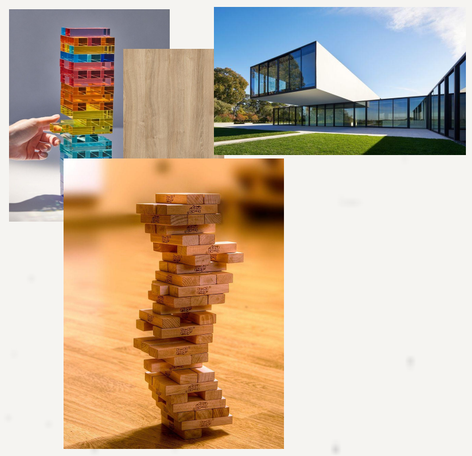
JengaVerse Academy

8 Sheung Yuet Road, Kowloon Bay,
Hong Kong (Zero Carbon Park (ZCP)

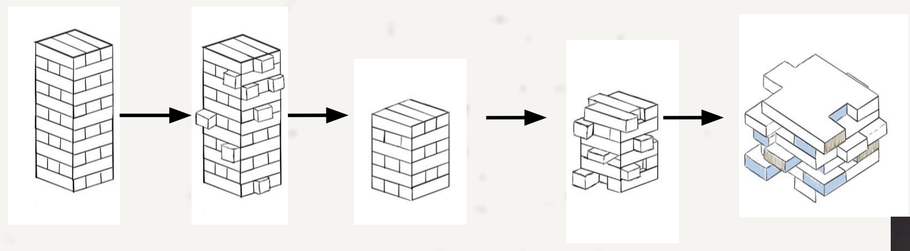
CIC BIM Competition 2024
Third-Note

Design Concept



Each block can be moved and adapted to reflect the flexibility and adaptability of the Academy. Stacking is an ongoing stacking process where students can continue to develop their abilities and potential through continuous exploration, building and stacking.

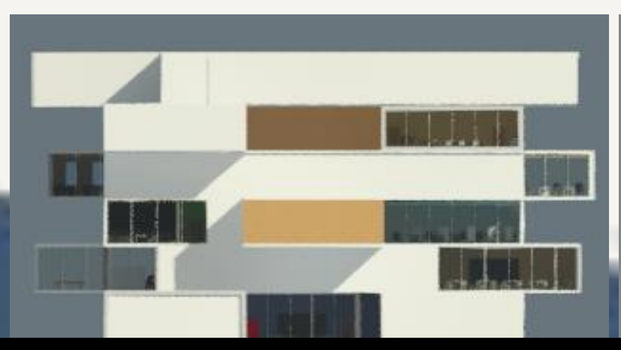
Design Development



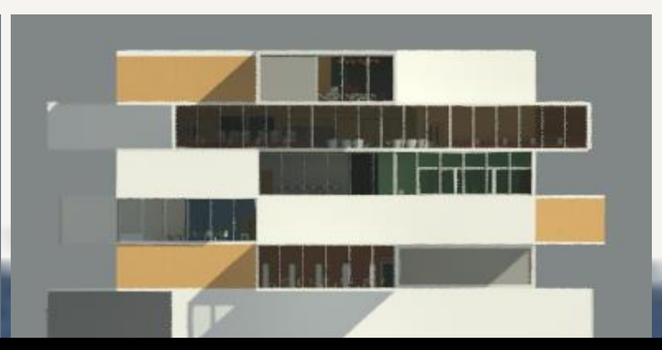
Material board

Parking Lot

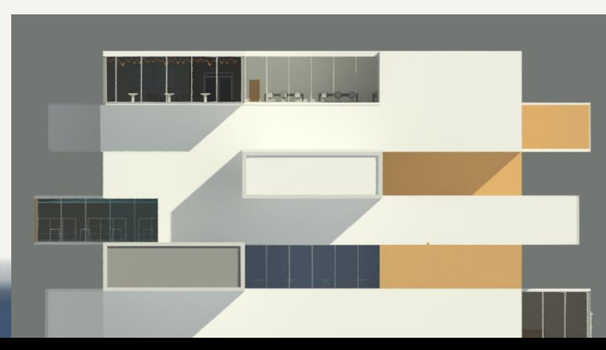
The parking lot is set outdoors, which is semi-enclosed to the school building, and the entrance and exit are set on Sheung Yee Road. The distance between two parking spaces is about 2 meters, which means that both sides can be easily opened and closed for loading and unloading. The circular road connecting the parking lot is designed for one-way traffic to avoid the obstruction of vehicles traveling in the same direction. The parking lot is surrounded by trees to isolate road noise and increase the green area. There are also two lawns outside the building with public seating along the lawn, providing ample outdoor space for students to move around and relax.



