

WHAT WENT WRONG?

As Structural Engineers, we're expected to consider every possible action when it comes to structural stability and design against them.

However, in some cases, even after punching all possible numbers the structure performs contrary to expectations. This more often times than not can mess with the confidence of a Structural Engineer, with one question on repeat: What Went Wrong??

Case Study: Concrete Cantilever Carport

The concrete structure rests on 600mm wide strip foundation (Inverted Tees). The frame consisted of 2 Nos 900 x 230 -6m long cantilever beams (30mm camber), 5.77m apart each anchored into 600 x 230 columns and restrained at their start & end.

Figure 1 below gives an overview of the structural system.

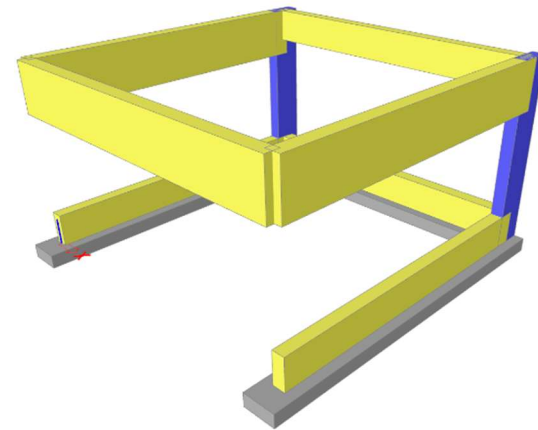


Figure 1: The Carport Frame + Foundation.

