction of costs in construction waste.



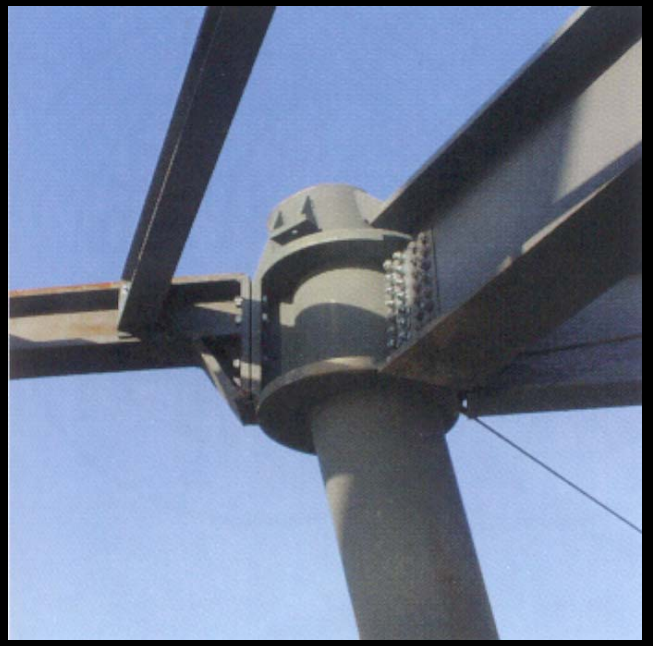
Central Concrete Core

- central concrete core covers 13,100 square meters in area
- composed of 1,950 tons of reinforced concrete
- it serves all primary core functions such as restrooms, HVAC systems, and a vertical egress of 7 elevator shafts and assisting stairways
- constructed with cast in site concrete on a group of 80 piles 1 meter in diameter which extend around 20 meters below ground