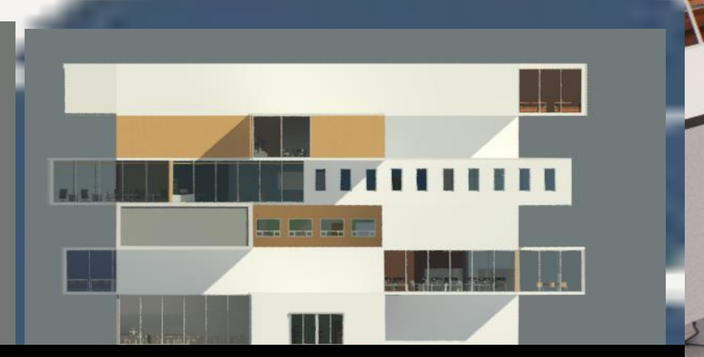
North



West



East



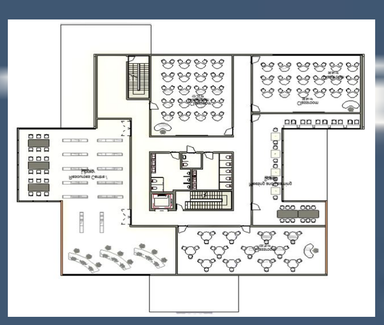
South

G/F
Floor Plan

The main colors are wood grain, green and white

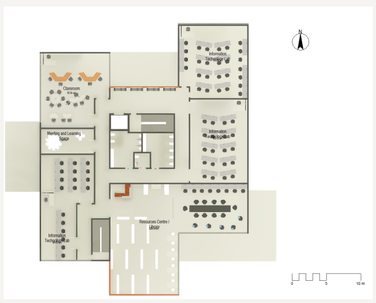
1/F
Floor Plan

The main colors are wood grain, green and white



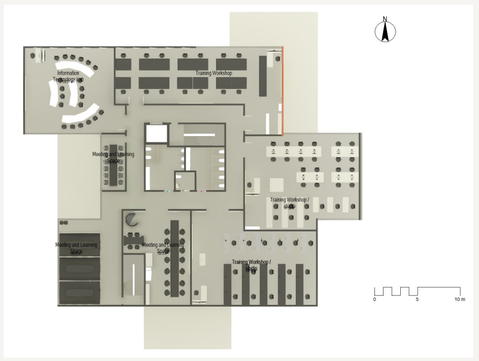
2/F

The combination of white, green, blue, and gray tones in wall and furniture design in the interiors creates a fresh, peaceful, and focused ambiance. vironment.



3/F

Incorporating different geometric patterns interspersed in the hallways and corridors can create a visually captivating and dynamic design.



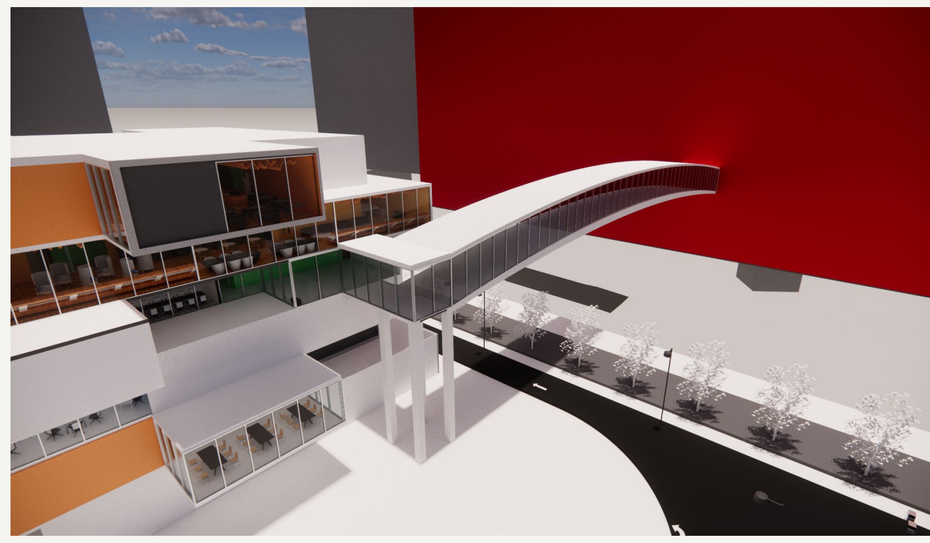
4/F

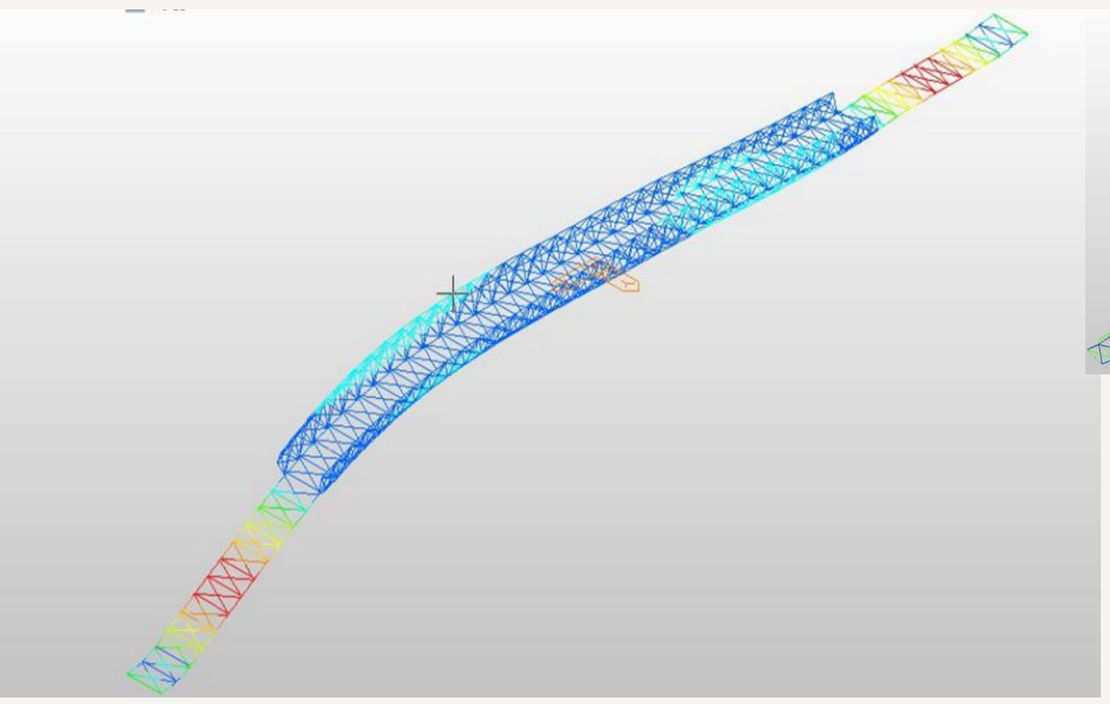
The walls and furniture are designed with a combination of wood, white, green, and black tones, creating a natural, fresh, and modern atmosphere. Adopting a natural style in the design concept enhances the comfort, natural connection, and visual contrast of the space.