Analysis result & Details: See Figures 2 & 3

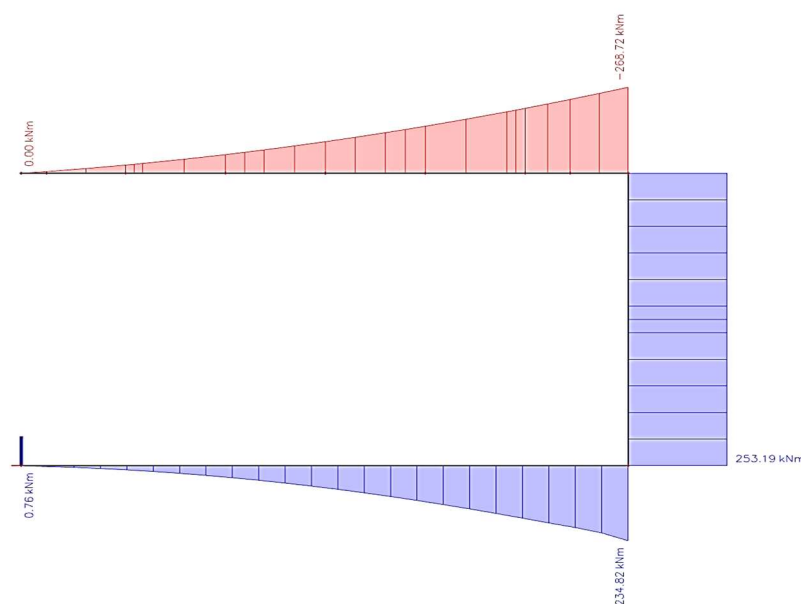


Figure 2: Moment diagram of the carport frame

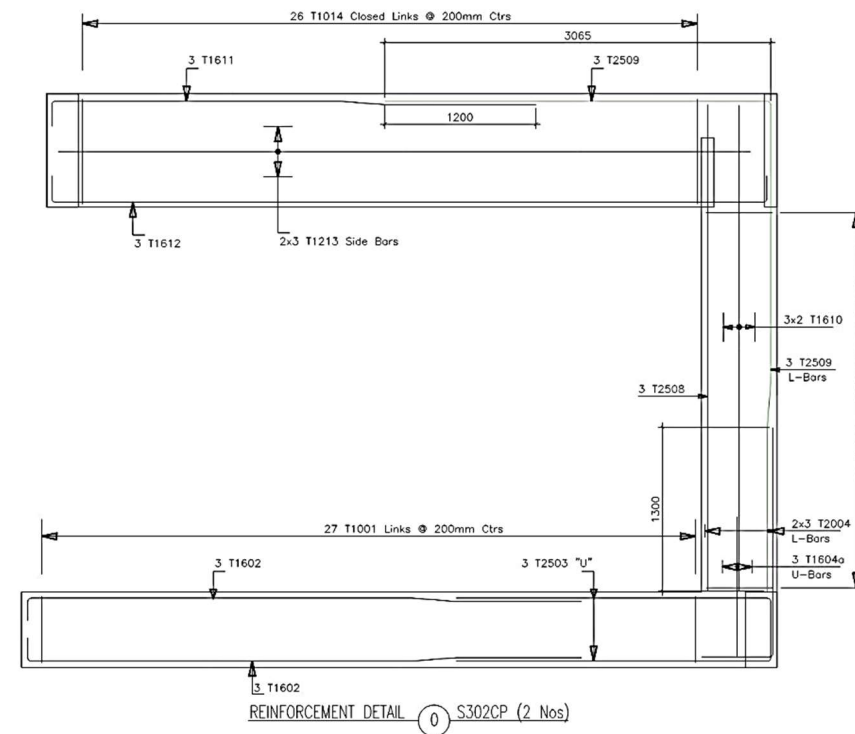


Figure 3: R.C details of the carport

Post Construction Aftermath

Day 28 -post casting of the cantilever beams arrived, and the workmen observed an overt stiffness in the props beneath the beams as though they were still very active in the load sharing arrangement.

On complete prop removal, the displacement of the cantilevers was monitored closely and observed to progress beyond projections. A crack pattern was likewise observed at the beam-column intersection. See Figure 5 for sketch of crack observed.



Figure 4: Car port after de-propping

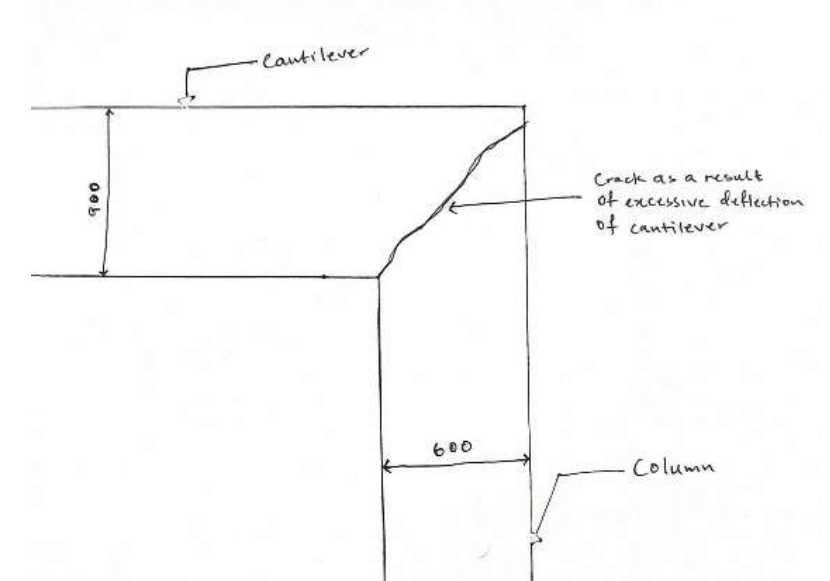


Figure 5: Sketch of Crack Pattern Observed

KISS to the Rescue

After the event recorded on site, we concluded to Keep it Stupid Simple (KISS) by incorporating permanent structural steel props to curb displacement.



Figure 7: Finished Structure

Please Share your thoughts & comments on What You think Went Wrong

<https://forms.gle/68ahDmcyF1C152hc9>