arch 631, fall 04

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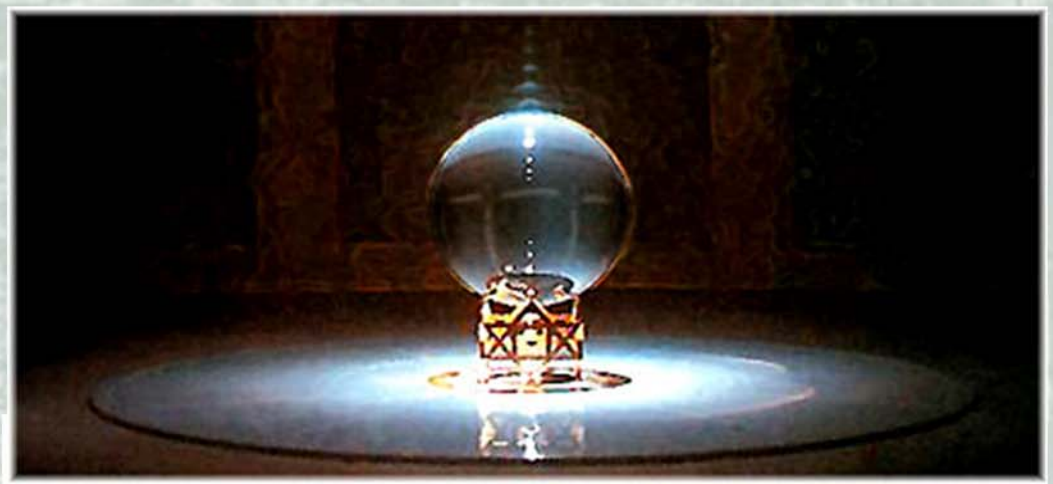

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introduction

Client: Aurobindo Ashram Society.

Location: Auroville, Pondichery, India.

Nature of building: Institutional (Temple)

Architect: Roger Anger and Pierro.

Construction Material: Reinforced Concrete.

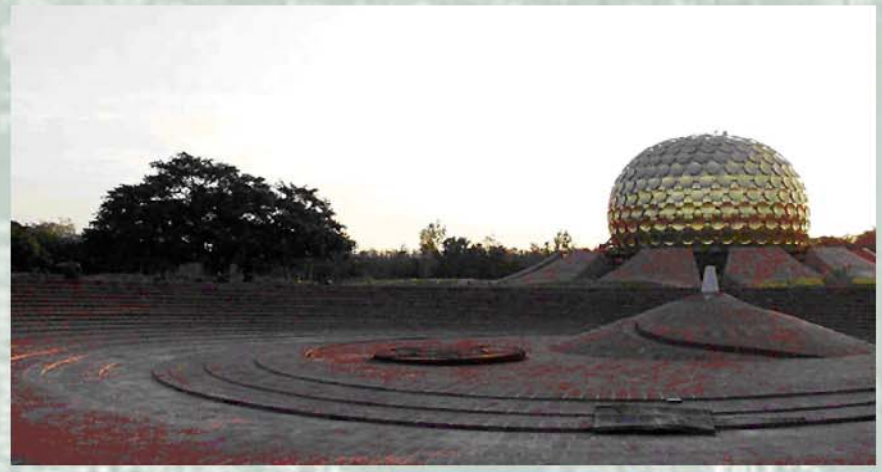
External Shell: Ferrocement.

Internal Materials: Marble, Granite,

Aluminum structural for Inner Skin.

Date of commencement: January 1971

Date of Completion:



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construction phases

Excavation:

The escavation of the site admeasures 10M in depth & 50M in width

Formwork:

The construction was facilitated by steel tubes that were 24" in diameter, 10M high & weighed 430 kg each. Wooden scaffolding and temporary towers for hoisting had to be erected on the four RCC pillars.