5/F

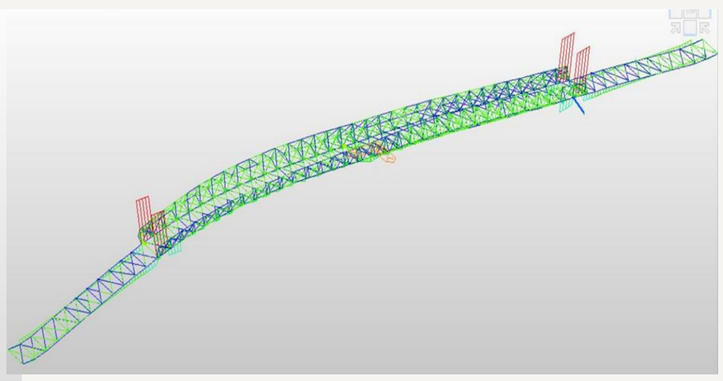
Structure of Bridge

Location	Max & Mini	Stress (N/m m^2)	Allowable value of stress (N/mm^2)
Whole Truss	Max	-101.7	381.8
	Mini	88.9	381.8



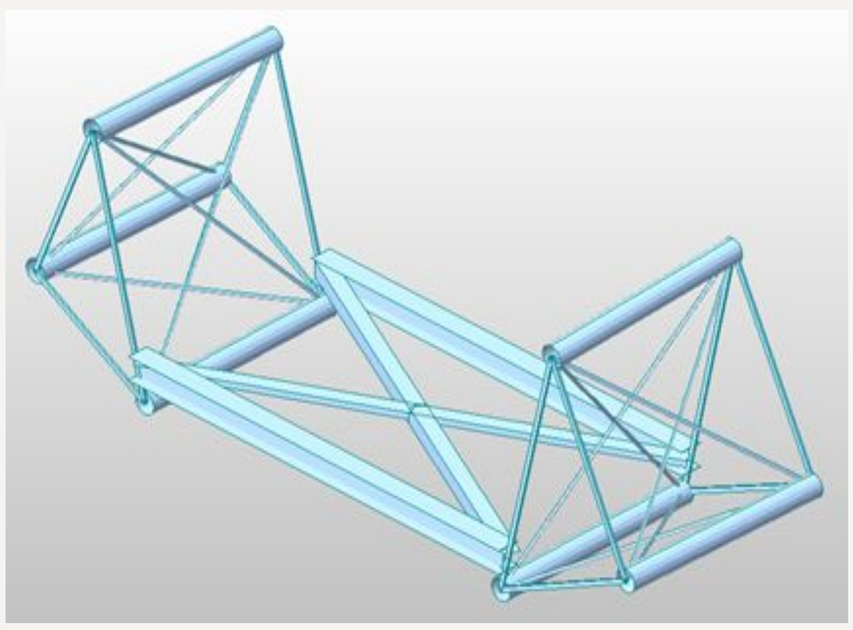


Displacement diagram under normal use limit state (N/mm2)

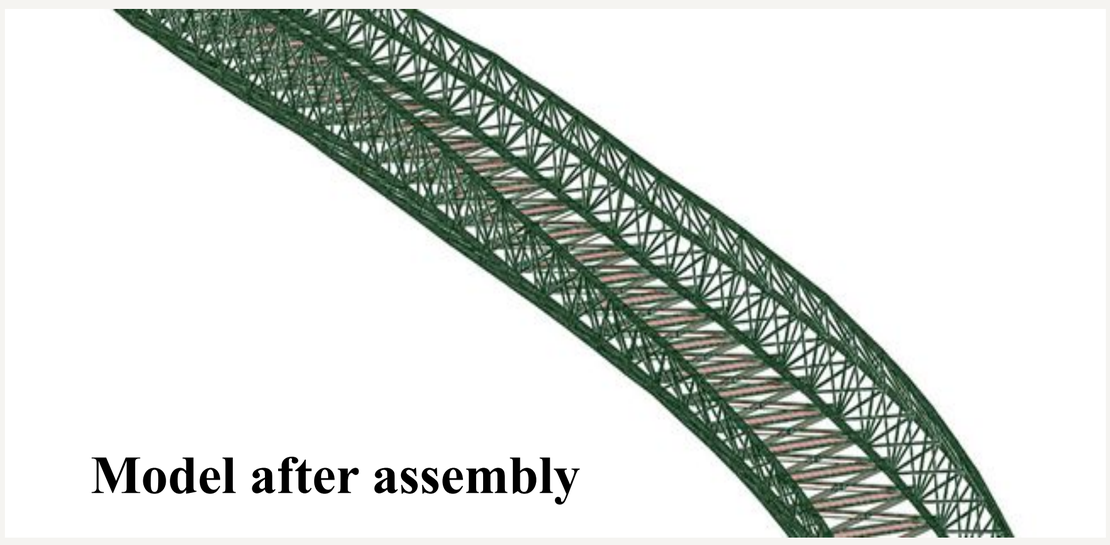


Bearing capacity limit state box girder shear stress envelope diagram (N/mm2)

The maximum displacement value in the above figure is 92<L/600=213mm, which meets the usage requirements, and is less than L/1600=136.25mm, so no pre-camber is set.