- currently serves as the main structural component of the building that resists lateral forces by working as a lateral bracing shear wall.

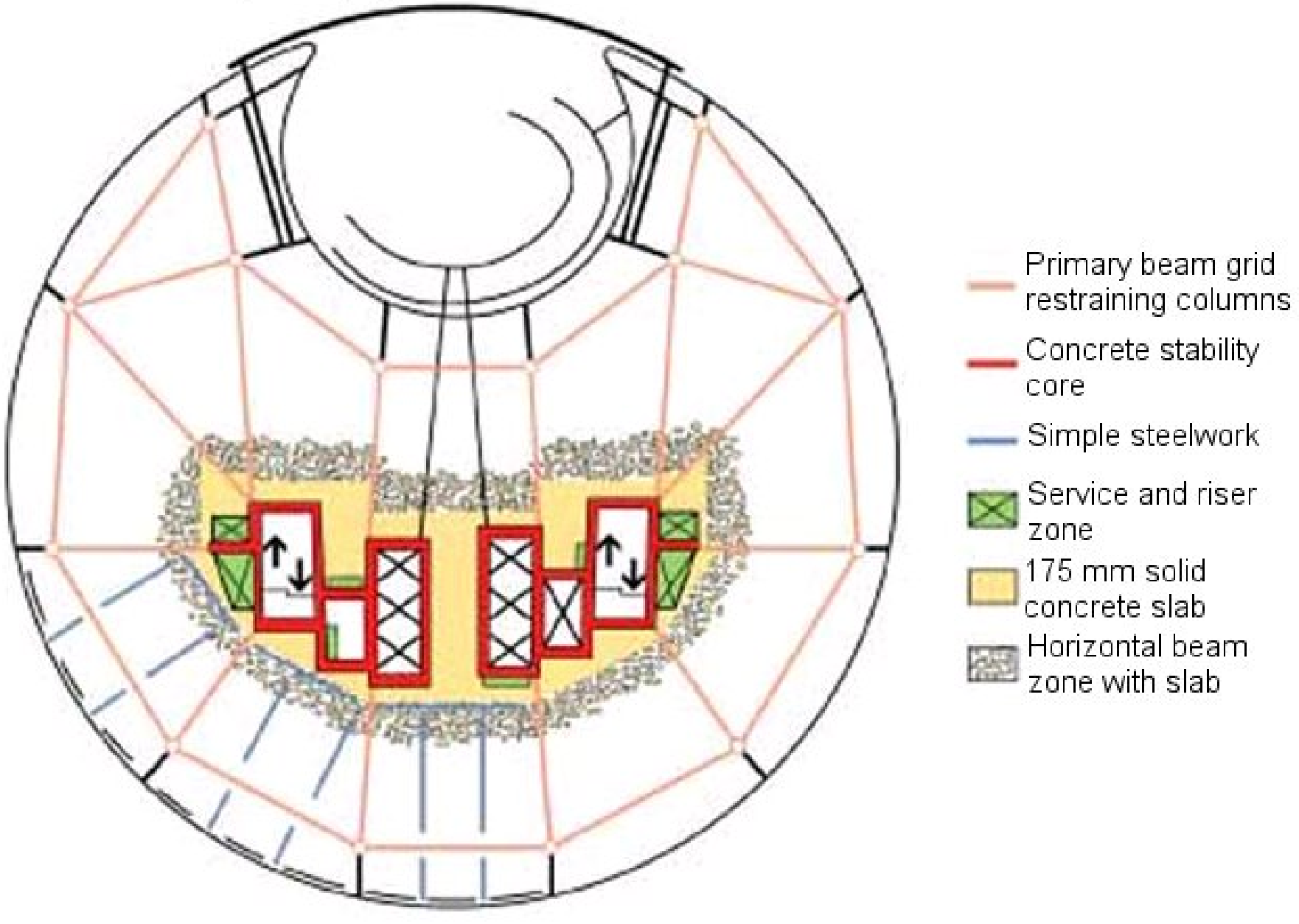


Steel Structure

- the inclined steel column system was chosen for the construction because of its cost effectiveness, simplicity, and because of its ability to be easily constructed