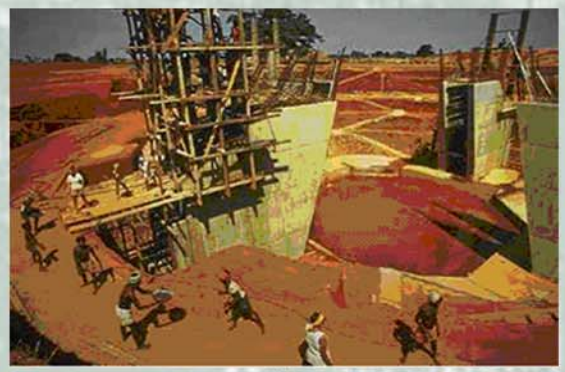
Foundation:

RCC foundation was adopted to take the load of the entire structure

construction phases

Columns:

The entire structure is supported on four pairs of RCC columns. These are connected at the base by means of a ring beam.



Framework:

Four pairs of RCC Framenwork is braced by cantilevered beam that support the inner chamber.

Shell:

The space-frame to support the skin is a grid of 1200 precast ferrocement triangles of varying sizes which envelopes the entire sphere within it.

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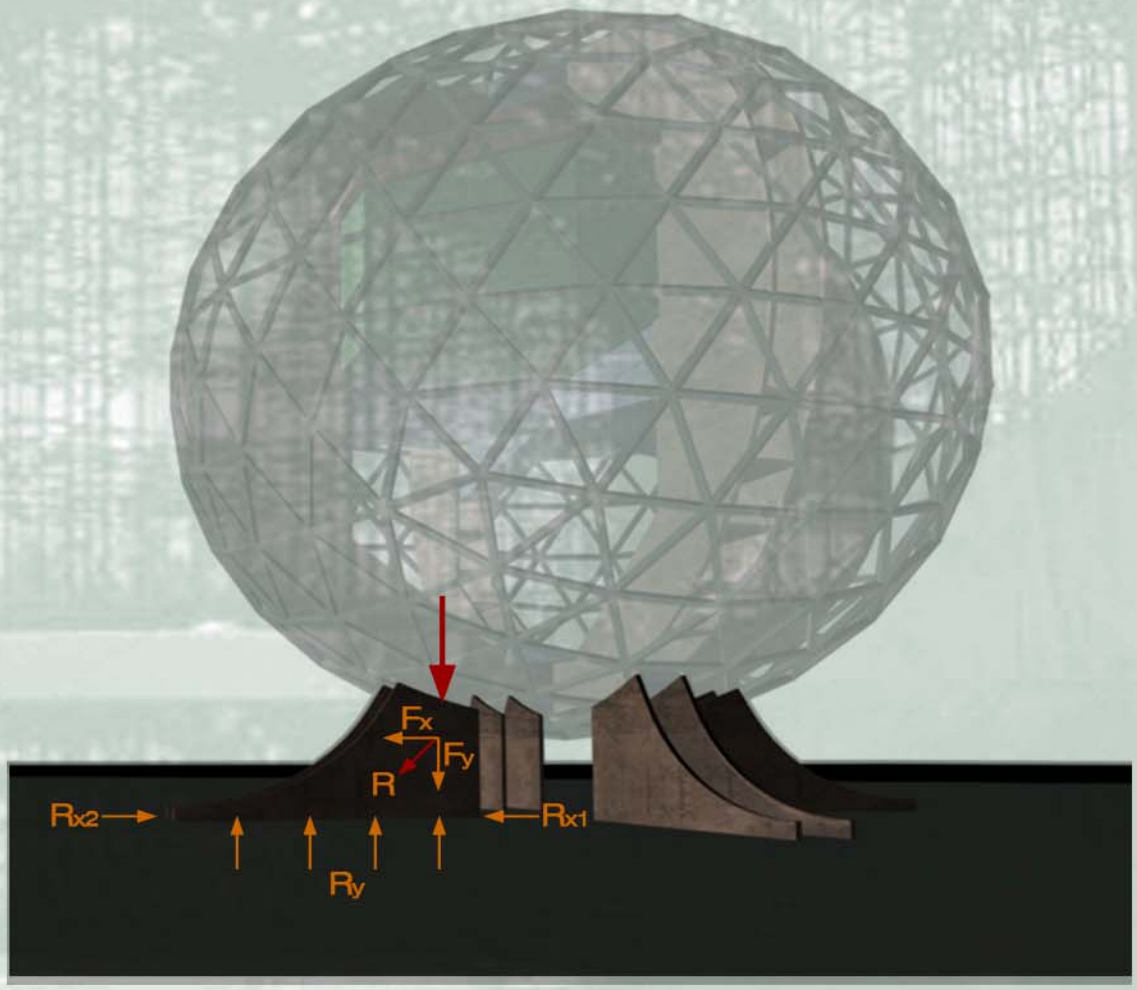
structural analysis

