

THE UGLY MOMENTS WILL BE NO MORE, TRUSS ME.

PROJECT INTRODUCTION

High-End Luxury Residential Development in the highbrow Ikoyi, Lagos, Nigeria. The project consist of a main building with Ground + 2 suspended floors + 3 Roof Levels, Recreational facilities (Swimming pool, gym) and all other necessary ancillary structure for efficient functionality.

THE CHALLENGE

An uninterrupted 14m opening at the Ground Floor right elevation having 4 levels above - namely the Mezzanine, 1st floor, Roof Level 1 & Roof Level 2 was the project's main test of ingenuity.

Preliminary calculations from the simplest approach- use of linear elements revealed need for:

- 1) A 750mm deep x 230mm wide Lintel beam (at the Mezzanine) to span across the 14m opening;
- 2) A 1650mm deep x 300mm wide transfer beam on the 1st floor level also spanning 14m, supporting the 1st floor and the new columns for the 2 roof levels above. -See 1st Sub-frame in Diagram 1.

With an available height of just 2850mm between the Mezzanine and 1st floor level, incorporation of the required 1650 deep transfer beam will translate to 1200mm gap between the floors. One of which isn't adequate for the natural lighting requirements for the space nor aesthetically pleasing to the eye.

ANALYSIS RESULT DIAGRAMS

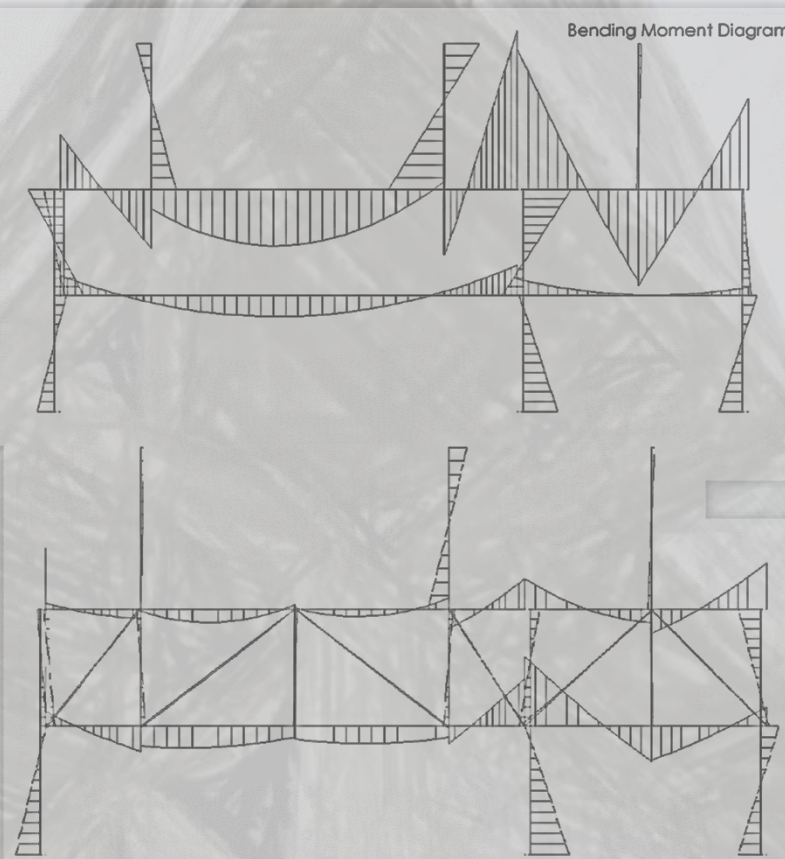


Diagram 1. Moment Diagram Initial/Final Structural System

PROBLEM SOLVED!!!

It was clear that a value Engineered solution providing necessary structural stability without comprising the Architect's intentions was needed.

As such, The Concept of marrying the Mezzanine and 1st floor levels via means of Struts & Ties was drawn up- A Transfer Concrete Truss System -See 2nd Sub-frame in Diagram 1.

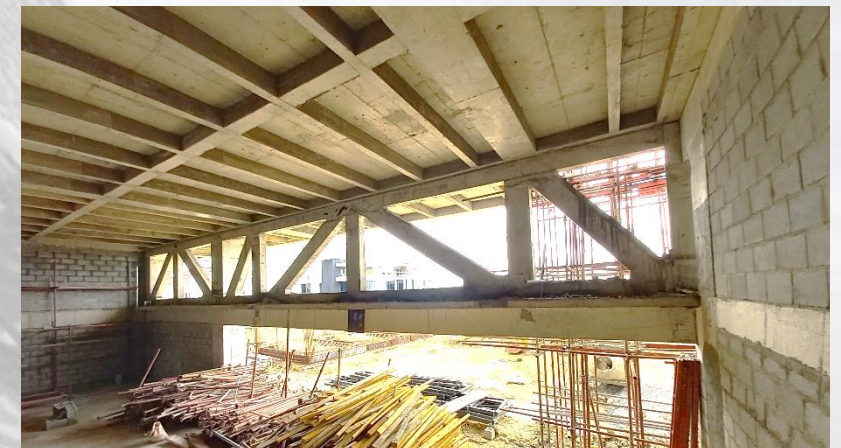
This way, loads from the new columns are directly transferred via Web members to the rigid columns and ample triangular openings achieved to be fitted with glass for natural lighting and aesthetics. Final Design Calculations resulted in:

Top Chord: 750mm deep x 230mm wide
Bottom Chord: 1050mm deep x 230mm wide
Web Members: 450mm deep x 230mm wide

SITE PHOTOGRAPHS



Picture 1. Truss Approach Elevation



Picture 2. Truss Perspective View

CONCLUSION

Use of the Transfer Concrete Truss System translated to about 25% & 42% savings in Concrete volume and steel tonnage respectively when compared with the Linear Element Approach.

An overall reduction in Structural material quantities was further recorded on the project as deploying the system on the right elevation emboldened Us to have similar approaches in long Cantilevers previously having robust Linear Elements to tackle Long Term Deflection.

project reality, a must...