- because of the 17-degree tilt, vertical columns were chosen to work with the curved structure
- circular steel columns 508 mm in diameter are lined up on top of each other connection from floor to floor and are angled to line up with the floor plate
- steel beams 675 mm deep are attached to the central core and provide horizontal forces five times the design wind load which is needed to resist the lateral forces of the angled columns



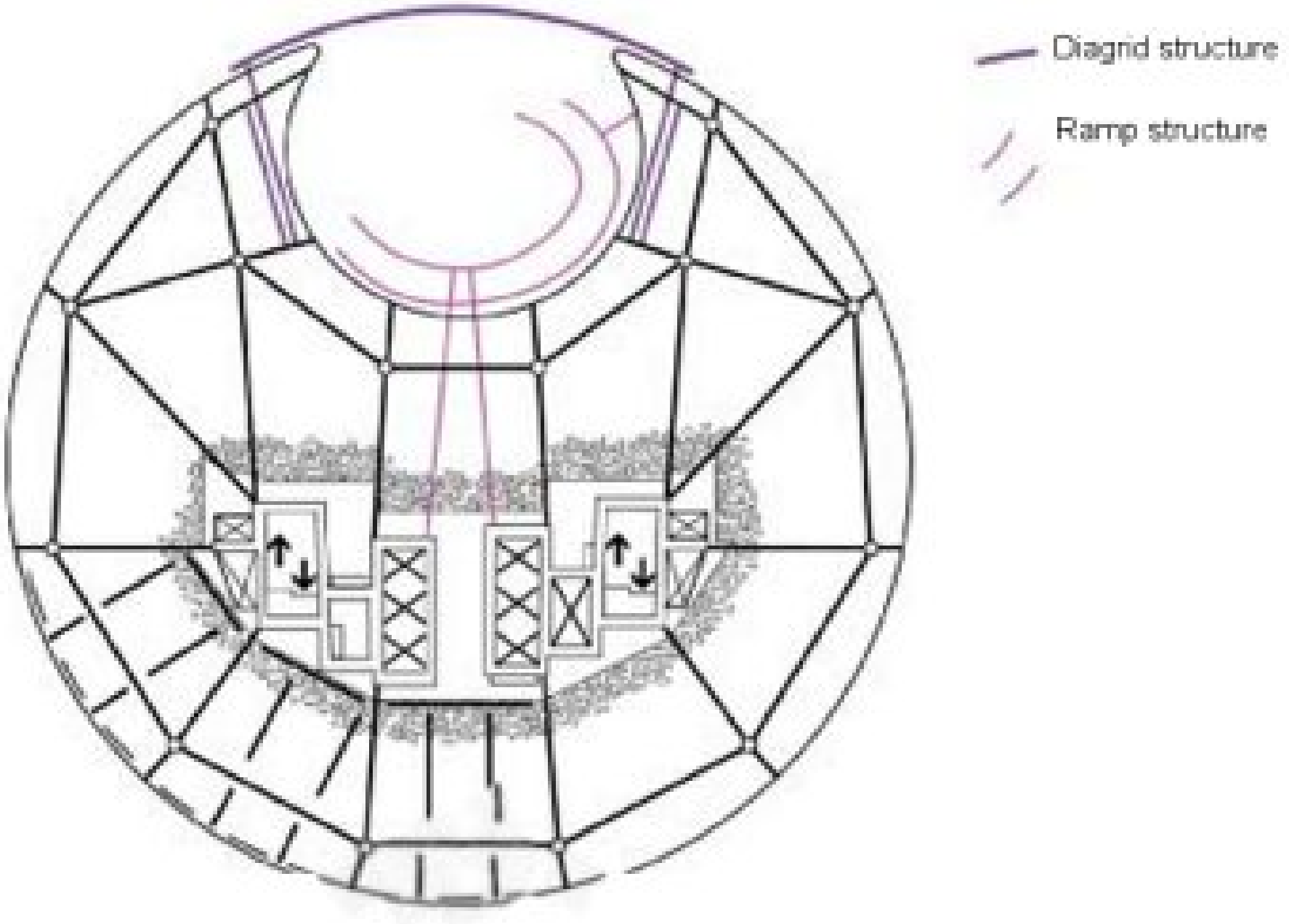
Main Structural System, Typical Floor



Spiral Ramp

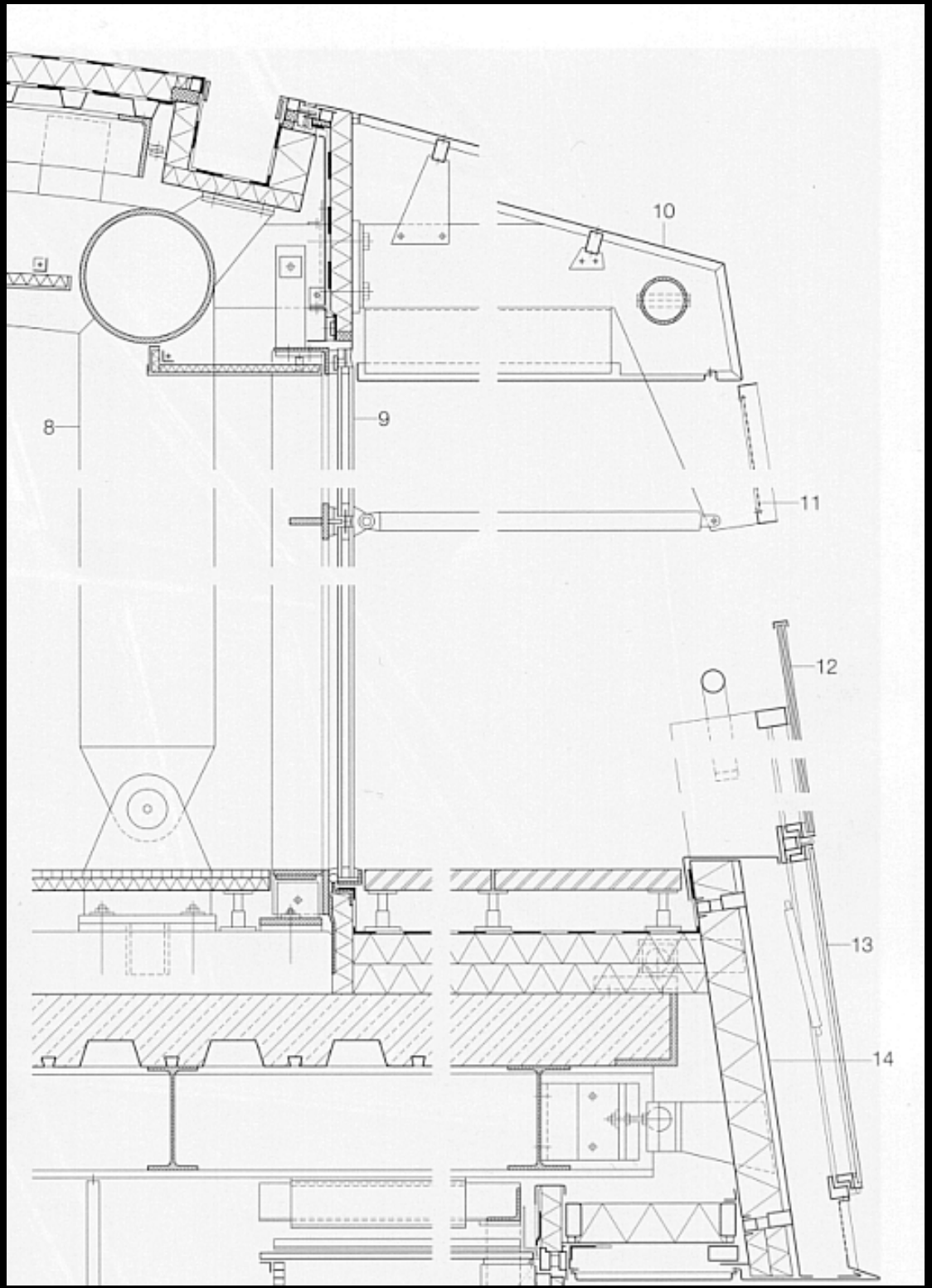
- running along the interior atrium is a stepped ramp which continues spiraling up above the debating chamber
- the ramp continues upward in a box structure 1,500 mm in width, and 400 mm deep
- is composed from 100 mm plates
- spans about 15 meters in distance to connect the landings of each floor level