Foundation:

The total load applied to the foundation is resisted can be resolved into two componenets namely, horizontal(Fx) & vertical (Fy). The Vertical component is resisted by the Vertical Reactions (Rx) from the ground.

Secondly, the Lateral reaction is mainly resisted by the ring beam at the base. It helps in bracing the foundation together. As a result, the ring beam is under compression. Also, frictional forces from the ground aid in providing the remainder of Lateral Thrust.



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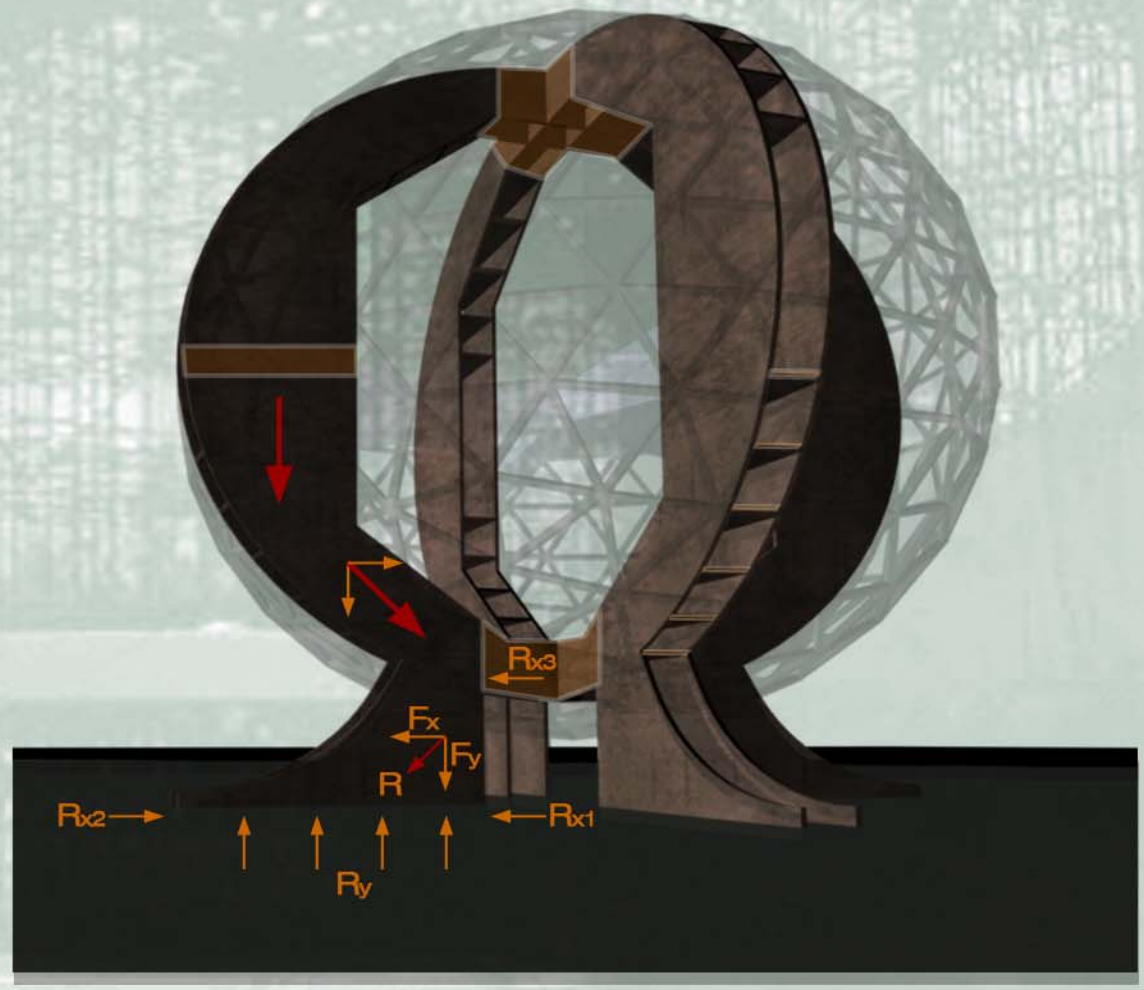
structural analysis