Standard section of Bridge Vision 2



Model after assembly

Structure of Building

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1. Stander layer Structure Calculation model Introduction

The structure adopts a mixed structure of steel frame and cable structure, uses a frame structure for the floor and roof, the method is steel structure roof, it uses a 120mm thick floor slab, a truss structure atrium roof。

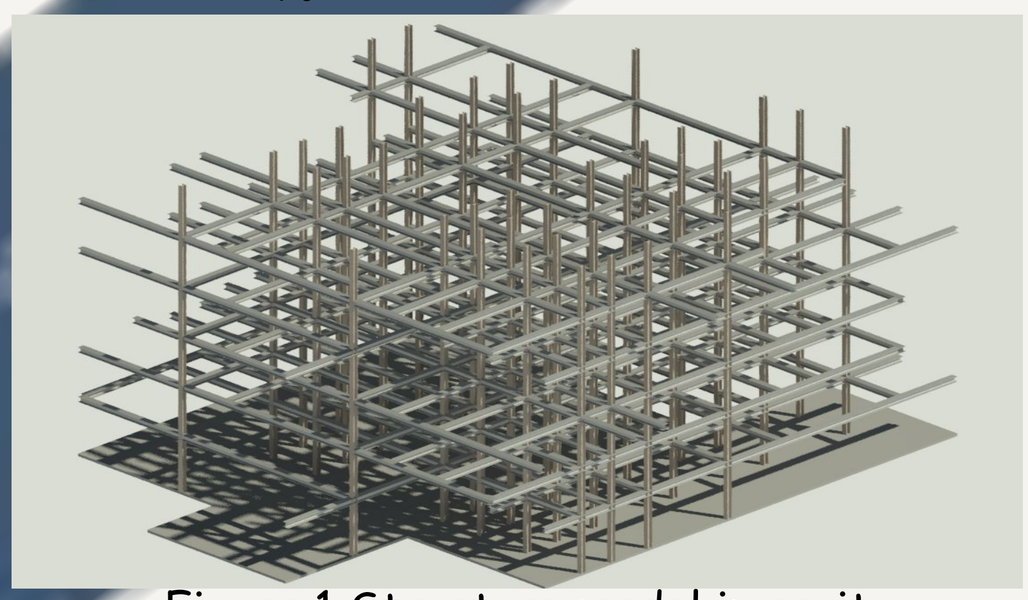

Figure 1 Structure model in revit

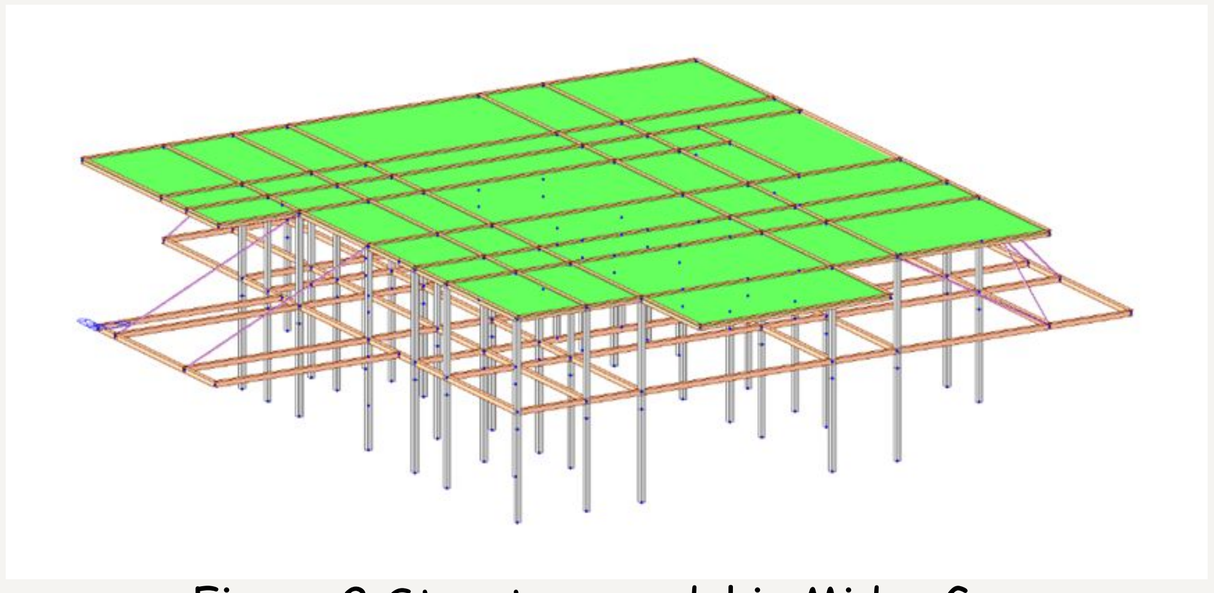

Figure 2 Structure model in Midas Gen

2. Load effects at the bearing capacity limit state and normal use limit state stage

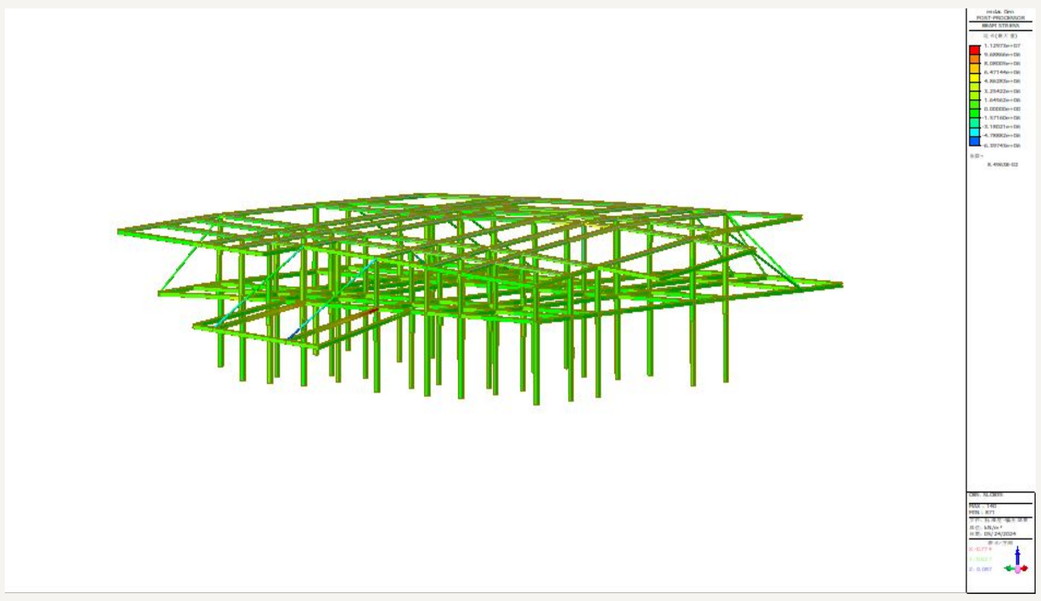

Figure 3 Stress Diagram at the Normal Use Limit State Stage (N/mm2)