- structure requires additional damping to make sure the user feels secure

Support of Spiral Ramp and Diagrid at Typical Floor



Glazing

- exterior glazing surrounding the atrium is supported on a triangulated diagrid structure which is formed from steel tubes 320 mm in diameter
- the span is composed of an arch and an inclined truss combination
- the horizontal arch members are located on the 3rd, 5th, 7th, and 9th floor and depend on the stable floor structure to resist the thrust of the arch
- on the third floor, however, vertical loads aren't able to be carried, so they rely on the 5th, 7th, and 9th instead
- The diagrid around the entire top of the building forming the room, and is attached to the concrete core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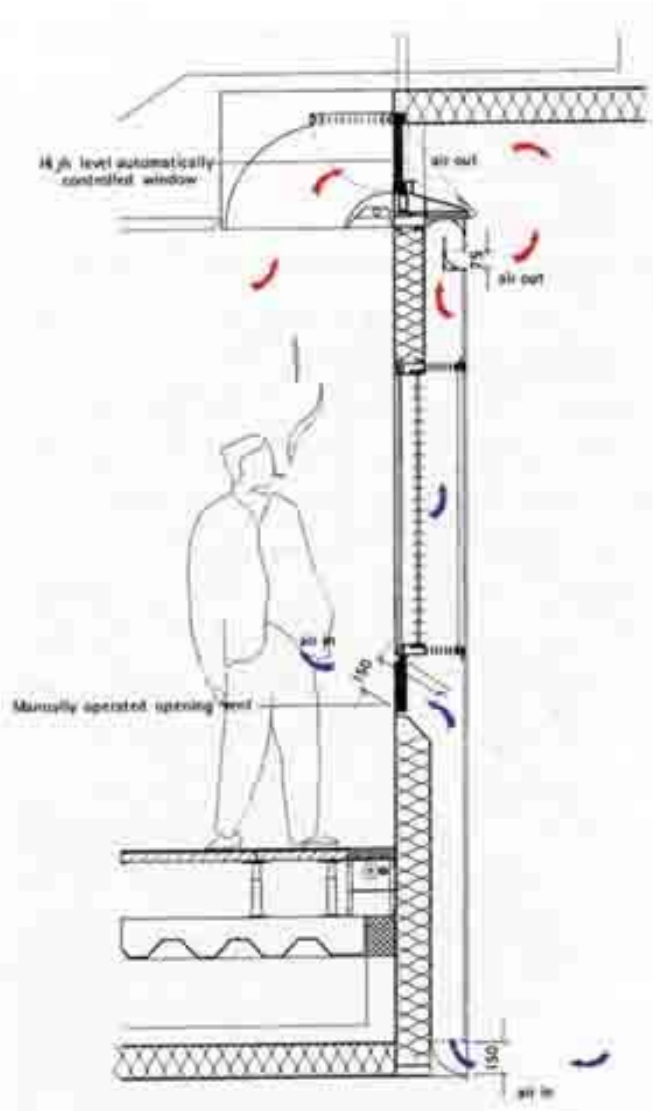