Framework:

All the loads are collected by the main frame of the structure that comprises of four pairs of columns. These have been braced so as to distribute the material away from the neutral axis thereby increasing the moment of inertia. As a result, the strength is increased-whilst optimising the weight of the the framework.

Due to the curvilinear shape of the frames, it needs to be braced at the top as well as at the bottom. This necessitates the introduction of compression ring at the bottom and a tension ring at the top.

The shape of the frame is an outcome of resisting maximum bending moment at the center. Since the floor beams transfer load at this junction, the width of the frames are maximum at mid-height and slender at the ends thereby justifying the shape of the framework.



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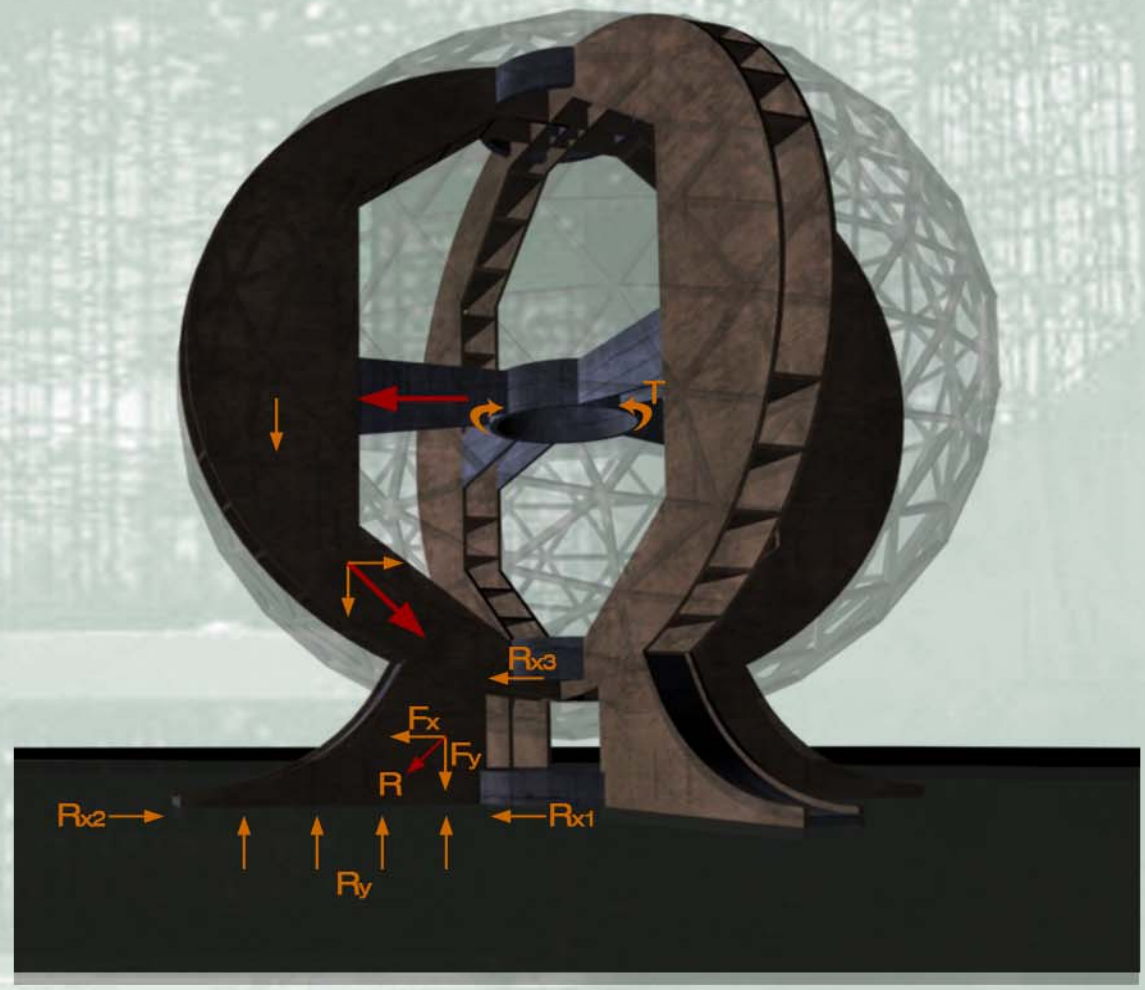
structural analysis