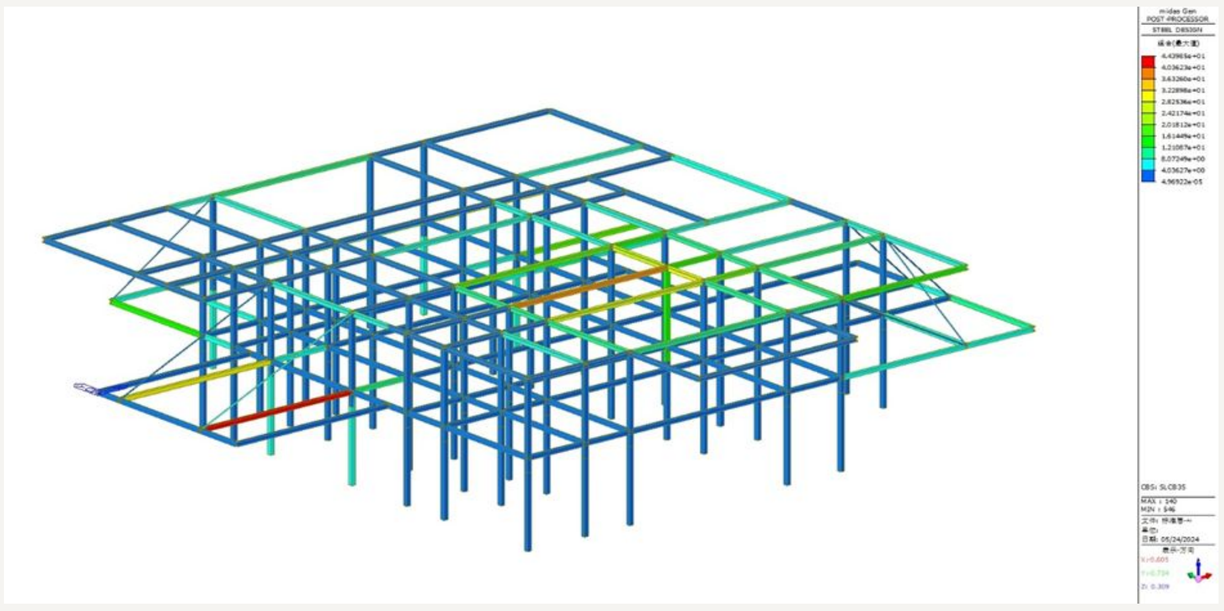

Figure 4 Shear Stress Envelope Diagram of Box Girder at the Bearing Capacity Limit State (N/mm2)

3.Seismic Response Analysis and Steel Component Optimization Analysis

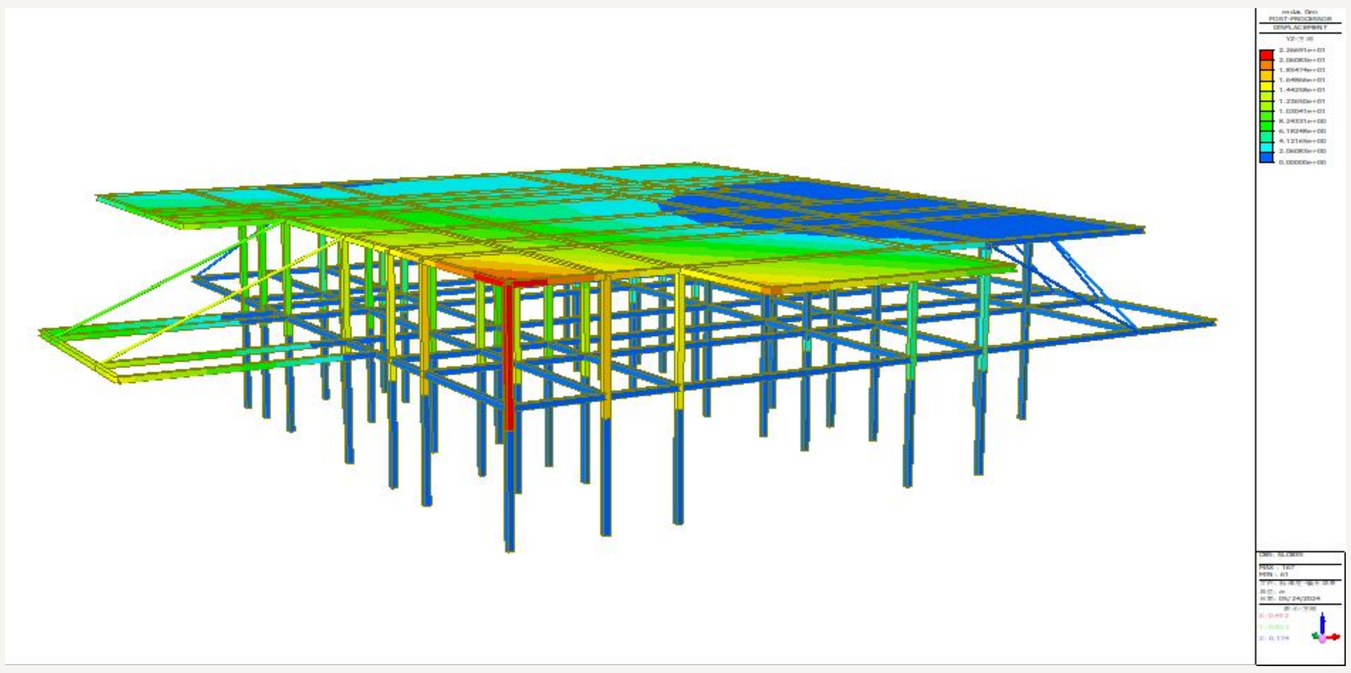

Figure 5 Displacement Diagram under the Bearing Capacity Limit State (mm)