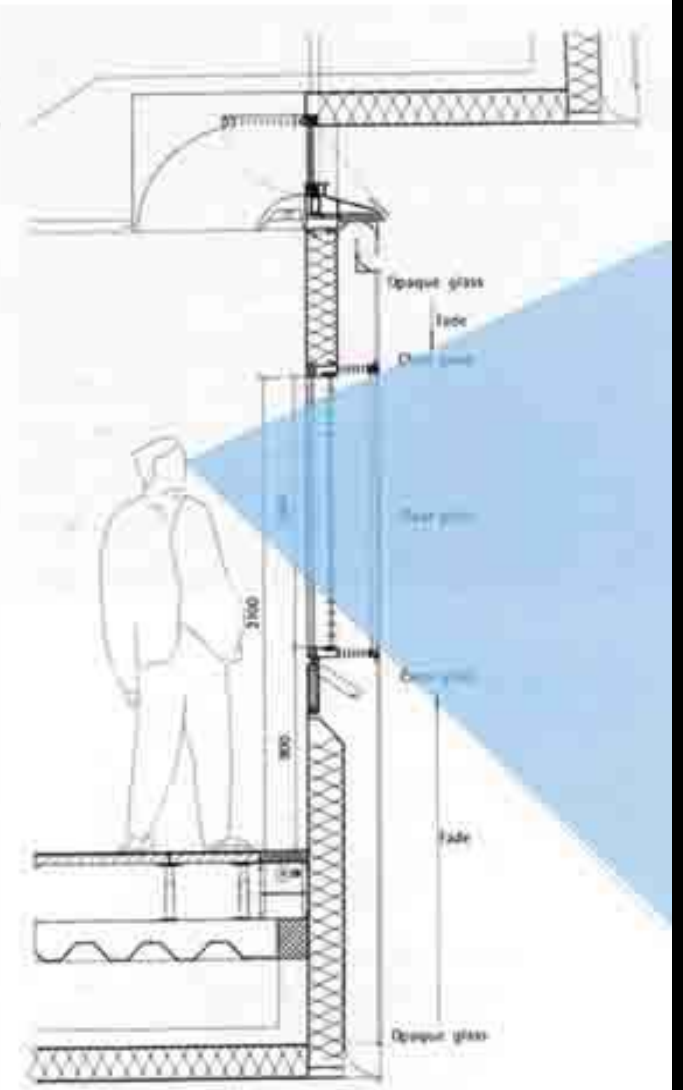
8
9
11
12
13
14


air out
air out
Manually operated opening vent
150
150
air in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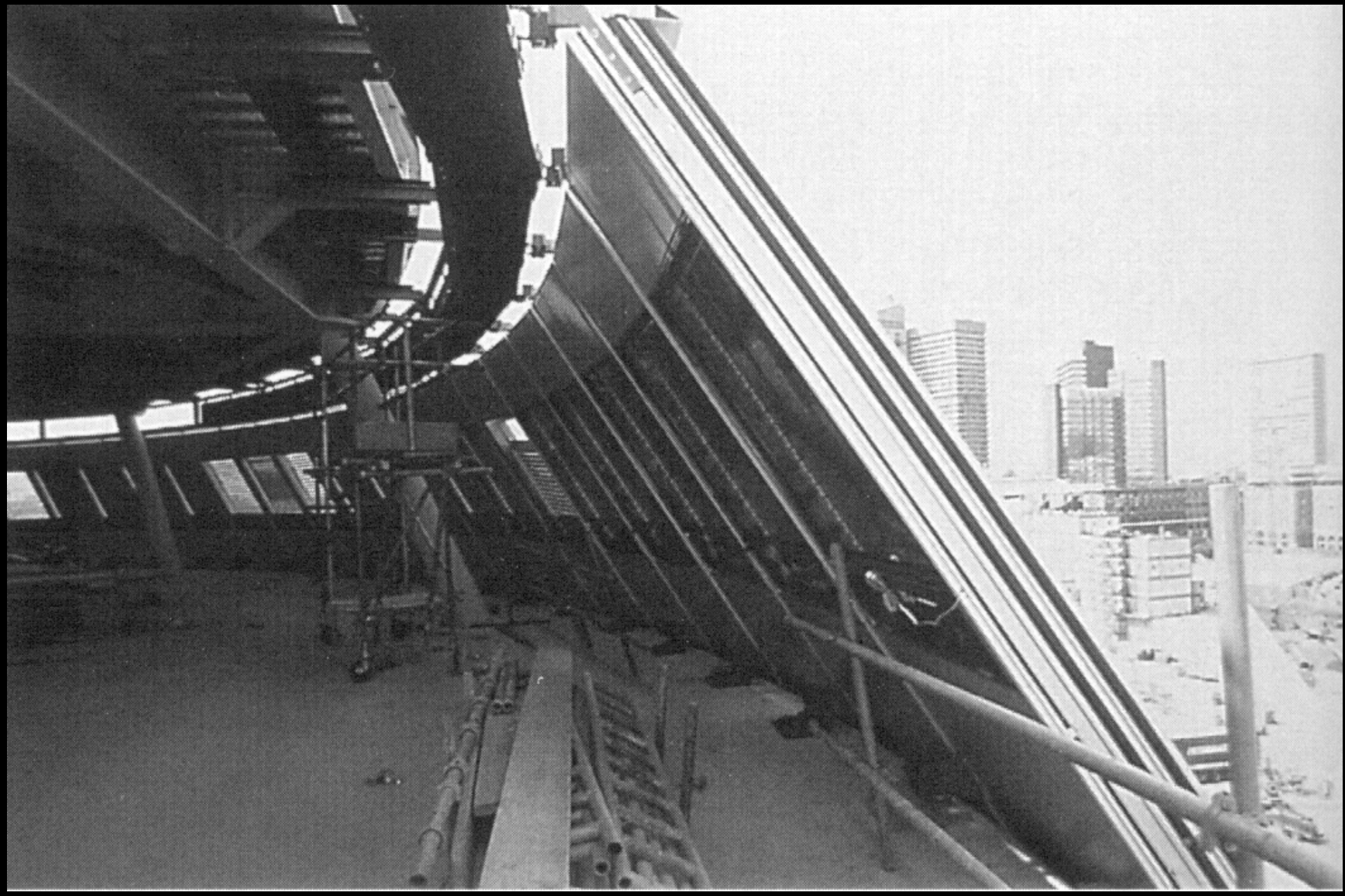
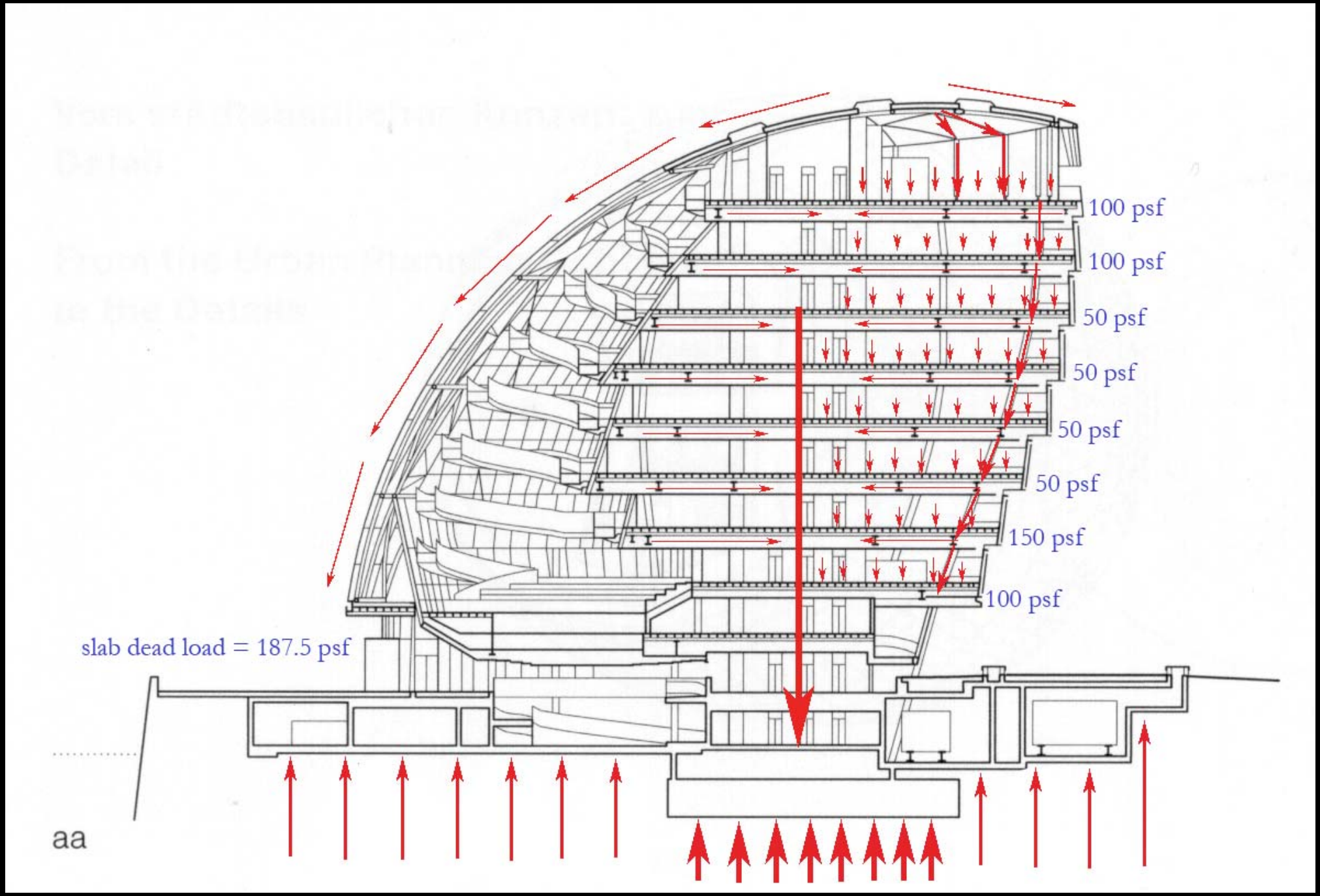
Fade
Clear glass
Clear glass
Fade
Opaque glass
1500
800

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100 psf
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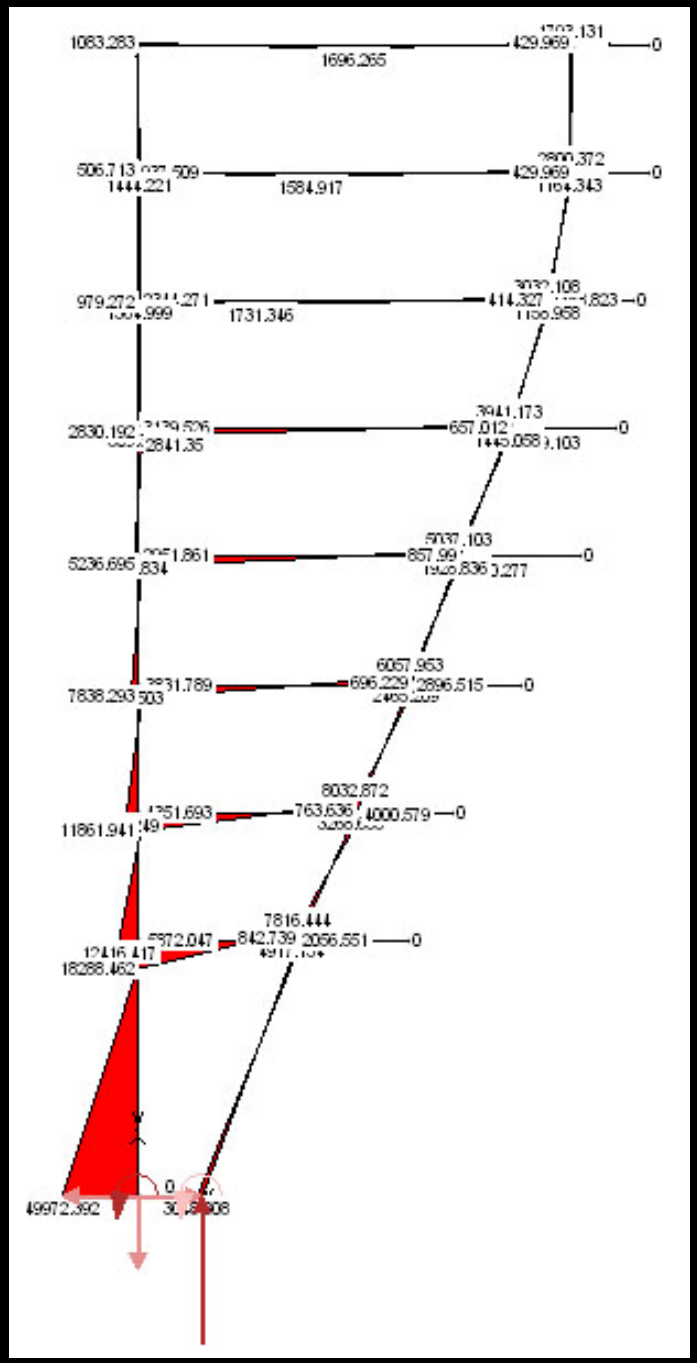