Tiebeams:

Due to the curvilinear shape of the frames, it needs to be braced at the top as well as at the bottom. This necessitates the introduction of compression ring at the bottom and a tension ring at the top.

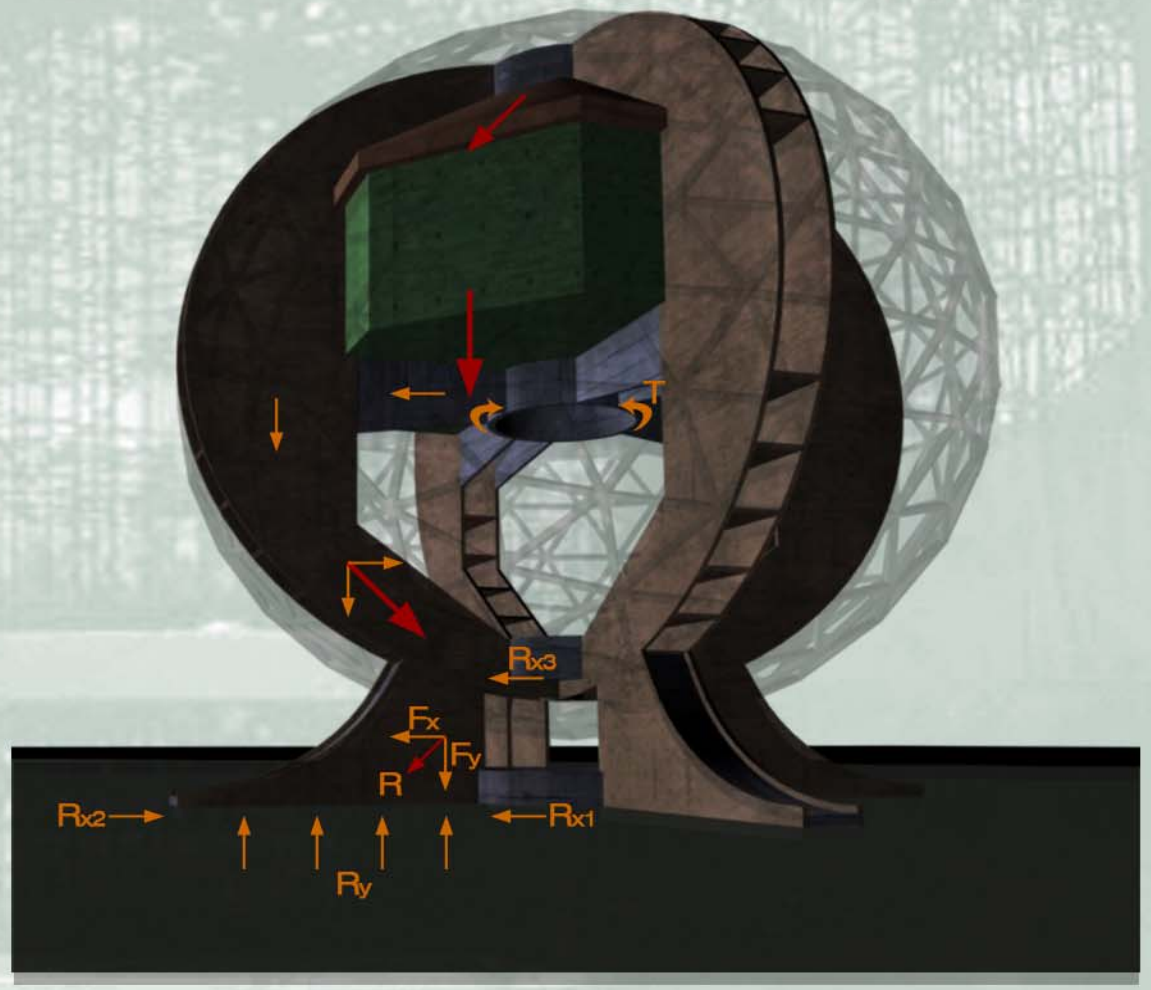
The beams at the mid-height performs dual function- Firstly, it transfer the load from the inner chamber to the frame. Secondly, it helps tie the frame at the junction. Since, these transfer load, it has greater depth at the ends then in the center. Also, due to tension generated at the center of these beams, an locationadditional ring has been employed at this