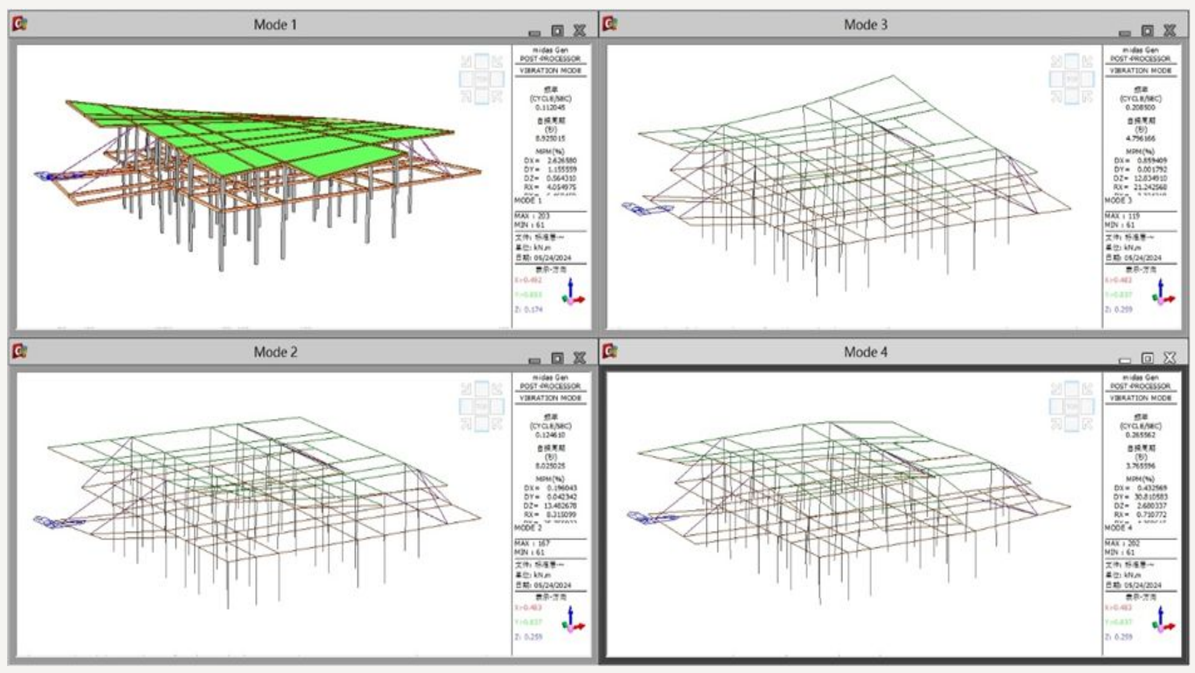

Figure 6 Self-vibration Displacement Diagram under Multi-modal Earthquake Action (mm)

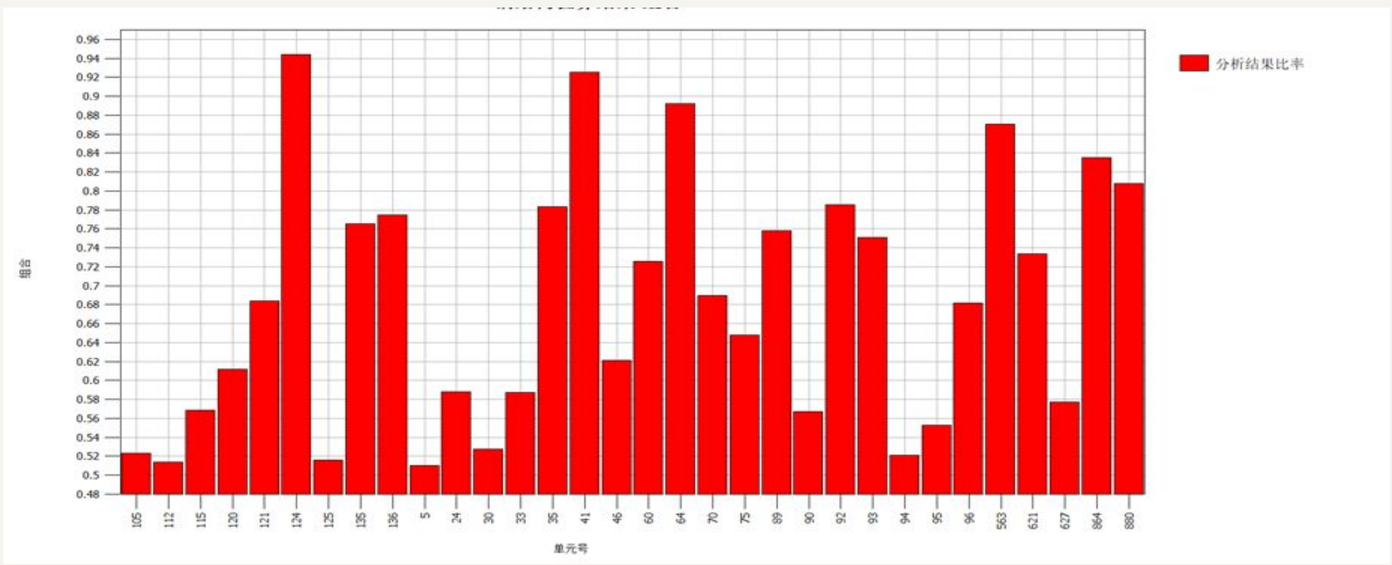

Figure 7 Verification Results of Steel Structure Components

Structure

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Third-Note

4. Element Structure Design and Analysis

In the problem of prestress leveling, we first establish a structural analysis model, then sequentially search for the zero-stress shape and analyze the construction process, and update the prestress distribution until the convergence condition is met. This process can use the Newton-Raphson method to iteratively update the prestress distribution until the predetermined accuracy requirement is met.