50 psf
150 psf
100 psf
slab dead load = 187.5 psf
aa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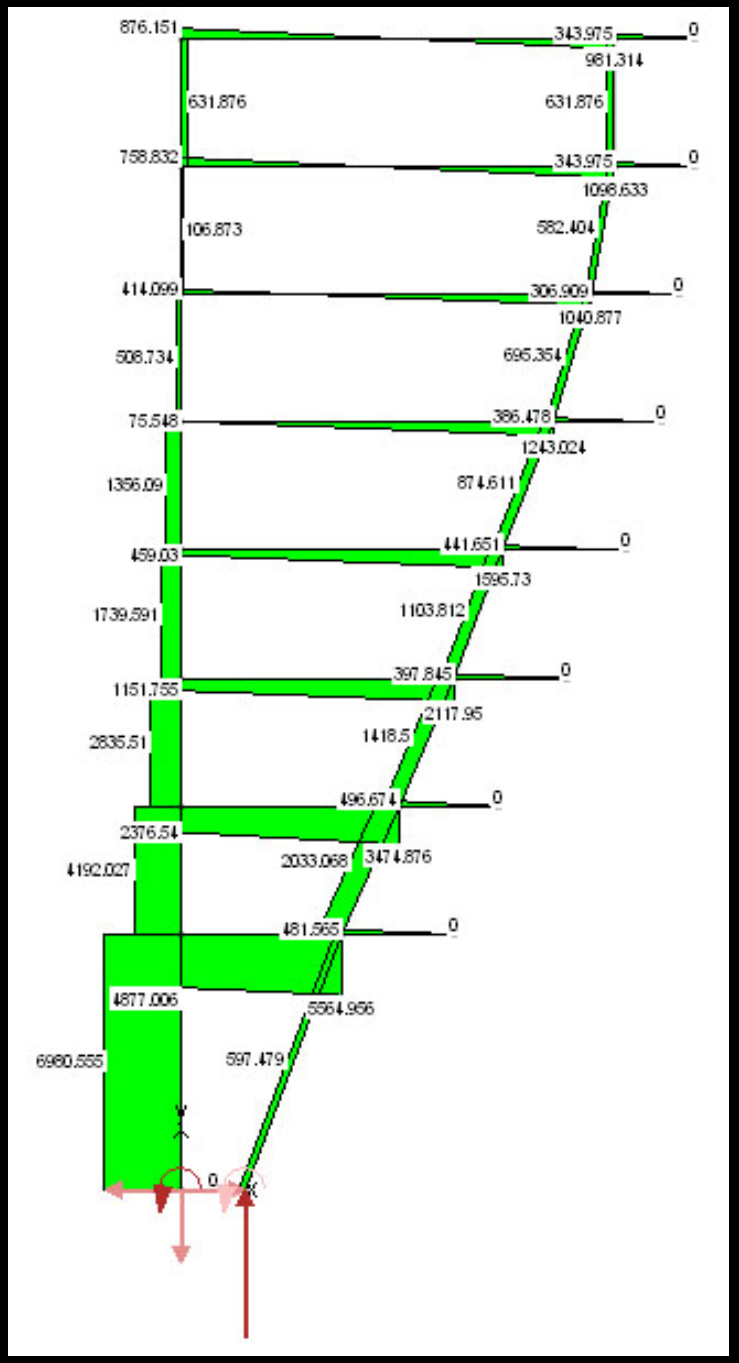
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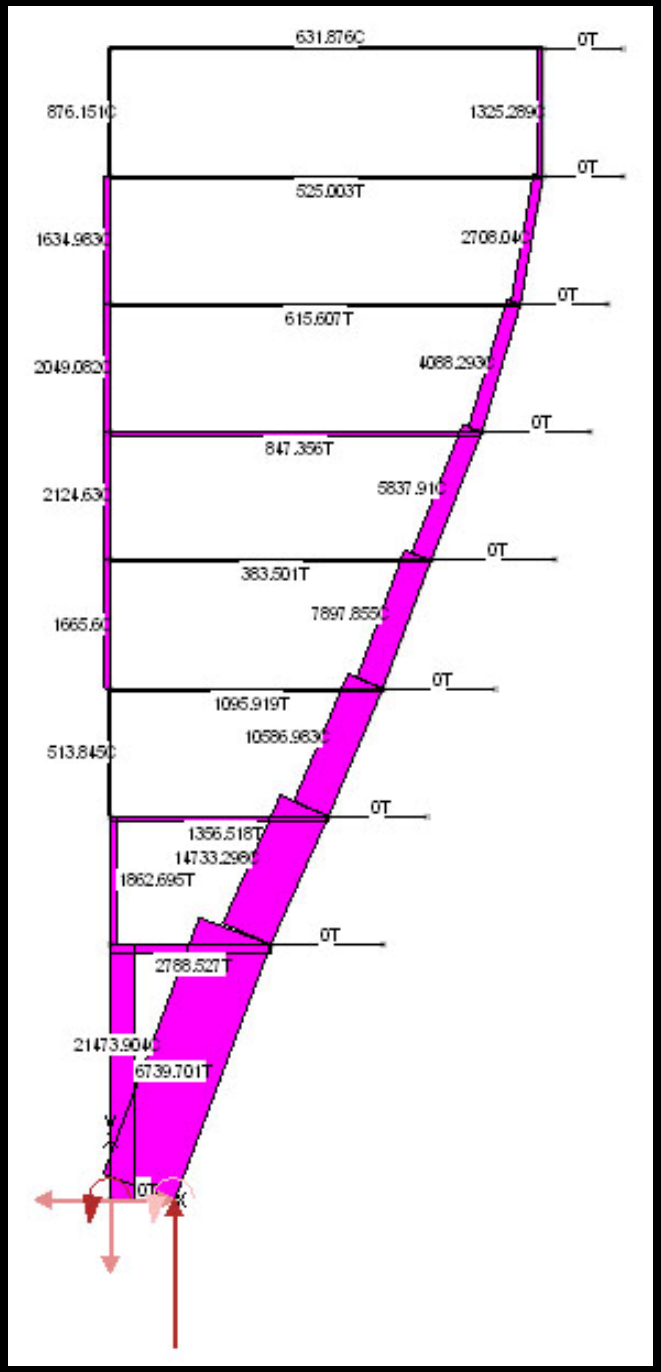
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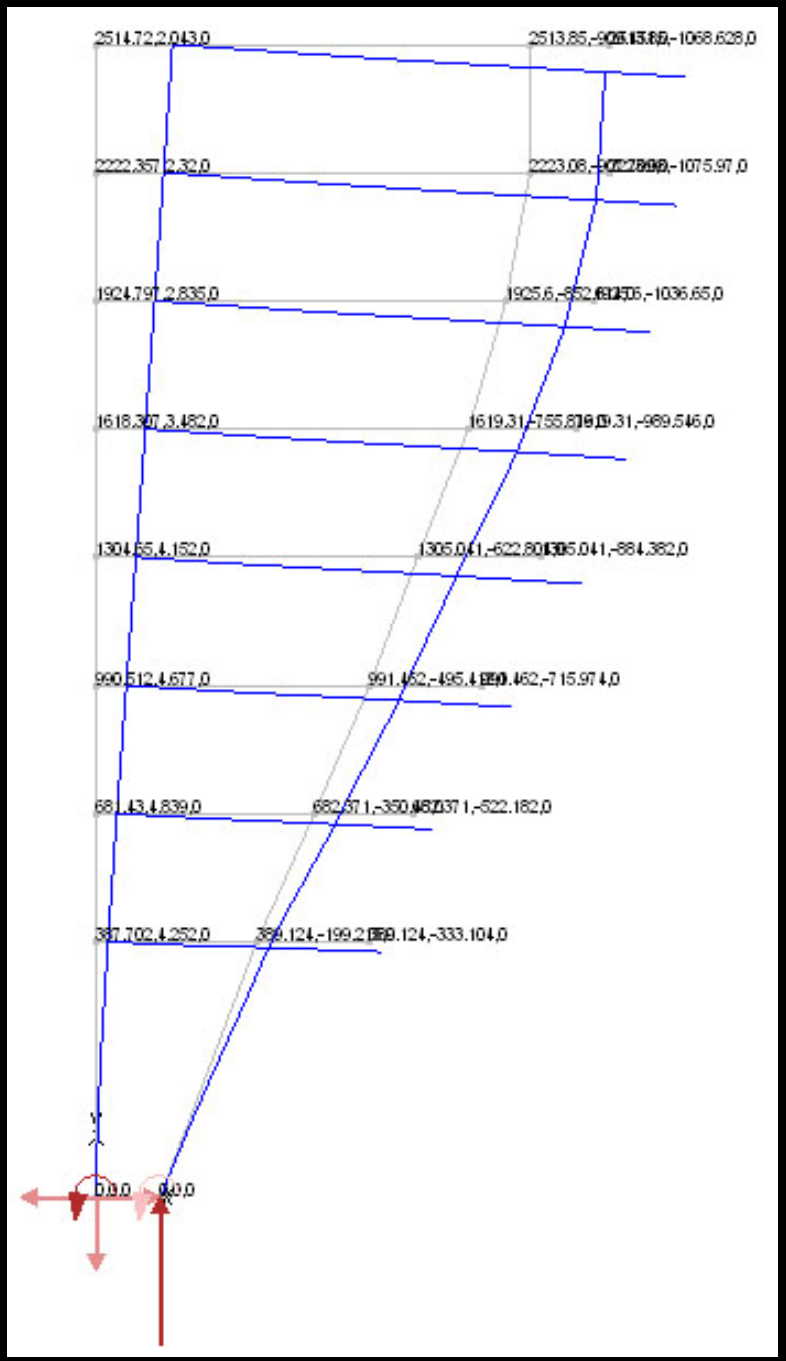
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