structural analysis

Dead Load:

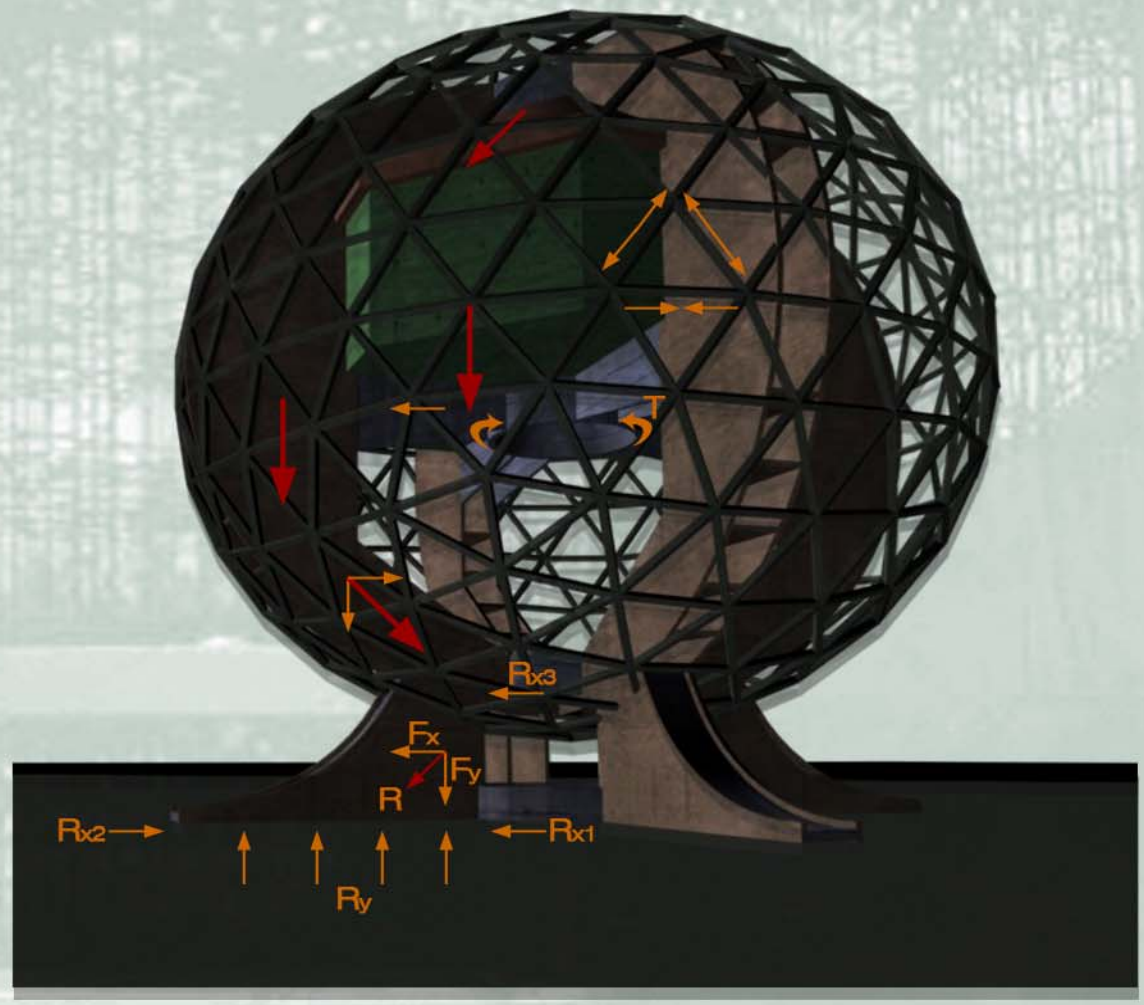
The dead load from the roof is tranferred to the walls of the inner-chamber. Consequently, the latter tranfers the load to the floor beams at the mid height.