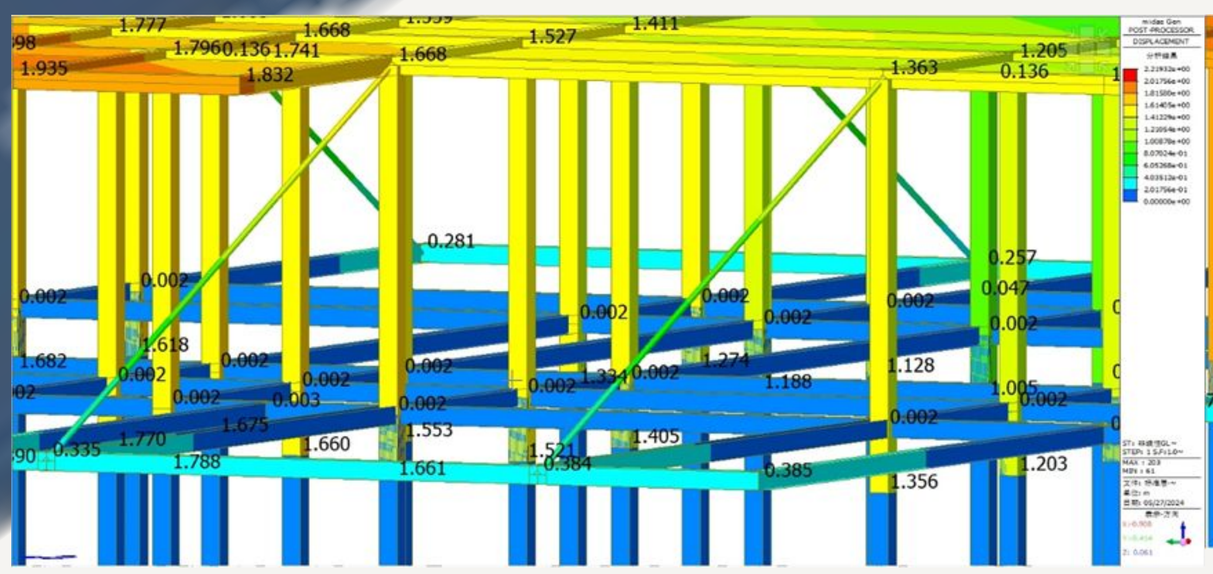

Figure 8 Primary cable displacement

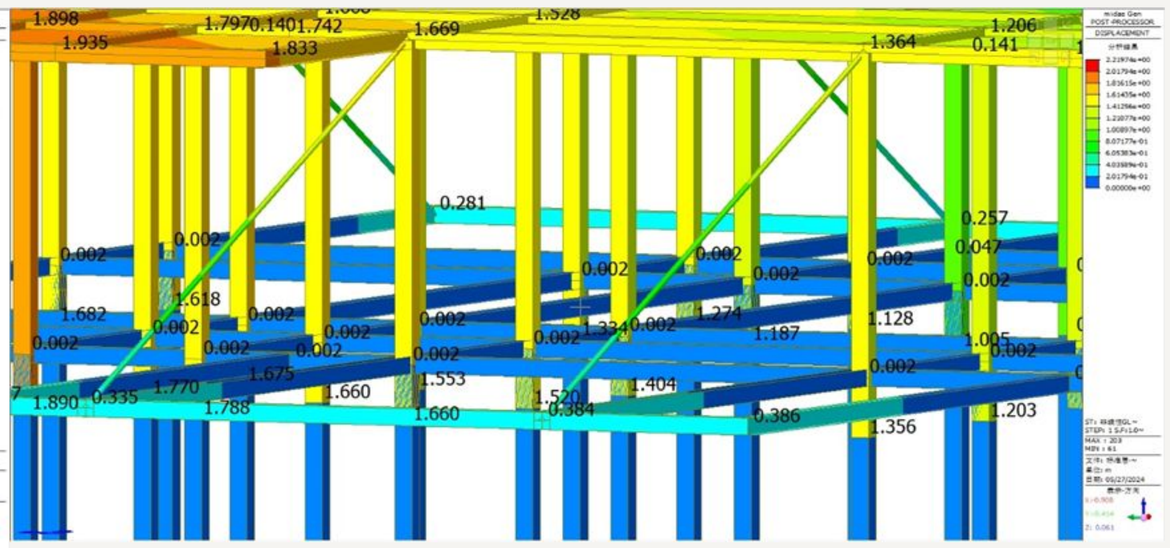

Figure 9 Cable displacement after leveling

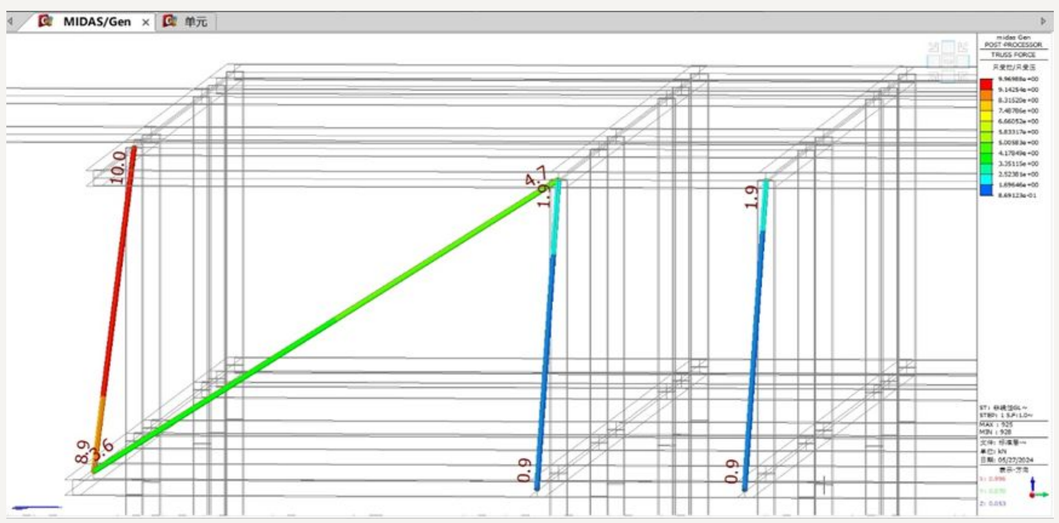

Figure 10 Internal force of the unit after leveling

MEP Design

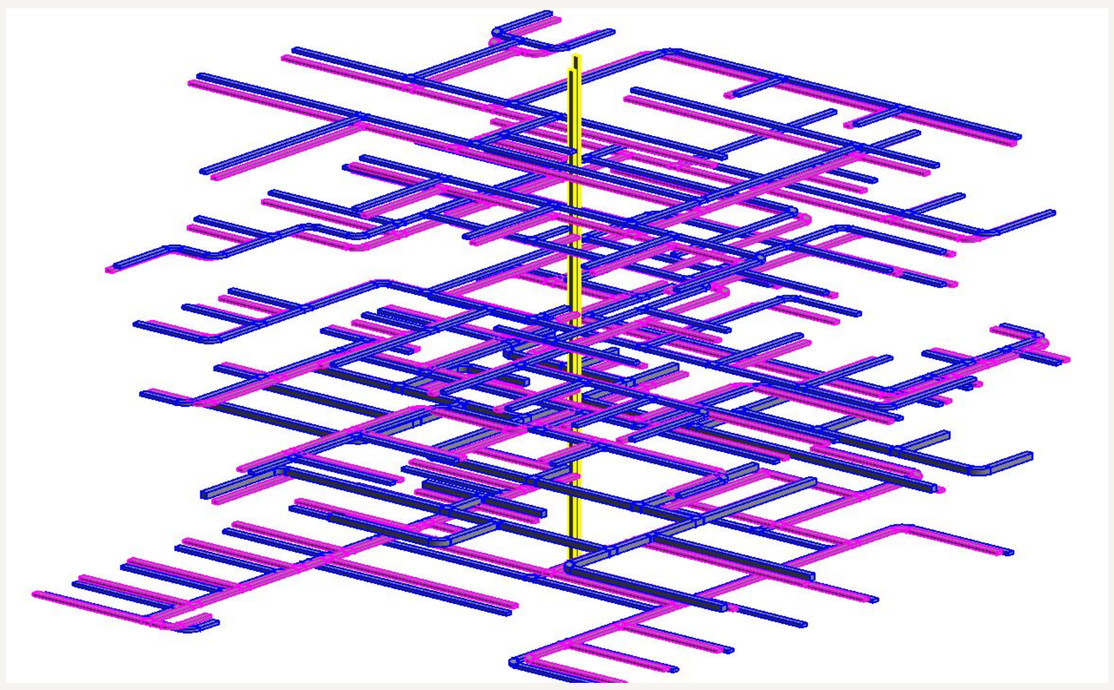

Figure 1. Layout of MEP system

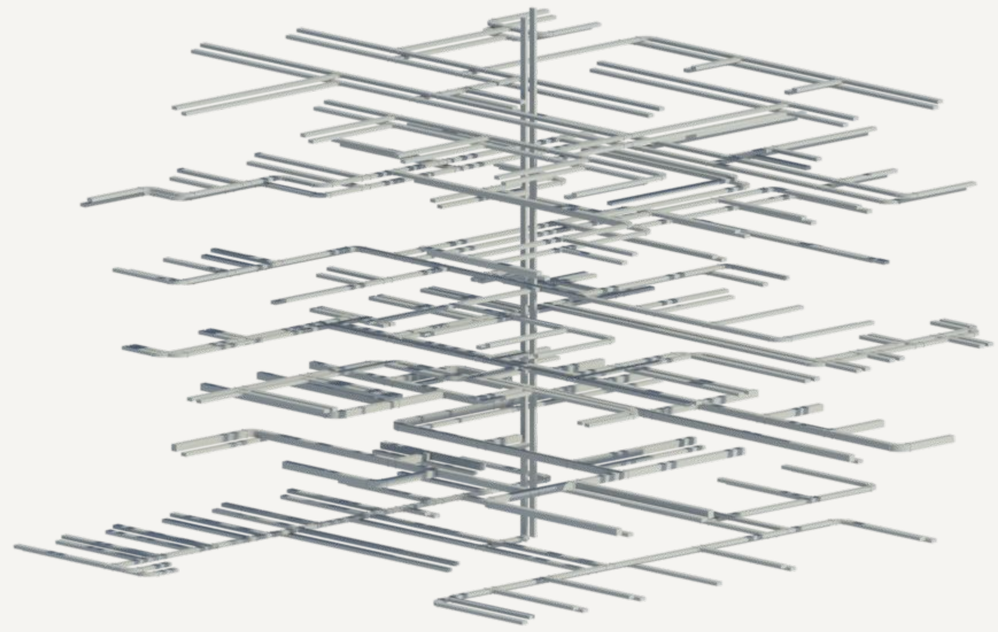

Figure 2. MEP Model in Revit

Various types of mechanical systems are used in transitional housing. The systems are demonstrated through MEP: • Space heating • Air conditioning • Mechanical ventilation

Benefits of BIM in MEP Design

1.Unprecedented Information Sharing

BIM extends beyond design, providing valuable data throughout a building's life cycle. Improves communication among stakeholders. Central platform for logistics and technical schematics.

2.Insight for Green Improvements

BIM helps stakeholders understand energy consumption patterns. Identify top energy consumers. Real-world energy data displayed in 3D models.

3.Value-Added Asset for MEP Contractors