structural analysis

Membrane:

The dead load from the membrane is uniformly distributed over the main frames.



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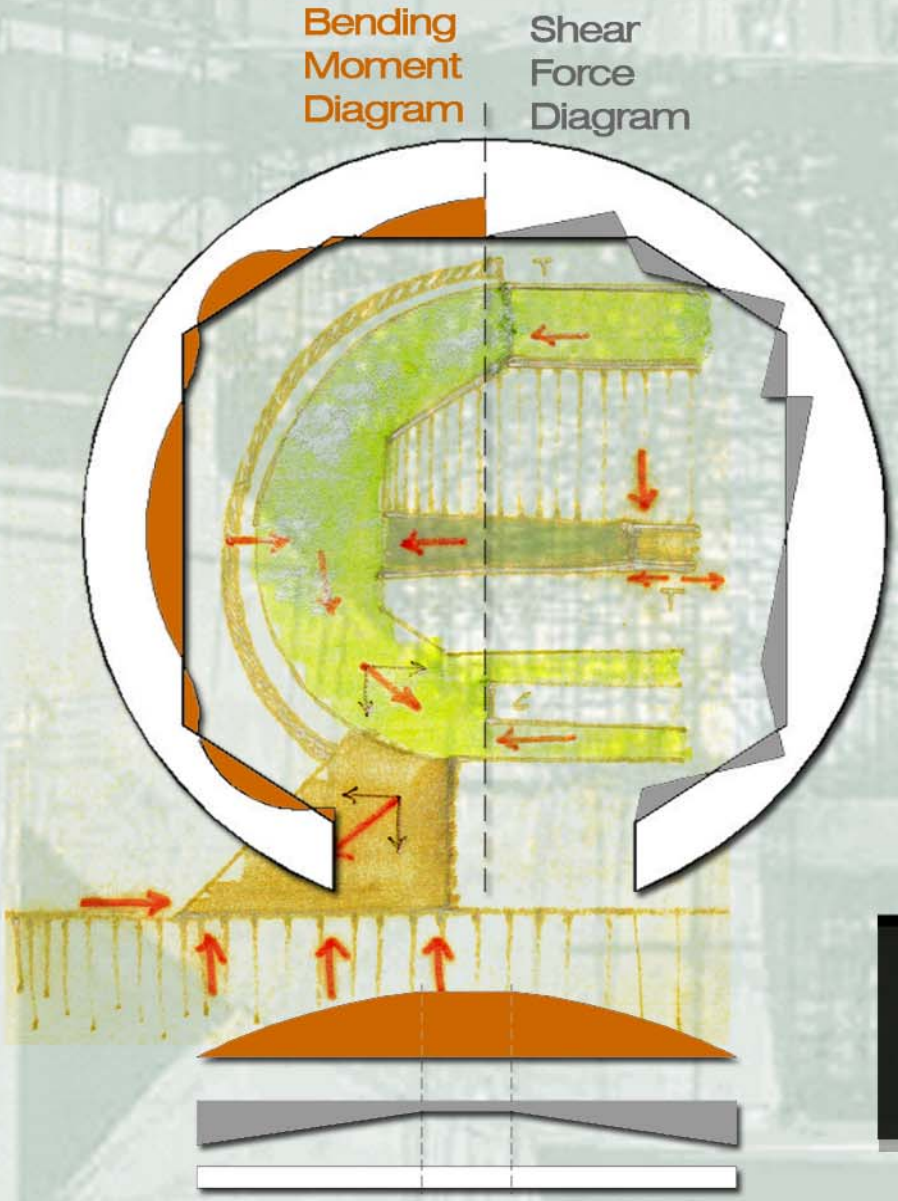
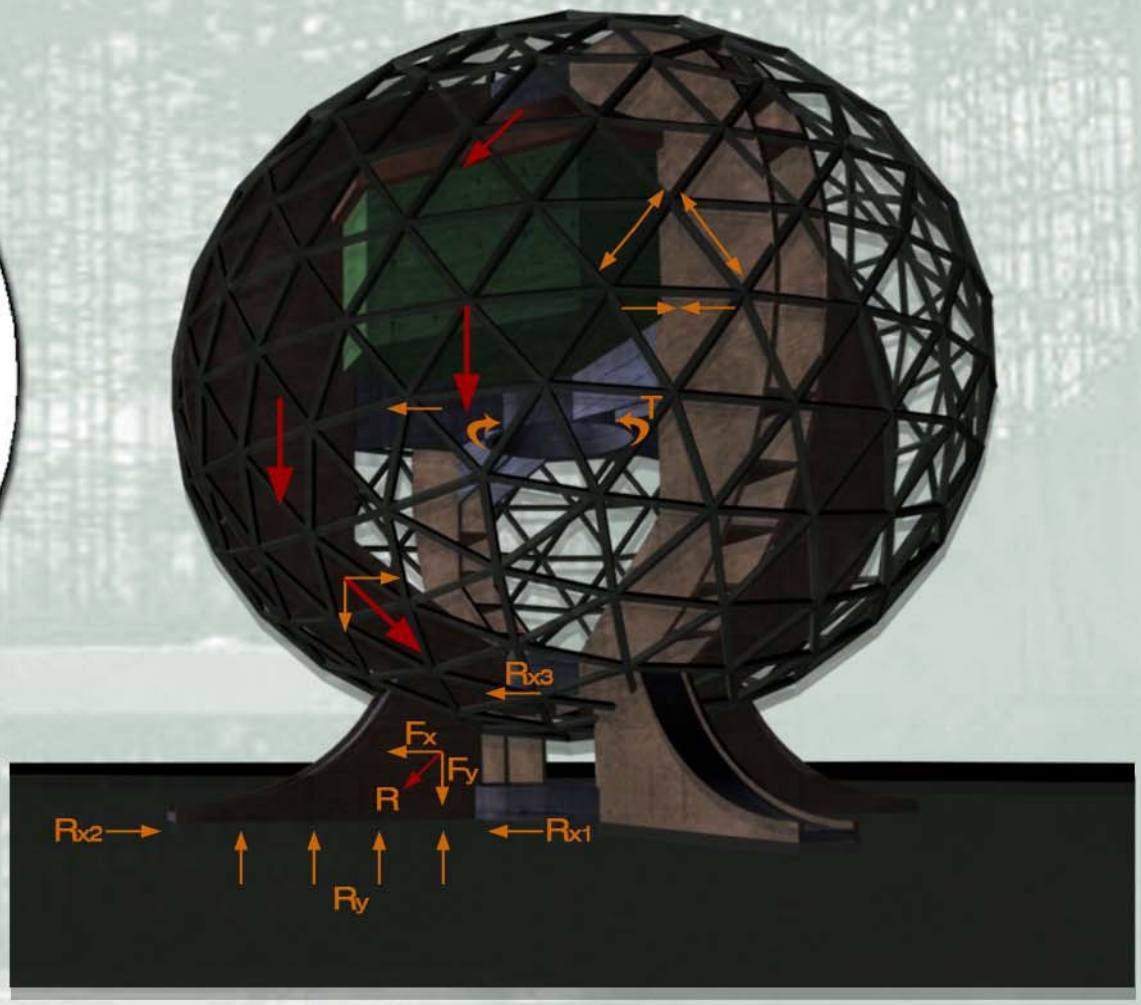
structural analysis





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